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TECHNOLOGY CONTRACT: STATEWIDE INTEROPERABLE RADIO NETWORK #111

1. PARTIES

The parties to this Contract, which includes the scope of work and all attachments (Contract) are the state of North Dakota, Information Technology Department in cooperation with the Office of Management and Budget State Procurement Office (STATE), and Motorola Solutions, Inc., a Delaware Corporation having its principal place of business at 500 W. Monroe Street, Chicago, IL 60661 (CONTRACTOR).

2. COOPERATIVE PURCHASING CONTRACT:

This contract is a cooperative purchasing contract established pursuant to North Dakota Century Code (NDCC) sections 54-44.4-13. This contract is made available to state entities, institutions under the jurisdiction of the State Board of Higher Education, other government entities (including political subdivisions, counties, cities, townships, public primary and secondary educational entities, governmental boards and commissions), nonprofit entities established on behalf of public entities, tribal agencies, transportation providers under N.D.C.C chapter 39-04.2, and the International Peace Garden. Participation in this open-ended contract is not mandated; therefore, the estimated volume of this contract is not known.

3. DEFINITIONS

a. Software as a Service (SaaS). The capability provided to the consumer is to use the provider's applications running on a provider's infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings. This definition is based on and consistent with National Institute of Standards and Technology (NIST) Special Publication 800-145.

b. Data - means any information provided to, or collected, generated, stored, or processed by the system. Data includes user identification information and metadata which may contain Data or from which the STATE's Data may be ascertainable.

c. Data Breach - means any access, destruction, loss, theft, use, modification or disclosure of Data by an unauthorized party or that is in violation of Contract terms and/or applicable state or federal law.

d. Data Classification - means the process of defining data into relevant categories so the information has the appropriate controls in place to protect confidentiality, integrity, and availability based on the type of information.

e. Personally Identifiable Information (PII) - information about an individual maintained by an agency, including that 1) can be used to distinguish or trace an individual's identity, such as name, social security number, date and place of birth, mother's maiden name, or biometric records; or (2) is linked or linkable to an individual, such as medical, educational, financial, and employment information.

f. Recovery Point Objective (RPO) - means the point in time to which Data can be recovered and/or systems restored when service is restored after an interruption. The Recovery Point Objective is expressed as a length of time between the interruption and

the most proximate backup of Data immediately preceding the interruption. The RPO is detailed in the SLA.

g. Recovery Time Objective (RTO) - means the period of time within which information technology services, systems, applications and functions must be recovered following an unplanned interruption. The RTO is detailed in the SLA.

h. Users – means contractors, subcontractors, outsourcing vendors, consultants and others who have a need to use the software for the benefit of STATE.

i. “Subsystem” means a major part of the System that performs specific functions or operations. Subsystems are described in the Technical and Implementation Documents.

j. “System” means the Equipment, including incidental hardware and materials, Software, and design, installation and implementation services that are combined together into an integrated system; the System(s) is (are) described in the Technical and Implementation Documents.”

4. SCOPE OF WORK

CONTRACTOR, in exchange for the compensation paid by STATE under this Contract, shall provide equipment and services to construct a public safety communications system to serve all first responders throughout the state of North Dakota according to this Contract including any Statements of Work (SOW) and attachments and documents mentioned in Section 40 of this Contract. The SOW shall delineate specific, independent phases (“Phases”) of work.

Any product additions to the contract may be initiated via an email request between the parties. STATE.

5. COMPENSATION

a. Contractual Amount

The STATE shall pay for the accepted services of each Phase under the Contract for that Phase the amount set forth in the SOW for that Phase (“Phase Contractual Amount”). If the Contract continues through all Phases set forth in the SOW, the total amount STATE shall pay for the accepted services provided by CONTRACTOR under this Contract (“Total Contractual Amount”) will be an amount not to exceed the following:

1) Exhibit C-4 – Maintenance and System Upgrade Agreement Pricing
2) Exhibit D Phase 1 Pricing
3) Exhibit D Phase 2 Pricing
4) Exhibit D Phase 3 Pricing
5) Exhibit D Options Pricing

The Phase Contractual Amounts and the Total Contractual Amount are firm for the duration of this Contract and constitute the entire compensation due CONTRACTOR for performance of its obligations under this Contract regardless of the difficulty, materials or equipment required, including fees, licenses, overhead, profit and all other direct and indirect costs or expenses incurred by CONTRACTOR except as provided by an amendment to this Contract.

b. Retainage

All deliverable payments shall be subject to 15% retainage. Amounts retained from CONTRACTOR's invoices shall be released to CONTRACTOR upon Final Acceptance of each Phase

c. Invoicing

The final cost set forth on each invoice shall be equivalent to the cost for each deliverable or service as specified in the Scope of Work. CONTRACTOR shall not submit an invoice for any deliverable or service specified in the Scope of Work that STATE has not fully accepted.

d. Payment

Payment made in accordance with this Compensation section shall constitute payment in full for the services and work performed and the deliverables provided under this Contract and CONTRACTOR shall not receive any additional compensation hereunder.

STATE shall make payment under this Contract within forty-five (45) calendar days after receipt of an approved invoice.

Payment of an invoice by STATE will not prejudice STATE's right to object to or question that or any other invoice or matter in relation thereto within a Phase. CONTRACTOR's invoice will be subject to reduction for amounts included in any invoice or payment made which are determined by STATE not to constitute allowable costs for that Phase, on the basis of audits conducted in accordance with the terms of this Contract. At STATE's sole discretion, all payments in a Phase shall be subject to reduction for amounts equal to prior overpayments in a Phase to CONTRACTOR.

For any amounts that are or will become due and payable to STATE by CONTRACTOR in a Phase, STATE reserves the right to deduct the amount owed from payments that are or will become due and payable to CONTRACTOR in that Phase under this Contract.

e. Travel

CONTRACTOR acknowledges travel expenses are covered by the Phase Contractual Amounts and the Total Contractual Amount and shall not invoice STATE for travel expenses.

f. Prepayment

STATE will not make any advance payments before performance by CONTRACTOR under this Contract.

g. Payment of Taxes by State

STATE is not responsible for and will not pay local, state, or federal taxes. STATE sales tax exemption number is E-2001. STATE will furnish certificates of exemption upon request by CONTRACTOR.

h. Taxpayer ID

CONTRACTOR's federal employer ID number is: 36-1115800.

i. Purchasing Card

STATE may make a payment using a government credit card. CONTRACTOR

will accept a government credit card without passing the processing fees for the government credit card back to STATE. CONTRACTOR will accept purchasing cards for payment but has a limitation of one million dollars ($1,000,000) per transaction. CONTRACTOR can process multiple transactions per invoice if required.

6. EQUIPMENT, MATERIALS, AND WORKSPACE – RESOURCES PROVIDED BY PARTIES

For periods during which the parties mutually agree that CONTRACTOR's assigned staff is on site:

a. On site means sites throughout the state of North Dakota.

b. STATE agrees to provide an adequate working space, when required.

c. Equipment and software for on-site CONTRACTOR personnel is to be provided by CONTRACTOR.

When STATE and CONTRACTOR agree that remote access to systems is required, STATE shall provide the necessary supervised remote access security to enable CONTRACTOR access to the appropriate STATE systems.

7. TERM OF CONTRACT

This Contract begins on January 18, 2019 and ends on January 17, 2024.

a. No Automatic Renewal

This Contract will not automatically renew.

b. Extension Option

STATE reserves the right to extend this Contract for an additional period of time, not to exceed 12 months, beyond the current termination date of this Contract.

c. Renewal Option

STATE may renew this Contract upon satisfactory completion of the initial Contract term. STATE reserves the right to execute up to three (3) options to renew this Contract under the same terms and conditions for a period of 12 months each.

d. Renegotiation Option

In view of the fact that it is unknown how long the products and services will be used by STATE and that STATE will require ongoing maintenance and support of the products for as long as the system is operational, therefore after completion of the initial term of this Contract including any extensions and renewals, STATE and CONTRACTOR may renegotiate this Contract upon mutual agreement of the parties.

8. TERMINATION

a. Termination by Mutual Agreement

This Contract may be terminated by mutual consent of both parties executed in writing.

b. Early Termination in the Public Interest

STATE is entering into this Contract for the purpose of carrying out the public policy of the State of North Dakota, as determined by its Governor, Legislative Assembly and Courts. If this Contract ceases to further the public policy of the State of North

Dakota, STATE, in its sole discretion, by written notice to CONTRACTOR, may terminate this Contract in whole or in part. The parties recognize that because of changing technology, the public policy of North Dakota may result in a need to pursue other technology , resulting in termination of this Contract at the conclusion of any Phase set forth in the SOW.

c. Termination for Lack of Funding or Authority

STATE, by written notice to CONTRACTOR, may terminate the whole or any part of this Contract under any of the following conditions:

1) If funding from federal, state, or other sources is not obtained and continued at levels sufficient to allow for purchase of the services or supplies in the indicated quantities or term.
2) If federal or state laws or rules are modified or interpreted in a way that the services are no longer allowable or appropriate for purchase under this Contract or are no longer eligible for the funding proposed for payments authorized by this Contract.
3) If any license, permit, or certificate required by law or rule, or by the terms of this Contract, is for any reason denied, revoked, suspended, or not renewed.

Termination of this Contract under this subsection is without prejudice to any obligations or liabilities of either party already accrued prior to termination.

d. Termination for Cause.

STATE may terminate this Contract effective upon delivery of written notice to CONTRACTOR, or any later date stated in the notice:

1) If CONTRACTOR fails to provide services required by this Contract within the time specified or any extension agreed to by STATE; or
2) If CONTRACTOR fails to perform any of the other provisions of this Contract, or so fails to pursue the work as to endanger performance of this Contract in accordance with its terms.
3) Except for a default by STATE for failing to pay any amount when due under this Agreement which must be cured immediately, the defaulting Party will have thirty (30) days after receipt of the notice of default to either cure the default or, if the default is not curable within thirty (30) days, provide a written cure plan. The defaulting Party will begin implementing the cure plan immediately after receipt of notice by the other Party that it approves the plan.

The rights and remedies of STATE provided in this subsection are not exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

If the Contract is terminated for any reason other than default, the STATE is responsible to CONTRACTOR for the cost of all services rendered and all equipment shipped up until the notice of termination in accordance with acceptance criteria and change management. The STATE will also be responsible for any negotiated, mutually agreed upon costs incurred by CONTRACTOR to shut down the work in process. The STATE must provide a 30-day formal written notice of termination for cause.

9. SUSPENSION FOR CONVENIENCE

STATE shall have the right at any time to order the services of CONTRACTOR fully or partially stopped for STATE's own convenience. STATE shall provide CONTRACTOR

written notice of the reason for and duration of the suspension. The schedule, which includes the payment schedule, shall be delayed on a day-for-day basis to the extent STATE has issued a stop work order to CONTRACTOR and such stop work order is causing delays in completing services in accordance with the schedule. The parties shall execute a change order setting forth all material terms that the stoppage is anticipated to have on the schedule. CONTRACTOR shall have the right to submit claims in accordance with the terms of this Contract that result from delays caused by any stop work orders issued under this section. STATE agrees to be responsible for payment of reasonable delay charge claims. Delay charge claims may include costs incurred by CONTRACTOR or its subcontractors for additional freight, warehousing and handling of equipment; extension of the warranties; travel; suspending and re-mobilizing the work; additional engineering, project management, and standby time calculated at then current rates; and preparing and implementing an alternative implementation plan.

10. FORCE MAJEURE

Neither party shall be held responsible for delay or default caused by fire, riot, terrorism, acts of God or war if the event is beyond the party's reasonable control and the affected party gives notice to the other party promptly upon occurrence of the event causing the delay or default or that is reasonably expected to cause a delay or default.

11. LIQUIDATED DAMAGES

The parties agree that STATE may suffer damages due to a failure by CONTRACTOR to provide deliverables or services under this Contract. Because it is difficult to fix the actual damages sustained in the event of such delays, STATE and CONTRACTOR agree that the amount of damages will be determined as per this section. In the event of any non-performance, CONTRACTOR shall pay that amount as liquidated damages and not as a penalty. Amounts due to STATE as liquidated damages may be deducted by STATE from any amounts payable to CONTRACTOR during the Phase in which liquidated damages were recognized, and any amount outstanding over and above the amounts deducted from the invoice will be promptly tendered by check from CONTRACTOR to STATE.

Delays due to causes of Force Majeure or due to the responsibility of STATE shall extend the time for performance on a day-for-day basis. STATE will not assess liquidated damages against CONTRACTOR when the delay in delivery or performance is beyond the control and without the fault or negligence of CONTRACTOR.

If CONTRACTOR fails to complete a Deliverable per the approved project schedule (as defined within the relevant Statement of Work) by the specified deadline agreed to during the contract design review (or revised deadline as agreed upon between the parties through the Integrated Change Control Process), CONTRACTOR shall pay liquidated damages to STATE in the amount of $1,500 per calendar day for each day the Deliverable is delayed.

In no event will liquidated damages for a Phase exceed fifteen percent (15%) of the dollar amount for the Phase as identified in the SOW, nor in any event will liquidated damages exceed fifteen percent (15%) of the Contract as a whole.

12. INJUNCTIVE RELIEF

CONTRACTOR shall immediately report to STATE any and all unauthorized disclosures or uses of STATE's Confidential Information or Proprietary Information of which

CONTRACTOR or its staff is aware or has knowledge. CONTRACTOR acknowledges that any unauthorized publication or disclosure of STATE's Confidential Information or Proprietary Information to others may cause immediate and irreparable harm to STATE. If CONTRACTOR should publish or disclose such Confidential Information or Proprietary Information without authorization, STATE shall immediately be entitled to injunctive relief or any other remedies to which it is entitled under law or equity without requiring a cure period. CONTRACTOR shall indemnify, defend, and hold harmless STATE from all damages, costs, liabilities, and expenses (including without limitation reasonable attorneys' fees) caused by or arising from CONTRACTOR's unauthorized use or disclosure of STATE's Confidential Information or Proprietary Information. As a condition to these indemnity obligations, STATE will provide CONTRACTOR with prompt notice of any claim of which STATE is aware and for which indemnification shall be sought under this Contract and shall cooperate in all reasonable respects with CONTRACTOR in connection with any such claim.

13. RIGHT OF SETOFF DAMAGES

Amounts due STATE by CONTRACTOR, including liquidated or other damages, or claims for damages, may be deducted or set-off by STATE from any money payable to CONTRACTOR pursuant to this Contract. All other amounts or damages not related to this Contract, i.e. State tax, are not subject to offset.

14. RIGHT TO WITHHOLD AMOUNTS OTHERWISE DUE IF THE CONTRACTOR IS IN BREACH

If CONTRACTOR fails to deliver Deliverables or to provide Services which satisfy CONTRACTOR's obligations under this Contract, STATE shall have the right to withhold any and all payments due during that Phase under this Contract. STATE may withhold any and all such payments due under this Contract to CONTRACTOR without penalty or work stoppage by CONTRACTOR, until such failure to perform is cured.

15. RIGHT TO REMEDIES AND CUMULATION OF RIGHTS

Unless specifically stated in another provision of the Contract, no remedy conferred by any of the specific provisions of this Contract is intended to be exclusive of any other remedy, and each and every remedy shall be cumulative and shall be in addition to every other remedy given under this Contract, now or in the future existing at law or in equity or by statute or otherwise.

16. NON-WAIVER

Either party's failure to exercise any of its rights under this Contract, its delay in enforcing any right, or its waiver of its rights on any occasion, shall not constitute a waiver of such rights on any other occasion. No course of dealing by either party in exercising any of its rights shall constitute a waiver thereof. No waiver of any provision of this Contract shall be effective unless it is in writing and signed by the party against whom the waiver is sought to be enforced.

17. INDEMNITY

CONTRACTOR will indemnify, defend and hold STATE harmless from any and all liability, expense, judgment, suit, cause of action, except for direct loss that cannot be limited pursuant to N.D.C.C. § 32-12.2-15 which may accrue against STATE to the extent it is caused by the negligence of CONTRACTOR, its subcontractors, or their employees

or agents, while performing their duties under this Agreement, if STATE gives CONTRACTOR prompt, written notice of any claim or suit. STATE will cooperate with CONTRACTOR in its defense or settlement of the claim or suit. This section sets forth the full extent of CONTRACTOR's general indemnification of STATE from liabilities that are in any way related to CONTRACTOR's performance under this Agreement and constitutes STATE's sole and exclusive remedy for indemnification.

ALTHOUGH THE PARTIES ACKNOWLEDGE THE POSSIBILITY OF SUCH LOSSES OR DAMAGES, THEY AGREE THAT CONTRACTOR WILL NOT BE LIABLE FOR ANY COMMERCIAL LOSS, INCONVENIENCE, LOSS OF USE, LOSS TIME, DATA, GOODWILL, REVENUEs, PROFITS OR SAVINGS; OR OTHER SPECIAL, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO OR ARISING FROM THIS AGREEMENT, THE SALE OR USE OF THE EQUIPMENT OR SOFTWARE, OR THE PERFORMANCE OF SERVICES BY CONTRACTOR PURSUANT TO THIS AGREEMENT.

18. INTELLECTUAL PROPERTY INFRINGEMENT INDEMNIFICATION

a. CONTRACTOR, at its own expense, shall defend and indemnify STATE against third party claims that products furnished under this Contract infringe a United States patent or copyright or misappropriate trade secrets protected under United States law.

b. As to any product which is subject to a claim of infringement or misappropriation, CONTRACTOR may (a) obtain the right of continued use of the product for STATE or (b) replace or modify the product to avoid the claim. If neither alternative is available on commercially reasonable terms then, at the request of CONTRACTOR, any applicable Software license and its charges will end, STATE will stop using the product, and will return the product to CONTRACTOR. Upon return of the product, CONTRACTOR will give STATE a credit for the price paid to CONTRACTOR, less a reasonable offset for use and obsolescence.

c. CONTRACTOR's duties to defend and indemnify are conditioned upon: STATE promptly notifying CONTRACTOR in writing of the Infringement Claim; CONTRACTOR having control of the defense of the suit and all negotiations for its settlement or compromise; and STATE providing to CONTRACTOR cooperation and, if requested by CONTRACTOR, reasonable assistance in the defense of the Infringement Claim. In addition to CONTRACTOR's obligation to defend, and subject to the same conditions, CONTRACTOR will pay all damages finally awarded against STATE by a court of competent jurisdiction for an Infringement Claim or agreed to, in writing, by CONTRACTOR in settlement of an Infringement Claim.

d. CONTRACTOR will have no duty to defend or indemnify for any infringement claim that is based upon: (a) the combination of the CONTRACTOR Product with any software, apparatus or device not furnished by CONTRACTOR; (b) the use of ancillary equipment or software not furnished by CONTRACTOR and that is attached to or used in connection with the CONTRACTOR Product; (c) CONTRACTOR Product designed or manufactured in accordance with STATE's designs, specifications, guidelines or instructions, if the alleged infringement would not have occurred without such designs, specifications, guidelines or instructions; (d) a modification of the CONTRACTOR Product by a party other than CONTRACTOR; (e) use of the CONTRACTOR Product in a manner for which the CONTRACTOR Product was not designed or that is inconsistent

with the terms of this Agreement; or (f) the failure by STATE to install an enhancement release to the CONTRACTOR Software that is intended to correct the claimed infringement. In no event will CONTRACTOR's liability resulting from its indemnity obligation to STATE extend in any way to royalties payable on a per use basis or the STATE's revenues, or any royalty basis other than a reasonable royalty based upon revenue derived by CONTRACTOR from STATE from sales or license of the infringing CONTRACTOR Product.

e. This Section provides STATE's sole and exclusive remedies and CONTRACTOR's entire liability in the event of an infringement claim. STATE has no right to recover and CONTRACTOR has no obligation to provide any other or further remedies, whether under another provision of this Agreement or any other legal theory or principle, in connection with an infringement claim. In addition, the rights and remedies provided in this Section are subject to and limited by the restrictions set forth in N.D.C.C. § 32-12.2-15.

19. REPRESENTATIONS AND WARRANTIES

CONTRACTOR represents and warrants to STATE that neither CONTRACTOR, in connection with performing the services in performance of this Contract, nor the completed product delivered by CONTRACTOR, will infringe any patent, copyright, trademark, trade secret or other proprietary right of any person. CONTRACTOR further represents and warrants to STATE that it will not use any trade secrets or confidential or proprietary information owned by any third party in performing the services related to this Contract or in delivery of the completed product unless CONTRACTOR has the authority to license, use or provide those trade secrets or confidential or proprietary information to STATE. CONTRACTOR further represents and warrants to STATE that neither CONTRACTOR nor any other company or individual performing services pursuant to this Contract is under any obligation to assign or give any work done under this Contract to any third party.

20. INSURANCE

Upon receipt of the Notice of Intent to Award, the successful offeror must obtain the required insurance coverage and provide the procurement officer with proof of coverage upon contract execution. The coverage must meet required insurance stated below. The successful offeror's failure to provide evidence of insurance coverage is a material breach and grounds for termination of the contract.

CONTRACTOR shall secure and keep in force during the term of this Contract and CONTRACTOR shall similarly require all subcontractors, prior to commencement of an agreement between CONTRACTOR and the subcontractor, to secure and keep in force during the term of this CONTRACT, from insurance companies, government self-insurance pools or government self-retention funds, authorized to do business in North Dakota, the following insurance coverages:

a. Commercial general liability, including premises or operations, contractual, and products or completed operations coverages (if applicable), with liability limits of $1,000,000 per occurrence and $2,000,000 general aggregate

b. Automobile liability, including Owned (if any), Hired, and Non-Owned automobiles, with liability limits of $1,000,000 per occurrence combined single limit

c. Workers compensation coverage meeting all statutory requirements. The policy must provide coverage for all states of operation that apply to the performance of this Contract

d. Employer's liability or "stop gap" insurance of $1,000,000 as an endorsement on the workers compensation or commercial general liability insurance

e. Professional errors and omissions that include cyber liability with limits of $1,000,000 per claim and in the aggregate, CONTRACTOR shall continuously maintain such coverage during the Contract period and for three (3) years thereafter. In the event of a change or cancellation of coverage, CONTRACTOR shall purchase an extended reporting period to meet the time periods required in this section.

The insurance coverages listed above must meet the following additional requirements:

a. Any deductible or self-insured retention amount or other similar obligation under the policies shall be the sole responsibility of the CONTRACTOR.

b. This insurance may be in policy or policies of insurance, primary and excess, including the so-called umbrella or catastrophe form and must be placed with insurers rated "A-" or better by A.M. Best Company, Inc., provided any excess policy follows form for coverage. Less than an "A-" rating must be approved by the State. The policies shall be in industry standard form and terms.

c. The duty to defend, indemnify and hold harmless the State under this agreement shall not be limited by the insurance required in this agreement.

d. The state of North Dakota and its agencies, officers, and employees shall be included on the commercial general liability policy, including any excess policies (to the extent applicable), as additional insured.

e. The insurance required in this agreement, through a policy or endorsement, shall include:

    1) Waiver of Subrogation" waiving any right to recovery the insurance company may have against the State with regard to the workers compensation policy

    2) CONTRACTOR's insurance coverage shall be primary (i.e., pay first)

    3) Cross liability/severability of interest under general liability policy

    4) The legal defense provided to the State under the policy and any endorsements must be free of any conflicts of interest, even if retention of separate legal counsel for the State is necessary

    5) The insolvency or bankruptcy of the insured CONTRACTOR shall not release the insurer from payment under the policy, even when such insolvency or bankruptcy prevents the insured CONTRACTOR from meeting the retention limit under the policy

f. CONTRACTOR shall furnish a certificate of insurance to the undersigned STATE representative upon contract execution r prior to commencement of work of this agreement. All required endorsements shall be provided as soon as practicable.

g. Failure to provide insurance as required in this agreement is a material breach of contract entitling STATE to terminate this agreement immediately.

h. CONTRACTOR shall provide at least 30-day notice of any cancellation or material change to the policies or endorsements."

Comments: If applicable to the contract, the professional liability that includes cyber liability shall include coverage of a data breach:

a. CONTRACTOR shall defend, indemnify, save and hold harmless, the STATE, its officers, agents and employees from liability of any nature or kind, including costs and expenses, for or on account of any and all suits, claims, or damages of any character whatsoever, resulting from injuries or damages sustained by any person or persons or property by virtue of performance of this contract, arising or resulting in whole or in part from the fault, negligence, wrongful act or omission of the Contractor, or any subcontractor, or their employees or agents.

21. WORKS FOR HIRE

CONTRACTOR will not provide any “work(s) for hire" within the meaning of the United States Copyright Act (Title 17 United States Code) under this Contract. CONTRACTOR, the third-party manufacturer of any equipment provided, and the copyright owner of any non- CONTRACTOR software own and retain all of their respective proprietary rights in the equipment and software provided by Contractor, and nothing in this Agreement is intended to restrict their proprietary rights. All intellectual property developed, originated, or prepared by CONTRACTOR in connection with providing to STATE the equipment, software, or related services remain vested exclusively in CONTRACTOR, and this Agreement does not grant to STATE any shared development rights of intellectual property. Except as explicitly provided in the software license agreement, CONTRACTOR does not grant to STATE, either directly or by implication, estoppel, or otherwise, any right, title or interest in CONTRACTOR’s proprietary rights. STATE will not modify, disassemble, peel components, decompile, otherwise reverse engineer or attempt to reverse engineer, derive source code or create derivative works from, adapt, translate, merge with other software, reproduce, distribute, sublicense, sell or export the Software, or permit or encourage any third party to do so. The preceding sentence does not apply to open source software which is governed by the standard license of the copyright owner.

22. WORK PRODUCT

All work product, equipment, or materials created for STATE or purchased by STATE under this Contract belong to STATE and must be immediately delivered to STATE at STATE'S request upon termination of this Contract. Notwithstanding, in no event will the intellectual property rights embodied in the work product transfer to the State. As stated above, CONTRACTOR will retain ownership in any and all intellectual property rights.

23. SOFTWARE LICENSE

All ownership rights to CONTRACTOR’s software provided to STATE under this Contract shall remain with CONTRACTOR. Any Contractor software, including subsequent releases, is licensed to State solely in accordance with the CONTRACTOR Software License Agreement in Exhibit A below. “Software License Agreement”). State hereby accepts and agrees to abide by all of the terms and restrictions of the Software License Agreement. Any third party software provided by CONTRACTOR is licensed to the State in accordance with the standard license, terms, and restrictions of the copyright owner on the effective date of the Agreement, unless the copyright owner has granted to CONTRACTOR the right to sublicense the software pursuant to the Software License Agreement, in which case it applies and the copyright owner will have all of Licensor’s

rights and protections under the Software License Agreement. CONTRACTOR makes no representations or warranties of any kind regarding third party software. Third party software may include open source software. To the extent any aspect of the goods or services set forth in this Contract are modified to incorporate any additional third-party software, STATE retains the right to negotiate the terms of the Contract related to any licensing agreement associated with the additional third party software. At no cost to the STATE, STATE shall have the right to reject any modification to the goods or services that contain that additional third-party software and continue using the prior version of CONTRACTOR's goods or services.

24. LICENSE GRANT AND SCOPE OF USE

a. Licensing

1) CONTRACTOR grants to STATE a perpetual, nonexclusive license to use the software and associated documentation, plus any additional software which shall be added by mutual agreement of the parties during the term of this Contract.

2) CONTRACTOR grants to STATE, including any federal, state or local governmental entity or emergency service provider in the state of North Dakota that uses the State's System, a personal, non-exclusive license to use the software and associated documentation, plus any additional software which shall be added by mutual agreement of the parties during the term of this Contract.

3) The license grant shall not be extended to any contractors, subcontractors, outsourcing vendors, consultants or others without the express, written consent of CONTRACTOR.

4) There shall be no limit on the number of machines, number of locations, or size of processors on which STATE can operate the software.

b. Software Functionality and Replacement

This software licensed by CONTRACTOR to STATE provides the following functionality:

1. ASTRO25 Public Safety Radio Communications System

Regarding the aforementioned software functionality licensed by CONTRACTOR to STATE, CONTRACTOR agrees that:

1) If CONTRACTOR reduces or replaces the functionality contained in the licensed product and provides this functionality as a separate or renamed product, then STATE shall be entitled to license such software product at no additional license or maintenance fee.

2) If CONTRACTOR releases an option, future product or other release that has substantially the same functionality as the software product licensed to STATE, and it ceases to provide maintenance for the older software product, then STATE shall have the option to exchange licenses for such replacement product or function at no additional charge.

c. Purchase of Additional Licenses

STATE may purchase additional software licenses during the term of this Contract at the same price offered by CONTRACTOR under the terms of this Contract.

d. Delivery of Authorized Software Only

CONTRACTOR shall not ship any software to STATE that STATE is not authorized to use.

e. Authorized Software Platform

STATE may transfer the software, at no additional cost, to any hardware platform, software operating system or database that CONTRACTOR supports for the software.

25. TECHNOLOGY STANDARDS

CONTRACTOR shall comply with applicable STATE enterprise architecture technology standards. These standards can be found on STATE's website at http://www.nd.gov/itd/standards.

26. PERSONNEL

a. STATE will designate a Project Manager to serve as the primary project manager for this Contract. If, during the course of this Contract, it becomes necessary for STATE to change the person assigned as STATE's Project Manager, STATE will notify CONTRACTOR in writing, pursuant to Notice section of this Contract.

b. Unless STATE otherwise notifies CONTRACTOR, STATE's Project Manager shall carry out STATE's administrative and management functions under this Contract, shall be responsible for acceptance of the Contract deliverables, and shall provide support and overall direction to CONTRACTOR.

c. CONTRACTOR will designate a Project Manager and provide individuals to meet the requirements and accomplish the work as stated in this Contract including any mutually agreed upon Scope of Work.

d. CONTRACTOR agrees and understands that STATE's execution of this Contract is predicated, in part and among other considerations, on the utilization of the specific individuals and personnel qualifications as identified. Therefore, CONTRACTOR agrees that:

1) Prior to assignment of personnel, CONTRACTOR shall obtain written approval from STATE for all personnel to be assigned to this project

2) The personnel assigned must have the knowledge necessary to complete requirements as defined in this Contract.

3) CONTRACTOR shall warrant that all personnel assigned to perform tasks in response to this Contract will remain assigned for the agreed-upon length of time.

4) No replacement, reassignment or substitution of any assigned individuals and personnel qualifications shall be made without the prior written approval of STATE and that such replacement, reassignment or substitution shall be made at no additional cost to STATE.

5) Any substitution made pursuant to this paragraph must be of equal or higher skills, knowledge and abilities than those personnel originally proposed and that STATE's approval of a substitution is not construed as an acceptance of the substitution's performance potential. STATE agrees that an approval of a substitution will not be unreasonably withheld.

6) CONTRACTOR shall assign personnel on a full-time basis. In the event that a work assignment does not justify full-time participation, CONTRACTOR shall assign personnel on a part-time basis with prior written approval of STATE's Project Manager. However, if the part-time assignments are specified in this Contract, no written approval from STATE's Project Manager is necessary except for substitution of CONTRACTOR personnel.

e. Upon request by STATE, CONTRACTOR shall replace any CONTRACTOR personnel that STATE determines, in its sole discretion, to be unable to perform the responsibilities of this Contract acceptably, e.g., inappropriate or unprofessional personal conduct, professional inabilities, etc.

f. STATE's working hours are Monday through Friday from 8:00 AM until 5:00 PM (CT or CT) with one hour for lunch. STATE Project Manager may approve alternate work schedules.

g. According to STATE policy, STATE personnel are only obligated to work a forty-hour workweek, Monday through Friday, and are allowed reasonable vacation, sick and educational absences.

h. CONTRACTOR's personnel are not expected to work on State holidays or other mandatory leave days.

i. CONTRACTOR agrees that STATE may require contracted staff and subcontractors assigned by CONTRACTOR to perform work under this Contract to submit to a criminal history record check in accordance with N.D.C.C. § 54-59-20 and §12-60-24. STATE shall have the right to reject any individual assigned to perform work under this Contract if, in its sole discretion, it determines that the results of the criminal history record check make the individual unacceptable.

j. STATE may require CONTRACTOR to conduct background investigations on all contracted staff and subcontractors assigned by CONTRACTOR to perform work under this Contract and shall furnish the results of such background investigations to STATE. STATE shall have the right to reject any individual assigned to perform work under this Contract if, in its sole discretion, it determines that the results of the background investigation make the individual unacceptable.

27. PROJECT MANAGEMENT

a. Reporting

1) CONTRACTOR personnel will be responsible for providing written, weekly time utilizations, for each individual, to STATE's Project Manager, or STATE's project staff, as STATE's Project Manager may assign.

2) CONTRACTOR's Project Manager shall deliver to STATE's Project Manager, weekly reports of CONTRACTOR's progress on the project and meeting the objective/deliverables as stated in the Scope of Work. Each report must contain a description of the current status of the project, the tasks on which time was spent, the estimated progress to be made in the next reporting period, and the problems encountered the proposed solutions to them and their effect, if any, on the project budget/schedule.

3) Project Variance Reporting – CONTRACTOR must provide data to allow STATE's project manager to calculate cost and schedule variance in accordance with N.D.C.C. §54-59-23 as determined by STATE. If STATE's analysis shows a negative

cost or schedule variance exceeding 20%, a subsequent report must also provide proposed corrective measures to address the issues.

b. Integrated Change Control Process

CONTRACTOR and STATE will utilize an integrated change control process to manage changes during the life of a project.

1) A change request must be in writing to document the potential change. The write-up for the proposed change must be submitted to CONTRACTOR and STATE's project managers who will in turn provide it to relevant parties for assessment.
2) All change requests will be logged and tracked. STATE's project manager will record the request in the project repository and will update the repository throughout the process.
3) The change will be reviewed and, if acceptable to STATE, CONTRACTOR will submit to STATE an estimate of the impact to cost, schedule, scope, and quality.
4) CONTRACTOR will continue performing the services in accordance with the original Contract unless otherwise agreed upon by STATE's project manager. Work shall not commence on any new activities related to the change request until all parties agree in writing.
5) CONTRACTOR's project manager and STATE's project manager will adapt the Project Plan to incorporate approved changes.
6) Each change request duly authorized in writing by the parties shall be incorporated into and considered part of this Contract.
7) During the course of this Contract, if CONTRACTOR determines or could reasonably determine any STATE actions or directions constitute a requirement to perform additional work, CONTRACTOR shall notify STATE within thirty (30) calendar days that STATE has requested CONTRACTOR to perform additional work in the form of a change request utilizing the process above. CONTRACTOR understands that it waives the right to request additional time and reimbursable costs if CONTRACTOR fails to notify STATE within thirty (30) calendar days of determining or reasonably being able to determine that any STATE actions or directions constitute a requirement to perform additional work under this Contract.

c. Deliverable Acceptance

1) Upon completion of a deliverable, CONTRACTOR will furnish STATE with the deliverable and associated documentation, the expected performance, and agreed upon Acceptance Criteria.
2) After receipt of items in Paragraph 27(c)(1), STATE will have five (5) working days or a different period of time as is agreed to by the parties, in which to accept or reject each item in writing. STATE will accept by signature. If STATE rejects it, STATE will specify in writing its grounds for rejection and CONTRACTOR shall use its best efforts to revise any issues for the deliverables to be acceptable to STATE within the following five (5) working days. If STATE rejects it a second time, STATE will have the option of repeating the procedure as described in this acceptance statement above, escalating the issue to the Executive Steering Committee, or terminating this Contract upon written notice to CONTRACTOR.

d. Final Acceptance

1) The successful completion of all deliverables for a Phase as stated in the Scope of Work in accordance with the deliverable acceptance process AND

2) The final delivered product for a Phase fully implemented in STATE's live production environment AND

3) STATE has sixty (60) calendar days thereafter in which to accept or reject it in writing. If STATE rejects it, STATE shall specify in writing its grounds for rejection and CONTRACTOR shall use its best efforts to make the product conform to the requirements of this Contract as soon as possible and at no additional cost to STATE. CONTRACTOR shall continue to use its best efforts to make the product conform to the requirements of this Contract until STATE accepts the product or terminates this Contract upon written notice to CONTRACTOR.

e. STATE reserves the right to unilaterally shift Deliverables identified in any statements of work from one Phase or statement of work to any other Phase or statement of work, at no additional cost to the STATE. In the event the STATE exercises its right to shift a Deliverable that the STATE has previously authorized CONTRACTOR to commence work on, or mobilize resources for, the Deliverable may only be shifted under the PARTIES mutual agreement setting forth any necessary change in time and costs incurred related to the prior commencement of work or mobilization of resources for that Deliverable.

f. Phase Initiation

CONTRACTOR's work on any Phase may not commence prior to the STATE providing written authorization directing the initiation of work. CONTRACTOR shall not be entitled to any compensation for any work on a Phase carried out prior to the STATE providing written authorization authorizing commencement of work on that Phase.

28. PRODUCT CONFORMITY

STATE has twelve (12) months following Final Acceptance of the product(s) delivered by CONTRACTOR in a Phase pursuant to this Contract to verify that the product(s) conform to the requirements of this Contract and perform according to CONTRACTOR system design specifications. Upon recognition of an error, deficiency, or defect, by STATE, CONTRACTOR shall be notified by STATE citing any specific deficiency (deficiency being defined as CONTRACTOR having performed incorrectly with the information provided by STATE, not CONTRACTOR having to modify a previous action due to additional and/or corrected information from STATE). CONTRACTOR, at no additional charge to STATE, shall provide a correction or provide a mutually acceptable plan for correction within thirty (30) calendar days following the receipt of STATE's notice to CONTRACTOR. If CONTRACTOR's correction is inadequate to correct the deficiency, or defect, or the error recurs, STATE may, at its option, act to correct the problem.
CONTRACTOR shall be required to reimburse STATE for any such costs incurred or STATE may consider this to be cause for breach of contract.

29. WARRANTY

"Warranty Period" for System hardware, software, or services related to system implementation means one (1) year from the date of Final Acceptance of the Phase or upon

Final Acceptance of a Sub-site (includes the rolling completion of PSAPs and RF Sites) as designated within the Statement of Work Warranty Period for professional Services means ninety (90) days from performance of the Service.

SYSTEM FUNCTIONALITY. CONTRACTOR represents that the System will perform in accordance with the specifications in all material respects. Final acceptance occurs when the tests in the acceptance test plan provided by Contractor have been successfully completed ("Final Acceptance"). Upon Final Acceptance of the Phase or upon Final Acceptance of a Sub-site as designated within the Statement of Work this System functionality representation is fulfilled. Contractor is not responsible for System performance deficiencies that are caused by ancillary equipment not furnished by Contractor which is attached to or used in connection with the System or for reasons or parties beyond Contractor's control, such as natural causes; the construction of a building that adversely affects the microwave path reliability or radio frequency (RF) coverage; the addition of frequencies at System sites that cause RF interference or intermodulation; or State changes to load usage or configuration outside the Specifications.

EQUIPMENT WARRANTY. During the Warranty Period, CONTRACTOR warrants that the equipment provided by CONTRACTOR under normal use and service will be free from material defects in materials and workmanship.

Software Warranty. Unless otherwise stated in the Software License Agreement, during the Warranty Period, CONTRACTOR warrants the Software in accordance with the warranty terms set forth in the Software License Agreement and the provisions of this Section that are applicable to the software. TO THE EXTENT, IF ANY, THAT THERE IS A SEPARATE LICENSE AGREEMENT PACKAGED WITH, OR PROVIDED ELECTRONICALLY WITH, A PARTICULAR PRODUCT THAT BECOMES EFFECTIVE ON AN ACT OF ACCEPTANCE BY THE END USER, THEN THAT AGREEMENT SUPERCEDES THE SOFTWARE LICENSE AGREEMENT AS TO THE END USER OF EACH SUCH PRODUCT.

EXCLUSIONS TO EQUIPMENT AND SOFTWARE WARRANTIES. These warranties do not apply to: (i) defects or damage resulting from: use of the Equipment or Software in other than its normal, customary, and authorized manner; accident, liquids, neglect, or acts of God; testing, maintenance, disassembly, repair, installation, alteration, modification, or adjustment not provided or authorized in writing by CONTRACTOR; STATE's failure to comply with all applicable industry and OSHA standards; (ii) breakage of or damage to antennas unless caused directly by defects in material or workmanship; (iii) Equipment that has had the serial number removed or made illegible; (iv) batteries (because they carry their own separate limited warranty) or consumables; (v) freight costs to ship Equipment to the repair depot; (vi) scratches or other cosmetic damage to Equipment surfaces that does not affect the operation of the equipment provided by Contractor; and (vii) normal or customary wear and tear.

SERVICE WARRANTY. During the Warranty Period, CONTRACTOR warrants that the Services will be provided in a good and workmanlike manner and will conform in all material respects to the applicable Statement of Work. Services will be free of defects in materials and workmanship for a period of ninety (90) days from the date the performance of the Services are completed. STATE acknowledges that the deliverables may contain recommendations, suggestions or advice from CONTRACTOR to STATE (collectively, "recommendations"). CONTRACTOR makes no warranties concerning those recommendations, and STATE alone accepts

responsibility for choosing whether and how to implement the recommendations and the results to be realized from implementing them.

WARRANTY CLAIMS. To assert a warranty claim, STATE must notify CONTRACTOR in writing of the claim before the expiration of the Warranty Period. Upon receipt of this notice, CONTRACTOR will investigate the warranty claim. If this investigation confirms a valid Equipment or Software warranty claim, CONTRACTOR will (at its option and at no additional charge to STATE) repair the defective Equipment or CONTRACTOR Software, replace it with the same or equivalent product, or refund the price of the defective Equipment or CONTRACTOR Software. These actions will be the full extent of CONTRACTOR's liability for the warranty claim. In the event of a valid Services warranty claim, STATE's sole remedy is to require CONTRACTOR to re-perform the non-conforming Service or to refund, on a pro-rata basis, the fees paid for the non-conforming Service. If this investigation indicates the warranty claim is not valid, then CONTRACTOR may invoice STATE for responding to the claim on a time and materials basis using CONTRACTOR's then current labor rates. Repaired or replaced product is warranted for the balance of the original applicable warranty period. All replaced products or parts will become the property of CONTRACTOR.

ORIGINAL END USER IS COVERED. These express limited warranties are extended by CONTRACTOR to the original user purchasing the System or Services for commercial, industrial, or governmental use only, and are not assignable or transferable.

DISCLAIMER OF OTHER WARRANTIES. THESE WARRANTIES ARE THE COMPLETE WARRANTIES FOR THE EQUIPMENT AND CONTRACTOR SOFTWARE PROVIDED UNDER THIS AGREEMENT AND ARE GIVEN IN LIEU OF ALL OTHER WARRANTIES. CONTRACTOR DISCLAIMS ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE."

30. SOFTWARE MAINTENANCE

CONTRACTOR shall provide, and STATE may subscribe to, Maintenance Services, including software/hardware updates and technical support services as defined in Exhibit ***C***, for the product(s) delivered pursuant to this Contract commencing at the end of the warranty period. CONTRACTOR and STATE shall negotiate the terms and price of such Maintenance Services. CONTRACTOR warrants that it will continue to offer Maintenance Services for the product(s) for a minimum of four (4) years from the date of final acceptance or installation date of any software/product update.

The maintenance period begins upon expiration of the Warranty period and continues on an annual basis for eight (8) years.

a. Maintenance Fee Cap

CONTRACTOR agrees that any change to the annual Maintenance Services fee may increase by not more than the lower of 3 % or Consumer Price Index (CPI). The rates shall be adjusted in accordance with the CPI titled "All Urban Consumers for the U.S. All Items,1982-84=100".

b. Right to Change Support Plan Level

STATE may choose to change its subscription to CONTRACTOR's Maintenance

Services plan to a higher or lower level plan that is offered by CONTRACTOR at this Contract's next renewal date upon thirty (30) calendar days' notice to CONTRACTOR.

c. **Right to Modify or Cancel Support**

1) STATE may choose to cancel Maintenance Services at this Contract's next renewal date upon thirty (30) calendar days' notice to CONTRACTOR.

2) STATE may delete a subset of licenses that are no longer in use from Maintenance Services at this Contract's next renewal date upon thirty (30) calendar days' notice to CONTRACTOR.

3) STATE may resume Maintenance Services for lapsed periods by paying CONTRACTOR an amount no greater than the amount that would have been due if maintenance services had been continued over the lapsed period. Upon payment of such amounts for lapsed periods, CONTRACTOR agrees to provide STATE with the right to any upgrades released during that period.

To sustain the ASTRO 25 Platform lifespan, CONTRACTOR makes on-going investments to regularly refresh the underlying IT components to address normal technology obsolescence and apply security safeguards. Both software and hardware updates are incorporated into major system releases.

The System Upgrade Agreement (SUA) provides hardware and software refreshes to ensure the network is up-to-date and shall be supported for 25 years. By making regular updates to its system, the STATE can extend supportability through the next 25 years.

CONTRACTOR shall agree to enter into a support agreement for the initial term of the Contract and any renewals or extensions.

Applicable 3rd party equipment is subject to separate manufacturers support policies.

31. SOFTWARE SUPPORT – SERVICE LEVEL REQUIREMENT

CONTRACTOR will respond to STATE requests for software support services regarding the licensed software in accordance with the procedures identified below. In each case, STATE may describe and submit the problem by telephone, facsimile or electronic mail.

Incident Severity	Response Time	Resolution Time	Escalation Procedure
High Impact – software unusable	1 hour	Final Resolution within: 4 hours	Described in Exhibit C.
Medium Impact – software useable with severely restricted functionality or performance	4 hours	Final Resolution within: 8 hours (1 business day)	Described in Exhibit C.

Low Impact – software useable with minor impact on functionality or performance	8 hours	Final Resolution within: 40 hours (1 business week)	Described in Exhibit C.

CONTRACTOR'S failure to meet the above defined Response Times or Resolution Times in any given month during the term and any renewal term shall be deemed a service level default ("Service Level Default") and STATE may obtain the non-exclusive remedies set forth below.

Response and Resolution Service Levels (calculated monthly on a per incident basis)	Service Level Credit (Prorated Fees – Monthly)
Meets Response or Resolution Time	0%
1st Failure to meet Response or Resolution Time	Warning, 0%
2nd Failure to meet Response or Resolution Time	10%
3rd Failure to meet Response or Resolution Time	20%

In the event STATE is eligible for a 20% Service Level Credit under this section for any two (2) consecutive months of the term, STATE may terminate this Contract without penalty upon written notice to CONTRACTOR.

Credits shall be applied against the next invoice. In the event a Service Level Default occurs after a party has given notice of termination, or STATE has made final payment to CONTRACTOR for the software support services and no further invoices shall issue as a result, CONTRACTOR shall refund to STATE the amount of the appropriate Service Level Credit due for the period of default.

Notwithstanding the foregoing, a Service Level Default will not have occurred nor will CONTRACTOR provide Service Level Credits in the event CONTRACTOR is unable to meet the above Response or Resolution Times due to forces outside of its control, including a Force Majeure or any action by a third party, including the STATE, that renders CONTRACTOR unable to comply with the above service level requirements.

32. SOFTWARE ESCROW

Should CONTRACTOR´s financial condition materially worsen such that it stands a reasonable chance of imminently becoming bankrupt or insolvent, and CONTRACTOR breaches a previously identified material term of its service and support obligations under the agreement, after written notice that identifies the specific breach and a 90 (ninety) day cure period has passed then, upon request by STATE, CONTRACTOR shall immediately place the source code for the software owned by CONTRACTOR to operate the CONTRACTOR products and corresponding to the material breach, in escrow, under terms and conditions that are mutually agreeable to the parties. Software provided by third parties is excluded from this source code escrow requirement. CONTRACTOR´s commitment regarding the source code escrow shall apply only to software developed by CONTRACTOR. Costs to maintain the software in escrow shall be paid by the STATE.

33. SOFTWARE AUDIT

CONTRACTOR may, upon sixty (60) calendar days' notice to STATE, but not more

frequently than once per year, either request a signed certification by an officer of STATE verifying that the software is being used in accordance with the terms of this Contract or audit STATE's use of the software to ensure compliance with the terms and conditions of this Contract. Any such audit shall be conducted at CONTRACTOR's expense during regular business hours at STATE's offices and shall not unreasonably interfere with STATE's business activities. CONTRACTOR shall provide documentation to STATE defining the scope of the audit not less than thirty (30) calendar days prior to the audit. STATE shall have sixty (60) calendar days to review CONTRACTOR's audit findings. If an audit reveals that STATE's use of the Software exceeds the use permitted hereunder, then CONTRACTOR may invoice STATE for the applicable additional amounts based on the price agreement between the parties as of the date of completion of the audit.

34. NOTICE

All notices or other communications required under this Contract must be given by registered or certified mail and are complete on the date postmarked when addressed to the parties at the following addresses:

STATE	CONTRACTOR
Greg Hoffman	Motorola Solutions, Inc.
Director, Administrative Services	Attn: Legal Department
4201 Normandy Street	500 W. Monroe Street, 43rd Floor
Bismarck, ND 58503	Chicago, IL 60661

Notice provided under this provision does not meet the notice requirements for monetary claims against STATE found at N.D.C.C § 32-12.2-04.

35. CONFIDENTIALITY

CONTRACTOR shall not use or disclose any information it receives from STATE under this Contract that STATE has previously identified as confidential or exempt from mandatory public disclosure except as necessary to carry out the purposes of this Contract or as authorized in advance by STATE. STATE shall not disclose any information it receives from CONTRACTOR that CONTRACTOR has previously identified as confidential and that STATE determines in its sole discretion is protected from mandatory public disclosure under a specific exception to the North Dakota public records law, N.D.C.C. ch. 44-04. The duty of STATE and CONTRACTOR to maintain confidentiality of information under this section continues beyond the term of this Contract.

36. COMPLIANCE WITH PUBLIC RECORDS LAWS

CONTRACTOR understands that, in accordance with this Contract's Confidentiality clause (Section 35), STATE must disclose to the public upon request any records it receives from CONTRACTOR. CONTRACTOR further understands that any records obtained or generated by CONTRACTOR under this Contract, except for records that are confidential under this Contract, may, under certain circumstances, be open to the public upon request under the North Dakota public records law. CONTRACTOR agrees to contact STATE promptly upon receiving a request for information under the public records law and to comply with STATE's instructions on how to respond to the request.

37. INDEPENDENT ENTITY

CONTRACTOR is an independent entity under this Contract and is not a STATE

employee for any purpose, including the application of the Social Security Act, the Fair Labor Standards Act, the Federal Insurance Contribution Act, the North Dakota Unemployment Compensation Law and the North Dakota Workforce Safety and Insurance Act. CONTRACTOR retains sole and absolute discretion in the manner and means of carrying out CONTRACTOR's activities and responsibilities under this Contract, except to the extent specified in this Contract.

38. ASSIGNMENT AND SUBCONTRACTS

CONTRACTOR may not assign or otherwise transfer or delegate any right or duty without STATE's express written consent, will not be unreasonably withheld. CONTRACTOR may, however, enter into subcontracts provided that any subcontract acknowledges the binding nature of this Contract and incorporates this Contract, including any attachments. CONTRACTOR is solely responsible for the performance of any subcontractor with whom CONTRACTOR contracts. CONTRACTOR does not have the authority to Contract for or incur obligations on behalf of STATE.

39. SPOLIATION – NOTICE OF POTENTIAL CLAIMS

CONTRACTOR shall promptly notify STATE of all potential claims that arise or result from this Contract. CONTRACTOR shall also take all reasonable steps to preserve all physical evidence and information that may be relevant to the circumstances surrounding a potential claim, while maintaining public safety, and grants to STATE the opportunity to review and inspect the evidence, including the scene of an accident.

40. MERGER AND MODIFICATION, CONFLICT IN DOCUMENTS

The entire agreement between the parties includes the Contract, and it also includes the following documents. There are no understandings, agreements, or representations, oral or written, not specified within this Contract. This Contract may not be modified, supplemented or amended, in any manner, except by written agreement signed by both parties.

Notwithstanding anything herein to the contrary, in the event of any inconsistency or conflict within the Contract, the parties shall look to the following documents to resolve that inconsistency or conflict using the following order of precedence. The parties are not bound by this order of precedence in circumstances where an inconsistency or conflict in the Contract does not exist. The order of precedence is as follows:

The terms of this Contract as may be amended, including the following Exhibits;

1) Exhibit A – Software License Agreement
2) Exhibit B – Statements of Work
    a) Exhibit B: Overview
    b) B-1 SOW Phase I
        i. B-1A – Phase I Draft Schedule
        ii. B-1B – Payment Schedule
    c) B-2 SOW Phase II
        i. B-2A – Phase II Draft Schedule
        ii. B-2B – Payment Schedule

d) B-3 SOW Phase III
    i. B-3A – Phase III Draft Schedule
    ii. B-3B – Payment Schedule
e) Exhibit C – Warranty and Maintenance
    i. C-1 – Phase I Consoles and Network Core
    ii. C-2 – Phase II
    iii. C-3 – Phase III
    iv. C-4 – Maintenance and SUA Pricing Phases I, II and III
f) Exhibit D – Pricing
g) Exhibit E – KMZ Coverage Files
h) Exhibit F – Regions

a. STATE's Best and Final Offer to Request for Proposal ("RFP") number 112-1801 dated May 2, 2018
b. STATE's Solicitation Amendment #3 to RFP number 112-1801 dated May 2, 2018
c. STATE's Solicitation Amendment #2 to RFP number 112-1801 dated December 13, 2017;
d. STATE's Solicitation Amendment #1 to RFP number 112-1801 dated November 24, 2017;
e. STATE's RFP number 112-1801, dated November 6, 2017;
f. CONTRACTOR'S Best and Final proposal dated June 6, 2018 in response to RFP number 112-1801.
g. CONTRACTOR's proposal dated February 15, 2018 in response to RFP number 112-1801.

All automated end-user agreements (e.g., click-throughs, shrink wrap, or browse wrap) are specifically excluded and null and void. Clicking shall not represent acknowledgement or agreement to any terms and conditions contained in those agreements.

41. UNANTICIPATED AMENDMENTS

If additional work is required within the scope of this Contract due to a legitimate unforeseen circumstance, STATE shall provide CONTRACTOR a written description of the additional work and request CONTRACTOR to submit a proposal for accomplishing the scope of work. CONTRACTOR will not commence additional work until STATE until all parties agree in writing.

42. SEVERABILITY

If any term of this Contract is declared to be illegal or unenforceable by a court having competent jurisdiction, the validity of the remaining terms is unaffected and, if possible, the rights and obligations of the parties are to be construed and enforced as if this Contract did not contain that term.

43. APPLICABLE LAW AND VENUE

This Contract is governed by and construed in accordance with the laws of the State of North Dakota. Any action to enforce this Contract must be adjudicated exclusively in the state District Court of Burleigh County, North Dakota. Each party consents to the exclusive jurisdiction of such court and waives any claim of lack of jurisdiction or forum non conveniens.

44. ALTERNATIVE DISPUTE RESOLUTION – JURY TRIAL

STATE does not agree to any form of binding arbitration, mediation, or other forms of mandatory alternative dispute resolution. The parties have the right to enforce their rights and remedies in judicial proceedings. STATE does not waive any right to a jury trial.

45. NONDISCRIMINATION AND COMPLIANCE WITH LAWS

CONTRACTOR agrees to comply with all applicable laws, rules, regulations and policies, including those relating to nondiscrimination, accessibility and civil rights. CONTRACTOR agrees to timely file all required reports, make required payroll deductions, and timely pay all taxes and premiums owed, including sales and use taxes, unemployment compensation and workers' compensation premiums. CONTRACTOR shall have and keep current at all times during the term of this Contract all licenses and permits required by law.

46. STATE AUDIT

Any directly pertinent records, regardless of physical form, relevant to this Contract are subject to examination by the North Dakota State Auditor, the Auditor's designee, or Federal auditors, if required. The parties agree that, proprietary and confidential information, are confidential and not subject to public disclosure as set forth in N.D.C.C. § 44-04-18.4.

CONTRACTOR shall maintain all of these records for at least three (3) years following completion of this Contract and be able to provide them at any reasonable time. STATE, State Auditor, or Auditor's designee shall provide reasonable notice to CONTRACTOR prior to conducting examination.

47. RIGHT TO INSPECT PLACE OF BUSINESS

At reasonable times, STATE may inspect those areas of CONTRACTOR'S place of business that relate to the performance of this Contract. If STATE makes an inspection, CONTRACTOR must provide reasonable assistance.

48. F.O.B. POINT AND FREIGHT

All commodities purchased through this Contract shall be Free on Board ("F.O.B.") final destination, freight prepaid. Unless specifically stated otherwise, all prices offered must include the delivery costs to any location within the state of North Dakota. Title shall pass to STATE at destination, and the vendor shall be responsible for any freight claims. Title to software will not pass to the STATE at any time.

49. EFFECTIVENESS OF CONTRACT

This Contract is not effective until fully executed by all parties. If no start date is specified in the Term of Contract, the most recent date of the signatures of the parties shall be deemed the Effective Date.

CONTRACTOR	STATE OF NORTH DAKOTA
Motorola Solutions, Inc.	Acting through its Office of Management and Budget
BY:	BY:
Printed Name: Chris Lonnett	Printed Name: Sherry Neas
Title: Vice President, Central US and Canada Government Sales	Title: Director, Central Services Division
Date: 1-28-2019	Date: 1/24/19

STATE OF NORTH DAKOTA
Acting through its Information Technology Department
BY:
Printed Name: Shawn Riley
Title: Chief Information Officer
Date: 25 Jan 19

EXHIBIT A – Software License Agreement

Motorola Solutions' Contractor Software License Agreement (SLA) is proposed in relation to Section 24 of the State of North Dakota's Attachment 7. This SLA follows.

Contractor Software License Agreement

This Exhibit A Software License Agreement ("Agreement") is between CONTRACTOR., ("Motorola"), and STATE ("Licensee").

For good and valuable consideration, the parties agree as follows:

1. DEFINITIONS

a. "Designated Products" means products provided by Motorola to Licensee with which or for which the Software and Documentation is licensed for use.

b. "Documentation" means product and software documentation that specifies technical and performance features and capabilities, and the user, operation and training manuals for the Software (including all physical or electronic media upon which such information is provided).

c. "Open Source Software" means software with either freely obtainable source code, license for modification, or permission for free distribution.

d. "Open Source Software License" means the terms or conditions under which the Open Source Software is licensed.

e. "Primary Agreement" means the Statewide Interoperable Radio Network Contract #111 to which this exhibit is attached.

f. "Security Vulnerability" means a flaw or weakness in system security procedures, design, implementation, or internal controls that could be exercised (accidentally triggered or intentionally exploited) and result in a security breach such that data is compromised, manipulated or stolen or the system damaged.

g. "Software" (i) means proprietary software in object code format, and adaptations, translations, de-compilations, disassemblies, emulations, or derivative works of such software; (ii) means any modifications, enhancements, new versions and new releases of the software provided by Motorola; and (iii) may contain one or more items of software owned by a third-party supplier. The term "Software" does not include any third-party software provided under separate license or third party software not licensable under the terms of this Agreement.

2. SCOPE

Motorola and Licensee enter into this Agreement in connection with Motorola's delivery of certain proprietary software or products containing embedded or pre-loaded proprietary software, or both. This Agreement contains the terms and conditions of the license Motorola is providing to Licensee, and Licensee's use of the proprietary software and related documentation.

3. GRANT OF LICENSE

a. Subject to the provisions of this Agreement and the payment of applicable license fees, Motorola grants to Licensee a personal, limited, non-transferable (except as permitted in

Section 7) and non-exclusive license under Motorola's copyrights and Confidential Information (as defined in the Primary Agreement) embodied in the Software to use the Software, in object code form, and the Documentation solely in connection with Licensee's use of the Designated Products. This Agreement does not grant any rights to source code.

b. If the Software licensed under this Agreement contains or is derived from Open Source Software, the terms and conditions governing the use of such Open Source Software are in the Open Source Software Licenses of the copyright owner and not this Agreement. If there is a conflict between the terms and conditions of this Agreement and the terms and conditions of the Open Source Software Licenses governing Licensee's use of the Open Source Software, the terms and conditions of the license grant of the applicable Open Source Software Licenses will take precedence over the license grants in this Agreement. If requested by Licensee, Motorola will use commercially reasonable efforts to: (i) determine whether any Open Source Software is provided under this Agreement; and (ii) identify the Open Source Software and provide Licensee a copy of the applicable Open Source Software License (or specify where that license may be found).

4. LIMITATIONS ON USE

a. Licensee may use the Software only for Licensee's internal business purposes and only in accordance with the Documentation. Any other use of the Software is strictly prohibited. Without limiting the general nature of these restrictions, Licensee will not make the Software available for use by third parties on a "time sharing," "application service provider," or "service bureau" basis or for any other similar commercial rental or sharing arrangement.

b. Licensee will not, and will not allow or enable any third party to: (i) reverse engineer, disassemble, peel components, decompile, reprogram or otherwise reduce the Software or any portion to a human perceptible form or otherwise attempt to recreate the source code; (ii) modify, adapt, create derivative works of, or merge the Software; (iii) copy, reproduce, distribute, lend, or lease the Software or Documentation to any third party, grant any sublicense or other rights in the Software or Documentation to any third party, or take any action that would cause the Software or Documentation to be placed in the public domain; (iv) remove, or in any way alter or obscure, any copyright notice or other notice of Motorola's proprietary rights; (v) provide, copy, transmit, disclose, divulge or make the Software or Documentation available to, or permit the use of the Software by any third party or on any machine except as expressly authorized by this Agreement; or (vi) use, or permit the use of, the Software in a manner that would result in the production of a copy of the Software solely by activating a machine containing the Software. Licensee may make one copy of Software to be used solely for archival, back-up, or disaster recovery purposes; provided that Licensee may not operate that copy of the Software at the same time as the original Software is being operated. Licensee may make as many copies of the Documentation as it may reasonably require for the internal use of the Software.

c. Unless otherwise authorized by Motorola in writing, Licensee will not, and will not enable or allow any third party to: (i) install a licensed copy of the Software on more than one unit of a Designated Product; or (ii) copy onto or transfer Software installed in one unit of a Designated Product onto one other device. Licensee may temporarily transfer Software installed on a Designated Product to another device if the Designated Product is inoperable or malfunctioning, if Licensee provides written notice to Motorola of the temporary transfer and identifies the device on which the Software is transferred.

Temporary transfer of the Software to another device must be discontinued when the original Designated Product is returned to operation and the Software must be removed from the other device. Licensee must provide prompt written notice to Motorola at the time temporary transfer is discontinued.

d. Licensee will maintain, during the term of this Agreement and for a period of two years thereafter, accurate records relating to this license grant to verify compliance with this Agreement. Motorola or an independent third party (“Auditor”) may inspect Licensee’s premises, books and records, upon reasonable prior notice to Licensee, during Licensee’s normal business hours and subject to Licensee's facility and security regulations. Motorola is responsible for the payment of all expenses and costs of the Auditor. Subject to state law, including NDCC § 44-04, any information obtained by Motorola and the Auditor will be kept in strict confidence by Motorola and the Auditor and used solely for the purpose of verifying Licensee's compliance with the terms of this Agreement.

5. OWNERSHIP AND TITLE

Motorola, its licensors, and its suppliers retain all of their proprietary rights in any form in and to the Software and Documentation, including, but not limited to, all rights in patents, patent applications, inventions, copyrights, trademarks, trade secrets, trade names, and other proprietary rights in or relating to the Software and Documentation (including any corrections, bug fixes, enhancements, updates, modifications, adaptations, translations, de-compilations, disassemblies, emulations to or derivative works from the Software or Documentation, whether made by Motorola or another party, or any improvements that result from Motorola’s processes or, provision of information services). No rights are granted to Licensee under this Agreement by implication, estoppel or otherwise, except for those rights which are expressly granted to Licensee in this Agreement. All intellectual property developed, originated, or prepared by Motorola in connection with providing the Software, Designated Products, Documentation or related services, remains vested exclusively in Motorola, and Licensee will not have any shared development or other intellectual property rights.

6. LIMITED WARRANTY; DISCLAIMER OF WARRANTY

a. Unless otherwise stated in the Primary Agreement, the commencement date and the term of the Software warranty will be a period of ninety (90) days from Motorola's shipment of the Software (the "Warranty Period"). If Licensee is not in breach of any of its obligations under this Agreement, Motorola warrants that the unmodified Software, when used properly and in accordance with the Documentation and this Agreement, will be free from a reproducible defect that eliminates the functionality or successful operation of a feature critical to the primary functionality or successful operation of the Software. Whether a defect occurs will be determined by Motorola solely with reference to the Documentation. Motorola does not warrant that Licensee’s use of the Software or the Designated Products will be uninterrupted, error-free, completely free of Security Vulnerabilities, or that the Software or the Designated Products will meet Licensee’s particular requirements. Motorola makes no representations or warranties with respect to any third-party software included in the Software. Notwithstanding, any warranty provided by a copyright owner in its standard license terms will flow through to Licensee for third party software provided by Motorola.

b. Motorola’s sole obligation to Licensee and Licensee’s exclusive remedy under this warranty is to use reasonable efforts to remedy any material Software defect covered by this warranty. These efforts will involve either replacing the media or attempting to correct significant, demonstrable program or documentation errors or Security Vulnerabilities. If Motorola cannot correct the defect within a reasonable time, then at Motorola’s option, Motorola will replace the defective Software with functionally-equivalent Software, license to Licensee substitute Software which will accomplish the same objective or terminate the license and refund the Licensee’s paid license fee.

c. Warranty claims are described in the Primary Agreement.

The express warranties set forth in this Section 6 are in lieu of, and Motorola disclaims, any and all other warranties (express or implied, oral or written) with respect to the Software or Documentation, including, without limitation, any and all implied warranties of condition, title, non- infringement, merchantability, or fitness for a particular purpose or use by Licensee (whether or not Motorola knows, has reason to know, has been advised, or is otherwise aware of any such purpose or use), whether arising by law, by reason of custom or usage of trade, or by course of dealing. In addition, Motorola disclaims any warranty to any person other than Licensee with respect to the Software or Documentation.

7. TRANSFERS

Licensee will not transfer the Software or Documentation to any third party without Motorola's prior written consent. Motorola’s consent may be withheld at its discretion and may be conditioned upon transferee paying all applicable license fees and agreeing to be bound by this Agreement. If the Designated Products are Motorola's radio products and Licensee transfers ownership of the Motorola radio products to a third party, Licensee may assign its right to use the Software (other than CPS and Motorola's FLASHport® software) which is embedded in or furnished for use with the radio products and the related Documentation; provided that Licensee transfers all copies of the Software and Documentation to the transferee, and Licensee and the transferee sign a transfer form to be provided by Motorola upon request, obligating the transferee to be bound by this Agreement.

8. TERM AND TERMINATION

a. Licensee’s right to use the Software and Documentation will begin when the Primary Agreement is signed by both parties and will continue for the life of the Designated Products with which or for which the Software and Documentation have been provided by Motorola, unless Licensee breaches this Agreement, in which case this Agreement and Licensee's right to use the Software and Documentation may be terminated immediately upon notice by Motorola.

b. Within thirty (30) days after termination of this Agreement, Licensee must certify in writing to Motorola that all copies of the Software have been removed or deleted from the Designated Products and that all copies of the Software and Documentation have been returned to Motorola or destroyed by Licensee and are no longer in use by Licensee.

c. Licensee acknowledges that Motorola made a considerable investment of resources in the development, marketing, and distribution of the Software and Documentation and that Licensee's breach of this Agreement will result in irreparable harm to Motorola for which monetary damages would be inadequate. If Licensee breaches this Agreement,

Motorola may terminate this Agreement and be entitled to all available remedies at law or in equity (including immediate injunctive relief and repossession of all non-embedded Software and associated Documentation unless Licensee is a Federal agency of the United States Government).

9. COMMERCIAL COMPUTER SOFTWARE

a. U.S. GOVERNMENT END USERS. The Software, Documentation and updates are commercial items as that term is defined at 48 C.F.R. Part 2.101, consisting of "commercial computer software" and "computer software documentation" as such terms are defined in 48 C.F.R. Part 252.227-7014(a)(1) and 48 C.F.R. Part 252.227-7014(a)(5), and used in 48 C.F.R. Part 12.212 and 48

C.F.R. Part 227.7202, as applicable. Consistent with 48 C.F.R. Part 12.212, 48 C.F.R. Part 252.227- 7015, 48 C.F.R. Part 227.7202-1 through 227.7202-4, 48 C.F.R. Part 52.227-19, and other relevant sections of the Code of Federal Regulations, as applicable, the Software, Documentation and Updates are distributed and licensed to U.S. Government end users: (i) only as commercial items, and (ii) with only those rights as are granted to all other end users pursuant to the terms and conditions contained herein.

b. If Licensee is licensing Software for end use by the United States Government or a United States Government agency, Licensee may transfer such Software license, but only if: (i) Licensee transfers all copies of such Software and Documentation to such United States Government entity or interim transferee, and (ii) Licensee has first obtained from the transferee (if applicable) and ultimate end user an enforceable end user license agreement containing restrictions substantially identical to the ones contained in this Agreement. Except as stated in the foregoing, Licensee and any transferee(s) authorized by this subsection may not otherwise use or transfer or make available any Motorola software to any third party nor permit any party to do so.

10. GENERAL

a. COPYRIGHT NOTICES. The existence of a copyright notice on the Software will not be construed as an admission or presumption of publication of the Software or public disclosure of any trade secrets associated with the Software.

b. COMPLIANCE WITH LAWS. Licensee acknowledges that the Software is subject to the laws and regulations of the United States and Licensee will comply with all applicable laws and regulations, including export laws and regulations of the United States. Licensee will not, without the prior authorization of Motorola and the appropriate governmental authority of the United States, in any form export or re-export, sell or resell, ship or reship, or divert, through direct or indirect means, any item or technical data or direct or indirect products sold or otherwise furnished to any person within any territory for which the United States Government or any of its agencies at the time of the action, requires an export license or other governmental approval. Violation of this provision is a material breach of this Agreement.

c. THIRD PARTY BENEFICIARIES. This Agreement is entered into solely for the benefit of Motorola and Licensee. No third party has the right to make any claim or assert any right under this Agreement, and no third party is deemed a beneficiary of this Agreement. Notwithstanding the foregoing, any licensor or supplier of third-party software included in the Software will be a direct and intended third party beneficiary of this Agreement.

d. SURVIVAL. Sections 4, 5, 6.3, 7, 8, 9, 10, 11 and 13 survive the termination of this Agreement.

e. SECURITY. Motorola uses reasonable means in the design and writing of its own Software and the acquisition of third-party Software to limit Security Vulnerabilities. While no software can be guaranteed to be free from Security Vulnerabilities, if a Security Vulnerability is discovered, Motorola will take the steps set forth in Section 6 of this Agreement.

EXHIBIT B – Overview

INFORMATION TECHNOLOGY SOLUTION: LMR APCO P25 PHASE 2

1. INFORMATION TECHNOLOGY SOLUTION

The proposal must completely describe the equipment and methods the Offeror intends to use to implement the proposed system. The intent is to allow the Offeror to propose the best equipment, technology and methods available to provide State-of-the-art public safety communications systems of highest quality and performance.

If the Offeror is successful, the Offeror agrees that it shall comply with all requirements throughout the full term of the Contract. Offerors must provide a full response to each item without cross referencing other sections of the proposal. Offerors must use the table format and maintain numbering provided by the STATE to respond to each item. Attachments, documents, or samples must be clearly referenced where in the response they can be found in the in the applicable Item Number.

In addition, the Offeror Response must include any specific references and/or supportive materials as described in the Offeror Response.

The STATE reserves the right to determine whether the supportive materials submitted by the Offeror demonstrate the Offeror will be able to comply with the items below.

The successful Offeror will plan, coordinate and conduct all work with minimal interruption of service to existing critical systems.

General

No.	
1.	Offeror must acknowledge that they have read and understand the North Dakota Statewide Interoperable Radio Network SIRN 20/20 Feasibility Study including the supplements.
	Offeror Response: Comply
2.	Offeror must describe in detail how their proposed solution aligns with Option 1 Hybrid VHF Portable Network in the feasibility study and is compatible with TIA/EIA/TSB-102, TIA/EIA-102 and TIA-102 Standards, or latest approved standards.
	Offeror Response: Comply Extensive coverage and site feasibility analysis plus voice traffic simulation were performed to optimize the designs and provide options to the State. Existing RF sites were prioritized for incorporation in the designs. - Motorola Solutions' proposed design is an 800 MHz Statewide ASTRO25 TDMA radio system.

	Our design provides an affordable, integrated Statewide solution with technology to provide equitable urban and rural representation. The proposed solution improves the challenges cited in the SIRN study with: - Simplified Operations with No Duplicated Systems – the ASTRO25 system provides seamless communications, sustainment and interoperability without the complexity that exists today with overlapping and duplicated systems. - Improved Interoperability with Network Mobility – The proposed solution is networked and allows unit-to-unit operations on the network with operations to dispatch Statewide. Users will not lose connection to their home PSAP. - Automatic Roaming with No Manual Operations – user operation is significantly improved with automatic roaming Statewide. The proposed solution eliminates the burden on field users and dispatchers, requiring constant awareness and announcement of their location with respect to a communications tower. - Coverage without Vehicular Repeaters – The proposed solution includes portable coverage is on-street without use of vehicular repeaters. The proposed Statewide 800 MHz ASTRO25 radio system deploys 800 MHz frequencies at the proposed IP Simulcast subsystems (Urban service area) to support predicted portable coverage in 20 dB loss buildings and at the ASTRO25 Site Repeater (ASR) sites to support predicted mobile coverage and portable coverage on street within Rural service area. The proposed 800 MHz ASTRO25 (P25 TDMA) system is comprised of the following: - Phase 1 Deployment: Primary Core at Bismarck with basic console licenses and optional Dynamic System Resilience (DSR) architecture with Geo Redundant Backup Core at Fargo. - Phase 1 Deployment: Twenty-two (22) IP Console Dispatch Sites (PSAP's) – twenty (20) new MCC7500E console locations and two (2) MCC7500E upgraded locations, with initial seven (7) sets of console spares - Phase 2 Deployment: Supplementary Primary Core Licenses and remaining thirteen (13) sets of console spares - Phase 2 Deployment: Forty-five (45) 800 MHz ASTRO25 Site Repeater (ASR) Sites (existing State-owned sites). - Phase 3 Deployment: Seven (7) 800 MHz IP Simulcast Subsystems (total of eighteen (18) IP Simulcast Sites). - Phase 3 Deployment: Seventy-six (76) 800 MHz ASTRO25 Site Repeater (ASR) Sites. In addition, the initial forty-five (45) RF site deployment provides mobile coverage by leveraging nearly all the same State-owned sites currently in use but with better quality audio over a larger coverage footprint compared to what the State has today with the following: - Radio Coverage: • Improved Mobile Coverage. • Improved Portable on Street Coverage.

	• Improved Portable In-building in Urban Areas. - Features/Maintenance: • Capacity and individual Agency Enhancements. • Interoperability Inter-County and Inter-State. • PSAP Application APIs and Capabilities. • Reliability and Maintenance. • Service with an O & M plan that builds upon the current ecosystem of radio servicers, as well as, various State agencies, such as DES, DOT and ITD which already have the resources and operational expertise in providing PSAP, IT and Maintenance services to the State Radio system. <u>Governance</u> - Technology with Security Groups that Supports Collaborative and Equitable Processes. - Financially and Operationally Sustainable Long Term. <u>Definitions:</u> - The Urban service area is defined as areas with greater than 10k of population. - The Rural service area is defined as the STATE minus the Urban service area. - Portable configuration is APX ASTRO25 TDMA Portable with Remote Speaker Microphone (RSM) in Swivel Case and ½ wavelength antenna at belt/hip (1-meter AGL). The following table is a list of P25 Trunking features available on an ASTRO25 trunking system. Features available on your system will vary dependent on the options purchased.

P25 TRUNKED SYSTEM FEATURE MATRIX

Last Updated: April 28, 2015	RELEASE 7.15		
TIA-102 STANDARD PUBLISHED P25 TRUNKED FEATURES	**FDMA CAI**	**TDMA CAI**	**TIA STANDARDS DOCUMENTS**
P25 CAI TRUNKING - PROJECT 25 COMMON AIR INTERFACE			
VOICE CALLS			
Group Voice Call	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Individual Voice Call	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Availability Check on Called Party	Yes	Yes	TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D/ TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA 102.BCAE
Broadcast Voice Call	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Announcement Group Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Emergency Group Voice Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Emergency Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Pre-Programmed Emergency Group Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.BCAE
Group Regrouping (part of P25 Dynamic Regrouping)	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABH
MOBILITY MANAGEMENT			
Roaming	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Intra-System Roaming (Automatic)	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1
Inter-System Roaming (Manual)	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1
Registration	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Restricting service access only to valid SU	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
De-registration	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Group Affiliation	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Call Restriction	Yes[1]	Yes[1]	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Call Routing	Yes	Yes	TSB102-B
Wide Area Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Location Registration	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1
WUID Validity Timer	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1
KEY MANAGEMENT			
KFD Based Key Management			
Manual Rekeying Features	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
Keyload	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
Key Erase	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
Erase all Keys	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
View Key Info	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
KMF Based Key Management			
Unique Key Encryption Key (UKEK)	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Individual Radio Set Identifier (Ind RSI)	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Key Management Facility Radio Set Identifier (KMF RSI)	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Message Number Period (MNP)	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Keyload	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
View Individual RSI	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Load Individual RSI	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
View KMF RSI	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Load KMF RSI	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
View MNP	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Load MNP	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
View Keyset Info	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Activate Keyset	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A

SECURITY SERVICES			
Confidentiality			
Encryption Transformation			
Traffic Encryption	Yes[3]	Yes[3]	TIA-102.AAAB-A, TIA-102.AAAD-A/ TIA-102.A TIA-102.AAAD-A / TIA-102.BBAC;-1
Integrity			
Chronological Integrity	Yes[4]	Yes[4]	TIA-102.AAAB-A / TIA-102.BBAC;-1
Message Integrity	Yes[5]	Yes[5]	TIA-102.AAAB-A / TIA-102.BBAC;-1
SU Authentication	Yes	Yes	TIA-102.AACE-A / TIA-102.BBAC;-1
Key Management	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Physical Key Distribution	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Over-the-Air Key Distribution	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Key Download Procedures	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Key Activation Procedures	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Destruction of Keys	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Rekey Request	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Provisioning of the MR	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Key Compromise	Yes[6]	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
ENCRYPTION			
Encryption	Yes	Yes	TSB102-B / TIA-102.AAAB-A/TIA-102.AAAD- TIA-102.AACD-A / TIA-102.AACA-A/ TIA-102.BE
DES-OFB Encryption of Voice	Yes	Yes	TSB102-B / TIA-102.AAAD-A / TIA-102.BBAC
AES Encryption of Voice	Yes	Yes	TIA-102.AAAD-A / TIA-102.BBAC;-1
AES Encryption of Packet Data	Yes	Yes	TIA-102.AAAD-A / TIA-102.BBAC;-1
Multiple Encryption Algorithms	Yes	Yes	TIA-102.AACA-A / TIA-102.BBAC;-1
Multiple Encryption Keys	Yes	Yes	TIA-102.AAAD-A / TIA-102.BBAC;-1
SUPPLEMENTARY SERVICES			
Priority Call	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.BCAE
Preemptive Priority Call	Yes[7]	Yes[7]	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.BCAE
Dispatcher Audio Takeover	Yes	Yes	TSB102-BAGA / TIA-102.BBAC;-1 / TIA-102.B
Emergency Alarm	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.CABC-B;B-1
Silent Emergency	Yes	Yes	TSB102-B
Radio Unit Monitoring	Yes[8]	Yes[8]	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.CABC-B;B-1
Talking Party Identification	Yes	Yes	TSB102-B
Call Alerting	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.CABC-B;B-1
Radio Check	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.CABC-B;B-1
Radio Inhibit	Yes	Yes	TSB102-B/ TIA-102.AABD-B /TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.CABC-B;B-1
Radio Uninhibit	Yes	Yes	TSB102-B/ TIA-102.AABD-B /TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.CABC-B;B-1
Alert Tones	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1
SU Status Update	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABA-B / TIA-102.AABB- 102.BBAC;-1 / TIA-102.CABC-B;B-1
Dynamic Regrouping (part of P25 Dynamic Regrouping)	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D 102.AABF-D / TIA-102.AABH
SYSTEM SERVICES			
Network Status Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
System Status Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
Channel Identifier Update Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
Adjacent Status Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
Backup Control Channel Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
MISCELLANEOUS			
Electronic Serial Number	Yes	Yes	TSB102-B
Queuing	Yes	Yes	TIA-102.AABD-B / TIA-102.AABC-D/ TIA-102.AA TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BB TIA-102.CABC-B;B-1
Message Trunking	Yes	Yes	TIA-102.AABD-B / TIA-102.AABC-D/ TIA-102.AA TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BB TIA-102.CABC-B;B-1
Transmission Trunking	Yes	Yes	TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AA TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BB TIA-102.CABC-B;B-1
Network Access Code	Yes	Yes	TIA-102.AABD / TIA-102.BBAC;-1
Extended hunt sequence	Yes	Yes	TIA-102.AABD / TIA-102.BBAC;-1

PHYSICAL LAYER				
P25 Phase 1 FDMA				
P25 Phase 1 FDMA CAI	Yes	N/A	TSB102-B / TIA-102.BAAA-A/TIA-102.BAAC-(102.BAAB-B
Enhanced Full Rate Vocoder	Yes	N/A	TIA-102.BABA / TSB-102.BABE / TIA-102.BAB 102.BABC / TSB-102.BABD /TIA-102.BAA
Frequency Division Multiple Access (FDMA)	Yes	N/A	TSB102-B / TIA-102.BAAA-A /TIA-102.BAA
9.6 kbps Gross Bit Rate	Yes	N/A	TSB102-B / TIA-102.BAAA-A/TIA-102.BAA
C4FM and CQPSK Modulation	Yes	N/A	TSB102-B / TIA-102.BAAA-A / TIA-102.BAAC-(102.CAAA-D / TIA-102.CAAB-D / TIA-102.BA
12.5 KHz Channel Bandwidth	Yes	Yes	TIA-102.CAAA-D / TIA-102.CAAB-D / TIA-102.B
P25 Phase 2 TDMA			
P25 Phase 2 TDMA CAI	N/A	Yes	TIA-102.BBAB / TIA-102.BCAD / TIA-102.BC
Enhanced Half Rate Vocoder	N/A	Yes[9]	TIA-102.BABA-1 / TSB-102.BABE / TIA-102.BAE 102.BABC / TSB-102.BABD / TSB-102.BABF 102.BABG / TIA-102.BCAD / TIA-102.BCA
Time Division Multiple Access (TDMA)	N/A	Yes	TIA-102.BBAB / TIA-102.CCAB-A / TIA-102.BCA 102.BCAD
12 kbps Gross Bit Rate	N/A	Yes	TIA-102.BBAB / TIA-102.CCAB-A
HCPM and HDQPSK Modulation	N/A	Yes	TIA-102.BBAB / TIA-102.CCAB-A
12.5 KHz Channel Bandwidth	Yes	Yes	TIA-102.BBAB / TIA-102.CCAB-A
DATA SERVICES			
Packet Switched Confirmed Delivery Data	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
Packet Switched Unconfirmed Delivery Data	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
Packet Switched Data Network Access	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
TCP/UDP Port Number Assignments	Yes	N/A[10]	TIA-102.BAJD
Data Configuration - Radio to FNE	Yes	N/A[10]	TIA-102.BAEA-B / TIA-102.BAEB-B / TIA-102.B
Packet Data Registration	Yes	N/A[10]	TIA-102.BAAD-A / TIA-102.BAEB-B
SU Registration	Yes	N/A[10]	TIA-102.BAAD-A / TIA-102.BAEB-B
SU Deregistration	Yes	N/A[10]	TIA-102.BAAD-A / TIA-102.BAEB-B
SU Location Tracking	Yes	N/A[10]	TIA-102.BAAD-A / TIA-102.BAEB-B
Mobile Data Interface (A)	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
Link Layer and Physical Layer Protocols	Yes	N/A[10]	TIA-102.BAEA-B / TIA-102.BAEB-B
SNDCP (Subnetwork Dependent Convergence Protocol)	Yes	N/A[10]	TIA-102.BAEB-B
Fixed Host Data Interface (Ed)	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
Ethernet (802.3)	Yes	N/A[10]	TIA-102.BAEB-B
Internet Protocol Suite	Yes	N/A[10]	TIA-102.BAEB-B

Notes:

[1] Motorola Network Management provides the capability to provision the services available to both subscriber radios and talkgroups.

[2] The P25 KMF utilizes the Phase 1 FDMA data channel. There is no P25 Phase 2 TDMA data channel.

[3] Traffic Encryption is made up of two parts; Voice Traffic Encryption and Encrypted Integrated Data. Voice Traffic Encryption is defined by the P25 standard and Motorola Today there is no published P25 standard for Encrypted Integrated Data however Motorola started offering this feature in the 7.8 release

[4] Today the Project 25 standard defines Chronological Integrity for OTAR, which Motorola offers

[5] Today the Project 25 standard defines Message Integrity for OTAR, which Motorola offers. The Project 25 standard will also support Message Integrity in the future Pack Security standard. Currently, Motorola supports Message Integrity for Encrypted Integrated Data.

[6] Zerorize and No Service procedures can be used in Key Compromise situation

[7] Motorola understands this feature to mean Emergency Priority will Pre-empt a Non-Emergency Call

[8] Motorola supports remote unit monitor for talkgroup calls however it will not support the U2U version of remote unit monitor.

[9] The APX subscriber uses the P25 enhanced vocoder. The XTS/XTL subscriber product portfolio uses the P25 baseline vocoder with added background noise reduction c

[10] The P25 Phase 1 FDMA data channel is used for P25 Packet Data Delivery. There is no P25 Phase 2 TDMA data channel.

Overall Comment – This matrix includes Motorola ASTRO 25 System Release 7.13 System Infrastructure Capabilities. Motorola offers a diverse portfolio of P25 solutions address a wide variety of customer needs. Customers should work with Motorola representatives to ensure that their specific requirements are addressed.

3.	Offeror must acknowledge that the proposed solution will comply with the APCO P25 Phase 1 Standard (TIA/EIATSB-102, TIA/EIA-102 and TIA-102 Standards, or latest approved standards).
	Offeror Response: N/A; the proposed system is APCO P25 TDMA Phase 2.
4.	The Offeror must comply with the following standards, rules, regulations and industry guidelines presented here as they apply to the system, equipment and services proposed, alphabetically with no priority implied: a. American National Standards Institute b. American Society of Testing Materials

	c. Electronic and Telecommunications Industry Associations d. Federal Aviation Administration e. Federal Communications Commission f. Institute of Electrical and Electronics Engineers g. National Electrical Code h. National Electrical Manufacturer's Association i. National Emergency Number Association j. National Fire Protection Association 1221 k. Telecommunications Distribution Methods Manual l. The Association for Public Safety Communications Officials m. Underwriters Laboratories, Inc.
	Offeror Response: Comply
5.	Offeror must acknowledge that they will comply with industry best practices for System installation, grounding, bonding and transient voltage surge suppression (TVSS), as outlined in the following standards: a. Motorola Solutions R56 – Standards and Guidelines for Communication Sites (latest revision) b. Harris Site Grounding and Lightning Protection Guidelines (AE/LZT – 123 4618/1 – latest revision) c. Other Offeror/industry standard – Offeror shall provide to the STATE for review and approval prior to contract award. d. If the Offeror cannot meet any of the standards or guidelines listed in this RFP, the Offeror shall list all deviations in their Proposal for approval or denial by the STATE.
	Offeror Response: Comply Motorola Solutions' system installation will be compliant to the latest revision of the R56 standards. R-56 Standard We have created and maintained an industry standard for installation of Communication Sites titled Motorola Solutions R56 – Standards and Guidelines for Communications Sites. This standard assures that our installations, as well as those of our contractors, meet the highest and most consistent level of quality. CCSi, or factory staging, performs racking and cabling per R56. Our partners and their technicians are trained in the standard and our Engineers design to the standard. Specific areas covered by the R56 standard include: - Site Design and Development. - Shelter Design and Installation. - External Grounding.

	- Power Sources. - Surge Protection. - Minimizing Site Interference. - Equipment Installation.
6.	The Offeror must outline how their proposed solution enhances interoperability of communications for the State and its local and county partners.
	Offeror Response: Comply Interoperability across the state between state and local partners is one of the many benefits to be derived from the new ASTRO25 statewide radio system which has interoperability at its core and includes many enhancements such as: - A single shared Project 25 Radio System with Integrated Dispatch Centers to communicate throughout the State. - One System Hardware Platform and System Software Release. - One/Single Shared Private IP Network. - Shared RF Sites and RF Channels. - Integrated Dispatch centers with One/Single System. - One/Single Radio User Database. The optional ISSI 8000 solution Motorola Solutions will deploy is built to the P25 ISSI standards and connects with P25 ISSI Compliant Broadband solutions and other P25 RF systems. Regardless of bands or brands, Motorola Solutions will deliver complete and total interoperability. We will offer this while providing the ability for manual roaming between the proposed system and other systems in the region while maintaining communications with home dispatch. All state, county and local partners will be able to communicate 24/7/365.
7.	Offeror must acknowledge that at any time during the transition to the proposed solution interoperability and coverage will not be decreased.
	Offeror Response: Comply The proposed ASTRO25 Statewide radio system will be constructed alongside the current existing systems in the State. The interoperability and coverage provided by current systems will be retained by utilizing Conventional Channel Gateway's (CCGW's) at the dispatch console (Phase 1 Deployment) and RF sites (Phase 2 Deployment). ASTRO25 Statewide radio system coverage is gained as RF sites are completed during the Phase 3 Deployment.
8.	Offeror must describe in detail how the proposed solution can be incorporated and interoperable with FirstNet.
	Offeror Response: Comply

	Incident response frequently requires that public safety, public works and/or federal agencies work closely together. As you are aware, separate data communications networks make interagency collaboration difficult. Broadband applications that are interoperable with LMR allow different agencies to share information with each other across broadband and mission-critical voice networks which is what Motorola Solutions will deliver. As a world leader in interoperable solutions, Motorola Solutions offers interoperability with FirstNet as follows: Motorola Solutions will provide: - FirstNet gateway at the proposed master site (Phase 2). - FirstNet gateway at the optional backup core (Phase 2, if purchased). Motorola Solutions will facilitate FirstNet connectivity for all of North Dakota's state, county and local agencies.
9.	Offeror must acknowledge that **ALL** costs are included in the cost proposal and be clearly defined in Attachment 1 Cost Proposal. This includes any items that are optional. If the cost is not clearly defined in the Cost Proposal then that feature, item, license etc. is included as a part of the solution or at no cost.
	Offeror Response: Comply Motorola Solutions complies with the understanding that all costs are included for the system as described in the proposal.
10.	Offeror must acknowledge that all prices will be held firm for the initial term of the Contract. Price adjustments shall apply to both fixed and indefinite quantity elements of the Contract. Because of uncertainty over when implementation will begin, a price adjustment factor for each renewal option(s) shall be set based on the CPI with the purpose of mitigating contractor risk in a long-term contract. Prices proposed in the Attachment 1 price sheets should all be in today's dollars. Accordingly: a. Prices paid for any fixed price element shall be adjusted based on the year in which it is implemented. b. Prices paid for any equipment item, optional or not, will be based on MSRP minus a discount rate. c. Prices paid for optional services labor will be adjusted based on the year in which the service is given. d. Prices paid for optional services upgrades or additions (not equipment) beyond the fixed price scope of work shall be based on the year in which the optional services or additions are ordered.
	Offeror Response: Comply
11.	Offeror must acknowledge the sequence of actions to implement a price adjustment is as follows:

	a. Prior to each renewal, the STATE shall advise the Offeror of the allowable percentage adjustment that may be applied for each labor rate for the twelve-month period following the anniversary date. The adjustment shall be based on the change in the CPI. In the event the calculation exceeds five percent (5%), the maximum increase shall be limited to five percent (5%) of the then current Contract labor rates. b. Within fifteen (15) calendar days of the receipt of the STATE'S notice of adjustment, the Offeror shall submit a schedule of revised labor rates to the STATE if it wishes to obtain a rate increase. In the event the CPI for the measured period is negative, the Offeror shall reduce prices accordingly. In the event the CPI for the measured period is positive, the Offeror shall have the option of keeping existing Contract prices or changing to any price up to the maximum allowable percentage increase. c. The adjustment for any renewal will be calculated as a percentage resulting from the change in the index for the most recent twelve-month increments beginning from the most current month available as posted by the U.S. Department of Labor, Bureau of Labor Statistics. (The second year would be one twelve-month increment; the third year would be two twelve-month increments and so on). A price for any fixed price element in the Contract would be determined by the year in which the order is placed. The price adjustment for a contract year would fix the price for the entire year. Additionally, if an ordered requirement has a duration that crosses into the next contract year, the price would not change but shall be determined by the order date no matter how long it takes to complete the tasks outlined in the SOW. d. The revised labor rate schedule shall be used for billing effective the first day of each successive year of the Contract.
	Offeror Response: Comply
12.	Offeror must acknowledge that they may leverage existing government assets (i.e. infrastructure, STAGEnet)
	Offeror Response: Comply The proposed design is primarily anchored on assets that are currently owned or used by public safety. In addition to the benefit of State-owned assets, the design also incorporates strategically situated sites that are already constructed and owned by third parties. In addition, the proposed offering recommends the continued State usage of existing STAGEnet and DCN backhaul with expansions as required. Due to the length and size of the tables, detailed tables indicating tower sites were originally included in Section 9, Appendix.
13.	If the Offeror is proposing a solution. without leveraging existing government assets, Offeror must describe in detail the proposed solution and include justification of how it will be more cost effective.

	Offeror Response: Comply The proposed solution leverages existing government assets. The design also supplements coverage of the existing State sites by using third-party sites that are already constructed. This design reduces the site count, decreases the implementation budget and speeds up the deployment with existing infrastructure and thereby reduces overall cost.
14.	Offeror must describe in detail the proposed solution's ability to support interoperability with local entities in neighboring States without negatively impacting operations.
	Offeror Response: Comply Motorola Solutions offers the highest level of interoperability; all surrounding states utilize Motorola Solutions trunking technology. We will provide additional enhanced feature sets for the State of North Dakota, not available from any other vendor. The proposed Statewide ASTRO25 radio system is capable of supporting interoperability with local entities in neighboring States via optional ISSI 8000. The optional ISSI 8000 solution is built to the P25 ISSI standards and connects with P25 ISSI Compliant Broadband solutions and other P25 RF systems regardless of their RF bands, manufacturer type and release versions. The optional ISSI 8000 provides customers more interoperability choices and allows them more features (i.e. optional Automatic Seamless Roaming, PTT ID, P25 TDMA support, Emergency Alarm). The optional ISSI 8000 provides interoperability between the proposed system and other systems in the region, while maintaining communications with home dispatch.
15.	Offeror must acknowledge that the proposal must be based on the most recent product release in its respective category and include a product lifecycle roadmap for no less than 15 years for all equipment proposed.
	Offeror Response: Comply With regard to our product lifecycle roadmap, Motorola Solutions will support the proposed ASTRO25 infrastructure platform for 15 years. Our compliance is based on the State's purchase of an on-going System Upgrade Agreement (SUA) during the 15-year period and applicable third-party support agreements which may include logging, UPS and batteries which typically require replacement in years 8-10.
16.	Offeror must acknowledge that the STATE considers subscriber unit products which the manufacturer plans to discontinue sales and/or support for within seven years from final system acceptance to be "end of lifecycle" products and specifically identify any use of these products.

	Offeror Response: Comply Motorola Solutions complies for the initial implementation. There are no anticipated cancellation dates for the APX subscriber units included in this proposal.
17.	Offeror must acknowledge in the case of sourced and non-sourced products, if software updates and upgrades require the replacement of hardware during this 15-year period, the STATE will consider this "end of lifecycle" and the successful Offeror will provide the replacement hardware at no cost to the STATE and specifically identify any use of these products.
	Offeror Response: Comply If a new system update or software upgrade of the infrastructure requires the replacement of hardware associated with those specific system components, that would be included as part of a System Upgrade Agreement (SUA). Our compliance is based on the State's purchase of an on-going SUA during the 15-year period and the applicable third-party support agreements.
18.	Offeror must acknowledge that their proposal includes a Statement on official manufacturer letter head signed by an individual authorized to legally bind the manufacturer indicating the manufacturer will support equipment proposed by supplying new parts for repair for a period of not less than 15 years and indicate where in the proposal it can be found.
	Offeror Response: Comply This requirement is addressed in the originally submitted Cover Letter in Section 1. As stated in the cover letter, and as part of the contract, Motorola Solutions will support infrastructure equipment by supplying new parts for a period of no less than fifteen (15) years.
19.	Offeror must provide a detailed diagram (along with the necessary descriptions) of the proposed solution architecture for the proposed solution and all integration for secondary systems (Example: Paging, Voice Recording, Fire Station Alerting, GPS mapping, etc.).
	Offeror Response: Comply The detailed diagram was originally included in Section 9, Appendix. Current diagrams for the negotiated project scope are included by reference in the Phase 2 Statement of Work, section 32, subsection a.
20.	Offeror must describe in detail their approach to working with the STATE on any interfaces needed for the proposed solution

	Offeror Response: Comply Motorola Solutions proposed Statewide ASTRO25 radio system is capable of many Application Programming Interfaces (API's). A listing of applicable API's follows: Core Level API's Include: - Flexible Computer Aided Dispatch Interface (CADI) is not proposed. - Flexible Air Traffic Interface Access (ATIA) plus services for ten (10) hours of technical support is proposed. Zone Level API Include: - Intelligent Middleware (IMW) API is Standard with each IMW. IMW is optionally proposed as part of GPS Location and Over the Air Rekeying features. Console API's Include: - MCC7500 API is standard with each MCC7500E or MCC7500E VPM console operator position. - Archiving Interface Server (AIS) API is standard with each optional AIS. The Software Development Kit (SDK) for each API requires a license agreement to be executed between the software developer and Motorola Solutions. Motorola Solutions will provide instruction, quote license fee and plant technical support quote upon request.

2. RF COVERAGE

The goal of this section is to:

- *Provide equal to or better overall coverage than current radio systems*
- *Provide 95% mobile radio coverage in each region*
- *Provide 85% on-street portable service in each region*
- *Address coverage gaps outlined by stakeholders*
- *Provide in-building coverage as described.*

No.	
1.	Offeror must describe in detail how the proposed solution will: a. Improve user experience b. Address critical coverage gaps c. Improve portable coverage Statewide d. Improve in-building coverages in urban areas e. Improve interoperability between all Public Safety entities within the State. f. Improve interoperability with State and local entities with neighboring States. g. Improve interoperability with agencies within Canada along border.
	Offeror Response: Comply **800 MHz Solution:** Fact: Organized Spectrum with 45MHz Guard Band Key Benefits: - Better digital quality voice transmissions. • Cleaner spectrum with reduced RF interference with Guard Band. • Significantly lower noise floor levels with Guard Band. - Much easier to expand system capacity. - Fewer tower sites needed. - Better inbound coverage with use of tower top amplifiers with Guard Band. - Major cost savings in combining equipment. Fact: Shorter Wavelength Key Benefits: - Better portable coverage. • Inside buildings and fill-in areas due to reflections off of hard surfaces. • Due to body loss when worn on hip. Fact: Balanced Coverage Predictions (Talk-out vs. Talk-in) Key Benefits: - Users are able to reach dispatch where they can hear dispatch. - Better roaming experience for users between RF sites.

	Portable configuration is APX ASTRO25 TDMA Portable with Remote Speaker Microphone (RSM) in Swivel Case and ½ wavelength antenna at belt/hip (1-meter AGL). The Urban service area is defined as areas with greater than 10k of population. The Urban coverage commitment is 95% service area reliability for portable configuration described above in 20 dB loss buildings (both Talk-in and Talk our directions with DAQ 3.4): - Seven (7) Simulcast Subsystems, with total of eighteen (18) Simulcast subsites (Phase 3 Deployment). - The Rural service area is defined as the State minus the Urban service area. - The Rural coverage commitment is 95% service area reliability for portable configuration described above on street (both Talk-in and Talk our directions with DAQ 3.4). - 121 ASTRO25 Site Repeater sites. NOTE – The combined total number of RF sites are 139 for the 800 MHz system solution deployed throughout Phases 2 and 3. The State's public safety interoperability experience is improved due to utilization of common RF sites and frequencies. The interoperability experience with neighboring States and agencies along Canada is improved due to the proposed single P25 TDMA system's optional ISSI 8000.
2.	Offeror must acknowledge that the proposed solution shall provide each region (as defined Attachment 2) with 95% mobile coverage throughout the geographically bounded area of the region at 95% reliability.
	Offeror Response: Comply
3.	Offeror must acknowledge that the proposed solution shall provide each region with 85% portable coverage, with 95% reliability.
	Offeror Response: Comply
4.	Offeror must describe in detail the ability for regions to improve coverage.
	Offeror Response: Comply Our ASTRO25 system is easily expandable with capacity and coverage to satisfy the State's need for future growth. Extensive coverage and site feasibility analysis plus voice traffic simulation were performed to optimize the designs and provide options to the State. Existing RF sites were prioritized for incorporation in the designs. Strategic RF Sites, either existing, Greenfield and third-party, are selected to provide the required Mobile

	coverage and Portable on street coverage in the four regions' service areas, plus portable in 20 dB loss buildings coverage in the Urban service area.
5.	Offeror must acknowledge that the region non-covered areas (i.e., the uncovered 5% mobile) shall not be all in one location. Offeror must acknowledge that the region non-covered areas (i.e., the uncovered 15% portable) shall not be all in one location.
	Offeror Response: Comply with Clarification Understanding the State's budget and value proposition for SIRN, Motorola Solutions is not offering a solution that meets all of the State's coverage requirements, specifically the Rural 10db in-building requirement. However, Motorola Solutions has thoughtfully designed reliable, deployable systems to provide superior coverage on a platform built to last and capable of expansion by adding sites, capacity, and compatible with future technologies to grow with North Dakota. Every detail was considered so that the State's budget for the initial phase and the total build will not be compromised. The project involved evaluation and careful selection from the State's tower farm of 2,000 sites, which resulted in providing 95% reliability portable on street coverage for 85% of each region, as well as 95% reliability portable in 20dB building coverage for 95% of each urban area, and 95% reliability mobile coverage for 95% of each region. Civil costs for radio tower sites for tower remediation, tower replacement of 50-year-old towers, and providing adequate shelters to remain consistent with the State's shelter requirements, were included so that Motorola Solutions is responsible for the complete construction and not putting the risk on the State. Motorola Solutions completed exhaustive coverage studies in an effort to comply to this requirement. Our findings, based on industry standard studies, concluded that compliance to this requirement would require more than 400 sites. As an example, with over 350 sites, the State of Minnesota does not offer 10dB in-building coverage statewide. Industry-standard studies included factors such as: - Noise floor evaluation - ERP Canadian Line-A restrictions - In-Building coverage requirements Motorola Solutions attempted to meet the Rural 10db in-building requirement by looking at all the sites listed in the Tower List RFP Appendix without considering any new tower construction sites (Greenfield). It was concluded it would take more than 420 sites to meet this requirement. Below are the 95% Reliability Portable 10dB In-building Inbound results from this design, which still comes up short to this requirement when leveraging existing towers: - NW region: 86.43% - NE region: 84.38% - SW region: 75.45% - SE region: 84.69%

	Note that the SW region is lower than the required 85% reliability using sites in the southwest region. With the current subscriber setup, we do not meet the southwest region requirements with the consideration of all sites provided by customer. Taking it one step further, Motorola Solutions evaluated the existing towers and adding in strategic new Greenfield towers. The coverage analysis had a total site count of 433 sites (using 24 Greenfield sites - all in the SW region). This higher count allows us to get closer to meeting the requirement; however still does not reach the 95% Reliability Portable 10dB In-Building requirement of covering at least 85% of the region for inbound only: NW region: 86.22% NE region: 84.37% SW region: 80.77% SE region: 84.69%
6.	As an option, Offeror must describe in detail a proposed solution to provide each county with 95% mobile coverage throughout the geographically bounded area of the county at 95% reliability.
	Offeror Response: Comply Motorola Solutions has provided a solution design by state and region that provides 95% mobile coverage.
7.	As an option, Offeror must describe in detail a proposed solution to provide each county with 85% portable coverage, with 95% reliability.
	Offeror Response: N/A Motorola Solutions has provided a solution design by state and region that provides 85% portable on street coverage.
8.	Offeror must describe in detail the ability for counties to improve coverage.
	Offeror Response: Comply Our ASTRO25 system provides for expansion. The use of additional sites, vehicular repeaters and in-building amplifiers can all be used to enhance coverage. Extensive coverage and site feasibility analysis plus voice traffic simulation were performed to optimize the designs and provide options to the State. Existing RF sites were prioritized for incorporation in the designs. Strategic RF Sites, either existing, Greenfield and third-party, are selected to provide the required Mobile coverage and Portable on street coverage in the four regions' service areas, plus portable in 20 dB loss buildings coverage in the Urban service area.
9.	As an option, Offeror must acknowledge that the county non-covered areas (i.e., the uncovered 5% mobile) shall not be all in one location.

	As an option, Offeror must acknowledge that the county non-covered areas (i.e., the uncovered 15% portable) shall not be all in one location.
	Offeror Response: Comply With Clarification Motorola Solutions has provided a design, by region, that non-covered areas would not exceed 5% mobile and 15% portable all in one location. Understanding the State's budget and value proposition for SIRN, Motorola Solutions' design is not compliant from a county coverage standpoint. This is because of the number of RF tower sites it would take to provide compliancy. As an example, the State of Minnesota ARMER system has over 290 sites and would not meet this requirement for individual county areas. Motorola Solutions evaluated and then carefully selected from the State's tower farm of 1,700 sites. This resulted in providing 95% reliability portable on street coverage for 85% of each region, as well as 95% reliability portable in 20dB building coverage for 95% of each urban area, and 95% reliability mobile coverage for 95% of each region. Civil costs for radio tower sites for tower remediation, tower replacement of 50-year-old towers, and providing adequate shelters to remain consistent with the State's requirements, were included so that Motorola Solutions is responsible for the complete construction and not putting the risk on the State. Every detail was considered so that the State's budget for the initial phase and the total build will not be compromised.
10.	**Expansion** Offeror must describe in detail the proposed solution's ability to be expanded and/or enhanced by adding additional hardware and/or software to increase coverage, capacity, or features. Offeror must describe in detail the expansion capabilities of which the proposed solution is equipped capable.
	Offeror Response: Comply All proposed equipment is modular, and can be expanded to support additional sites for coverage (up to 150 total/zone) or capacity (channel expansion modules or ESS racks). Proposed Expansion Capabilities: ▪ Each proposed ASTRO 25 Repeater Site (ASR) to be deployed in Phases 2 and 3, is equipped with three (3) channels (total of four (4) talkpaths). One GTR 8000 Expandable Sub Subsystem (ESS) rack supports up to six (6) channels. Therefore, three (3) additional channel can be added without adding another ESS rack.

	▪ The proposed Simulcast subsites Fargo/West Fargo are four (4) channels (total of six (6) talkpaths). One GTR 8000 ESS rack support up to six (6) channels total. Therefore, two (2) additional channels can be added without adding another ESS rack. ▪ The proposed Simulcast subsites Bismarck/Mandan (Phase 3) are five (5) channels (total of eight (8) talkpaths). One GTR 8000 ESS rack support up to six (6) channels total. Therefore, one (1) additional channel can be added without adding another ESS rack. ▪ The proposed Simulcast subsites for the five urban cities (Phase 3) are four (4) channels each (total of six (6) talkpaths each). One GTR ESS 8000 rack supports up to 6 channels, therefore two (2) additional channels can be added without adding another ESS rack. ▪ Each proposed PSAP (Phase 1) support additional dispatch console operator positions (50 positions max per dispatch site) and Conventional resources up to 40 ports.
11.	Offeror must describe in detail their ground level noise testing performed within the State of North Dakota, identifying the areas tested. *Offeror Response:* N/A; the proposed ASTRO25 system utilizes 800MHz frequencies.
12.	Offeror must acknowledge that during system testing all inaccessible grids will be eliminated from the calculation. *Offeror Response:* Comply
13.	Offeror must acknowledge that the proposed solution's coverage design, implementation and testing for the solution shall adhere to the TIA TSB #88-D or latest version. *Offeror Response:* Comply 1 Wireless Communications Systems --- Performance in Noise- and Interference-Limited Situations --- Part 1: Recommended Methods for Technology Independent Performance Modeling Technical Service Bulletin TSB 88.1 D, Telecommunications Industry Association (TIA), Arlington VA, 2012. 2 Wireless Communications Systems --- Performance in Noise- and Interference-Limited Situations --- Part 3: Recommended Methods for Technology Independent Performance Verification, Technical Service Bulletin TSB 88.3 D, Telecommunications Industry Association (TIA), Arlington VA, 2013.
14.	Offeror must describe in detail how the proposed solution addresses interoperability with other governmental entities such as, but not limited to Federal Marshall, Bureau of Indian Affairs, Border Patrol, FBI, etc. throughout the proposed phased implementation. *Offeror Response:* Comply

	Interoperability for communication between disparate systems can be accomplished several different ways, when direct system to system interoperability is not possible. Motorola Solutions' system architecture supports console patching when communication with other public safety systems is required, such as, but not limited to Federal Marshall, Bureau of Indian Affairs, Border Patrol, FBI and any other public safety users. For these scenarios, Motorola Solutions proposes the use of its Conventional Channel Gateway (CCGW) as an option for interoperability. System cross band communications through the CCGW could be accomplished using dedicated RF control stations programmed with the neighboring system directly tied into the IP based MCC7500E console or even a remote RF site. This setup allows dispatchers to bridge audio between disparate systems. With the IP based consoles, dispatchers only have to point and click on their computer screens in order to set up and disable this interconnection as needs arise. Likewise, providing radio access to your system can offer the ability for their dispatch to perform similar capabilities.
15.	Offeror must describe in detail how the proposed solution addresses State to State interoperability with Minnesota, South Dakota and Montana and list any expected cost known that neighboring States will incur to create the interoperability proposed.
	Offeror Response: Comply Motorola Solutions offers the highest level of interoperability; all surrounding states utilize Motorola Solutions trunking technology. We will provide additional enhanced feature sets for the State of North Dakota, not available from any other vendor. The proposed Statewide ASTRO25 radio system is capable of supporting interoperability with local entities in neighboring States via optional ISSI 8000. The optional ISSI 8000 solution is built to the P25 ISSI standards and connects with P25 ISSI Compliant Broadband solutions and other P25 RF systems regardless of their RF bands, manufacturer type and release versions. The optional ISSI 8000 provides customers more interoperability choices and allows them more features (i.e. optional Automatic Seamless Roaming, PTT ID, P25 TDMA support, Emergency Alarm). The optional ISSI 8000 provides interoperability between the proposed system and other systems in the region, while maintaining communications with home dispatch.
16.	Offeror must describe in detail how the proposed solution addresses State to Canada interoperability with Manitoba and Saskatchewan and list any expected cost known that the provinces will incur to create the interoperability proposed.
	Offeror Response: Comply Motorola Solutions offers the highest level of interoperability; Manitoba utilizes Motorola Solutions trunking technology. We will provide additional enhanced feature sets for the State of North Dakota, not available from any other vendor. The proposed Statewide ASTRO25 radio system is capable of supporting

	interoperability with local entities in neighboring Canadian Provinces via optional ISSI 8000. The optional ISSI 8000 solution is built to the P25 ISSI standards and connects with P25 ISSI Compliant Broadband solutions and other P25 RF systems regardless of their RF bands, manufacturer type and release versions. The optional ISSI 8000 provides customers more interoperability choices and allows them more features (i.e. optional Automatic Seamless Roaming, PTT ID, P25 TDMA support, Emergency Alarm). The optional ISSI 8000 provides interoperability between the proposed system and other systems in the region, while maintaining communications with home dispatch.
17.	Offeror must describe in detail how the proposed solution addresses State to local interoperability throughout the proposed phased implementation. *Offeror Response:* Comply Motorola Solutions proposed ASTRO25 Statewide radio system will be constructed alongside current existing systems in the State. Current system interoperability and coverage will be retained by utilizing Conventional Channel Gateway's (CCGW's) at the dispatch console and RF sites. Proposed ASTRO25 Statewide radio system coverage is gained as RF sites are completed. The proposed three implementation phases are defined as: 1. High Level Phase 1 Deployment: a. Implement the proposed Primary and Optional Backup Cores (if purchased). b. Implement the proposed twenty-two (22) IP Console Dispatch Sites. 2. High Level Phase 2 Deployment: a. Mobile coverage in the four regions' service areas. b. Implement the proposed ASTRO25 Site Repeater (ASR) Sites. i. Forty-five (45) State-Owned ASR Sites for the 800 MHz solution. 3. High Level Phase 3 Deployment: a. For Mobile coverage commitment in the four regions' service areas, plus Portable on Street coverage commitment in the four regions' service areas, plus Portable in 20 dB loss buildings coverage commitment in Urban service area. b. Implement the proposed seven (7) IP Simulcast subsystems. i. Eighteen (18) total simulcast sites (800 MHz solution.). c. Implement the remaining proposed ASTRO25 Site Repeater (ASR) Sites. i. Seventy-six (76) remaining ASR Sites for the all 800 MHz solution.

	At each MCC7500E radio dispatch console site deployed in Phase 1 (as applicable), GGM 8000 High Density Conventional Channel Gateways (CCGW's) are proposed to support interfacing of the current/existing analog conventional channels. The supported analog conventional channels must be either 4-wire Tone Remote Control and/or E&M control. The design will allow current channels to traverse the ASTRO25 IP network and be able to be provisioned at the proposed MCC7500E radio dispatch console sites for interoperability. Each proposed RF site /tower site deployed throughout Phases 2 and 3 includes one (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of interfacing up to eight (8) current/existing analog conventional channels.
18.	Offeror must describe in detail the propagation models used and the assumptions made in preparation of the maps of The proposed solution
	Offeror Response: Comply **Hydra Overview** Hydra is an innovative software tool developed by Motorola Solutions to accurately predict coverage, model traffic (voice and data), analyze interference, plan channel re-use and perform other design tasks for Motorola Solutions' diverse portfolio of radio networks. This proven tool has been used to determine coverage for all 36 Motorola Solutions' statewide systems. This description concentrates on Hydra's coverage planning aspects. **Hydra Development** Hydra's coverage prediction tool was developed to provide accurate coverage simulations by applying proven models to detailed system and environmental data across large geographical areas. To accurately create a picture of the predicted radio coverage, many elements must be considered. Some of these elements, called system factors, are related to the system design parameters. System factors affecting coverage performance include the following: frequency, distance, transmitter power, receiver sensitivity, antenna height and antenna gain. Other factors, called environmental factors, vary according to the path taken by the radio signal and the environment surrounding the receiver. Environmental factors include the following: terrain variations, obstructions, vegetation, buildings, ambient noise and interference. All coverage prediction methods try to account for both types of factors and incorporate them into a computational model. In general, the currently accepted models, such as Okumura and Longley-Rice, provide excellent portrayals of radio coverage when used within their respective ranges of applicability. In the past, signal strength analysis was adequate for the type of basic systems that were available. However, today's complex technologies, such as digital voice radios, simulcast, packet data systems and broadband data such as LTE require a much more comprehensive analysis of signal and system characteristics to create a cost-effective design. This makes it necessary to use the appropriate coverage and

loading models, provide accurate representation of the environmental factors and apply the analysis method to every location within the service area.

Recognizing these facts, Motorola Solutions has developed Hydra, a multi-purpose radio network design tool that includes both coverage and traffic analysis models. Taking advantage of the knowledge gained from Motorola Solutions' many years of practical experience and coverage testing, Hydra provides a superior means for analyzing system coverage and capacity. This program, unique to Motorola Solutions, employs a technique of computing coverage on every tile in a service area. Hydra computes “layers” of these tiles, with each layer containing the values of propagation model losses, coverage simulation results, or datasets. Layers can be displayed separately or in any combination as maps of the service area.

Hydra Detailed Description

Inputs And Outputs

Inputs to Hydra’s simulations include system architecture, equipment characteristics, service area boundaries, areas of various building losses, subscriber unit distribution density for Traffic analysis, etc.

Hydra’s coverage map outputs are created and displayed using ESRI’s shapefiles, an industry-standard GIS file format. Shapefiles from many sources (GIS vendors, the Internet, your own GIS department, etc.) can be loaded, displayed and used in Hydra to enhance mapping and to define polygons for service areas, building loss areas and subscriber placement. Hydra’s coverage analyses can be limited to specified service area polygons (e.g., a county, a city, or a dispatch territory), so coverage reliability can be analyzed exclusively within the boundaries of your operating area.

In addition to showing coverage reliability, Hydra maps can display terrain, land cover, roads and boundaries, signal strength and field strength, interference predictions, etc.

Hydra, together with Motorola Solutions’ Voyager coverage acceptance testing tool, provides closed-loop integration between predicting and verifying coverage. Field survey measurements – signal strength, Bit Error Rate (BER), data throughput and message success information – can be loaded into Hydra for analysis, display and printing.

Tile Method

Hydra uniformly divides the entire geographical area to be analyzed into small, distinct areas called tiles. The resolution. (size) of the tiles can be as fine as one arc-second (approximately 100 feet at U.S. latitudes). At each tile, Hydra models propagation from each site in the system.

The tile method is of particular importance in the calculation of simulcast coverage and interference analysis. Information from every site and all datasets is available in every tile, providing the most accurate results for multi-site analyses (simulcast, voting, interference, best server, etc.).

Datasets

For propagation prediction, Hydra uses two types of geophysical datasets:

- Hypsographic (terrain elevations) - to determine shadow loss and elevation.
- Morphological (land use) - for environmental clutter loss.

With the proper datasets, Hydra produces accurate results. Because propagation prediction accuracy is directly dependent on the quality of the digitized datasets, Motorola Solutions uses high-quality datasets for its analyses. These datasets originate from commercial or government sources such as the U.S. Geological Survey in the United States and equivalent geodata providers worldwide.

Even the best datasets contain a certain amount of errors, caused by a number of factors that are difficult to completely overcome due to the massive amount of data involved. Dataset errors can originate in the source information or in the dataset development process. Old datasets can also contribute to errors due to physical changes that have taken place since the development of the dataset.

Hydra, like all terrain-based propagation tools, provides coverage predictions that are only as accurate as the available datasets permit. In the U.S., Motorola Solutions uses high-quality terrain and land cover data derived from USGS 30-meter DEM and NLCD sources.

Other datasets which Hydra can use include the following:

- Planimetric (mapping) – roads, water features, political boundaries, feature names, etc.
- U.S. Radio Site Locations – coordinates of existing radio sites, including FCC Wireless Licenses, FCC Antenna Site Registry and some commercial site providers.
- U.S. Frequencies – potentially available channels in geographic areas, per FCC Wireless Licenses.

Propagation Model

For each tile, Hydra predicts signal strength using an improved algorithm based on the industry-accepted Okumura model.

Coverage Reliability

Hydra predicts Area reliability, defined as the probability of achieving a specified performance criterion within a geographical area of interest. The area of interest is either the Covered Area (the painted area on a Hydra coverage map), or the entire Service Area. Possible criteria include voice Delivered Audio Quality (DAQ), data throughput or data Message Success Rate (MSR).

Since system coverage can never be one-hundred percent reliable, there will always be particular times and locations where the signal strength or BER does not meet that needed to reach the performance criterion. These locations of unsatisfactory performance are often predictable in a coverage study. However,

	there are also areas of unsatisfactory coverage that cannot be predicted due to unknown circumstances such as unusual structures, tree density, ambient noise, atmospheric conditions, dataset errors and interference from co-channel or adjacent channel units operating outside their normal service area. Because these conditions exist and signals fade due to these environmental and terrain factors, coverage must be described statistically in terms of a percentage of locations that exhibit the minimum acceptable criterion. To provide radio systems with acceptably few communications failures throughout the Covered Area, Motorola Solutions designs coverage at high Area reliabilities. It is also important to note that locations outside of a Hydra covered area map may still provide useable communications, even though such locations do not achieve the minimum acceptable reliability. **Hydra Capabilities** Voice Systems Hydra's coverage models use proven Okumura-based prediction methods and Monte Carlo simulation techniques to provide coverage reliability maps. Voice coverage models (ASTRO25) provide systemwide coverage maps, as well as subsystem maps (when applicable, e.g., for Simulcast cells and Receiver Voting) and individual site maps. Simulcast Coverage Performance For a simulcast system, merely providing coverage maps of individual sites (separately or on the same map) does not accurately represent the total system performance, which depends upon differential delays and aggregate signal levels. Therefore, Motorola Solutions has developed Hydra's simulcast model which uses the delay spread methodology to simulate aggregate signal strength and power weighted delay throughout the entire predicted coverage area. All locations within the predicted coverage area are analyzed for the combined effect of signal strengths and differential delays from the simulcast transmitters in the system. Hydra's simulcast coverage maps will show any areas predicted to have coverage problems caused by out-of-phase signals and/or inadequate signal strengths. Hydra allows modeling with varied transmitter launch delays to predict optimized simulcast coverage within the area being evaluated.
19.	Offeror must provide a brief description of the methodology the software used to calculate coverage for the proposed solution and documented standards used for calculation.
	Offeror Response: Comply Hydra is an innovative software tool developed by Motorola Solutions to accurately predict coverage, model traffic (voice and data), analyze interference, plan channel re-use and perform other design tasks for Motorola Solutions' diverse portfolio of radio networks. This description concentrates on Hydra's coverage planning aspects. **Hydra Development**

Hydra's coverage prediction tool was developed to provide accurate coverage simulations by applying proven models to detailed system and environmental data across large geographical areas.

To accurately create a picture of the predicted radio coverage, many elements must be considered. Some of these elements, called system factors, are related to the system design parameters. System factors affecting coverage performance include the following: frequency, distance, transmitter power, receiver sensitivity, antenna height and antenna gain. Other factors, called environmental factors, vary according to the path taken by the radio signal and the environment surrounding the receiver. Environmental factors include the following: terrain variations, obstructions, vegetation, buildings, ambient noise and interference.

All coverage prediction methods try to account for both types of factors and incorporate them into a computational model. In general, the currently accepted models, such as Okumura and Longley-Rice, provide excellent portrayals of radio coverage when used within their respective ranges of applicability.

In the past, signal strength analysis was adequate for the type of basic systems that were available. However, today's complex technologies, such as digital voice radios, simulcast, packet data systems and broadband data such as LTE require a much more comprehensive analysis of signal and system characteristics to create a cost-effective design. This makes it necessary to use the appropriate coverage and loading models, provide accurate representation of the environmental factors and apply the analysis method to every location within the service area.

Recognizing these facts, Motorola Solutions has developed Hydra, a multi-purpose radio network design tool that includes both coverage and traffic analysis models. Taking advantage of the knowledge gained from Motorola Solutions' many years of practical experience and coverage testing, Hydra provides a superior means for analyzing system coverage and capacity. This program, unique to Motorola Solutions, employs a technique of computing coverage on every tile in a service area. Hydra computes "layers" of these tiles, with each layer containing the values of propagation model losses, coverage simulation results, or datasets. Layers can be displayed separately or in any combination as maps of the service area.

Hydra Detailed Description

Inputs And Outputs

Inputs to Hydra's simulations include system architecture, equipment characteristics, service area boundaries, areas of various building losses, subscriber unit distribution density for Traffic analysis, etc.

Hydra's coverage map outputs are created and displayed using ESRI's shapefiles, an industry-standard GIS file format. Shapefiles from many sources (GIS vendors, the Internet, your own GIS department, etc.) can be loaded, displayed and used in Hydra to enhance mapping and to define polygons for service areas, building loss areas and subscriber placement. Hydra's coverage analyses can be limited to specified service area polygons (e.g., a county, a city, or a dispatch territory), so

coverage reliability can be analyzed exclusively within the boundaries of your operating area.

In addition to showing coverage reliability, Hydra maps can display terrain, land cover, roads and boundaries, signal strength and field strength, interference predictions, etc.

Hydra, together with Motorola Solutions' Voyager coverage acceptance testing tool, provides closed-loop integration between predicting and verifying coverage. Field survey measurements – signal strength, Bit Error Rate (BER), data throughput and message success information – can be loaded into Hydra for analysis, display and printing.

Tile Method

Hydra uniformly divides the entire geographical area to be analyzed into small, distinct areas called tiles. The resolution. (size) of the tiles can be as fine as one arc-second (approximately 100 feet at U.S. latitudes). At each tile, Hydra models propagation from each site in the system.

The tile method is of particular importance in the calculation of simulcast coverage and interference analysis. Information from every site and all datasets is available in every tile, providing the most accurate results for multi-site analyses (simulcast, voting, interference, best server, etc.).

Datasets

For propagation prediction, Hydra uses two types of geophysical datasets:

- Hypsographic (terrain elevations) - to determine shadow loss and elevation.
- Morphological (land use) - for environmental clutter loss.

With the proper datasets, Hydra produces accurate results. Because propagation prediction accuracy is directly dependent on the quality of the digitized datasets, Motorola Solutions uses high-quality datasets for its analyses. These datasets originate from commercial or government sources such as the U.S. Geological Survey in the United States and equivalent geodata providers worldwide.

Even the best datasets contain a certain amount of errors, caused by a number of factors that are difficult to completely overcome due to the massive amount of data involved. Dataset errors can originate in the source information or in the dataset development process. Old datasets can also contribute to errors due to physical changes that have taken place since the development of the dataset.

Hydra, like all terrain-based propagation tools, provides coverage predictions that are only as accurate as the available datasets permit. In the U.S., Motorola Solutions uses high-quality terrain and land cover data derived from USGS 30-meter DEM and NLCD sources.

Other datasets which Hydra can use include the following:

	▪ Planimetric (mapping) – roads, water features, political boundaries, feature names, etc. ▪ U.S. Radio Site Locations – coordinates of existing radio sites, including FCC Wireless Licenses, FCC Antenna Site Registry and some commercial site providers. ▪ U.S. Frequencies – potentially available channels in geographic areas, per FCC Wireless Licenses. <u>Propagation Model</u> For each tile, Hydra predicts signal strength using an improved algorithm based on the industry-accepted Okumura model. <u>Coverage Reliability</u> Hydra predicts Area reliability, defined as the probability of achieving a specified performance criterion within a geographical area of interest. The area of interest is either the Covered Area (the painted area on a Hydra coverage map), or the entire Service Area. Possible criteria include voice Delivered Audio Quality (DAQ), data throughput or data Message Success Rate (MSR). Since system coverage can never be one-hundred percent reliable, there will always be particular times and locations where the signal strength or BER does not meet that needed to reach the performance criterion. These locations of unsatisfactory performance are often predictable in a coverage study. However, there are also areas of unsatisfactory coverage that cannot be predicted due to unknown circumstances such as unusual structures, tree density, ambient noise, atmospheric conditions, dataset errors and interference from co-channel or adjacent channel units operating outside their normal service area. Because these conditions exist and signals fade due to these environmental and terrain factors, coverage must be described statistically in terms of a percentage of locations that exhibit the minimum acceptable criterion. To provide radio systems with acceptably few communications failures throughout the Covered Area, Motorola Solutions designs coverage at high Area reliabilities. It is also important to note that locations outside of a Hydra covered area map may still provide useable communications, even though such locations do not achieve the minimum acceptable reliability.
20.	Offeror must acknowledge that they have included predicted coverage measurements that account for geographic, population and coverage on major roads (Interstate highways, US and State highways) for the State and for each County.
	<u>Offeror Response:</u> Comply Hydra utilizes the following datasets for Terrain, Clutter and Roads: ▪ Terrain, Ultra Hi Res-WGS84 (1 arc-sec resolution.). ▪ Clutter, NLCD 2011 Clutter (30-meter resolution.). ▪ Roads, TIGER 2015.

21.	Offeror must acknowledge that they will provide the coverage statistics for each Implementation Phase, as well as a Statewide Summary. *Offeror Response:* Comply
22.	Offeror must acknowledge that they have submitted both talk-out and talk-in System composite coverage maps for all proposed design configurations. *Offeror Response:* Comply Radio configurations are (DAQ 3.4): 1. Mobile Talk-out. 2. Mobile Talk-in. 3. Portable in swivel case, Talk-out, on Street, with RSM and ½ wavelength antenna at hip. 4. Portable in swivel case, Talk-in, on Street, with RSM and ½ wavelength antenna at hip. 5. Portable in swivel case, Talk-out, in 20 dB Loss Building, with RSM and ½ wavelength antenna at hip. 6. Portable in swivel case, Talk-in, in 20 dB Loss Building, with RSM and ½ wavelength antenna at hip. 7. Portable in swivel case, Talk-out, in 10 dB Loss Building, with RSM and ½ wavelength antenna at hip. 8. Portable in swivel case, Talk-in, in 10 dB Loss Building, with RSM and ½ wavelength antenna at hip. Note: RSM = Remote Speaker Microphone
23.	Offeror must acknowledge that the maps must be clearly labeled and must show System gain calculations for each of the following: a. Mobile radios mounted in vehicles (police car) using roof top unity gain antenna (assume 1.5-meter antenna height): a. Mobile Talk-out b. Mobile Talk-in b. Portable radios outdoors: a. Talk-out to a portable radio worn at the hip (assume 1-meter antenna height) b. Talk-in from a portable radio worn at the hip c. For Urban Portable radios in-building, using -20dB building loss a. Talk-out to a portable radio worn at the hip b. Talk-in from a portable radio worn at the hip d. For Rural Portable radios in-building, using -10dB building loss a. Talk-out to a portable radio worn at the hip b. Talk-in from a portable radio worn at the hip *Offeror Response:* Comply

	Updated KMZ files and Google Earth maps have been included in Exhibit E.
24.	Offeror must acknowledge that the maps depict coverage using a light transparent color or crosshatching for those areas that meet or exceed the minimum coverage reliability threshold.
	Offeror Response: Comply Updated KMZ files and Google Earth maps have been included in Exhibit E.
25.	Offeror must acknowledge that map details such as roadways and boundaries are legible.
	Offeror Response: Comply Updated KMZ files and Google Earth maps have been included in Exhibit E.
26.	Offeror must acknowledge that all maps clearly delineate the difference between areas with coverage predicted to be equal to or greater than DAQ 3.4 and areas that do not meet this coverage.
	Offeror Response: Comply Areas/ tiles that meet or exceed design criteria are colored or painted. The Areas/ tiles that do not meet the design criteria are not colored or not painted. Updated KMZ files and Google Earth maps have been included in Exhibit E.
27.	Offeror must acknowledge that they have provided the coverage maps in following two formats: a. Five (5) hard copies in 11-inch x 17-inch, full-color, that shows Statewide, region and county coverage. b. a KMZ file to a minimum of 10-meter resolution. of radio coverage
	Offeror Response: Comply with Clarification The 139 Site (Phases 2 and 3) KMZ coverage prediction maps for Statewide and four (4) regions are provided. The Statewide and Regions maps depict counties jurisdictional boundaries. The supplied 30-meter resolution. KMZ file is for Informational Purpose Only. KMZ files were included on the requested thumb drives.
28.	Offeror must acknowledge that the coverage maps include sufficient detail to allow another party to duplicate the predicted coverage utilizing propagation software.
	Offeror Response: Comply Updated KMZ files of coverage maps have been included in Exhibit E.

	The required link budgets were originally located in Section 9, Appendix.
29.	Offeror must indicate on the coverage maps any coverage extending beyond the State.
	Offeror Response: Comply Updated KMZ files of coverage maps have been included in Exhibit E.
30.	**Map Criteria** Offeror must acknowledge that all maps must include a background layer suitable for the STATE'S reference (e.g., topographic map, roads, rivers, etc.).
	Offeror Response: Comply Updated KMZ files of coverage maps have been included in Exhibit E.
31.	**Link Budgets** Offeror must acknowledge that the Link budgets provided clearly defining the following minimum information, relating to each map and each site: a. Base station/repeater RF power output b. Antenna manufacturer and model c. Antenna gain d. Antenna down tilt (if applicable) e. Antenna null fill (if applicable) f. Transmitter antenna system loss (combiner and line) g. Transmit ERP h. Receiver sensitivity i. Receiver antenna system loss or gain (multicoupler, line and amplifier loss/gain) j. Antenna height k. Mobile and portable antenna height for talk-out and talk-in l. Mobile and portable RF output power m. The configuration of field units (for example – talk-out to portable inside dB loss buildings) n. Simulcast timing parameters (if applicable)
	Offeror Response: Comply Due to the length of the link budget information, the detailed spreadsheets were originally included in Section 9, Appendix.
32.	Offeror must acknowledge that thirty-meter USGS, NAD-83 terrain elevation data has been used for coverage simulations. 3-arc-second data may be used where 30-meter data is not available. Offeror must indicate where 3-arc-second data may be used and where 30-meter data has been used.

	Offeror Response: Comply Updated KMZ files of coverage maps have been included in Exhibit E.
33.	**Coverage Model** Offeror must acknowledge that they have employed a suitable coverage prediction model using appropriate terrain and land cover data for the State environment in both winter and summer conditions. Offeror must describe in detail the coverage model used to predict their maps.
	Offeror Response: Comply Motorola Solutions performed coverage analysis based on worst case season, summer with foliage. **Hydra Overview** Hydra is an innovative software tool developed by Motorola Solutions to accurately predict coverage, model traffic (voice and data), analyze interference, plan channel re-use and perform other design tasks for Motorola Solutions' diverse portfolio of radio networks. This description concentrates on Hydra's coverage planning aspects. **Hydra Detailed Description** Inputs And Outputs Inputs to Hydra's simulations include system architecture, equipment characteristics, service area boundaries, areas of various building losses, subscriber unit distribution density for Traffic analysis, etc. Hydra's coverage map outputs are created and displayed using ESRI's shapefiles, an industry-standard GIS file format. Shapefiles from many sources (GIS vendors, the Internet, your own GIS department, etc.) can be loaded, displayed and used in Hydra to enhance mapping and to define polygons for service areas, building loss areas and subscriber placement. Hydra's coverage analyses can be limited to specified service area polygons (e.g., a county, a city, or a dispatch territory), so coverage reliability can be analyzed exclusively within the boundaries of your operating area. In addition to showing coverage reliability, Hydra maps can display terrain, land cover, roads and boundaries, signal strength and field strength, interference predictions, etc. Hydra, together with Motorola Solutions' Voyager coverage acceptance testing tool, provides closed-loop integration between predicting and verifying coverage. Field survey measurements – signal strength, Bit Error Rate (BER), data throughput and message success information – can be loaded into Hydra for analysis, display and printing.

Tile Method

Hydra uniformly divides the entire geographical area to be analyzed into small, distinct areas called tiles. The resolution. (size) of the tiles can be as fine as one arc-second (approximately 100 feet at U.S. latitudes). At each tile, Hydra models propagation from each site in the system.

The tile method is of particular importance in the calculation of simulcast coverage and interference analysis. Information from every site and all datasets is available in every tile, providing the most accurate results for multi-site analyses (simulcast, voting, interference, best server, etc.).

Datasets

For propagation prediction, Hydra uses two types of geophysical datasets:

- Hypsographic (terrain elevations) - to determine shadow loss and elevation.
- Morphological (land use) - for environmental clutter loss.

With the proper datasets, Hydra produces accurate results. Because propagation prediction accuracy is directly dependent on the quality of the digitized datasets, Motorola Solutions uses high-quality datasets for its analyses. These datasets originate from commercial or government sources such as the U.S. Geological Survey in the United States and equivalent geodata providers worldwide.

Even the best datasets contain a certain amount of errors, caused by a number of factors that are difficult to completely overcome due to the massive amount of data involved. Dataset errors can originate in the source information or in the dataset development process. Old datasets can also contribute to errors due to physical changes that have taken place since the development of the dataset.

Hydra, like all terrain-based propagation tools, provides coverage predictions that are only as accurate as the available datasets permit. In the U.S., Motorola Solutions uses high-quality terrain and land cover data derived from USGS 30-meter DEM and NLCD sources.

Other datasets which Hydra can use include the following:

- Planimetric (mapping) – roads, water features, political boundaries, feature names, etc.
- U.S. Radio Site Locations – coordinates of existing radio sites, including FCC Wireless Licenses, FCC Antenna Site Registry and some commercial site providers.
- U.S. Frequencies – potentially available channels in geographic areas, per FCC Wireless Licenses.

Propagation Model

For each tile, Hydra predicts signal strength using an improved algorithm based on the industry-accepted Okumura model.

Coverage Reliability

	Hydra predicts Area reliability, defined as the probability of achieving a specified performance criterion within a geographical area of interest. The area of interest is either the Covered Area (the painted area on a Hydra coverage map), or the entire Service Area. Possible criteria include voice Delivered Audio Quality (DAQ), data throughput or data Message Success Rate (MSR). Since system coverage can never be one-hundred percent reliable, there will always be particular times and locations where the signal strength or BER does not meet that needed to reach the performance criterion. These locations of unsatisfactory performance are often predictable in a coverage study. However, there are also areas of unsatisfactory coverage that cannot be predicted due to unknown circumstances such as unusual structures, tree density, ambient noise, atmospheric conditions, dataset errors and interference from co-channel or adjacent channel units operating outside their normal service area. Because these conditions exist and signals fade due to these environmental and terrain factors, coverage must be described statistically in terms of a percentage of locations that exhibit the minimum acceptable criterion. To provide radio systems with acceptably few communications failures throughout the Covered Area, Motorola Solutions designs coverage at high Area reliabilities. It is also important to note that locations outside of a Hydra covered area map may still provide useable communications, even though such locations do not achieve the minimum acceptable reliability.
	RF Coverage – System
34.	Offeror must acknowledge that the coverage design, implementation and testing for the System adheres to the TIA TSB #88-C, *Wireless Communications Systems Performance in Noise-Limited Situations*1 (or latest revision). *Offeror Response:* Comply TSB 88.1 D and TSB 88.3 D are the only subsections cited in CATP document (dated Jan 2017). 1 Wireless Communications Systems --- Performance in Noise- and Interference-Limited Situations --- Part 1: Recommended Methods for Technology Independent Performance Modeling Technical Service Bulletin TSB 88.1 D, Telecommunications Industry Association (TIA), Arlington VA, 2012. 2 Wireless Communications Systems --- Performance in Noise- and Interference-Limited Situations --- Part 3: Recommended Methods for Technology Independent Performance Verification, Technical Service Bulletin TSB 88.3 D, Telecommunications Industry Association (TIA), Arlington VA, 2013.
35.	Offeror must acknowledge that CPC – RF coverage is defined as the digital BER that provides a minimum DAQ 3.4 audio signal for both outbound (talk-out) and inbound (talk-in) communications.

	Offeror Response: Comply
	RF Coverage – In-Building
36.	For Urban, Offeror must acknowledge that the solution shall be designed to provide portable in-building coverage to 95% of the service area with 95% reliability and a DAQ of 3.4 or better.
	Offeror Response: Comply
37.	For Rural, Offeror must acknowledge that the solution shall be designed to provide portable in-building coverage to 85% of the service area with 95% reliability and a DAQ of 3.4 or better.
	Offeror Response: Non Compliant Motorola Solutions completed exhaustive coverage studies in an effort to comply to this requirement. Our findings, based on industry standard studies, concluded that compliance to this requirement would require more than 400 sites. For example, with more than 350 sites, the State of Minnesota does not offer 10dB in-building coverage statewide. Industry-standard studies included factors such as: noise floor evaluation, ERP Canadian Line-A restrictions and In-Building coverage requirements. The summaries of the Greenfield/no Greenfield runs that attempt to meet the 85% BAPC requirement with 10dB in-building loss. Note that neither run was able to meet the requirement with over 400 sites. Motorola is not offering a solution that meets State's Rural 10dB in Building Requirement. Motorola attempted to meet this requirement by looking at all the sites listed in the Tower List RFP Appendix without considering any new tower construction sites(Greenfield). It was concluded it would take more than 420 sites to meet this requirement. Below are the Portable 10dB In-building Inbound results from this design, which still comes up short to this requirement: - NW: 86.43% - NE: 84.38% - SW: 75.45% - SE: 84.69% Note that, using most sites in the southwest region, results are below the required 85% reliability. With the current subscriber setup, and the sites provided by State of North Dakota, we do not meet the southwest region requirements. Leveraging existing and strategic new towers:

	Total site count of 433 sites (using 24 Greenfield sites - all in the southwest region). Using this count brings us closer to meeting the requirement, however we do not achieve the 85% BAPC requirement. BAPC numbers for inbound only: - NW: 86.22% - NE: 84.37% - SW: 80.77% - SE: 84.69%
38.	Offeror must acknowledge that the proposed in building coverage performance needs to be at a minimum of -20 dB building density for Urban and -10 dB building density for Rural. Offeror must acknowledge that the proposed solution will comply with latest IFC (International Fire Code) Section 510.
	Offeror Response: Comply with Clarification Motorola Solutions compliant with -20 dB building density coverage for Urban. Motorola Solutions complies with clarification for the -10 dB building density coverage for Rural. The latest IFC (International Fire Code) Section 510. requires building amplifier systems. Motorola Solutions has not included Building Amplifiers as part of our response, instead, we have designed to an urban area coverage is 20dB buildings. The preliminary Coverage Acceptance Test Plan was originally included in Section 9, Appendix, and will be conducted as part of the Phase 3 Deployment
39.	As an option, Offeror must describe in detail the ability to enhance in-building coverage for structures greater than -20 dB building density.
	Offeror Response: Comply The Bidirectional Amplifier (BDA) design will enhance the in building coverage for structures greater than -20 dB building density. As required and per request a customized BDA quote can be provided to the State.
40.	Offeror must acknowledge that all maps must clearly delineate the difference between areas predicted to be greater than DAQ 3.4 equivalent coverage and areas that do not meet coverage requirements.
	Offeror Response: Comply Areas/ tiles that meet or exceed design criteria are colored or painted.

3. RADIO COMMUNICATIONS SYSTEM

It is the intent for The proposed solution to support open standards providing interoperability between all vendors meeting standards allowing interoperability between all public safety agencies within North Dakota and neighboring States.

No.	
1.	Offeror must acknowledge that they have proposed a System that is configured to operate in APCO P25 Phase 1 (FDMA) mode.
	Offeror Response: N/A as initial system will be APCO P25 Phase 2 from the beginning.
2.	Offeror must describe in detail how the proposed solution can be upgraded to a APCO P25 Phase 2 solution. with the ability to work dynamically with APCO P25 Phase 1.
	Offeror Response: N/A as the proposed system will be APCO P25 Phase 2 initially. The proposed MCC 7500E radio dispatch console system is equipped with vocoding services to support IMBE APCO 25 Phase 1 (FDMA), AMBE APCO 25 Phase 2 (TDMA). Note: The proposed optional subscribers are APCO P25 Phase 2 equipped.
3.	**Spectrum** Offeror must acknowledge that they have proposed a System utilizing any of the unlicensed Public Safety frequencies available for use in the State. In addition, any frequency currently licensed for Public Safety reasons by a ND State or local public safety entity is also eligible for consideration in the proposed solution
	Offeror Response: Comply The proposed Statewide ASTRO25 radio system will utilize current and future Public Safety licensed frequencies.
4.	**Capacity** Offeror shall design the System to a Grade-of-Service of 1% or less. A subscriber unit inventory is provided in Attachment 3. Offeror must determine the number of channels per site based on the user quantities that were gathered during the SIRN 20/20 study with Offeror recommended surplus capacity capable of handling mutual aid events.
	Offeror Response: Comply The traffic loading analysis were conducted based on the subscriber inventory supplied by the State of North Dakota, Motorola Solutions' predicted coverage maps and assuming average public safety profiles for Law, Fire, EMS and Public Works in order to achieve Grade of Service (GoS) of 1% or less.

5.	**Capacity** Offeror must describe in detail how the Offeror calculates capacity for site and how additional capacity can be added.
	Offeror Response: Comply Voice Traffic Prediction The purpose of traffic analysis is to have a theoretical base to estimate the channel requirements for each site and simulcast subsystem in the State's proposed ASTRO 25 radio voice system while maintaining coverage requirements and grade of service (GOS). Essential to any voice traffic engineering study are the inputs used. The best inputs to use for such studies are the real-world traffic information including talkgroups, message transmission lengths, and arrival rate of traffic. Such information can be entered into Motorola's Hydra traffic prediction tool to conduct a thorough traffic study. In the absence of the State's public safety voice profiles information, the Motorola's Hydra predicted traffic loading analysis was based on the subscriber inventory supplied by the STATE, predicted coverage maps, and average public safety profiles for Law, Fire, EMS, and Public Works. Hydra Computer Simulation A "discrete event simulation" is a computer representation of the specific architecture and protocols used in the system to be modeled. After the appropriate inputs are provided and the simulation is started, the modeling is "event driven"; that is, calls are processed, queued, etc., just as they would be in the real system. A simulation clock is maintained, and simulation time passes as events occur; there can be multiple concurrent events at any instant of simulation time (for example, simultaneous multiple call requests). With each event, the status of the simulated system is updated; statistics are collected for performance analysis when the modeling is completed. Note that any simulation is an abstraction of a system, so it can never be 100% perfect nor 100% accurate. The most accurate simulation results are obtained by using inputs which most accurately represent the system being modeled (talkgroup loading, site origination and involvement, quantity and type of channel resources per site, etc.). Also, since simulation results are based on statistical probabilities of events occurring, increasing the number of events (in this case, calls to be simulated) increases the confidence in the simulation results. Hydra uses discrete event simulations of Motorola trunked systems for modeling voice traffic performance. Hydra is a system engineering tool for modeling performance of radio communications systems. Both coverage prediction and traffic analysis are performed in a single simulation tool.

	Additional Site Capacity The proposed ASTRO 25 Site Repeater (ASR) sites (forty-five (45) sites in Phase 2 Deployment and seventy-six (76) sites in Phase 3 Deployment) are equipped with three (3) channels (total of four (4) talkpaths. One GTR 8000 Expandable Sub Subsystem (ESS) rack supports up to six (6) channels. Therefore, three (3) additional channels can be added without adding another ESS rack. The proposed Simulcast subsites (Phase 3 Deployment) Fargo/West Fargo is four (4) channels, for a total of six (6) talkpaths. One (1) GTR 8000 ESS rack supports up to six (6) channels total. Therefore, two (2) additional channels can be added without adding another ESS rack. The proposed Simulcast subsite (Phase 3 Deployment) at Bismarck/Mandan are five (5) channels, for a total of eight (8) talkpaths. One (1) GTR 8000 ESS rack supports up to six (6) channels total. Therefore, one (1) additional channel can be added without adding another ESS rack. The proposed Simulcast subsites (Phase 3 Deployment) for the five urban cities are four (4) channels each, for a total of six (4) talkpaths each. One GTR ESS 8000 rack supports up to six (6) channels, therefore two (2) additional channels can be added without adding another ESS rack.

4. CORE RADIO INFRASTRUCTURE

The STATE utilizes redundant data center locations which may be available for equipment co-location.

No.	
1.	Offeror must provide a diagram (along with the necessary descriptions) of the proposed architecture for the proposed solution Including, but not limited to: a. Console hardware b. Tower facilities and infrastructure c. Core hardware d. Software e. Circuits
	Offeror Response: Comply This diagram was originally included in Section 9, Appendix. Current diagrams for the negotiated project scope are included by reference in the Phase 2 Statement of Work, section 32, subsection a.
2.	Although it is a goal of the STATE to leverage existing STAGEnet infrastructure, the STATE will entertain proposals not utilizing existing STAGEnet infrastructure, including but not limited to dedicated dark fiber, Ethernet transport services and microwave connectivity. Offeror must describe in detail any STAGEnet resources that will be utilized as well as any other resources.
	Offeror Response: Comply Our plan will utilize the existing Dakota Carrier Network (DCN) /STAGEnet to provide Gold (99.999% Backhaul Reliability) Ethernet Transport Service (ETS), to the existing forty-five (45) RF sites (Phase 2 Deployment) and twenty-two (22) dispatch sites (Phase 1 Deployment). Motorola Solutions understands DCN deploys redundancy and patch diversity whenever possible. The Greenfield and third-party tower sites planned for in Phase 3 Deployment will also utilize DCN Gold ETS. As required, the last mile will be constructed by DCN.
3.	If any additional non-STAGEnet network circuits are required, Offeror must describe the proposed circuits including provider, reliability and bandwidth.
	Offeror Response: Comply Our plan will utilize the existing Dakota Carrier Network (DCN)/STAGEnet to provide Gold (99.999% Backhaul Reliability) Ethernet Transport Service (ETS).
4.	Offeror must acknowledge that they will manage all right of way issues, obtain all necessary permits and franchise authority from the respective locale.
	Offeror Response: Comply

5.	Offeror must describe in detail configuration back up procedures and secure storage of all relevant configuration files.
	Offeror Response: Comply Backup and Restore Services Description The proposed ASTRO25 system Backup and Restore (BAR) services provide mechanisms to back up and restore important files. A BAR server works in tandem with BAR Client software to provide the means to back up and restore data for workstations and server devices in the radio system. The server that provides the BAR function exists as a single virtual machine on a Virtual Server host. The Virtual Server host runs on the ESXi operating system. The server that provides the BAR function runs on the Red Hat Enterprise Linux operating system. Two levels of functionality are available: - Baseline functionality: This level is standard with ASTRO25 systems. It supports only the following ASTRO25 system BAR clients: • Domain controllers. • Authentication Center (AuC) server, if this feature is implemented in the system. • Linux-based Network Management servers and zone controllers. • Linux-based BAR Client for backing up the baseline BAR server itself. • Packet Data Gateway. • License Manager. • IP Packet Capture. - Full functionality: This level supports all BAR clients in ASTRO25 systems, as well as the Fortinet FortiManager Server, if present. In a system with the optional Dynamic System Resilience (DSR) functionality implemented, a BAR server exists in both the Primary and Backup cores. Network Attached Storage Device as an Offline Storage NAS The Network Attached Storage (NAS) device is a hardware storage device used to support Backup and Restore (BAR) services providing an off-site archive for backing up Virtual Management Server platforms. It is connected to the virtual server hardware platform through the BAR NAS Connection Port on the extender panel. The port on the panel is connected to the server with a permanent dedicated cable. The NAS device is provided for a BAR Server. Backup and Restore Services Theory of Operation The following explanation is how the centralized Backup and Restore service works in the context of a radio system.

Role of Centralized Backup in System Recovery

Local system backups require manual access to individual system devices, making local backups time intensive and cumbersome. Centralized system backups reduce the effort required to manage system data backup and restore operations.

In the recovery of a device, the software and configuration data are loaded first, followed by the volatile data that was previously backed up. If the volatile data was backed up centrally, the data can be restored remotely. This action reduces the time and effort required, compared to a local data restoration process.

A long-term solution. for recovery should include:

- Implementation of standard operating systems and operating system configurations of devices within the radio network.
- A media server that can restore dynamic files stored on each system.

Backup and Restore Service

The centralized data Backup and Restore (BAR) service collects and stores volatile data from supported devices at the same location. Later, the backed-up data can be restored to the device in the event of a disaster that necessitates recovery of the device. To perform these functions, the BAR Client software must be installed on the device.

Note - The zone core (master site) devices are supported BAR clients only.

Backup Scheduling

You can select the following options when scheduling a data backup:

- Device you want to back up.
- Time that the backup is to occur.
- Frequency of backups from that device.
- Maximum network transfer speed for the backup.
- Whether the backup is recurring or one-time.
- Whether the backup is full or incremental.

Note: If a full backup is chosen, all data requiring backup is transmitted to the central backup storage location. If incremental backup is chosen, only data that has changed since the last backup is transmitted. This system reduces the amount of data that must be transmitted over the local network connection.

Data in the central backup location can be periodically archived to the offline Network Attached Storage (NAS) as part of a recovery plan for the ASTRO25 system.

Data Recovery Service

Data recovery is needed before a device can return to operational status after an event that caused the device to fail or lose data critical to operation. The Backup and Restore (BAR) Service can restore backed up data to devices that:

- Have BAR Client software installed.
- Are registered with the BAR server.

	▪ Have backup schedules. The BAR Client computes the amount of free disk space on the device being restored to ensure that there is enough space to recover the requested data. This computation includes a buffer of 20%. To prevent overwriting of the current data in the standard backup location, the data is restored to a different location. <u>Security Protocol Considerations for the Backup and Restore Service</u> The Backup and Restore (BAR) Client software operates only in secure mode. To enable secure registration, backup and restore operations, the following processes are required: ▪ Provisioning Secure Shell (SSH) host keys. ▪ Provisioning SSH client keys (if your organizational policies require disabling the default BAR client registration keys).
6.	Offeror must describe in detail how the proposed solution is fully redundant and how seamless failover works (equipment and technical requirements). *<u>Offeror Response:</u>* Comply The proposed solution deploys fully redundant architecture and devices as described below. <u>Phase 1: Single Zone with Optional Dynamic System Resilience (DSR)</u> A single zone master site with optional Dynamic System Resilience (DSR) architecture includes a single zone with Primary and Optional Backup Cores, including redundant InterZone Links. The Redundant Subsystem includes the hardware required to provide higher system availability. Each core includes a redundant Zone Controller (ZC) to supply a backup platform to automatically take over call processing functionality in case of a catastrophic software or hardware failure in the on-line ZC. The Redundancy Subsystem includes the following elements: ▪ Redundant ZC Server – A Redundant ZC server provides redundant ZC functionality. This means if the Combined ZC/NM (Network Management) Server fails, then all call processing continues on the Redundant ZC Server after an automatic switchover. It does not provide redundancy to any of the NM servers. ▪ Optional Redundant Network Manager Services: • Redundant Unified Event Manager (UEM) is provided per zone. Both UEM's for the zone are active at once; no switchover is required. • Configuration Management is also redundant; manual intervention is required for switchover. ▪ The Provisioning Manager application configures subscriber access control records. The active Provisioning Manager periodically, synchronizes SAC

records with the standby Provisioning Manager via a secure data transfer protocol. The network operator chooses which of the two PMs to be active.
    - The Unified Network Configurator (UNC) configures the infrastructure. Since the UNCs and PMs are configured separately, the UNCs need to be configured to synchronize (via a secure data transfer protocol) in the same time period as the PMs.
    - Redundant System Statistics Server.
    - Redundant Air Traffic Routers (ATR's).
    - Redundant Zone Statistics Server (ZSS).
- Optional Redundant Data Services – Optional DSR introduces redundant data subsystem components that switch independently of the voice components. Data component failures and switchover do not impact voice system operation.
- Redundant LAN Switch – A second LAN switch used to connect the redundant elements together as well as some devices in the Core.
- Redundant Core and Gateway Routers – These Routers are used to provide redundant routing functionality and WAN connectivity. The redundant routers connect to the Relay Panel in the same way as the main router, but only one router can connect to the remote sites at any instance.

Phase 2: Console Sites

Higher system availability is achieved at each proposed console site due to:

- Redundant LAN Switch – The failure of an Ethernet switch will cause only the effected operator positions connected to the failed switch will be taken out of service. The remaining operator positions are unaffected.
- Redundant Site Gateway Router – Redundant site gateway routers support redundant site Link to Cores. The failure of a router will cause automatic switch to the backup router.

Conventional Channel Controller – With failure of both redundant site links to cores, the Conventional Channel Controller will function as a local zone controller for all local audio/control processing including the proposed and existing backup consolettes.

Phases 2 and 3: RF Sites

Higher system availability is achieved at IP Simulcast and ASTRO25 Site Repeater (ASR) Sites due to:

- Redundant Prime Site Controller - Primary and Backup Prime Simulcast Site Controllers with redundant site Link to Cores. The site controllers automatically determine the active and standby site controller operation. The standby site controller monitors the Trunking Status Pulses (TSPs) sent by the active site controller and active site controller monitors the standby site controller via periodic pings. There are two Zone Controller RF Site Control Paths (SCPs) between the zone controller and the simulcast subsystem. Each SCP goes to one site controller. Upon failure of the active site controller, the standby takes over as the active site controller with no impact on Wide Area Trunking operation
- Redundant ASTRO25 Site Repeater Controller - Primary and Backup ASTRO25 Repeater Site Controllers with redundant site Link to Cores. Failure of the primary controller will result in automatic switchover to the standby controller with no impact on Wide Area Trunking operation. Each site controller is programmed with a set of rules that helps the site controller determine which one of the two assumes the role

	of primary site controller initially and when it is necessary for the other site controller to take over the operation of the subsystem. - Redundant LAN Switch – The failure of an Ethernet switch will cause only the effected channel to be removed from RF site subsystem until the failed switch is replaced or repaired. - Redundant Site Gateway Router – Redundant site gateway routers support redundant site Link to Cores. The failure of a router will cause automatic switch to the backup router. - Multiple Control Channels - Motorola Solutions trunking systems provide up to four possible control channels at an RF Site. If the currently active control channel fails, another channel automatically takes over as the control channel and the failed channel is automatically taken out of service. - Multiple Voice Channels - In a trunking system, multiple channels inherently provide redundancy. The failure of one base station will be transparent to all system users. The failure of a base station will result in the ASTRO25 Zone Controller automatically removing the channel from the system, resulting in some reduced channel capacity at the effected site.
7.	Offeror must acknowledge that all site equipment supplied shall be new, of high quality and designed to provide high reliability to support mission-critical communications for a minimum of 15 years. *Offeror Response:* Comply Motorola Solutions will support its proposed ASTRO25 infrastructure platform for 15 years.
8.	Offeror must describe in detail all of the proposed site equipment and/or RF infrastructure. *Offeror Response:* Comply Phase 2 Deployment: RF Infrastructure, (Quantity forty-five (45)) ASTRO 25 Site Repeater (ASR) Sites (800 MHz, APCO 25 Phase 2, TDMA) The proposed RF equipment at each three (3) channel ASR Site includes: - One (1) 7.5' Open Rack GTR 8000 Expanded Site System (ESS), AC or DC Power Distribution. • Three (3) 7/800 MHz GTR 8000 ASTRO 25 Repeaters. • One (1) Primary 6 Port Cavity Combiner. • One (1) Cabinet Receiver Multicoupler. • One (1) Transmit Filters, 800 MHz. • Two (2) Site Controllers. • Two (2) GGM 8000 Gateways with Encryption and Common Criteria (AC Power). - One (1) 7.5' Open Rack and Rackmount AC Power Strips.

- One (1) SDM 3000 RTU (AC Only) for site's Auxiliary Digital Inputs forwarding to UEM.
- One (1) TXRX 428 E Control Monitoring Unit (CMU, AC Only).
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) UPS, SEPS Inc. 9PX, 2700W, 120V, Softwired, 23 Min Runtime Rack Mounted.

- Antenna Network
  - Two (2) RFI CC807-11T1 Antennas (one Transmit and one Receive Antenna).
  - One (1) TXRX 428 E Tower Top Amplifier (TTA).
  - 7/8" Coaxial transmit line plus connectors and jumpers.
  - 7/8" Coaxial receive line plus connectors and jumpers.
  - 1/2" Coaxial test line plus connectors and jumpers.

- Station Spares (Rural)
  - Twenty-One (21) Configuration/Service Software.
  - Twenty-One (21) Power Supply FRU's.
  - Twenty-One (21) PA 7/800 MHz FRU's.
  - Twenty-One (21) Transceiver 7/800 MHZ V2 FRU's.
  - Twenty-One (21) Fan Module FRU's.
  - Twenty-One (21) 700/800 MHZ Site LNA FRU's.
  - Twenty-One (21) 700/800 MHZ Cabinet RMC Module FRU's.
  - Four (4) RFI CC807-11T1 Antennas (one Transmit and one Receive Antenna).

Phase 3 Deployment: RF Infrastructure, Seven (7) IP Simulcast Subsystems (800 MHz, APCO 25 Phase 2, TDMA)

The proposed IP Simulcast Subsystems are:

- [redacted]

The proposed RF equipment at each Prime IP Simulcast Site includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
    - Two (2) GGM 8000 Prime Site Gateways with Encryption and Common Criteria.
    - Four (4) 24 Port Prime Site Ethernet Switches with GBIC Modules and Fiber Cables.
    - Two (2) GGM 8000 Subsites Access Gateways with Encryption.
    - Two (2) GCP 8000 Prime IP Simulcast Controllers (Redundant).
    - GCM 8000 IP Comparator Modules – one (1) per TDMA channel.
- Five (5) IP Comparator Modules at Bismarck/Mandan IP Simulcast.
- Four (4) IP Comparator Modules at Fargo/West Fargo IP Simulcast.
- Four (4) IP Comparator Modules at each of the Five IP Simulcast subsystems.

Each IP Simulcast Remote Site includes the following equipment:

- One (1) 7.5' Open Rack GTR 8000 Expanded Site System (ESS), AC Only.
    - Five (5) 7/800 MHz GTR 8000 IP Simulcast (Bismarck/Mandan IP Simulcast Only)
    - Four (4) 7/800 MHz GTR 8000 IP Simulcast (Fargo/West Fargo IP Simulcast Only).
    - Four (4) 7/800 MHz GTR 8000 IP Simulcast (at each of the remaining Five IP Simulcast Sites Only).
    - One (1) Primary 6 Port Cavity Combiner.
    - One (1) Cabinet Plus Site and Cabinet Receiver Multicoupler, 12 ports, (Bismarck/Mandan and Fargo/West Fargo IP Simulcast Sites Only).
    - One (1) Cabinet Receiver Multicoupler.
    - One (1) Transmit Filters, 800 MHz.
- One (1) 7.5' Open Rack and Rackmount AC Power Strips.
    - Two (2) GGM 8000 Gateways with Encryption and Common Criteria.
    - Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
    - One (1) TRAK 9100 GPS site reference.
    - One (1) TXRX 428 E Control Monitoring Unit (CMU, AC Only).
    - One (1) SDM 3000 RTU (AC Only) for site's Auxiliary Digital Inputs forwarding to UEM.
    - One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
    - Two (2) UPS, SEPS Inc. 9PX, 2700W, 120V, Softwired, 23 Min Runtime Rack Mounted.

- Antenna Network
    - Three (3) RFI CC807-11T1 Antennas (one Transmit and two Receive Antenna for a second branch receiver diversity design) for all sites, except

Fargo and 1038763 will use RFI CC807-06 Antennas. One (1) TXRX 428 E Tower Top Amplifier (TTA).

- 7/8" Coaxial transmit line plus connectors and jumpers.
- 7/8" Coaxial receive line plus connectors and jumpers.
- 1/2" Coaxial test line plus connectors and jumpers.

- Total IP Simulcast Spares (Urban)
  - Fourteen (14) Four Port DDM's.
  - Seven (7) 2620-48 Ethernet switches.
  - Seven (7) GCP 8000/GCM 8000/GPB 8000 FRU's.
  - Fourteen (14) Configuration/Service Software.
  - Seven (7) Power Supply FRU's.
  - Seven (7) PA 7/800 MHz FRU's.
  - Seven (7) Transceiver 7/800 MHZ V2 FRU's.
  - Seven (7) Fan Module FRU's.
  - Seven (7) 700/800 MHZ Site LNA FRU's.
  - Seven (7) 700/800 MHZ Cabinet RMC Module FRU's.
  - Seven (7) G-SERIES XHUB FRU's.

Phase 3 Deployment: RF Infrastructure, seventy-six (76) ASTRO 25 Site Repeater (ASR) Sites (800 MHz, APCO 25 Phase 2, TDMA)

The proposed RF equipment at each three (3) channel ASR Site includes:

- One (1) 7.5' Open Rack GTR 8000 Expanded Site System (ESS), AC or DC Power Distribution.
  - Three (3) 7/800 MHz GTR 8000 ASTRO 25 Repeaters.
  - One (1) Primary 6 Port Cavity Combiner.
  - One (1) Cabinet Receiver Multicoupler.
  - One (1) Transmit Filters, 800 MHz.
  - Two (2) Site Controllers.
  - Two (2) GGM 8000 Gateways with Encryption and Common Criteria (AC Power).

- One (1) 7.5' Open Rack and Rackmount AC Power Strips.
  - One (1) SDM 3000 RTU (AC Only) for site's Auxiliary Digital Inputs forwarding to UEM.
  - One (1) TXRX 428 E Control Monitoring Unit (CMU, AC Only).
  - One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
  - Two (2) UPS, SEPS Inc. 9PX, 2700W, 120V, Softwired, 23 Min Runtime Rack Mounted.

- Antenna Network

	• Two (2) RFI CC807-11T1 Antennas (one Transmit and one Receive Antenna). • One (1) TXRX 428 E Tower Top Amplifier (TTA). • 7/8" Coaxial transmit line plus connectors and jumpers. • 7/8" Coaxial receive line plus connectors and jumpers. • 1/2" Coaxial test line plus connectors and jumpers. - Station Spares (Rural) • Twenty-Three (23) Configuration/Service Software. • Twenty-Three (23) Power Supply FRU's. • Twenty-Three (23) PA 7/800 MHz FRU's. • Twenty-Three (23) Transceiver 7/800 MHZ V2 FRU's. • Twenty-Three (23) Fan Module FRU's. • Twenty-Three (23) 700/800 MHZ Site LNA FRU's. • Twenty-Three (23) 700/800 MHZ Cabinet RMC Module FRU's.
9.	Offeror must describe in detail the proposed tiers of network backhaul reliability (i.e. bronze, silver, gold, 99.9%, 99.99%, 99.999%) for the following: a. Tower b. Dispatch Consoles c. Core Radio Infrastructure
	Offeror Response: Comply Our proposed plan will utilize the existing Dakota Carrier Network (DCN)/STAGEnet providing Gold (99.999% Backhaul Reliability) Ethernet Transport Service (ETS) to the existing forty-five (45) RF sites (Phase 2 Deployment) and twenty-two (22) dispatch sites (Phase 1 Deployment). Motorola Solutions understands DCN deploys redundancy and patch diversity whenever possible. The Greenfield and third-party tower sites planned in Phase 3 Deployment will also utilize DCN Gold ETS. As required, the last mile will be constructed by DCN.
10.	Offeror must describe in detail the expected annual downtime including but, not limited to patches and hardware maintenance.
	Offeror Response: Comply Motorola Solutions recommends periodic STATE scheduled and initiated switch over between Primary and optional Backup cores for the purpose of the user training and system readiness. For the optional DSR, the worst case Switchover time and Remote Site Voice Restoration time is estimated to be: - 150 seconds (for up to 150 RF Sites) - 60 seconds (9-35 MCC7500 Console Sites) The Statewide systems upgrades could occur every other year. Motorola Solutions' Upgrade Operations (UO) team completes a comprehensive audit of the entire system and prepares a detailed Implantation Time Line (ITL). The ITL includes step by step

	required tasks, task durations, with minimized system and user impacts. The system upgrade commences only after customer reviewed and approved ITL.
11.	Offeror must describe in detail how the proposed site control equipment is capable of controlling all voice channels in the proposed solution to and from the dispatch console systems.
	Offeror Response: Comply Basic IP Call Processing as it pertains to the proposed radio system is described in the following steps: Step 1 – Call Request A subscriber user presses the PTT on the radio to talk to other users in the talkgroup. The radio then transmits a Call Request on the RF control channel. The Call Request is received by the base station and forwarded to the Ethernet LAN. Before placing the Call Request packet on the Ethernet LAN, the base station encapsulates the Call Request message in a UDP/IP datagram with the destination IP address of the Zone Controller. Step 2 – Zone Controller Assigns Group Address in Call Request The IP packet network routes the Call Request packet to the Zone Controller. Upon receiving the Call Request message, the Zone Controller checks an internal database to determine the location of all members in the requested talkgroup (i.e. RF sites and Remote Dispatch sites locations). The Zone Controller then assigns a multicast group to the call and sends the assigned multicast group to all affiliated RF sites, MCC7500E IP consoles and optional AIS (Archiving Interface Server) devices. Note: This message is referred to as a Call Grant message and is sent in an IP datagram to the appropriate RF sites and Remote Dispatch sites. Step 3 – Resources Join the IP Group Upon receiving the Call Grant message, the RF sites, MCC7500E IP consoles and AIS (Archiving Interface Server) devices extract the IP multicast address from the Call Grant and join the multicast group by generating an IGMP Group Membership Report. The IP multicast group join message is a network control packet using the standard IGMP protocol. Step 4 – Multicast Routes are Established by IP Network Upon receiving the IP multicast group join message, the RF site router and console site router communicate with other routers in the system to set-up an IP multicast distribution tree. This tree is used to distribute traffic to all sites participating in the call. Step 5 – Vocoded Audio Placed in Packets with Group Address The radio begins transmitting vocoded (i.e., compressed) audio on a traffic channel as defined by the air interface standard. The audio is received by the base station and forwarded to the Ethernet LAN. Prior to placing the vocoded audio on the Ethernet LAN, the base station places the audio in an IP datagram destined to the assigned IP

	multicast address (as assigned in the Call Grant). The IP multicast packet is placed on the Ethernet LAN. Step 6 – IP Network Distributes Packets (Multicast Tree) The IP Multicast audio stream is distributed to all affiliated RF sites and console sites via the IP multicast tree. The MCC7500E IP console and optional AIS will directly de-vocode the audio stream. Step 7 – Talkgroup Members Transmit (Same Multicast Tree) When the first user dekeys and a second member of the talkgroup transmits while the call is still active, the same multicast tree is used. Vocoded audio is received by the base station and placed in an IP packet destined for the group's IP multicast address. The IP packet flows down the same IP multicast tree generated earlier by the routers. Step 8 – Call Tear-Down When the last user dekeys and hang-time has expired or when a site is removed from a call, the site (RF, MCC7500E console) generates an IP multicast group Leave message. This Leave message prunes the IP multicast branch to prevent audio from flowing down the branch (or tree). Essentially this tears down the branch of the call (in the case where a site was removed from the call) or tears down the entire multicast tree in the case where the call is over. Note: Multicast trees are removed after a call to free up router resources.
12.	Offeror must acknowledge that the control equipment shall fully support APCO P25 functional requirements, features and performance objectives, including the CAI, DFSI, ISSI and CSSI standards.
	Offeror Response: Comply with Clarification ISSI 8000, DFSI, and CSSI are optional proposed capabilities
13.	If proposed, Offeror must describe in detail the manner in which the proposed solution and site controllers function and operate.
	Offeror Response: Comply ASTRO25 Site Repeater Controller – Phases 2 and 3 An ASTRO25 repeater site contains two GCP 8000 Site Controllers which provide protection against a single point of failure. Each site controller is programmed with a set of rules that helps the site controller determine which one of the two assumes the role of primary site controller initially and when it is necessary for the other site controller to take over the operation of the subsystem. If the active site controller fails, the other site controller automatically takes control of the site. The site controller provides the following functions at the site: - Manages the site and channels. - Forwards registration and context activation requests. - Administers broadcasts. - Provides a time and frequency reference signal to the GTR 8000 base radios. - Monitors GTR 8000 Base Radios and RF distribution equipment.

	▪ Interacts with MOSCAD SDM 3000 site device manager. ▪ Provides redundant site control. <u>Simulcast Site Controller – Phase 3</u> The GCP 8000 Site Controller is the control interface between the IP simulcast subsystem and the zone controller. The site controller performs the following functions: ▪ Translates mobility and call service control messages received from the channels into the protocol required for interfacing to the zone controller. ▪ Translates mobility and call service control messages received from the zone controller into the protocol required for interfacing to the channels. ▪ Maintains a mobility database uploaded to the zone controller as part of the recovery process when the site transits from Site Trunking to Wide Area Trunking. ▪ Supervises subsystem resources that include determining channel status and remote site status based on status information received from the channels and reported to the Unified Event Manager (UEM) and also indicates to the zone controller the capabilities of the channels at the site. The zone controller uses the channel capabilities for resource allocation. ▪ Performs trunked data call processing while in Site Trunking. ▪ Supports Site Trunking and Failsoft failure modes. ▪ Receives the 1PPS from the TRAK 9100 Simulcast Site Reference and Global Positioning Satellite and then provides a unique launch time reference for the comparators and base radios. The standard installation uses two site controllers in a redundant configuration. The site controllers automatically determine the active and standby site controller operation. The standby site controller monitors the Trunking Status Pulses (TSPs) sent by the active site controller and active site controller monitors the standby site controller via periodic pings. There are two Zone Controller RF Site Control Paths (SCPs) between the zone controller and the simulcast subsystem. Each SCP goes to one site controller. Upon failure of the active site controller, the standby takes over as the active site controller.
	If The proposed solution utilizes STAGEnet resources Offeror must describe in detail the proposed interconnects to STAGEnet including routers, switches, firewalls and servers etc.
14.	*<u>Offeror Response:</u>* Comply Motorola Solutions proposed plan is to utilize the existing Dakota Carrier Network (DCN)/STAGEnet providing Gold (99.999% Backhaul Reliability) Ethernet Transport Service (ETS) to all proposed sites. Motorola Solutions demarcations per each site type is described below: ▪ Primary Core site demarcation will be at redundant Encrypted Optional Exit and Core Routers; Phase 1. ▪ Optional Backup Core site demarcation will be at redundant Encrypted Exit and Core Routers; when purchased. ▪ MCC7500E or MCC7500E VPM Radio Console Site demarcation will be at redundant Encrypted Site Router; Phase 1.

	▪ ASTRO25 Site Repeater demarcation will be at redundant Encrypted Site Router; Phase 2 and 3. ▪ IP Simulcast Prime Site demarcation will be at redundant Encrypted Prime and Access Routers; Phase 3. ▪ IP Simulcast Remote Site demarcation will be at redundant Encrypted Site Routers; Phase 3. Zone Core Protection (ZCP) feature is proposed that provides the hardware and software necessary to protect the Radio Network Infrastructure (RNI) from potential attacks that originate from Remote Sites or the communication links that Remote Sites utilize. The ZCP feature provides TCP/IP traffic filtering in the ASTRO25 Radio Network Infrastructure to enhance the security of the network. The traffic filtering is implemented by Stateful Packet Inspection firewalls. The security enhancement is realized by only allowing traffic for a combination of predefined subnets, hosts and protocols. All other traffic not defined as valid for the ASTRO25 network is dropped by the firewall.
15.	If the proposed solution does not utilize STAGEnet resources Offeror must describe in detail the proposed IP network including routers, switches, firewalls and servers etc. Offeror must acknowledge that all primary IP circuits utilized will be TSP enabled.
	Offeror Response: Comply The proposed solution will utilize the existing Dakota Carrier Network (DCN)/STAGEnet providing Gold (99.999% Backhaul Reliability) Ethernet Transport Service (ETS), to all proposed sites.
16.	Offeror must describe in detail any features that would be available if the core is unavailable.
	Offeror Response: Comply The proposed ASTRO25 radio system includes optional redundant configuration with Dynamic System Resilience (DSR) architecture including a geographically separate backup for the Core Site to protect against a catastrophic failure. The proposed single Zone with optional DSR system is supported by two, Primary and optional Backup, Cores in two separate Master Sites. The optional Backup Core provides the same level of redundancy as the Primary Core; if the optional Backup Core were to take over, it provides redundancy for voice, transport and other subsystems. All system features are preserved after optional Backup Core take over, since system will continue to operate in the Wide Area Trunking mode of operation. In the unlikely event that both Primary and optional geographically separated Backup Cores are unavailable due to multiple failures the Wide Area Trunking mode is affected. The sites will enter Site Trunking mode. The minimum conditions required to maintain Site Trunking (per RF Site) include:

- One functioning site controller.
- One functioning control channel.
- At least one functioning voice channel.

As part of Site Trunking mode, the Wireline Console and Network Management features, plus any optional Integrated Voice and Date (IV&D) service will not be available. The proposed Conventional Channel Controller at each dispatch site will function as a local zone controller for all local audio/control processing including the proposed and existing backup consolettes.

17. Offeror must describe in detail how the proposed solution will provide an Inter RF Subsystem Interface (ISSI) that is compatible with the APCO P25 Phase 1 and Phase 2 suite of standards and connect to other ISSI based systems as required to support State to State interoperability with a minimum of 5 talk paths with each bordering State.

Offeror Response:

Comply

The proposed optional ISSI 8000 is capable of providing the interconnections to up to 24 APCO P25 Radio systems. The feature complies with P25 TIA 102.BACA for voice interoperability and TIA 102.BACD for supplementary data interoperability (i.e., emergency alarm, emergency cancel and call alert). Figure 1 below shows detailed TIA 102.BACA and TIA 102.BACD feature information.

ISSI 8000 FEATURES AND CAPABILITIES	ISSI 8000 Support
P25 TIA 102.BACA ISSI and TIA 102.BACD Features	
ISSI Individual Registration	Yes
ISSI Group Registration	Yes
ISSI Supplementary Data Registration	Yes
ISSI Confirmed Group Call	Yes
ISSI Unconfirmed Group Call	Limited
ISSI Unit-to-Unit Call	No
ISSI Emergency Group Call	Yes
ISSI Availability Monitoring	Yes

Figure 1: TIA 102.BACA and TIA 102.BACD Feature Information

Project 25 ISSI Trunking Features Offered by Motorola Solutions

	P25 ISSI Trunking Features Offered by Motorola			
	P25 ISSI Trunking Feature Name	Offered by Motorola ISSI.1 ?	Offered by Motorola ISSI 8000?	TIA-102 Standards Document
Voice & Mobility Features				
	Voice Features			
	Broadcast Call	No	Yes	TIA-102.BACA-B
	Announcement Group Call	No	Yes	TIA-102.BACA-B
	Confirmed Group Voice Service	No	Yes	TIA-102.BACA-B
	Unconfirmed Group Voice Service	Yes	Yes[Note 1]	TIA-102.BACA-B
	Emergency Group Call	Yes	Yes	TIA-102.BACA-B
	Encrypted Voice (AES)	Yes	Yes	TIA-102.BACA-B
	P25 Full-rate vocoder (FDMA)	Yes	Yes	TIA-102.BACA-B
	P25 Half-rate vocoder (TDMA)	No	Yes	Future
	SU and Group Mobility Management			
	SU Registration	No	Yes	TIA-102.BACA-B
	Transport of Authentication Credential	No	Yes	TIA-102.BACA-B
	Secure SU registration (SU authentication)	No	Yes	TIA-102.BACA-B
	SU Deregistration	No	Yes	TIA-102.BACA-B
	Group Affiliation	Yes	Yes	TIA-102.BACA-B
	Call Restriction	No	Yes	TIA-102.BACA-B
	Roaming			
	Inter-WACN (manual)	Yes	Yes	TIA-102.BACA-B
	Inter-WACN (automatic)	No	Yes	TIA-102.BACA-B
	Inter-System (manual)	Yes	Yes	TIA-102.BACA-B
	Inter-System (automatic)	No	Yes	TIA-102.BACA-B
	Intra-System (automatic)	No	Yes	TIA-102.BACA-B
	RFSS Service Capability Polling	Yes	Yes	TIA-102.BACA-B
Supplementary Services Features				
	Transport of Talking Party Identity	No	Yes	TIA-102.BACA-B
	Priority Call	No	Yes	TIA-102.BACA-B
	Emergency Alarm	No	Yes	TIA-102.BACD-B
	Emergency Alarm Cancellation	No	Yes	TIA-102.BACD-B
	Group Emergency Cancellation	No	Yes	TIA-102.BACD-B

NOTES

Note 1: Motorola's ISSI 8000 support unconfirmed group call only as a serving system

Figure 2: P25 ISSI Trunking Features

The proposed optional ISSI 8000 is capable of allowing an ASTRO25 trunked network to connect to up to 24 other Project 25 (P25) ISSI-compliant trunked networks through one ISSI 8000 Gateway. The connected foreign systems can be other ASTRO25 systems with ISSI 8000, ASTRO25 systems with ISSI.1 Network Gateway, or non-Motorola Solutions P25 ISSI-compliant systems with third-party vendor's ISSI gateway. Optional ISSI 8000 enables FDMA or TDMA talkgroup calls joining differing System IDs, WACN IDs, different system releases, RF bands, manufacturers and coverage areas.

The mandatory InterSystem Firewall provides network address translation, protects the zone core from unauthorized traffic on the ISSI link and optionally provides encryption on the connection to the foreign system.

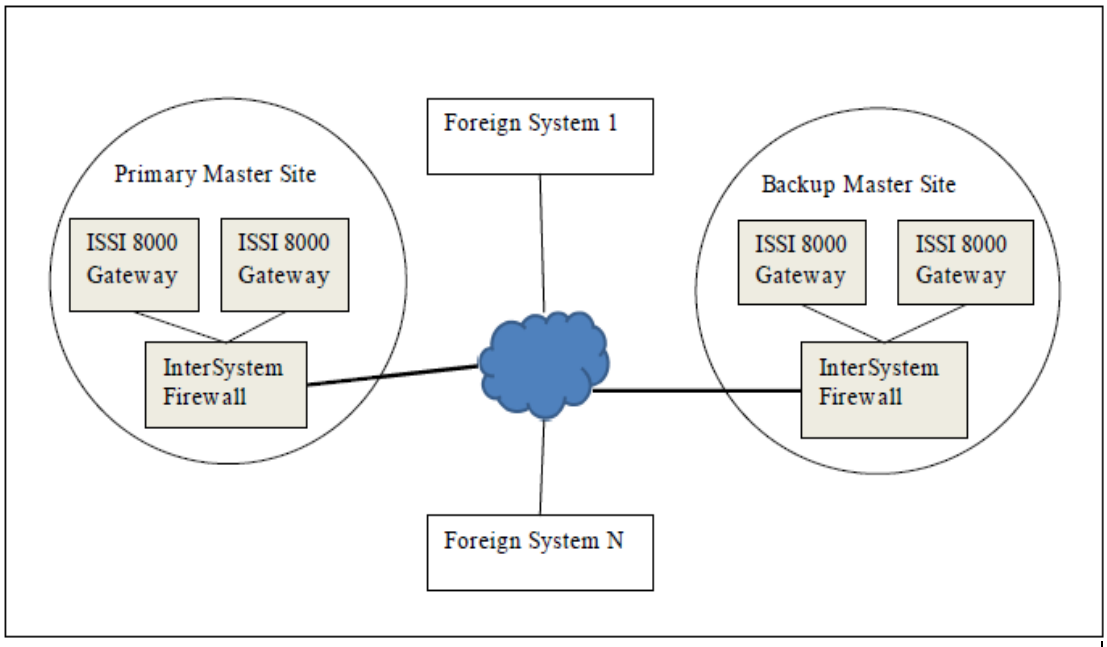


Figure 3: Optional DSR ASTRO25 System with ISSI 8000

The proposed optional ISSI 8000 roaming license includes five (5) manual roaming licenses and the ability to operate up to total of 50 simultaneous calls (Talkgroups) across all ISSI links combined. The simultaneous call capacity is a resource pool and not assigned to any particular system to system connection. Calls across any of the system connections will borrow resources from the pool and return them as calls are ended.

18.	Offeror must describe in detail the maximum concurrent talk paths and systems able to be handled by a single ISSI server.
	Offeror Response: Comply The optional ISSI 8000 is expandable to support for up to 200 simultaneous calls (Talkgroups) through the ISSI interface. The simultaneous call capacity is a resource pool and not assigned to any particular system to system connection. Calls across any of the system connections will borrow resources from the pool and return them as calls are ended. The optional ISSI 8000 is capable of allowing an ASTRO25 trunked network to connect to up to 24 other Project 25 (P25) ISSI-compliant trunked networks through one ISSI 8000 Gateway.
19.	Offeror must describe in detail the limitations and capabilities of their ISSI solution to include capabilities and limitations with other manufactures ISSI solutions.
	Offeror Response: Comply

Motorola Solutions-offered P25 ISSI Trunking Features are listed in the table below. Features listed are defined in the following P25 ISSI/CSSI Standard Documents.

	P25 ISSI Trunking Features Offered by Motorola			
	P25 ISSI Trunking Feature Name	Offered by Motorola ISSI.1 ?	Offered by Motorola ISSI 8000?	TIA-102 Standards Document
Voice & Mobility Features				
	Voice Features			
	Broadcast Call	No	Yes	TIA-102.BACA-B
	Announcement Group Call	No	Yes	TIA-102.BACA-B
	Confirmed Group Voice Service	No	Yes	TIA-102.BACA-B
	Unconfirmed Group Voice Service	Yes	Yes[Note 1]	TIA-102.BACA-B
	Emergency Group Call	Yes	Yes	TIA-102.BACA-B
	Encrypted Voice (AES)	Yes	Yes	TIA-102.BACA-B
	P25 Full-rate vocoder (FDMA)	Yes	Yes	TIA-102.BACA-B
	P25 Half-rate vocoder (TDMA)	No	Yes	Future
	SU and Group Mobility Management			
	SU Registration	No	Yes	TIA-102.BACA-B
	Transport of Authentication Credential	No	Yes	TIA-102.BACA-B
	Secure SU registration (SU authentication)	No	Yes	TIA-102.BACA-B
	SU Deregistration	No	Yes	TIA-102.BACA-B
	Group Affiliation	Yes	Yes	TIA-102.BACA-B
	Call Restriction	No	Yes	TIA-102.BACA-B
	Roaming			
	Inter-WACN (manual)	Yes	Yes	TIA-102.BACA-B
	Inter-WACN (automatic)	No	Yes	TIA-102.BACA-B
	Inter-System (manual)	Yes	Yes	TIA-102.BACA-B
	Inter-System (automatic)	No	Yes	TIA-102.BACA-B
	Intra-System (automatic)	No	Yes	TIA-102.BACA-B
	RFSS Service Capability Polling	Yes	Yes	TIA-102.BACA-B
Supplementary Services Features				
	Transport of Talking Party Identity	No	Yes	TIA-102.BACA-B
	Priority Call	No	Yes	TIA-102.BACA-B
	Emergency Alarm	No	Yes	TIA-102.BACD-B
	Emergency Alarm Cancellation	No	Yes	TIA-102.BACD-B
	Group Emergency Cancellation	No	Yes	TIA-102.BACD-B

NOTES
Note 1: Motorola's ISSI 8000 support unconfirmed group call only as a serving system

Figure 4: ISSI Features

	Interoperability with other Vendor Systems The following ISSI 8000 features are only supported between two Motorola Solutions ISSI 8000 systems, but are not available when interoperating between Motorola Solutions and other third-party P25 systems because the ISSI standard does not support them: - Individual Alias Sharing between systems. - Console Emergency Setup with Infinite Hangtime. - Emergency Recognize across systems. In addition, Emergency Cancel initiated by the non-Motorola Solutions system will not end the emergency call/alarm at the Motorola Solutions system, since Motorola Solutions only supports emergency cancel from a console and not from a radio. There are many ISSI 8000 features that are optional in the ISSI standard and may not be supported by other vendors. The following are examples of features that are supported by ISSI 8000, but may not be supported by other vendors. - Foreign Adjacent Control Channel Broadcast resulting in faster roaming. - Busy queuing with callback. - TDMA. - Radio Authentication. Dynamic System Resiliency/ISGW Redundancy is not addressed in the ISSI standard and therefore the interoperability for these features depends on the particular vendor's implementation. For compatibility with Harris radio system infrastructure where the upper 8 bits of the NAC may be independent of the system ID, the Motorola Solutions subscriber radio can be optionally configured to not validate the upper 8 bits (system id part) of the NAC. When the radio is roaming between Harris and Motorola Solutions, the subscriber should be configured not to validate the upper 8 bits of the NAC. Motorola Solutions has deployed its P25 ISSI solution. with the following systems: - State of Colorado (Motorola Solutions ASTRO25) and Front Range Communications Consortium (Cassidian P25). - State of Minnesota (Motorola Solutions ASTRO25) and WISCOM - State of Michigan and State of Ohio (both Motorola Solutions ASTRO25)
20.	Offeror must describe in detail how the proposed solution will interface to the CAD systems currently in use at the PSAPs.
	Offeror Response: Comply Motorola Solutions understands the existing CAD systems currently in use at the PSAPs are standalone, independent and not integrated with any of the existing RF Systems. The proposed MCC7500E and upgraded MCC7500E VPM radio dispatch console positions provide the right to use MCC7500E Dispatch API for any future third-party

	i.e. CAD system integration if required. The Software Development Kit (SDK) for the MCC7500E Dispatch API requires a license agreement to be executed between the software developer and Motorola Solutions. Motorola Solutions will provide instruction, quote license fee and plant technical support quote upon request. Further, the proposed radio system is capable of Core Level Flexible Computer Aided Dispatch Interface (CADI) and/or Flexible Air Traffic Interface Access (ATIA) Interface(s). The proposed solution includes the Flexible ATIA Interface plus services for ten (10) hours of technical support and optional Flexible CADI Interface and services for thirteen (13) Dispatch Centers.
21.	Offeror must describe in detail how The proposed solution will interface to the voice recorders currently in use at the PSAPs. *Offeror Response:* Comply The existing analog conventional recorders can be optionally upgraded and replaced and utilized for recording of the existing analog conventional channels. The following optionally proposed IP Logging Recorder System to be located at Primary and optional Backup Cores. - One (1) IP trunked talkgroup voice recorder solution. located at the centralized Bismarck site (Primary Core). - One (1) IP trunked talkgroup recorder solution. located at the optional Backup Core. - Four (4) Clear Archiving Interface Servers (AISs) per Primary and optional Backup Cores. - OR Optional Eight (8) Secure Archiving Interface Servers (AISs) per Primary and optional Backup Cores, each with AES and DES-OFB Encryption Algorithms. Note: The required Ethernet transport (outside the RNI, Radio Network) among Bismarck Site Primary Core, optional Fargo Site Backup Core and twenty-two (22) dispatch sites will be provided by DCN.
22.	Offeror must describe in detail how the proposed solution will interface to the station alerting systems currently in use at the PSAPs. *Offeror Response:* Comply The proposed interfaces are via Conventional Channel Gateways (CCGWs). The proposed interface supports 4 wire tone remote control channels. The default tones used for various commands on different types of conventional channels are shown in the following table. These may be modified to meet customer needs via the radio system's network manager.

T1R1 Channel			
FREQ	**W/O PL**	**W/4 PL**	**W/8 PL**
2050	PL MON	PL MON	PL MON
1950	F1	F1	F1
1850	--	TX w/o PL **	TX w/o PL **
1750	R2 OFF	R2 OFF	PL5
1650	R2 ON	R2 ON	PL6
1550	RPTR OFF	RPTR OFF	PL7
1450	RPTR ON	RPTR ON	PL8
1350	WC I ON	PL1	PL1
1250	WC I OFF	PL2	PL2
1150	WC II ON	PL3	PL3
1050	WC II OFF	PL4	PL4

Figure 5: Wire Tone Remote Control Channels

** Only used on T1 paging stations when the TX without PL capability is also configured.

23.

Offeror must describe in detail how the proposed solution will interface to the paging systems currently in use at the PSAPs.

Offeror Response:

Comply

The proposed MCC7500E or upgraded MCC7500E VPM radio dispatch console positions utilize an Integrated Paging Encoder feature which provides robust analog tone paging capabilities on analog conventional radio resources. This feature is required to provide tone and voice alert paging to the existing State and County Fire Stations that are alerted using analog conventional channels.

At each MCC7500E or upgraded MCC7500E VPM radio dispatch console site (as applicable) 4 wire Tone Remote Control interface via Conventional Channel Gateway (CCGW) is utilized.

Dispatch consoles may be configured for either sequential or simultaneous operation. In sequential operation, the individual members in group pages (whether manually created or preconfigured) are sent out on the radio resources in the exact order in which they were entered. This mode should be used when the order in which pages are sent is important. In simultaneous operation, the individual members are sent out as quickly as possible. Pages on different resources will be sent out in parallel. If more than one page is being sent on a resource, those pages will be sent out sequentially. A dispatch console is capable of sending pages on up to 20 resources simultaneously.

Analog Tone Paging

Analog tone pages specify the target receiver (i.e., pager) via a series of analog tones. Over the years, various formats have been established for analog tone paging. Among other things, these formats vary in their number of page digits, the number of tones that represent a digit, the actual tone frequencies used and the durations of the tones and the inter-tone space. The digits may specify just the address of the target receiver, or they may additionally specify the tone group that is to be used for that

page. A tone group is a particular set of tones (analog frequencies) to which the address digits are to be mapped. In some formats, the digits also identify the type of page (e.g. individual page or group page). Since the differing types of tone pages within a format usually require different timing characteristics (tone duration, inter-tone gap), the digits may also be considered to specify the timing variant to be used for the page. In general, analog tone pages are defined by the analog tone paging format to be used, the paging digits (including the target address) to be sent, the radio resource over which the page is to be sent and, if needed, the radio frequency to be used for the page transmission (applicable on multi-frequency conventional stations).

System Paging

System pages use digital signaling methods to send alert messages to the target receiver. Trunked Call Alerts are an example of system pages. System pages are defined by the system paging format to be used, the Unit ID of the target receiver and a radio resource associated with the trunking system over which the page is to be sent.

Supported Formats

The following analog tone paging formats are supported by the integrated paging encoder.

- Quick Call I.
- Quick Call II B–Tone & Voice.
- Quick Call II C–Tone Only.
- Quick Call II D–Battery Saver.
- Quick Call II E–Competitive.
- Touch Code/DTMF.
- Knox Single Tone 0.5
- Single Tone 1.5.
- Motorola Solutions 5/6 Tone.
- Digital Dial 1 (1500 Hz).
- Digital Dial 2 (2805 Hz).
- Digital Dial 3 (1500/2805 Hz).
- Proposed integrated paging encoder supports the following:
- Up to 9100 pre-configured individual pages per system.
- Up to 1750 pre-configured groups pages per system.
- Up to 50 members in a group page.
- Up to 20 pages sent simultaneously (when dispatch console is configured for simultaneous paging).

Paging Nuances

The MCC7500E console's integrated paging encoder has a few unique operational differences described in the following sections.

No Dekey Between Sequential Pages on a Resource

When the MCC7500E console sends sequential pages on the same conventional channel or talkgroup, it does not dekey and rekey the channel between pages.

No Paging on Patched Resources on the Patching Op

	The MCC7500E console does not allow pages generated by the internal paging encoder to be sent on members of patch groups if the paging console also “owns” the patch. Paging on the Selected Resource The MCC7500E console can be configured to allow pre-configured individual pages to be sent on the “currently selected channel” on the dispatch console. This means the page will be sent on whatever channel happens to be selected on that dispatch console when the pre-configured page is chosen. Call Alert Paging When a MCC7500E is configured for simultaneous paging operation, the integrated paging encoder will only wait for 300 milliseconds between sending out pre-configured Call Alerts. It will not wait for an acknowledgement to be received from the target radio. This allows pre-configured Call Alerts to be sent much faster and thus makes them more suitable for use as a replacement for analog tone paging. When a MCC7500E console is configured for sequential paging operation, the integrated paging encoder will wait until it gets a resolution. on the previous Call Alert (either acknowledged by the target, rejected by the Zone Core Controller, or timed out) before moving on to the next page.
24.	Offeror must describe in detail alarm, monitor and control capabilities. *Offeror Response:* Comply The Unified Event Manager (UEM) is an application that provides a fault management solution for ASTRO25 Private Radio Systems. The UEM operates at zone level providing centralized, secure, reliable functionalities to fault manage. The UEM has the capabilities to fault manage devices securely via a fully secure interface using the SNMPv3 protocol. This secure interface includes both South (i.e., site device) and North Bound Interfaces (i.e., Motorola Solutions Systems Support Center (SSC)). The UEM application is accessed using a standard web browser from Network Management client workstations residing within the radio system network. Users launch and use the application directly within the browser. A UEM is present in each Zone and is used to fault manage the devices within that Zone. The UEM is a client server application. UEM server resides in zone core and UEM clients can be accessed from any Network Management client workstation. The main functions of UEM are: - Fault Management of devices (SNMP traps or informs). - Maintaining inventory of managed devices. - Detecting and reporting loss of communication with managed devices (Supervision). - Ensuring the status reported is current (Synchronization). - Basic Troubleshooting Capability.

- Ability to manage/Unmanage a device or delete a subnet/device.
- Device Command Operation.
- Alarm Generation/Annotation/Ownership Assignment/Clearing / Acknowledgment.
- Alarm Summary.
- Zone Health Map.
- Capability to use secure protocol (i.e., SNMPv3) configuration.
- User access management.
- Data access management.
- Redundancy Management (i.e., router, Site Controller).

The SDM 3000 RTU is supported by the UEM Fault Manager.

Environmental I/O Interfaces

The SDM3000 RTU supports scalable environmental I/O to collect alarms and initiate controls through the various inputs, and outputs via the onboard Input and Output (I/O) board. Wiring from the RTU to the I/O is through punch blocks.

The Fault Management RTU provides dry/wet alarm inputs to site equipment such as doors, tower lights, UPS, security, third-party devices, etc. The Fault Management RTU Digital Inputs capacity is as follows:

SDM3000 RTU – 48 DI on board expandable to 336.

The Fault Management RTU provides contact outputs to site equipment which can be controlled such as doors, generators, security, equipment switching, etc. The Fault Management RTU Digital Outputs capacity is as follows:

SDM3000 RTU – 16 DO on board expandable to 112.

Environmental Alarm Input Interface

The SDM3000 RTU supports wet or dry contact inputs which can interface to site equipment such as doors, tower lights, UPS, security and other third-party devices with alarm cards.

A wet contact input means the device provides the source voltage. The SDM3000 RTU detects the voltage from the device to determine the alarm State.

- Wet contact Voltage: MAX VIN is 30VDC.
- Polarity on input connectors = 5V positive with respect to ground.
- Input Voltage: OFF = Voltage < 0.8 VDC & ON = Voltage > 4 VDC.

A dry contact input means the SDM3000 RTU provides the source voltage and the device input is simply a resistive loop. The SDM3000 RTU detects the resistance from the device to determine the alarm State.

- Dry Contact: Internal 5VDC power supply.
- Input Resistance: OFF = Resistance > 15kOhm & ON = Resistance < 1kOhm.

Equipment Control Interface

The SDM3000 RTU supports control outputs which can initiate controls (On/Off, Open/Close, Start/Stop) on equipment and devices with suitable inputs. Typical site equipment which can be controlled are doors, generators, security, lights, etc.

	Offeror must describe in detail how system status and system alarm conditions are displayed.
25.	*Offeror Response:* Comply **Unified Event Manager (UEM) Status** Site Views Overview Site views display the overall status of site infrastructure. They contain physical network elements managed within a particular site directly by UEM and through Remote Terminal Units (RTUs) and additional information, for example, redundancy group association, services status, digital output/input status, or analog input values. Each site view contains up to four sections: - General Information - Main information for each site, for example, the name of the managed resource, the name of the subsystem, or the class name. - More Information - Additional information, for example, location tags. - Note - An editable area where users can enter and save any text (maximum 1024 characters long). - Objects - A tree containing up to three groups of objects associated with the site. - Service - The status of all services within the site. - Environmental - The status of digital inputs and digital outputs directly configured through SDMB configuration file. - Equipment - The status of all physical devices managed directly by UEM and devices managed through a Remote Terminal Unit (RTU) – devices are grouped by type and the status is aggregated from physical and logical parts of a particular device. When discovered, sites are added dynamically to the navigation tree. The list of sites is divided into the following fixed categories: - Console Sites - All discovered console sites. - Conventional Subsystem - All discovered conventional subsystems. - Core Sites - All discovered core sites (Primary Zone Core, Backup Zone Core, Primary Operations Supports Systems, Backup Operations Supports Systems, DSR Shared Devices, Backhaul Devices, Customer Enterprise Network). - RF Sites - All discovered RF sites. - Simulcast Sites - All discovered multisite subsystems (prime and remote sites). - Trunking Subsystems - All discovered Trunking Subsystems (Tsubs). This includes the prime site and remote sites supporting any of the following site types: ASTRO25 Site Repeater (ASR) Site, Centralized Conventional Site, Console Site (NM/Dispatch Site), High Performance Data (HPD) Site, or IP Simulcast Subsite. Unified Event Manager (UEM) Alarms An alarm results from an event in a managed resource. It occurs as a result of a pre-determined significant State (a failure or a fault) that may require user attention. Alarms are raised within UEM based on notifications from the network element, or by UEM to report failures associated with fault management functions.

Alarms can fall into the following general:

- Communication alarms.
- Equipment alarms.
- Quality-of-service alarms.

Alarms across a network are commonly related to:

- Resources that have failed.
- Connectivity issues.
- Devices malfunctioning.
- Threat assessment reports.
- SNMPv3 or Web Service credentials failure.

Alarms Summary

Alarm summary is used to display the count of the total number of alarms organized by device categories and/or severities. It is positioned just below the navigation tree in the main window. Each severity is represented in a single cell or graph, depending on the presentation that is selected. The view is updated automatically and the counts can be seen at all times, irrespective of the view that is currently open.

The presentation of the alarm summary can be modified by clicking the buttons at the top of the summary panel. Three different presentations are available:

- Table view.
- Bar graph view.
- Pie chart view.

Clicking a particular severity symbol opens an alarms window with the corresponding alarm type filtered.

Alarms Window

The Alarms window can be opened from the Navigation View by clicking the Alarms node under the Fault Management node. In the window, only active alarms of devices are displayed, that is the latest failure or an event clearing a failure.

The detailed view of an alarm can be opened by double-clicking an entry in the window. By default, 25 alarms can be viewed on a single page. The number of alarms displayed on the page can be customized.

The maximum number of alarms on a page is 1,000. The Alarm Details window allows the Unified Event Manager user to perform the following functions:

- Assign/Unassign an alarm.
- Acknowledge/Unacknowledge an alarm.
- Annotate an alarm.
- View the history of the selected alarm.

To view the failure or fault history of a network element, look at the Network Events window.

	The default sorting criterion in the Alarms window is the Date/Time columns. Events can be sorted by any attribute by clicking the associated column heading. To toggle between ascending and descending sort orders, click the column again.
26.	Offeror must describe in detail how the proposed solution provides the ability to remotely access the system to check the operational status of the system and to view alarms.
	Offeror Response: Comply Private Network Manager (PNM or NM) Client is a remote control software application. It is utilized to remotely manage Windows systems. Authorized system managers or network administrator personnel use the PNM or NM client workstations to start and run the software applications for configuring, viewing equipment operational status and monitoring network utilization and performance. FCAPS is a Network Management model intended to maximize the available resources and minimize system downtime and maintenance costs. It consists of five functional areas: Fault Management, Configuration Management, Accounting, Performance Management and Security Management. The PNM or NM client workstations reside within ASTRO25 Network at Primary and optional Backup Cores, plus at any desired centralized dispatch console site. Multiple access levels to five functional areas are configurable per user account and based upon the individual user responsibility.
27.	Offeror must describe in detail the proposed solution's System Alarms.
	Offeror Response: Comply In the Unified Event Manager (UEM), an alarm results from an event in a managed device that met a pre-determined significant State that may require user attention. The UEM alarm browser provides a way to look at all alarms (or a filtered subset of alarms). An audible tone can be associated with alarms, based on severity. An alarm becomes active once UEM displays it in the alarm window, but not cleared yet. UEM allows alarms assignment and annotation to capture any textual information while the alarm remains active. In addition, a user can define custom view(s) to view a filtered subset of alarms as well. Whenever the problem that caused the alarm (of a particular managed device) to be elevated in UEM is resolved, UEM will clear the alarm. An Alarm Clear Timer policy can be set (by a user with Admin privileges) to cause cleared alarms to persist in the UEM alarm display anywhere from 15 minutes to 10 hours, in 15 min increments. The SDM 3000 RTU Digital Input alarms are reported to the UEM Fault Manager. Lastly, UEM supports exporting events and alarms for future analysis. In addition, a user can print these exported files from local client platform as well.

28.	Offeror must describe in detail the proposed solution's ability to acquire, process and display information in an integrated and uniform fashion for a variety of critical systems including: a. Radio systems b. Local and remote site facilities c. Primary and backup power systems d. Leased line and data networks e. Other
	Offeror Response: Comply Motorola Solutions Private Radio Network Management (PRNM) Suite Applications are based upon FCAPS model and are detailed below. **System-Level Application:** System Historical Reports (Accounting, Performance) – Application allows to generate reports for system-wide activity. **Zone-Level Applications:** Affiliation Display (Performance) - Application that displays the association of a radio with a talkgroup and a site and information about conventional channels, console sites and consoles. Air Traffic Information Access (ATIA) Log Viewer (Performance) - Application that displays log files generated by the Air Traffic Router server application (ATR) and ZoneWatch. These log files contain records of all recent zone activity, such as site registrations and calls processed. Dynamic Reports (Accounting, Performance) - Application that provides predefined report templates you can use to display statistics for a zone, site, or a console site in near real time. Zone Historical Reports (Accounting, Performance) - Application that allows to generate reports for individual zones. ZoneWatch (Fault, Performance) - Application that allows monitor radio call traffic for an individual zone in real time. This application uses different Watch Windows that allow to display only the required information. The License Manager, Unified Network Configurator (UNC), Unified Event Manager (UEM) and the Provisioning Manager applications are launched using browser shortcuts. License Manager (Accounting) - An application for loading licenses, checking license status and managing licensed application session.

	Unified Event Manager (Fault) - A tool that provides reliable fault management services, such as service discovery, fault management, supervision and synchronization. Unified Network Configurator (Configuration) - An advanced network configuration tool that provides controlled and validated configuration management of system devices. It includes Voyence Control and Unified Network Configurator Wizards (UNCW). Provisioning Manager (Configuration) - A management application used to enter and maintain configuration information for the User Configuration Server (UCS). The Provisioning Manager configures Consoles, CCGWs, AuC, System, Subscribers, Security and applications (such as ZoneWatch). Radio Control Manager (Configuration, Security) - The Radio Control Manager (RCM) is an application used primarily by dispatchers to monitor and manage radio events, issues; to monitor commands and make informational queries of the system database. It also enables to present and analyze data showing RCM activity in the system. SDM 3000 RTU Digital Inputs is utilized at RF and dispatch console site facilities. Digital Inputs are reported directly to the Unified Event Manager (UEM). Primary and backup power systems could utilize a similar approach. Note - UEM is capable of receiving third-party SNMP traps for monitoring via UEM SNMP Element Management Toolkit. Toolkit requires third-party MIB files and customer provided network. UEM is also capable of NORTHBOUND Interface. The existing Dakota Carrier Network (DCN) management will remain independent of ASTRO25 radio system.
29.	Offeror must describe in detail any proprietary protocols in The proposed solution *Offeror Response:* Comply Optional Over the Air Programming (OTAP, aka Programming Over P25 (PoP25)), optional Enhanced Data feature and Advanced Digital Privacy (ADP) software encryption (Standard on all APX subscriber units) are Motorola Solutions proprietary protocols proposed. ADP software encryption is proposed per MCC7500E radio dispatch console operator position since ADP comes standard on Motorola Solutions APX radios.
30.	Offeror must describe in detail the RTUs in the proposed solution and acknowledge that there are sufficient quantities to monitor the proposed solution *Offeror Response:* Comply A SDM 3000 Basic Aux I/O is proposed to monitor site environmental alarms at each MCC7500E radios dispatch console site, each RF site and at Primary and optional

	Backup Cores. The SDM 3000 RTU is supported by and integrated with the UEM Fault Manager to provide a unified view of all system alarms. Environmental I/O Interfaces The SDM3000 RTU supports scalable environmental I/O to collect alarms and initiate controls through the various inputs, outputs and analog signals via the onboard Input and Output (I/O) board. Wiring from the RTU to the I/O is through punch blocks. The Fault Management RTU provides dry/wet alarm inputs to site equipment such as doors, tower lights, UPS, security, third-party devices, etc. The Fault Management RTU Digital Inputs capacity is as follows: SDM 3000 RTU – 48 DI on board The Fault Management RTU provides contact outputs to site equipment which can be controlled such as doors, generators, security, equipment switching, etc. The Fault Management RTU Digital Outputs capacity is as follows: ▪ SDM 3000 RTU – 16 DO on board Environmental Alarm Input Interface The SDM3000 RTU supports wet or dry contact inputs which can interface to site equipment such as doors, tower lights, UPS, security and other third-party devices with alarm cards. A wet contact input means the device provides the source voltage. The SDM3000 RTU detects the voltage from the device to determine the alarm State. ▪ Wet contact Voltage: MAX VIN is 30VDC. ▪ Polarity on input connectors = 5V positive with respect to ground. ▪ Input Voltage: OFF = Voltage < 0.8 VDC & ON = Voltage > 4 VDC. A dry contact input means the SDM3000 RTU provides the source voltage and the device input is simply a resistive loop. The SDM3000 RTU detects the resistance from the device to determine the alarm State. ▪ Dry Contact: Internal 5VDC power supply. ▪ Input Resistance: OFF = Resistance > 15kOhm & ON = Resistance < 1kOhm. Equipment Control Interface The SDM3000 RTU supports control outputs which can initiate controls (On/Off, Open/Close, Start/Stop) on equipment and devices with suitable inputs. Typical site equipment which can be controlled are doors, generators, security, lights, etc.
31.	Offeror must describe in detail how the following will be monitored by the RTUs: a. Radio network components b. Site facilities including shelter, tower, lighting, power and generator c. Data network equipment, including routers, switches, etc. d. Other miscellaneous equipment

Offeror Response:
Comply

The proposed ASTRO25 IP devices will be monitored by the Unified Event Manager Zone level application. A tool that provides reliable fault management services, such as service discovery, fault management, supervision and synchronization.

A SDM 3000 Basic Aux I/O is proposed to monitor site environmental alarms at each MCC7500E radios dispatch console site, each RF site and at Primary and optional Backup Cores. The SDM 3000 RTU is supported by and integrated with the UEM Fault Manager to provide a unified view of all system alarms.

Environmental I/O Interfaces
The SDM3000 RTU supports scalable environmental I/O to collect alarms and initiate controls through the various inputs, outputs and analog signals via the onboard Input and Output (I/O) board. Wiring from the RTU to the I/O is through punch blocks.

The Fault Management RTU provides dry/wet alarm inputs to site equipment such as doors, tower lights, UPS, security, third-party devices, etc. The Fault Management RTU Digital Inputs capacity is as follows:

SDM 3000 RTU – 48 DI on board
The Fault Management RTU provides contact outputs to site equipment which can be controlled such as doors, generators, security, equipment switching, etc. The Fault Management RTU Digital Outputs capacity is as follows:

- SDM 3000 RTU – 16 DO on board

Environmental Alarm Input Interface
The SDM3000 RTU supports wet or dry contact inputs which can interface to site equipment such as doors, tower lights, UPS, security and other third-party devices with alarm cards.

A wet contact input means the device provides the source voltage. The SDM3000 RTU detects the voltage from the device to determine the alarm State.
- Wet contact Voltage: MAX VIN is 30VDC.
- Polarity on input connectors = 5V positive with respect to ground.
- Input Voltage: OFF = Voltage < 0.8 VDC & ON = Voltage > 4 VDC.

A dry contact input means the SDM3000 RTU provides the source voltage and the device input is simply a resistive loop. The SDM3000 RTU detects the resistance from the device to determine the alarm State.
- Dry Contact: Internal 5VDC power supply.
- Input Resistance: OFF = Resistance > 15kOhm & ON = Resistance < 1kOhm.

Equipment Control Interface

	The SDM3000 RTU supports control outputs which can initiate controls (On/Off, Open/Close, Start/Stop) on equipment and devices with suitable inputs. Typical site equipment which can be controlled are doors, generators, security, lights, etc. The existing Dakota Carrier Network (DCN) management will remain independent of ASTRO25 radio system.
32.	**Expansion** Offeror must describe in detail the propose solution's ability to be expanded by adding additional hardware and/or software to increase coverage, capacity, or features. Offeror must describe in detail the expansion capabilities of which the proposed solution is equipped capable, with future costs.
	Offeror Response: Comply The proposed ASTRO25 radio solution is easily expandable by addition of software and hardware. Depending upon the required expansion type (i.e. zone, RF site, dispatch console site, system features) the preconfigured new devices are installed, discovered in the Unified Event Manager application and further optimized by the Unified Network Configurator application.
33.	Offeror must describe in detail how the proposed solution would monitor the proposed core radio infrastructure.
	Offeror Response: Comply The proposed ASTRO25 radio system includes a Unified Event Manager (UEM) server at core. UEM manages the Core's network elements via Simple Network Management Protocol version 3 (SNMPv3). The UEM provides a central location for managing all radio, transport and environmental devices on the system. Monitored device defect/interference responses can be automatic and/or manual. Automatic response can be triggered if the specific threshold value level has been reached or exceeded. In those cases, the Malfunction Timer Value may be activated and after the timer expires, the device will enter a specific default State and an event/message is sent to the UEM. The Motorola Solutions SSC (System Support Center) router interfaces to access the entire system during first year warranty and as part of optional SUA II maintenance contract. The proposed ASTRO25 radio system with the optional Dynamic System Resilience (DSR) feature includes two operational Unified Event Manager (UEM) servers, one in each core. The UEM servers are placed in the Primary and optional Backup cores, which are geographically separated. The UEM servers also have different host names and IP addresses. Both UEM's manage their respective Zone Core network elements via Simple Network Management Protocol version 3 (SNMPv3). However, the two UEM's are not synchronized and operate independently. Changes made to one UEM do not affect the operation of the other UEM.

	In DSR systems (optional), device discovery is performed separately for each UEM. Managed devices send notifications to both UEM's independently. For optional DSR the Motorola Solutions' SSC (System Support Center) has a pair of redundant interfaces to access the entire system. When one SSC interface goes down, the SSC has access through the second interface.
34.	Offeror must describe in detail how the proposed solution would monitor and control the proposed remote sites.
	Offeror Response: Comply The Unified Event Manager (UEM) application manages IP Simulcast, ASTRO25 Repeater and dispatch Console Sites network elements. Site environmental alarms such as intrusion, power, etc. will be monitored with the SDM3000 RTUs. In DSR systems (optional), device discovery is performed separately for each UEM. Managed devices send notifications to both UEM's independently.
35.	Offeror must describe in detail an option for providing an Offeror or third-party hosted station alerting in the proposed solution.
	Offeror Response: Comply The proposed system's P25 trunking Call Alert feature will be utilized for alerting. The call alert function, provided in all proposed radios, allows a caller to leave a "page" in an unattended radio. This prevents users from tying up airtime calling unattended radios. Since the page is both visual and auditory, this feature is particularly beneficial for radio users whose jobs frequently take them away from their radio, or who operate in a noisy environment. When the Call Alert is sent; the receiving radio will emit a series of tones until the user responds or resets the radio. Any button press will turn off the Call Alert indicators. The radios can be programmed to operate Call alert in several different ways. Call Alert Encode only enables a radio programmed with this capability to initiate a call alert. Call Alert Decode only enables a radio to only receive call alert pages. A radio can also be programmed for both Call Alert Encode and Decode, so the user can place and receive calls. Limited Call Alert allows the user to only place calls from the preprogrammed list. With unlimited call alert, the user may place calls to unlimited radios using the keypad.
	Redundancy and Survivability
	Offeror must describe in detail how their proposed IP network topology utilizes fault tolerance through a distributed and/or redundant architecture.

36.	*Offeror Response:* Comply Redundancy exists in the network and there is no single point of failure. Dual site links are proposed between sites (i.e. Trunked RF sites and dispatch console sites) and Primary and optional Backup Cores. The site Gateway Router holds the control Rendezvous Point (RP) for the active Zone Controller to RF Site Control Path (ZC-RF SCP). For the proposed redundant configuration system with redundant Gateway Routers (Dual Site Link), the control RP for the site control paths is split between the two Gateway Routers. The proposed redundant configuration system is designed such that with the deployed "Dual Site Link", the ZC -RF SCP's will be routed through separate WAN links. The result is that a single point of failure in the network will keep the Trunked RF site in Wide Area Trunking Mode. Additionally, a single point of failure in the network will keep connectivity to the MCC7500 dispatch console site.
37.	The STATE prefers that the proposed solution be geo-diverse and use layer 3 IP networking for redundancy. If the solution is not capable of layer 3 redundancy, Offerors must describe in detail how layer 2 redundancy will be accomplished and any additional IP network dependencies the layer 2 solution. will require. The STATE requires there be no single point of hardware failure within the proposed solution's design. *Offeror Response:* Comply Motorola Solutions' plan is to utilize the existing Dakota Carrier Network (DCN) providing Gold (99.999% Backhaul Reliability) Ethernet Transport Service (ETS), to the twenty-two (22) dispatch sites deployed in Phase 1 and the existing forty-five (45) RF sites deployed in Phase 2. Motorola Solutions understands DCN deploys redundancy and patch diversity whenever possible. The Greenfield and third-party tower sites deployed in Phase 3 will also utilize DCN Gold ETS. As required, the last mile will be constructed by DCN. The proposed ASTRO25 system includes optional redundant configuration, Dynamic System Resilience (DSR) architecture including the Primary and optional Backup Cores at geo diverse locations, with redundant InterZone Links. The Redundancy Subsystem includes the hardware required to provide higher system availability.

Each Primary or optional Backup core (Phase 1) includes a redundant Zone Controller (ZC) to supply a backup platform to automatically take over call processing functionality in case of a catastrophic software or hardware failure in the on-line ZC. The Redundancy Subsystem includes the following elements:

- Redundant ZC Server – A Redundant ZC server provides redundant ZC functionality. This means if the Combined ZC/NM (Network Management) Server fails, then all call processing continues on the Redundant ZC Server after an automatic switchover. It does not provide redundancy to any of the NM servers.
- Optional Redundant Network Manager Services –
  - Redundant Unified Event Manager (UEM) is provided per zone. Both UEM's for the zone are active at once; no switchover is required.
  - Configuration Management is also redundant; manual intervention is required for switchover.
    - The Provisioning Manager application configures subscriber access control records. The active Provisioning Manager periodically, synchronizes SAC records with the standby Provisioning Manager via a secure data transfer protocol. The network operator chooses which of the two PMs to be active.
    - The Unified Network Configurator (UNC) configures the infrastructure. Since the UNCs and PMs are configured separately, the UNCs need to be configured to synchronize (via a secure data transfer protocol) in the same time period as the PMs.
    - Redundant System Statistics Server.
    - Redundant Air Traffic Routers (ATR's).
    - Redundant Zone Statistics Server (ZSS).
- Optional Redundant Data Services - DSR introduces redundant data subsystem components that switch independently of the voice components. Data component failures and switchover do not impact voice system operation.
- Redundant LAN Switch – A second LAN switch used to connect the redundant elements together as well as some devices in the Core.
- Redundant Core and Gateway Routers – These Routers are used to provide redundant routing functionality and WAN connectivity. The redundant routers connect to the Relay Panel in the same way as the main router, but only one router can connect to the remote sites at any instance.

<u>RF Sites – Phases 2 and 3</u>

Higher system availability is achieved at IP Simulcast and ASTRO25 Repeater Sites due to:

- Redundant Prime Site Controller - Primary and Backup Prime Simulcast Site Controllers with redundant site Link to Cores. Failure of the primary controller will result in automatic switchover to the standby controller with no impact on Wide Area Trunking operation.
- Redundant ASTRO25 Site Repeater Controller - Primary and Backup ASTRO25 Repeater Site Controllers with redundant site Link to Cores. Failure of the primary controller will result in automatic switchover to the standby controller with no impact on Wide Area Trunking operation.
- Redundant LAN Switch – The failure of an Ethernet switch will cause only the effected channel to be removed from RF site subsystem until the failed switch is replaced or repaired.

	▪ Redundant Site Gateway Router – Redundant site gateway routers support redundant site Link to Cores. The failure of a router will cause automatic switch to the backup router. ▪ Multiple Control Channels - Motorola Solutions trunking systems provide up to four possible control channels at an RF Site. If the currently active control channel fails, another channel automatically takes over as the control channel and the failed channel is taken out of service automatically. ▪ Multiple Voice Channels - In a trunking system, multiple channels inherently provide redundancy. The failure of one base station will be transparent to all system users. The failure of a base station will result in the ASTRO25 Zone Controller automatically removing the channel from the system, resulting in some reduced channel capacity at the effected site. <u>Console Sites – Phase 1</u> Higher system availability is achieved at each proposed console site due to: ▪ Redundant LAN Switch – The failure of an Ethernet switch will cause only the effected operator positions connected to the failed switch will be taken out of service. The remaining operator positions are unaffected. ▪ Redundant Site Gateway Router – Redundant site gateway routers support redundant site Link to Cores. The failure of a router will cause automatic switch to the backup router. ▪ Conventional Channel Controller – With failure of both redundant site links to cores, the Conventional Channel Controller will function as a local zone controller for all local audio/control processing including the proposed and existing backup consolettes.
38.	Offeror must acknowledge that the proposed solution conforms to the STATE IP addressing scheme.
	<u>Offeror Response:</u> Comply During the Detailed Design Review Phase, Motorola Solutions will coordinate with the State's IT Department to develop an IP Plan that is compatible with the State's Layer 2 or Layer 3 IP addressing scheme.
39.	Offeror must describe in detail the proposed solution's redundancy for all solution elements in which failure would result in a major failure of the system; single points of failure are not acceptable.
	<u>Offeror Response:</u> Comply with Clarification The proposed ASTRO25 system includes optional redundant configuration, Dynamic System Resilience (DSR) architecture including the Primary and optional Backup Cores at geo diverse locations, with redundant InterZone Links. The Redundancy Subsystem includes the hardware required to provide higher system availability.

Each Primary or optional Backup Core includes a redundant Zone Controller (ZC) to supply a backup platform to automatically take over call processing functionality in case of a catastrophic software or hardware failure in the on-line ZC. The Redundancy Subsystem includes the following elements:

- Redundant ZC Server – A Redundant ZC server provides redundant ZC functionality. This means if the Combined ZC/NM (Network Management) Server fails, then all call processing continues on the Redundant ZC Server after an automatic switchover. It does not provide redundancy to any of the NM servers.
- Optional Redundant Network Manager Services –
  - Redundant Unified Event Manager (UEM) is provided per zone. Both UEM's for the zone are active at once; no switchover is required.
  - Configuration Management is also redundant; manual intervention is required for switchover.
    - The Provisioning Manager application configures subscriber access control records. The active Provisioning Manager periodically, synchronizes SAC records with the standby Provisioning Manager via a secure data transfer protocol. The network operator chooses which of the two PMs to be active.
    - The Unified Network Configurator (UNC) configures the infrastructure. Since the UNCs and PMs are configured separately, the UNCs need to be configured to synchronize (via a secure data transfer protocol) in the same time period as the PMs.
    - Redundant System Statistics Server.
    - Redundant Air Traffic Routers (ATR's).
    - Redundant Zone Statistics Server (ZSS).
- Optional Redundant Data Services - DSR introduces redundant data subsystem components that switch independently of the voice components. Data component failures and switchover do not impact voice system operation.
- Redundant LAN Switch – A second LAN switch used to connect the redundant elements together as well as some devices in the Core.
- Redundant Core and Gateway Routers – These Routers are used to provide redundant routing functionality and WAN connectivity. The redundant routers connect to the Relay Panel in the same way as the main router, but only one router can connect to the remote sites at any instance.

<u>RF Sites – Phases 2 and 3</u>

Higher system availability is achieved at IP Simulcast and ASTRO25 Repeater Sites due to:

- Redundant Prime Site Controller - Primary and Backup Prime Simulcast Site Controllers with redundant site Link to Cores. Failure of the primary controller will result in automatic switchover to the standby controller with no impact on Wide Area Trunking operation.
- Redundant ASTRO25 Repeater Site Controller - Primary and Backup ASTRO25 Repeater Site Controllers with redundant site Link to Cores. Failure of the primary controller will result in automatic switchover to the standby controller with no impact on Wide Area Trunking operation.
- Redundant LAN Switch – The failure of an Ethernet switch will cause only the effected channel to be removed from RF site subsystem until the failed switch is replaced or repaired.

	▪ Redundant Site Gateway Router – Redundant site gateway routers support redundant site Link to Cores. The failure of a router will cause automatic switch to the backup router. ▪ Multiple Control Channels - Motorola Solutions trunking systems provide up to four possible control channels at an RF Site. If the currently active control channel fails, another channel automatically takes over as the control channel and the failed channel is automatically taken out of service. ▪ Multiple Voice Channels - In a trunking system, multiple channels inherently provide redundancy. The failure of one base station will be transparent to all system users. The failure of a base station will result in the ASTRO25 Zone Controller automatically removing the channel from the system, resulting in some reduced channel capacity at the effected site. <u>Console Sites – Phase 1</u> Higher system availability is achieved at each proposed console site due to: ▪ Redundant LAN Switch – The failure of an Ethernet switch will cause only the effected operator positions connected to the failed switch will be taken out of service. The remaining operator positions are unaffected. ▪ Redundant Site Gateway Router – Redundant site gateway routers support redundant site Link to Cores. The failure of a router will cause automatic switch to the backup router. ▪ Conventional Channel Controller – With failure of both redundant site links to cores, the Conventional Channel Controller will function as a local zone controller for all local audio/control processing including the proposed and existing backup consolettes.
40.	Offeror must acknowledge that the proposed radio communications system shall include several modes of degraded operation, known as failure modes. The system shall be capable of automatic activation of failure modes in the event of a system failure. Additionally, the system shall switch to a failure mode gracefully. Offeror must describe in detail how the proposed solution is capable of operating as one system or as independent systems if connectivity between the servers is lost, regardless of physical distance.
	<u>Offeror Response:</u> Comply A trunked RF Site (Phases 2 and 3) may operate in one of the following modes: ▪ Wide Area Trunking. ▪ Site Trunking. ▪ (Site) Failsoft. The proposed radio system with optional Dynamic System Resilience (DSR) feature adds a geographically separate backup for the Master Site to protect against a catastrophic failure. The proposed zone in the optional DSR system is supported by two, Primary and optional Backup, Cores in two separate Master Sites. The optional Backup Core provides the same level of redundancy as the Primary Core; if the optional Backup Core were to take over, it provides redundancy for voice, transport and other subsystems.

All system features are preserved after optional Backup Core take over, since system will continue to operate in the Wide Area Trunking mode of operation.

Criteria for Wide Area Trunking

If a Trunked Site maintains the following, it should be in Wide Area Trunking mode.

- There is an active Zone Controller to RF Site Control Path.
- Requires a Gateway router to be available.
- One functioning control channel.
- At least one functioning voice channel.

If both proposed Primary and optional Backup Cores are unavailable due to multiple failures the Wide Area Trunking mode is not possible.

Criteria for Site Trunking

If Wide Area Trunking is not possible, the site sub-system may enter Site Trunking mode.

The conditions required to maintain site trunking include:

- One functioning site controller.
- One functioning control channel.
- At least one functioning voice channel.
- Connectivity between the various site/sub-system components.

Criteria for (Site) Failsoft

If Site Trunking is not possible, the RF site may enter (Site) Failsoft mode.

The conditions which would cause Failsoft include any of the following.

- Both site controllers are lost.
- All control channels are lost.
- All voice capable channels, within the RF site/sub-system, are lost.

In (Site) Failsoft mode, the individual channels configured for Failsoft operation, become active. The Failsoft channel(s) key up their transmit carrier continuously, transmitting a Failsoft LC message along with received call traffic. In the case of simulcast sub-systems, the Failsoft channel(s) continue to simulcast the Failsoft LC message and voted call traffic. User Radios configured for Failsoft operation will use the channels as assigned in their Failsoft configurations.

Subscriber Configuration for Failsoft

The subscriber radios may be configured for the following modes of Failsoft operation.

- Failsoft by Control Channel.
- Failsoft by Working Group.

Simulcast Unique Operational Modes

Resource Voting (Simulcast)

In Simulcast sub-systems, there is an algorithm called “Resource Voting”. Resource Voting controls when resource (channel) failures at a given subsite (aka remote site):

- Are utilized or ignored by trunked call processing.

-AND-

- Cause the entire simulcast sub-system to enter Failsoft mode.

Resource Voting:

- Is a simulcast site controller function.
- Determines the availability of simulcast sub-system channels.
- In service: the simulcast channel is available to be assigned by trunked call processing due to an acceptable level of channel component availability.
- Out of service: the simulcast channel is not available for assignment by trunked call processing due to the failure of at least one channel component.

Each simulcast subsite (aka remote site) is assigned an Availability Number. This parameter specifies the percentage of subsite resources (channels) that can experience malfunctions before the subsite is removed from service (placed in a Malfunctioned State). The availability number can take a value from 1 to 100. The default value is 50.

An “Essential Subsite” is a subsite with an availability number of 100. In this case, with only one subsite resource (BR) failure, the entire simulcast sub-system enters (Site) Failsoft mode.

A subsite should only be given an Availability Number of 100 if its RF coverage is critical to the simulcast sub-system’s radio users. Setting a subsite as an Essential Subsite indicates that radio users prefer operating in (Site) Failsoft mode with the malfunctioned subsite rather than operating in a Trunked mode without the malfunctioned subsite.

<u>Simulcast Local Failsoft</u>

IP Simulcast sub-systems support the use of Local Failsoft. Local Failsoft provides a fallback mode of operation at Trunked Simulcast Subsites experiencing a critical failure involving either the IP Simulcast Prime Site, or the links between the IP Simulcast Prime Site and an IP Simulcast Subsite. Local Failsoft supports the limited use of a subsite’s resources (BRs) for RF coverage within the subsite.

Local Failsoft may occur when:

- The comparators at the Simulcast Prime Site are inoperable.

-OR-

- An IP Simulcast Subsite has lost its link(s) to the comparators at the IP Simulcast Prime Site.

In Local Failsoft mode, the individual base radios (BRs), if configured for Local Failsoft operation, become active. The Failsoft BR(s) key up their transmit carrier continuously, transmitting a special Local Failsoft LC message along with any received call traffic. Call traffic is no longer being simulcasted. User Radios configured for Failsoft operation will use the channels as assigned in their configurations. Local Failsoft should be used with caution to avoid interference within the simulcast sub-

system itself, as each local failsoft channel will key independently on the same frequency (for the channel) at other sub-sites.

The timing of the Local Failsoft alert tone is different than that of the (Site) Failsoft alert tone. This is so that the radio user is able to distinguish between Local Failsoft and (Site) Failsoft.

Offeror must describe in detail a description of each failure mode and describe how communications are affected including the PSAP consoles by the failure. At a minimum, failure modes shall include the following scenarios:

a. Loss of single site
b. Loss of multiple sites
c. Loss of a repeater station due to an equipment failure
d. Loss of single channel
e. Loss of multiple channels
f. Any other scenario the Offeror would like to describe

41.

Offeror Response:

Comply

Sample of failure and recovery scenarios.

Scenario:	Failure of Single Site
Result:	Either loss of a single ASTRO25 Repeater Site or a remote Simulcast Site will result in reduced RF coverage in the affected area. Transport to the dispatch operators.
Protection:	
Detection:	Alarm on Network Manager client workstations and ZoneWatch.

Scenario:	Failure of Multiple Sites
Result:	Either multiple ASTRO25 Repeater Sites or multiple remote Simulcast Sites will result in reduced RF coverage in the affected area. Transport to the dispatch operators.
Protection:	
Detection:	Alarm on Network Manager client workstations and ZoneWatch.

Scenario:	Failure of the Active Zone Controller
Result:	Motorola Solutions proposed ASTRO25 system provides redundant Zone Controllers at each Core. Failure of the active Zone Controller will result in automatic switchover to the redundant Zone Controller. As the switchover process takes place, the system will temporarily enter site trunking mode for a period less than 35 seconds. Only active calls at the time of switchover will be dropped. Wide area trunking will be restored when the switchover process is complete. Any and all calls generated after automatic switchover to the redundant controller will not observe any change of service. During the transition, the dispatch operators will revert to new backup consolettes interfaced via CCGW and Conventional channel controller.
	The Zone Controllers have redundant power supplies as a standard feature, which will help keep the controllers operational in case of a failure of that component. The redundant controller is regularly updated with all pieces of critical information so that if it needs to become the active controller, the current system configuration and operational characteristics are maintained.
Protection:	Redundant Zone Controllers at the Primary Core.
Detection:	Alarm on Network Manager client workstations.

Scenario:	Failure of an Enterprise Switch
Result:	Motorola Solutions proposed ASTRO25 system includes dual Ethernet Switches at each Core. All equipment critical for wide-area voice communications has connections to both switches. Failure of one Ethernet Switch will cause the LAN traffic to use the other switch. The entire system remains in the Wide Area Trunking mode. The failure is transparent to all system users. Non-critical Network Management applications connected to the failed switch will not be available.
Protection:	Dual Master Site Ethernet Switches.
Detection:	Alarm on Network Manager client workstations.

Scenario:	Failure of a Core Router
Result:	Motorola Solutions proposed ASTRO25 system includes redundant Core Routers at each Core. The Core Routers are configured so that all RF cells and dispatch centers are connected to both Core Routers. Failure of one Core Router

	will result in automatic switchover to the redundant Core Router.
Protection:	Redundant Core Router.
Detection:	Alarm on Network Manager client workstations.

Scenario:	Failure of the Network Management Servers
Result:	There are several Network Management servers on the ASTRO25 Network LAN. The failure of any specific server on the LAN will result in loss of the management function associated with the server, while the entire system will remain in the Wide Area Trunking mode. The failure is transparent to all radio and dispatch console users. The failure will only affect the Network Management system user.
Protection:	
Detection:	Alarm on Network Manager client workstations.

Scenario:	Failure of the Primary Simulcast Prime Site Controller
Result:	For each Simulcast subsystem, a fully redundant Simulcast system controller is proposed. Failure of the primary controller will result in automatic switchover to the standby controller with no impact on Wide Area Trunking operation. Calls generated after automatic switchover to the redundant controller will not observe any change of service.
Protection:	Redundant Prime Simulcast Controllers.
Detection:	Alarm on Network Manager client workstations, Unified Event Manager (UEM).

Scenario:	A Comparator Failure at Prime Site
Result:	A failed comparator will result in affected channel to be removed from service at all sites (one reduced channel resource). The entire system remains in the Wide Area Trunking mode. Dispatch console operation remains unaffected.
Protection:	Multiple channels.
Detection:	Alarm on Network Manager client workstations.

Scenario:	Failure of the Primary ASTRO25 Site Controller
Result:	For each ASTRO Repeater Site, a fully redundant Site controller is proposed. Failure of the primary controller will result in automatic switchover to the standby controller with no impact on Wide Area Trunking operation. Calls generated after automatic switchover to the redundant controller will not observe any change of service.
Protection:	Redundant Site Controllers.
Detection:	Alarm on Network Manager client workstations, Unified Event Manager (UEM).

Scenario:	Failure of a Single Base Station
Result:	In a trunking system, multiple channels inherently provide redundancy. The failure of one base station will be transparent to all system users. The failure of a repeater will result in the ASTRO25 Zone Controller automatically removing the failed channel from the system, resulting in some reduced channel capacity. Any calls in progress on the failed channel will be lost and on the next push-to-talk, radio traffic will be restored. All other channels remain unaffected. The entire system remains in the Wide Area Trunking mode. Dispatch console operation remains unaffected.
Protection:	Multiple channels.
Detection:	Alarm on Network Manager client workstations.

Scenario:	Failure of a Single Control Channel
Result:	Motorola Solutions trunking systems provide up to four possible control channels at an ASTRO25 remote simulcast or ASTRO25 Repeater Site. If the currently active control channel fails, another channel automatically takes over as the control channel and the failed channel is automatically taken out of service. All other channels remain unaffected. The system remains in the wide-area trunking mode. The failure is transparent to all system users. Dispatch console operation remains unaffected.
Protection:	Multiple potential control channels.
Detection:	Alarm on Network Manager client workstations.

Scenario:	Failure of Multiple Base Stations
Result:	The failure of multiple repeaters will result in the ASTRO25 Zone Controller automatically removing the failed channels from the system, resulting reduced channel capacity. Any

	calls in progress on the failed channels will be lost and on the next push-to-talk, radio traffic will be restored. All other channels remain unaffected. The entire system remains in the Wide Area Trunking mode. Dispatch console operation remains unaffected.
Protection:	Multiple channels.
Detection:	Alarm on Network Manager client workstations.

Scenario:	Failure of RF Site Gateway
Result:	The ASTRO25 network was designed with dual RF site gateways that connect each RF site to Cores. The failure of the site gateway will cause the second gateway to become active. The failure will not cause reduced radio channels.
Protection:	Redundant RF Site Gateways.
Detection:	UEM detection, ZoneWatch indication.

Scenario:	Failure of Remote Simulcast Ethernet Switch
Result:	The ASTRO25 network was designed with two Ethernet switches that connect the remote simulcast site to the prime site. The failure of an Ethernet switch will cause only the affected channel to be removed from simulcast subsystem until the failed switch is replaced. The failure will cause reduced channel resources.
Protection:	
Detection:	UEM detection, ZoneWatch indication.

42.	Offeror will select the location for the control equipment and identify the selected locations in the proposal and explain in detail the reasons for selecting these locations.
	Offeror Response: Comply The proposed ASTRO25 system includes optional redundant configuration, Dynamic System Resilience (DSR) architecture including the Primary and optional Backup Cores at geography diverse locations, with redundant InterZone Links. The geography diverse Core locations are selected to be at Bismarck and optional Fargo where Dakota Carrier Networks (DCN) already has facilities to host this equipment.
43.	Offerors must describe in detail how security is handled within the proposed solution.
	Offeror Response: Comply

The proposed ASTRO25 radio system contains the following infrastructure Information Assurance features.

Strong passwords

In an ASTRO25 system users will encounter the strong password requirement as early as the OS installation process. Default passwords from hardware manufacturers are replaced by Motorola Solutions. Before beginning any procedure, users need to obtain the current passwords from their system administrator.

Users should be aware that failure after the configured number of login attempts may require complex recovery procedures, depending on the device where the failure occurred. For some accounts, password complexity and/or aging can be configured as required by your organization's policies.

Management of Embedded (Non-Interactive) Passwords

Different ASTRO25 system applications and administrative scripts use embedded accounts to communicate with other applications, such as databases and LDAP servers. Motorola Solutions provides the capability to change, backup and restore embedded passwords for non-interactive accounts on specified devices. This functionality has a local device scope – it does not manage account passwords across devices.

The embedded password management functionality is automatically installed together with the supported ASTRO25 system applications. Some applications include embedded password management as part of their installation procedure.

Supplemental configuration

In ASTRO25 systems, operating system configuration is supplemented with additional operating system, application and account configuration.

For example, supplemental configuration of Windows-based devices uses a graphical user interface launched from an ASTRO25 system Windows Supplemental media. Additional procedures are provided in a Windows Supplemental Configuration Setup Guide manual, which also lists the supported Windows operating systems and Windows-based devices.

Access Control Lists (ACLs) on transport devices

Pre-configured Access Control Lists (ACL's) on transport devices allow only the traffic on the lists to pass through routers in the ASTRO25 radio network infrastructure (RNI). A number of security rules enforced by ACL's, on routers and gateways in ASTRO25 systems.

Authentication by domain controllers

Domain controllers provide central management of interactive and non-interactive user accounts in the system, for multiple platforms and types of devices. Centrally managed credentials are cached locally for use in the event of a network failure. The following standard IT services are used:

- Domain Name Service (DNS).
- Active Directory.
- Remote Authentication Dial-In User Service (RADIUS).

Securing protocols with SSH

This feature provides a secure connection between end points through encryption and authentication of an Secure Shell (SSH) client and an SSH server. An SSH client initiates the SSH connection request and the SSH server receives the request.

An SSH utility is required for interactive sessions with ASTRO® 25 system devices that operate in secure mode only. PuTTY can be installed from the Windows Supplemental media to Windows based devices in an ASTRO25 system, as needed. The PuTTY key generation utility is customized by Motorola Solutions to facilitate SSH key rotation for non-interactive SSH connections between Unix based servers. All other devices in an ASTRO® 25 system that support SSH have SSH functionality built in.

SNMPv3

This feature uses Simple Network Management Protocol (SNMP) version 3 capabilities to secure interactive connections between SNMPv3-enabled devices in an ASTRO25 system.

Anti-virus/Anti-spyware/Anti-malware Server and Client Software for Windows Devices

The McAfee ePolicy Orchestrator (ePO) application on the Core Security Management Server

(CSMS) provides a single point of control to configure the anti-virus/anti-spyware/anti-malware system and monitor it for events and alarms.

Fortinet Firewalls

A firewall allows or denies access to the radio network infrastructure (RNI) based on the source of the data traffic, the destination, the direction of traffic flow and the type of data service. Firewalls are placed between a trusted zone and an untrusted zone in the system. Fortinet firewall devices are utilized for with optional ISSI 8000, Control Room firewall, or Zone Core Protection (ZCP) Mediation LAN features.

Two-factor Authentication at the Fortinet RNI-DMZ Firewall for Remote VPN Access

The two-factor authentication compliments the standard authentication functionality in ASTRO25 systems to authenticate the identity of a person or other entity attempting to access the system remotely through a VPN connection. Two-factor authentication requires a token in addition to their Active Directory credentials.

Centralized Event logging

Centralized Event Logging captures operating system events generated by most devices in the radio network infrastructure in the form of event messages. Event messages for these devices are forwarded to a Centralized Event Logging server, for

	ease of administration. The type of information logged is defined by the client operating system, according to industry standards. Link encryption and authentication The ASTRO25 radio system encryption-capable routers and gateways provide cryptographic protection for all traffic traversing: ▪ Networks between an ASTRO25 system's remote sites and master sites. ▪ The DMZ between the ASTRO25 system border gateway and the radio network infrastructure (RNI). The RNI-DMZ firewall provides this encryption feature for specific types of data traffic sent to the Customer Enterprise Network or another zone from the Gateway Router in the Motorola Solutions radio network master site. Zone core protection Zone Core Protection (ZCP) safeguards the radio network infrastructure Master Site from unexpected traffic from remote sites and site links. The ZCP firewalls are added to block unexpected traffic from remote sites so that it cannot reach other components in the Master Site. Access Control Lists (ACLs) on the Core Routers and Exit Routers block unexpected traffic before it reaches other components in the Master Site. Ethernet port security (MAC port lockdown and 802.1x service port access) The two major components of the Ethernet Port Security feature are: MAC Port Lockdown - Provides the capability to lock an Ethernet switch port to the MAC addresses that are expected in the normal system configuration, so that unexpected MAC addresses cannot use the port. 802.1x - Provides additional port-based network control by requiring a user who connects to the 802.1x enabled port to authenticate with the centralized Active Directory and RADIUS services. This feature is based on the IEEE 802.1x standard for Ethernet networks. Secure Software Download (Secure SWDL) Secure Software Download (Secure SWDL) eliminates the use of clear File Transfer Protocol (FTP) and replaces it with secure FTP (Secure Shell / SFTP protocol) when downloading software to RF Site and VPM-based products. SSH and Secure SWDL configuration is performed through CSS or the UNC. For a software download to an entire RF Site, the entire site must share the same configuration for the SSH feature and requested SWDL transfer mode.
44.	Offerors must describe in detail the IPv6 capability of the proposed solution Offerors must also include information on their IPv6 roadmap.
	Offeror Response: Comply The proposed Statewide ASTRO25 radio system in based upon IPv4. The IPv6 – External (Site Links) Interfaces functionality may be optionally included in Motorola Solutions ASTRO25 system designs. The proposed ASTRO25 system is capable of enables IPv6 connectivity at the Zone Core and Remote Sites with appropriate Zone Level and per Remote Site level options.

IPv6 Addressing

The endpoints for each IPv6 Ethernet Site/Interzone link require IPv6 addresses routable on the customer backhaul network. The endpoints need to be configured to IPv6 addresses as specified by the customer backhaul network scheme.

It is expected that customers will typically use IPv6 Global Unicast Addresses as defined in RFC4291 to configure the link endpoints. It is important to note that RFC4291 defines a fixed 64-bit subnet mask for these addresses. While it is rumored that some IPv6 backhaul providers are utilizing subnet masks beyond 64 bits, IPv6 Ethernet Site/Interzone links provide a fixed 64-bit subnet mask as defined in RFC4291.

Backhaul network routers must use IPv6 Link-Local addresses that are in the FE80: :/64 range for communication with the ASTRO25 network routers. Some router vendors support configuration of Link-Local addresses outside of this range, but cannot be used with this feature.

The feature does support a default IPv6 address scheme to use for customer backhaul networks, but it is highly recommended for the customer to choose their own scheme. The default scheme provided is very generic and will typically not be optimal since the backhaul network topology is unknown. The default scheme utilizes a static implementation of IPv6 Unique Local Addresses as defined in RFC4193.

Note: When configuring IPv6 addresses for this feature, a fixed 64-bit subnet mask is enforced. Attempts to use this feature with backhaul networks configured with subnet masks greater than 64 bits may result in failure to properly route ASTRO RNI application traffic. This would result in catastrophic Site and Interzone Link failure.

IPv6 Backhaul Network Routers Using Redundancy Protocols

If the customer backhaul network demarcation is a pair (or more) of routers utilizing router redundancy protocols (i.e. VRRP, HSRP, etc.) between each other, all routers in the group must be capable of responding to ICMPv6 messages for Neighbor Discovery to function properly. If Neighbor Discovery fails, packet forwarding between ASTRO RNI routers and customer backhaul network routers will fail resulting in failure of the link. This issue could be intermittent in nature (link bouncing).

Customer backhaul network routers must be configured properly to avoid this potential Neighbor Discovery issue when utilizing router redundancy protocols. For example, on a Juniper router running VRRP the “accept-data” parameter in the VRRP group configuration must be specified in order to allow proper functioning of Neighbor Discovery. As of JUNOS version 9.3, this parameter is not enabled by default.

5. RADIO AND IP NETWORK MONITORING & REPORTING

The Offeror must provide a hierarchical NMS capable of incorporating multiple management systems into a high-level management system that provides a single point to manage multiple subsystems.

No.	
1.	Offeror must describe in detail the solution's: a. standard reporting capabilities. b. custom reporting capabilities.
	Offeror Response: Comply The proposed ASTRO25 radio system is capable of Historical Reports, Dynamic Reports and Custom Historical Reports. Historical Reports Historical Reports is a Private Radio Network Management (PRNM) Suite application that allows you to generate reports for system-wide activity and for individual zones. These reports display data that is stored on the server. The Historical Reports application generates reports of statistical data that is gathered at specific, predefined time intervals. Reports can be created from this data to monitor and analyze information about zones, sites, channels, talkgroups and users. This data is displayed using predefined report templates and parameters. Historical Reports is based on a third-party application (Crystal Reports). Historical Reports can be used for resource management. For example, it can be determined if interconnect resources are being overused because too many interconnect calls appear in the report. Historical reports allow for long-term analysis of traffic data. Only Historical Reports less than 30,000 pages can be viewed or imported to file. Motorola Solutions recommends splitting the report into two or three smaller ones. Do not exceed 2,000 objects (radio users, talkgroups etc.) per report. Dynamic Reports Dynamic Reports is a Private Radio Network Management (PRNM) Suite application that provides predefined report templates to display statistics for a zone, site, or a console site (but not for a system) in near real time. With Dynamic Reports, user can monitor and report usage trends and patterns of activity. Based on the results of the reports, user could do any of the following: - Make changes in how radios and talkgroups are managed. - Modify your system design to improve communication. - Recommend system expansion.

	Custom Historical Reports Custom Historical Reports lets you create or modify reports to meet your specific needs using the statistical data elements supported by the Performance Reports application. The custom historical report is created using the Crystal Reports 2008 application and is an optional feature of the ASTRO25 system. The Custom Report feature applies only to Historical Reports and not to Dynamic Reports.
2.	Offeror must describe in detail how the proposed solution is able to export the data in output formats such as delimited and Microsoft Excel that allows the operator to further manipulate or merge data sets.
	Offeror Response: Comply The proposed ASTRO25 radio system's Historical Reports includes an Export Reports feature. The following formats are available: - Comma Separated Values (CSV) - suitable for export to database programs, such as Microsoft Access or Excel. - Adobe Portable Document Format (PDF). - Microsoft Word Format. - Microsoft Excel Format. - Native Crystal Reports Format (rpt). - Rich Text Format (rtf).
3.	Offeror must describe in detail the reports available to administrators and users. Offeror must also describe in detail how the administrators and users are able to access the reports.
	Offeror Response: Comply Historical Reports are predefined templates at System-Level and Zone Level. Historical Reports predefined System-Level templates are: - User at System. - System Busy. - System Voice Detail. - Talkgroup at System. - Radio Authentication. - Talkgroup at InterSystem. - Group Calls per Systems. - User at System Summary. - System Data Detail. - System Voice and Data Detail. - Talkgroup at System Summary. - User at InterSystem. - InterSystem Voice Detail. Historical Reports predefined Zone-Level report templates are: - Channel. - User at Zone. - Shared Service Site Detail. - Site Busy. - Site Resource Busy. - Site Voice Detail. - Site Summary. - Channel FDMA vs.TDMA. - User at Zone Summary. - Shared Service Site Summary. - Site Busy by Access Method Type. - Site Data Detail. - Site Voice Detail by Access Method Type. - Site Voice and Data Detail.

- Conventional Talkgroup at Conventional Talkgroup Channel.
- Talkgroup at Site.
- Talkgroup at Zone.
- Talkgroup at Zone by Access Method Type.
- Talkgroup at Zone Summary.
- Zone Busy.
- Zone Busy Conventional Talkgroup.
- Zone Busy by Access Method Type.
- Zone Data Detail.
- Zone Voice Detail.
- Zone Voice Detail by Access Method Type.
- Zone Summary.
- Zone Voice and Data Detail.
- Console Site Detail.
- Console Site Summary.
- Channel FDMA vs. TDMA.
- Site Channel Type Utilization Summary.
- Site Resource Busy FDMA vs. TDMA.
- Site Busy FDMA vs. TDMA.
- Site Voice Detail FDMA vs. TDMA.
- Site Voice Detail 2 FDMA vs. TDMA.
- Site Summary FDMA vs. TDMA.
- Radio Authentication.

Dynamic Reports are predefined templates at Zone-Level, Site-Level and Console Site-Level.

<u>Templates for Zone-Level Reports</u>

Dynamic Reports allows user to run reports to capture statistics across a zone. For example, the Zone Call Activity report provides statistics for determining the levels of different call activities within the zone, such as call rejects or call terminations. A complete Zone-Level Reports template list includes:

- Zone Average Sites Per Call.
- Zone Average Number of Sites in a Busied Call.
- Zone Busy Count.
- Zone Busy Service.
- Zone Call Activity.
- Zone Call Level Count.
- Zone Call Properties.
- Zone Call Site Usage Percentages.
- Zone Call Type PTT Count.
- Zone Resource Utilization.
- Zone Non-Voice Activity.
- Zone Reject Graph.

<u>Templates for Site-Level Reports</u>

Dynamic Reports allows user to run reports to capture statistics across a site. For example, the Site Busy Count report provides statistics for determining the number of busies caused by lack of resources at this site or the number of busy calls originating at this site. A complete Site-Level Reports template list includes:

- Site Channel Utilization.
- Site Busy Count.
- Site Busy Service.
- Site Call Activity.
- Site Call Type PTT Count.

<u>Templates for Console Site-Level Reports</u>

Dynamic Reports allows user to run reports to capture statistics across a console site. For example, the Console Site Link Bandwidth Usage report provides the

	percentage of bandwidth to a console site consumed by trunking calls in the time interval. A complete Console-Level Reports template list includes: - Console Site Link Bandwidth Usage. - Console Site Denied Service. - Console Site Busy Service. - Console Site Call Type PTT Count. Any system administrator with provisioned Network Manager user account and proper credential is able to access Private Radio Network Management (PRNM) Suite application to run Historical and Dynamic Reports.
4.	Offeror must describe in detail how The proposed solution: a. Monitors the health of all IP networked devices b. Remotely interrogates equipment and troubleshooting to board level failures c. Provides electronic notification functions based on multiple levels of fault configurations
	Offeror Response: Comply The Unified Event Manager (UEM) is an application that provides a fault management solution. for ASTRO25 Private Radio Systems. The UEM operates at zone level providing centralized, secure, reliable functionalities to fault manage. The UEM has the capabilities to fault manage devices securely via a fully secure interface using the SNMPv3 protocol. This secure interface includes both South (i.e., site device) and North Bound Interfaces (i.e., Motorola Solutions Systems Support Center (SSC)). The UEM application is accessed using a standard web browser from Network Management client workstations residing within the radio system network. Users launch and use the application directly within the browser. A UEM is present in each Zone and is used to fault manage the devices within that Zone. The UEM is a client server application. UEM server resides in zone core and UEM clients can be accessed from any Network Management client workstation. The Primary functions of UEM are: - Fault Management of devices (SNMP traps or informs). - Detecting and reporting loss of communication with managed devices (Supervision). - Ability to manage/Unmanage a device or delete a subnet/device. - Alarm Generation/Annotation/Ownership Assignment/Clearing / Acknowledgment. - Alarm Summary. - Maintaining inventory of managed devices. - Ensuring the status reported is current (Synchronization). - Redundancy Management (i.e., router, Site Controller). - Device Command Operation. - Zone Health Map.

- Capability to use secure protocol (i.e., SNMPv3) configuration.
- Data access management.
- User access management.
- Basic Troubleshooting Capability.

UEM Alarms

An alarm results from an event in a managed resource. It occurs as a result of a pre-determined significant State (a failure or a fault) that may require user attention. Alarms are raised within UEM based on notifications from the network element, or by UEM to report failures associated with fault management functions.

UEM Alarms can fall into the following general categories:

- Communication alarms.
- Quality-of-service alarms.
- Resources that have failed.
- Devices malfunctioning.
- SNMPv3 or Web Service credentials failure.
- Equipment alarms.
- Alarms across a network are commonly related to:
- Connectivity issues.
- Threat assessment reports.

UEM Alarms Summary

Alarm summary is used to display the count of the total number of alarms organized by device categories and/or severities. It is positioned just below the navigation tree in the main window. Each severity is represented in a single cell or graph, depending on the presentation that is selected. The view is updated automatically and the counts can be seen at all times, irrespective of the view that is currently open.

The presentation of the alarm summary can be modified by clicking the buttons at the top of the summary panel. Three different presentations are available:

- Table view
- Bar graph view
- Pie chart view

Clicking a particular severity symbol opens an alarms window with the corresponding alarm type filtered.

UEM Alarms Window

The Alarms window can be opened from the Navigation View by clicking the Alarms node under the Fault Management node. In the window, only active alarms of devices are displayed, that is the latest failure or an event clearing a failure.

T the detailed view of an alarm can be opened by double-clicking an entry in the window. By default, you can view 25 alarms on a single page. The number of alarms displayed on the page can be customized.

The maximum number of alarms on a page is 1,000. The Alarm Details window allows the Unified

	Event Manager user to perform the following functions: - Assign/Unassign an alarm - Acknowledge/Unacknowledge an alarm - Annotate an alarm - View the history of the selected alarm The default sorting criterion in the Alarms window is the Date/Time column. You can sort the events by any attribute by clicking the associated column heading. To toggle between ascending and descending sort orders, click the column again. <u>UEM Severity Definitions</u> Alarms and events are assigned with severity levels, indicated by a severity color and an alarm or event message. The action required depends on the severity of the alarm. <u>InfoVista</u> InfoVista is a customizable performance management application that is a part of the Transport Network Management (TNM) application suite. When installed, this application is accessible through the Transport Network Management menu or through the InfoVista server. InfoVista interfaces with and obtains data from, multiple network devices that support Simple Network Management Protocol (SNMP) including Master Site gateway, Ethernet LAN switches and Cooperative WAN Routing (CWR). This data includes CPU utilization, memory utilization, buffer utilization, port characteristics and traffic analysis. In particular, InfoVista performs the following tasks: - Collects Management Information Base (MIB) data at the specified time intervals - Reports and graphs MIB data for single or multiple devices, spanning – daily, weekly, monthly and yearly time periods - Provides customized reports using pre-configured report templates for network transport devices in your Motorola Solutions radio system The InfoVista client application is used to access server software and perform administrative tasks such as starting and stopping existing reports, adding an instance, or creating a report. Network Time Protocol (NTP) is a service used to provide time and date information to devices in the network. The source time and date reference for the InfoVista server is default, which is a local Domain Controller.
5.	Offeror must describe in detail the following: a. Local administration database b. Real time airtime usage c. Real-time monitoring of IP network element status

d. Hierarchical updates on error conditions
e. Real-time status of IP network usage
f. Real-time alarm management

Offeror Response:

Comply

UEM Network Database

Network database serves as an inventory view for the resources that are currently present in the Unified Event Manager (UEM) database.

By default, network database displays certain critical properties associated with these resources. Entries in the Network Database can be:

- Unknown physical devices (IP managed devices, SNMP managed generic switches and routers)
- Network Managed Resources (NMRs)
- Logical Managed Resources (LMRs)
- Group Managed Resources (GMRs)
- Generic Nodes (GNs)
- Physical devices (for example a Repeater Site Controller)
- Networks
- Logical entities (for example a site)
- Groups of resources
- Device Managed Resources (DMRs)

The contents are presented in a tabular format with each row corresponding to a resource. The default page size of this view is 25 entries, but it can be modified to show more or fewer entries in one page. The maximum number of events on a page is 125.

Network database displays a status value for each resource. This value is calculated based on the highest severity of the alarms that are currently outstanding against the resource. Only DMRs and LMRs can report alarms, so their state is directly based on the highest severity of the alarm they report. If a DMR has LMRs associated with it (for example Sites in a Zone Controller), the state of the LMRs is included in the calculation of the DMR State. The state of DMRs and LMRs is propagated further to associated NMRs and GMRs.

The unknown state value indicates that UEM does not currently manage the resource.

UEM Device Categories

Each Device Managed Resource (DMR) and each Logical Managed Resource (LMR) have an assigned category. All events and alarms for the DMRs and LMRs are marked with this particular category. The device category is visible in the Network Database, Network Element View, Network Events and Alarms windows.

	Network elements in UEM are grouped in 10 categories: Application This category includes additional components in the system, not related directly to its basic capabilities. Core This category includes core equipment and applications in the system. Environmental This category includes digital/analog inputs and digital outputs. Microwave Components This category includes microwave components equipment (PTP800 LMRs). Microwave Infrastructure This category includes all microwave radios. Moscad This category includes represents Moscad Remote Terminal Unit (RTU) devices. NM (Network Management) This category includes all network management devices, for example, NM Servers. RAN (Radio Access Network) This category includes all radio network devices, for example, Site Controllers or Zone Controllers. Transport This category includes the transport infrastructure: switches, routers and gateways. Generic This category includes all devices not included in other categories, for example, Generic Nodes or Generic SNMP Nodes. UEM Network Element View This view is used to display the status of a particular network element. Each network element view contains up to seven sections: General Information Main information for each site, for example, the name of the managed resource, the name of the subsystem, or the class name. More Information Additional information, for example, location tags. Microwave Information

	Information available only for microwave radios, for example, the microwave path or location parameters. Relationships Information regarding the redundancy State, redundancy groups and related managed resources. Commands and Metering Information Available only for devices supporting commands or values; from this section users can issue commands to devices (for Network Management Alliance devices, the commands are scheduled as jobs) or read values from devices. Objects A tree of managed objects and their statuses, grouped by type and hierarchy. If applicable, the status of a redundant network element (a device which is in the same redundancy group) is also displayed. UEM Commands You can use the command window or the network element view to send commands to a selected managed resource. For Network Management Alliance (NMA) devices, commands issued from the Commands and Metering Information section in the Network Element View window are scheduled – a job is created. These commands can be sent to multiple instances of entities at the same time. For devices reporting to UEM through Remote Terminal Units (RTUs), commands issued both from the command window and from the Commands and Metering Information section in the Network Element View are sent to RTUs and no job is created. Commands issued from the command window are sent immediately and no job is created. These commands can only be sent to a single entity at a time. If multiple instances of an entity can exist (for example, channels at a site), a combo box is displayed next to the entity type. The list in the combo box contains all possible IDs for the entity type. The entities are sorted in alphabetical order. The following Motorola Solutions Private Radio Network Management (PRNM) Suite Applications provide real time Zone-Level information below: - Dynamic Reports (Accounting, Performance) - Application that provides predefined report templates you can use to display statistics for a zone, site, or a console site in near real time. - ZoneWatch (Fault, Performance) - Application that allows monitor radio call traffic for an individual zone in real time. This application uses different Watch Windows that allow to display only the required information.

6. RADIO NETWORK MANAGEMENT TERMINAL

The Offeror must provide a hierarchical NMS capable of incorporating multiple management systems into a high-level management system that provides a single point to manage multiple subsystems.

The RNMT will provide primary processing, display and control of information to and from a variety of locations with different partitioned privileges at locations. System status and alarm conditions shall be displayed. The RNMT shall provide the ability to remotely access the system to check the operational status of the system and view alarms.

No.	
1.	Offeror must describe in detail the proposed RNMTs including all features (standard and optional). Offeror must also describe in detail where the RNMTs will be installed.
	Offeror Response: Comply Phase 1 Deployment: The proposed ASTRO25 Network Management (NM) Applications User Licenses consist of the following licenses (per Primary and optional Backup Cores located at Bismarck and Fargo respectively): - Two (2) Provisioning Manager (PM) Licenses. - Two (2) Unified Event Manager (UEM) Licenses. - Two (2) Unified Network Configurator (UNC) Licenses. - Two (2) Historical Reports Licenses. - One (1) Security Partioning License. - One (1) Network Manager Client License and Workstation with Monitor. - One (1) 500 Radio User License - One (1) FDMA Trunking Operation - One (1) TDMA Trunking Operation Phase 2 Deployment: The proposed ASTRO25 Network Management (NM) Applications Supplemental Licenses consist of the following licenses (per Primary and optional Backup Cores located at Bismarck and Fargo respectively): - One (1) Provisioning Manager Interface (PMI) License, plus twenty (20) hours of PMI technical assistance. - Twenty four (24) Radio Control Manager (RCM) Concurrent Licenses. - Two (2) Dynamic Reports Licenses. - One (1) Flexible Air Traffic Interface Access (ATIA) License, plus ten (10) hours of FATIA technical assistance. - One (1) Email Alarm Notifications License. - Two (2) Zone Watch Licenses. - Two (2) Affiliation Reports Licenses.

	- Forty-Three (43) 500 Radio User License - Forty-Five (45) TDMA Site Licenses - One Hundred Thirty Five (135) TDMA Base Radio Licenses - One (1) Dynamic Frequency Blocking. - One (1) INFOVISTA License. - - Forty-Five (45) FDMA Site Licenses Phase 3 Deployment: The proposed ASTRO25 Network Management (NM) Applications Supplemental Licenses consist of the following licenses (per Primary and optional Backup Cores located at Bismarck and Fargo respectively): - Ninety-Four (94) TDMA Site Licenses - Ninety-Four (94) FDMA Site Licenses - Three Hundred Four (304) TDMA Base Radio Licenses The optional NM User Licenses (can be quoted upon the State request) are: - One (1) Flexible Computer Aided Dispatch Interface (CADI) License, plus Forty (40) hours of FATIA technical assistance. - One (1) Interference Locator UNC System License. - One (1) Northbound Interface, plus NBI Technical Assistance, Forty (40) hours. - One (1) UEM Enhanced Navigation - One (1) or more UEM SNMP Element Management Toolkit (Quantity 10). - One (1) Radio Authentication License.
2.	Offeror must describe in detail how the network management of a trunked radio network: a. Maintains network components b. Upgrades network components when necessary c. Manages and operating over-the-air features d. Optimizes performance e. Manages intersystem interoperability f. Configures components remotely g. Routinely backups remote equipment configuration h. Remotely restores equipment configuration i. Pushes updates to remote equipment
	Offeror Response: Comply Private Network Manager (PNM or NM) Client is a remote control software application. It is utilized to remotely manage Windows systems. Authorized system managers or network administrator personnel use the PNM or NM client workstations to start and run the software applications for configuring, viewing equipment operational status and monitoring network utilization and performance. FCAPS is a Network Management model intended to maximize the available resources and minimize system downtime and maintenance costs. It consists of five

functional areas: Fault Management, Configuration Management, Accounting, Performance Management and Security Management.

The PNM or NM client workstations reside within ASTRO25 Network at Primary and optional Backup Cores, plus at any desired centralized dispatch console site. Multiple access levels to five functional areas are configurable per user account and based upon the individual user responsibility.

Motorola Solutions PRNM Suite Applications

FCAPS is a Network Management model intended to maximize the available resources and minimize system downtime and maintenance costs. It consists of five functional areas: Fault Management, Configuration Management, Accounting, Performance Management and Security Management.

Motorola Solutions Private Radio Network Management (PRNM) Suite Applications are based upon FCAPS model and are detailed below.

System-Level Application:

System Historical Reports (Accounting, Performance) – Application allows to generate reports for system-wide activity.

Zone-Level Applications:

Affiliation Display (Performance) - Application that displays the association of a radio with a talkgroup and a site and information about conventional channels, console sites and consoles.

Air Traffic Information Access (ATIA) Log Viewer (Performance) - Application that displays log files generated by the Air Traffic Router server application (ATR) and ZoneWatch. These log files contain records of all recent zone activity, such as site registrations and calls processed.

Dynamic Reports (Accounting, Performance) - Application that provides predefined report templates you can use to display statistics for a zone, site, or a console site in near real time.

Zone Historical Reports (Accounting, Performance) - Application that allows to generate reports for individual zones.

ZoneWatch (Fault, Performance) - Application that allows monitor radio call traffic for an individual zone in real time. This application uses different Watch Windows that allow to display only the required information.

The License Manager, Unified Network Configurator (UNC), Unified Event Manager (UEM) and the

Provisioning Manager applications are launched using browser shortcuts.

License Manager (Accounting) - An application for loading licenses, checking license status and managing licensed application session.

	Unified Event Manager (Fault) - A tool that provides reliable fault management services, such as service discovery, fault management, supervision and synchronization. Unified Network Configurator (Configuration) - An advanced network configuration tool that provides controlled and validated configuration management of system devices. It includes Voyence Control and Unified Network Configurator Wizards (UNCW). Provisioning Manager (Configuration) - A management application used to enter and maintain configuration information for the User Configuration Server (UCS). The Provisioning Manager configures Consoles, CCGWs, AuC, System, Subscribers, Security and applications (such as ZoneWatch). Radio Control Manager (Configuration, Security) - The Radio Control Manager (RCM) is an application used primarily by dispatchers to monitor and manage radio events, issues; to monitor commands and make informational queries of the system database. It also enables to present and analyze data showing RCM activity in the system. **Secure Software Download** One of the proposed infrastructure Information Assurance feature called Secure Software Download (Secure SWDL) utilizes secure File Transfer Protocol (Secure Shell / SFTP protocol) when downloading software (reconfiguration or upgrade) to RF Site and VPM-based products. SSH and Secure SWDL configuration is performed through Configuration Service Software (CSS) or the Unified Network Configurator (UNC) application. For a software download to an entire RF Site, the entire site must share the same configuration for the SSH feature and requested SWDL transfer mode. SWDL is accessible from Network Management terminal with a valid user account and credential. **Backup and Restore** The proposed Backup and Restore (BAR) Client software provides the means to back up and restore data for workstations and server devices in the radio system.
3.	Offeror must describe in detail how the proposed solution manages encryption for: a. Management of keys and key IDs b. Administration of keys and key IDs *Offeror Response:* Comply There are two ways to manage secure keys in an ASTRO25 system: - Non-centralized, using a key loading device (i.e. KVL 4000). - Centralized, using the Key Management Facility (KMF). (Part of the Optional Over The Air Rekeying feature)

Initial Key Loading

Initial encryption key distribution is performed manually using a key loader device. A key loader is a handheld portable device that connects through a cable to a secure device. There are two ways to handle initial key loading for a device:

- Manual key loading.
- Store and Forward. (Part of the Optional Over-the-Air Rekeying (OTAR) feature)

Key Management

Once keys are initially loaded into the correct radios and other system entities, you must manage key material to ensure that your encryption scheme remains effective. Effective management of keys requires changing them regularly.

Rekeying in ASTRO25 Systems

One way of changing keys is by loading new keys into existing units, known as rekeying. Before the existence of the KMF (optional), changing the encryption keys meant bringing radios into the shop or carrying a hand-held device into the field to load the new keys. With the help of the KMF, new keys can be loaded into radios using Over-the-Air Rekeying (OTAR) or other devices using Over-The-Ethernet Keying (OTEK). The Full Update command sends all OTAR information, including keys, for the selected unit, regardless of currency status. The CKR Update command uses OTAR to assign new encryption keys to a CKR group. All radios that use the CKR are updated by the KMF (optional) and acknowledgments are tracked and reflected in the CKR currency display.

A Rekey Request is a message sent from a radio to the optional KMF requesting an update to the key management information. This request can be encrypted or clear. The optional KMF automatically sends a response to the radio and begins an update, full or optimized, without any actions required by the operator. The Operations Status view in the KMF Client application displays the status of Rekey Requests and Full Updates.

Non-Centralized Key Management Using KVL

The Motorola Solutions non-centralized key management solution. allows you to manage encryption keys for your entire system using one or more key loading devices (optional), such as the KVL 3000, KVL 3000 Plus, or KVL 4000. The KVL is a handheld portable device that connects to a secure device through a cable.

The optional KVL supplies the encryption keys the secure device needs to perform encryption and decryption operations. The optional KVL uses Traffic Encryption Keys (TEKs) to encrypt voice or data. To load keys manually, do one of the following:

- Take the KVL to the secure device (such as a radio).
- Bring the secure devices to the KVL.

If you have many portable or mobile radios in your system, this process can take a considerable amount of time, especially if the radios are widely dispersed.

Management and Administration of keys, key IDs and radio user IDs in a Non-Centralized configuration are manual.

	Offeror must describe in detail how the NMS provides seamless multi-agency radio network sharing with independent monitoring of subscribers, thereby enabling seamless operation and local autonomy for local user management. Areas of management include talkgroup population, user access privileges, security assignments, failure reports, usage reports, performance reports, etc.
4.	*Offeror Response:* Comply The ASTRO25 radio system Security Partitioning feature (a Zone level application) allows creation of Security Groups in order to partition system management resources. With Agency Partitioning, departments or agencies can share a system for cost savings and interoperability, yet manage and maintain control over their own resources, such as talkgroups, encryption keys and configuration data. User Access and Security Management The Provisioning Manager (PM) provides access and security control by partitioning data configurations in Security Groups, assigning access privileges in Groups ascribed to Users and limiting the creation of Radio and Group records in configured Subscriber ID blocks. Data Partitioning The Provisioning Manager supports partitioning of configuration data using security groups. Security Groups are the names of partitions which can be based on agencies. However, System Administrators can base the security groups to any partition grouping as required to fit to the system. Each configuration record is associated with a security group. Application Users having access to security groups can either view, add, update, or delete configuration within the security groups based on the access configuration. Application Users and Accounts Management The Provisioning Manager uses Group-based Access Control scheme to define authorization settings (that is, record and operation permissions) for the application users. The basic access control involves the following high-level steps: - The creation of the user account on the Domain Controller. - The definition of a Provisioning Manager Group records with the appropriate settings, including permissions to create various record types, fine-grained control (Read, Insert, Update, Delete and Attach) to security groups defined within the PM and permissions for executing the provisioning operations. - The creation of Provisioning Manager User records with appropriate role assignments. All these operations must be performed for the user to log in and use the application. Upon successful logon, the application enforces the settings assigned to the user, which enables viewing, creating, updating and deleting records for the security groups that the user has access to, based on the groups assignment. System Managers can achieve Agency Partitioning using these operations and features.

7. TOWER SITES

Attachment 4 provides a list of identified FCC licensed towers in the State that was used the SIRN 20/20 study.

No.	General
1.	Offeror must describe in detail which existing towers will be used in the proposed solution. Using Attachment 5 Proposed Towers, Offeror must identify and propose any additional equipment or modifications necessary to existing sites, including, but not limited to: a. Towers b. Shelters c. Backup power d. Site preparation e. Fencing f. Bringing the site into compliance with applicable standards and industry guidelines
	Offeror Response: Comply The following existing State-owned towers are being utilized for the Phase 1 Deployment of RF sites: - Bismarck – Rooftop-230' - Elgin / Lipzig-200' - Emmons- 200' - Esmond-200' - Fargo-380' - Hilsboro-200' - Linton-200' - Marmarth-150' - Mohall-180' - Peer Creek-100' - Wales-180' Attachment 5 is included in Exhibit D.
2.	Offeror must acknowledge that they are responsible to negotiate agreements for the proposed towers with the tower owners to utilize the tower.
	Offeror Response: Comply
3.	Offeror must acknowledge that site survey, tower and the study information may be dated; therefore, Offerors must perform due diligence in verifying all proposed site data for inclusion in the proposed solution.

	Offeror Response: Comply
4.	Offeror may request permission to perform site visits on existing locations prior to submitting their proposal, to ensure a full understanding of each site's condition.
	Offeror Response: Comply Site visits were requested on November 16, 2017 and approved on November 29, 2017 and performed December 12 through 15, 2017.
5.	Offeror must describe in detail if the proposed solution includes additional towers.
	Offeror Response: Comply Additional towers will be constructed at existing State of North Dakota radio sites where the towers are 30+ years old. These towers will be replaced with new towers to provide sufficient height to provide coverage. All replacement towers are Guyed type towers ranging from 200' to 500'.
6.	Offeror must acknowledge that the minimum printed code standard requirements of the following organizations for material quality, fabrication and installation procedures shall be met or exceeded for applicable methods employed in building construction. The latest published version of the following code publications shall be referenced for design and construction of these sites. a. Air Conditioning, Heating and Refrigeration Institute b. American Institute of Steel Construction c. American Concrete Institute d. American Institute of Timber Construction e. American Iron and Steel Institute f. American Welding Society g. American Plywood Association h. American Softwood Lumber Standard i. American Society of Testing and Materials. j. International Building Code k. State and/or Local Building Codes l. Uniform Plumbing Code and State Plumbing Code m. National Electrical Code and State Electrical Code. n. State Fire Code. o. International Mechanical Code and State Boiler Rules.
	Offeror Response: Comply
7.	Offeror must acknowledge that all permits, licenses and fees will be obtained by the Offeror.

	Offeror Response: Comply
8.	Offeror must acknowledge that they will be responsible for all dirt work.
	Offeror Response: Comply
9.	Offeror must acknowledge that the top of foundation slab elevation shall be set approximately 6 inches above adjacent ground areas and they will verify with the STATE prior to performing site grading.
	Offeror Response: Comply
10.	Offeror must acknowledge that the site shall be leveled and landscaped.
	Offeror Response: Comply
11.	Offeror must acknowledge that crushed rock shall be placed around new shelter, tower, propane tank and under Ice Bridge. Rock must be free of dirt, sand and debris.
	Offeror Response: Comply
12.	Offeror must acknowledge that a commercial woven geotextile separation fabric equivalent to US Fabric's-US315 shall be placed under all crushed rock areas. Limit of crushed rock/geotextile fabric is 12 feet around building and propane tank and 6 feet on both sides of the entire length of Ice Bridge.
	Offeror Response: Comply
13.	Offeror must acknowledge that they will be responsible for cleanup of the site during and after construction is complete. After final grading, Offeror shall perform site restoration including replacement of topsoil and seeding of grass in all disturbed areas.
	Offeror Response: Comply
14.	Offeror must acknowledge that the concrete shall have a minimum compressive strength of 3500 PSI at 28 days. Offeror must acknowledge that they will be responsible to collect samples, the STATE will perform testing to make sure concrete meets these requirements. Offeror must acknowledge that any failing concrete shall be removed and replaced at Offeror's expense.
	Offeror Response: Comply

15.	Offeror must acknowledge that the concrete mix design shall be provided to the STATE a minimum of one week before pouring concrete. Offeror must acknowledge that the concrete mix design can contain up to a maximum of 30 percent. Fly ash shall meet chemical composition as specified in Section 820 of NDDOT's Standard Specifications for Road & Bridge Construction (NDDOT's Std. Spec.). Offeror must acknowledge that the concrete sample must be collected and delivered to the STATE for testing.
	Offeror Response: Comply
16.	Offeror must acknowledge that they are responsible for correcting any errors, omissions or deviations from original material lists discovered during construction of the tower.
	Offeror Response: Comply
	Tower Structure
17.	Offeror must describe in detail the proposed self-supporting tower.
	Offeror Response: Comply No self-supported towers are proposed.
18.	Offeror must provide a list of proposed self-supporting tower materials.
	Offeror Response: Comply No self-supported towers are proposed.
19.	Offeror must describe in detail the proposed guyed tower.
	Offeror Response: Comply Materials to be provided for each guyed tower include: - Complete tower steel and hardware complete guying system - Base material and standard deadman anchor arms (see notes) climbing ladder incorporated into one (1) face - Waveguide support ladder incorporated into three (3) faces (to support up to thirty-six (36) lines), three (3) 6' sidearms each with one (1) tieback with one (1) 5' mounting pipe at 280' elevation - Required lighting mounts - Safety cable kit without harness (300') - One (1) 5' x 5/8" lightning rod copper clad - P.E. certified tower profile and foundation drawings

	- Final erection drawings
20.	Offeror must provide a list of proposed guyed tower materials.
	Offeror Response: Comply Materials to be provided for each guyed tower include: - Complete tower steel and hardware complete guying system - Base material and standard deadman anchor arms (see notes) climbing ladder incorporated into one (1) face - Waveguide support ladder incorporated into three (3) faces (to support up to thirty-six (36) lines), three (3) 6' sidearms each with one (1) tieback with one (1) 5' mounting pipe at 280' elevation - Required lighting mounts - Safety cable kit without harness (300') - One (1) 5' x 5/8" lightning rod copper clad - P.E. certified tower profile and foundation drawings - Final erection drawings
21.	Offeror must describe in detail the proposed dual – red beacon/medium intensity strobe tower lighting system.
	Offeror Response: Comply Lighting System – H&P (D1) Dual LED Horizon(Avian Compliant) Lighting System 151'-350' (C30034051)
22.	Offeror must acknowledge that all proposed towers will have structural engineering and load testing completed and the reports submitted to the STATE.
	Offeror Response: Comply
23.	Offeror must acknowledge that they are responsible for soil testing and foundation design based on the geotechnical report. Offeror must acknowledge that they will install foundations per TIA-222-G.
	Offeror Response: Comply
24.	Offeror must acknowledge that they will furnish a set of plan drawings, indicating in detail all features of the proposed tower. Structural design factors used shall be included with drawings. In the case of prefabricated buildings and proprietary design, submit advertising literature depicting structural system and preliminary floor plan.
	Offeror Response: Comply

25.	Offeror must describe in detail all manufacturer's or Offeror's warranties available for all products or installations proposed.
	Offeror Response: Comply
26.	Offeror must provide for foundation work—detailed drawings for construction.
	Offeror Response: Comply
27.	Offeror must acknowledge that following construction, they will provide Operation and Maintenance Manuals including manufacturer's instructions, as-built drawings, warranty information and other operation and/or maintenance information for all necessary equipment.
	Offeror Response: Comply
	Shelters
28.	Offeror must describe in detail their approach to remodel or replace shelters so that they meet the specifications below in proposed solution. Offeror must indicate in Attachment 5 the specific remodeling required for each site.
	Offeror Response: Comply For the existing State sites with Thermo Bond 12x32 shelters, no upgrades will be required. In the older State sites with steel framed shelters, HVAC systems, electrical systems and generator and ATS systems will be replaced. This is required for the new HVAC systems and dual electrical demand for the dual usage during Burn-in and cut over. - 120 / 240 volt, 200 amp, single-phase meter pedestal & hookup for electrical service by the local utility. - 120 / 240 volt, 200 amp, single-phase underground electrical service including trenching and installation of appropriately sized electrical conductors buried 30 inches below grade from utility meter to the service disconnect located on the building. - 200A Breaker panel with capacity for 30 circuits. - Install 20A single pole breakers in the panel and wire to simplex outlets located on an average within 35 cable feet. - Install secondary surge protector (MOV) on electrical service side of the Automatic transfer switch (ATS) and connect to alarm panel. - Install automatic transfer switch and connect to generator, electric main and connect to alarm panel. - Cable runway (12 inches wide). - Upgrade internal grounding and terminate near equipment locations (inside 500 Sq. Ft. room).

	- Supply and install (1) Wall mounted 10 lb. CO2 fire extinguisher, (1) Wall mounted 20lb. ABC fire extinguisher. - Supply and install No smoking, EME signage at the site in accordance with R56 section 5.13. - Supply and install Eye wash and first aid kits. - Supply 2 ton wall mounted HVAC unit. - Install, power and test wall mounted HVAC unit and its controls. Terminate alarms at punch block. - Supply and install sensors for alarming (Fire, Smoke, Hi/Lo temp, water on floor, door intrusion), punch block and wiring of contact closures to alarm block. - Furnish materials and labor to install (2) new 60amp single pole breakers, conduit and wire for new AC Edge Panel. - Furnish materials and labor to create openings for new HVAC unit. - Furnish materials and labor to reconfigure existing LP piping for new generator.
29.	Offeror must acknowledge that the shelter shall will be constructed using new materials that have a proven track record and shall be responsible for all products, components, accessories and methods used in constructing these buildings.
	Offeror Response: Comply
30.	Offeror must acknowledge that they will furnish a set of plan drawings, indicating in detail all features of the proposed building. Structural design factors used shall be included with drawings. In the case of prefabricated buildings and proprietary design, submit advertising literature depicting structural system and preliminary floor plan.
	Offeror Response: Comply
31.	Offeror must describe in detail all manufacturer's or Offeror's warranties available for all products or installations proposed.
	Offeror Response: Comply Thermo Bond has provided a 2-year warranty on components and 10 years on the structure. The proposed buildings are the same buildings meeting the exacting standards of the RFP specification that the State has been installing at the State radio sites for the past 8 years.
32.	Offeror must acknowledge that at remote tower sites operational temperatures may fluctuate from -40 to +100 degrees Fahrenheit with possible spikes to +120 degrees Fahrenheit
	Offeror Response: Comply
33.	Offeror must acknowledge that non-operational temperatures may fluctuate between -40 to +150 degrees Fahrenheit

	Offeror Response: Comply
34.	Offeror must describe in detail the equipment and/or materials to be used for the proposed shelter.
	Offeror Response: Comply
35.	Offeror must acknowledge that they are responsible for correcting any errors, omissions or deviations from original material lists discovered during construction of the shelter.
	Offeror Response: Comply
36.	~~Offeror must describe in detail the complete design calculations for the shelter.~~
	Offeror Response: Deleted by Solicitation Amendment 1 issued November 24, 2017.
37.	Offeror must describe the proposed dimensions of the shelter. The minimum dimensional requirements for the shelter is as follows: a. Width: 12 feet b. Length: 32 feet c. Side Walls: 8 feet
	Offeror Response: Comply
38.	Offeror must acknowledge that the proposed shelter will have two separate rooms including 10-foot generator room. Offeror must acknowledge that there will be an interior wall separating generator room from equipment room.
	Offeror Response: Comply
39.	Offeror must describe in detail the proposed pre-engineered, self-supporting, pre-constructed, self-contained, steel or wood framed building complete with floor and necessary foundations which are designed to securely and permanently support roof and wall construction. Offeror must acknowledge that the proposed shelter meets or exceeds following minimum structural design criteria: a. Live Loads: 200 pounds per square foot (psf) floor and 150 psf roof. b. Wind Load: 150 miles per hour. c. Roof Impact Load: 220-foot pound with no damage.

	Offeror Response: Comply Thermo Bond 12'x32' shelters are proposed.
40.	Offeror must acknowledge that: a. The building foundation shall consist of a 6-inch-thick concrete slab on grade with 24 inches wide/ tapered, by 18 inches deep thickened edge. b. The edge of foundation shall extend 12 inches outside perimeter of building. c. Reinforce thickened edges with two #5, grade 60 rebar around perimeter. d. Center area use #4 grade 60 rebar, 24 inch O.C. both ways, throughout slab portion.
	Offeror Response: Comply
41.	Offeror must acknowledge that they are responsible to include all costs for providing a foundation based on the building included in their proposal. Offeror must acknowledge that they will provide a detailed design drawing of the foundation with building shop drawings. Offeror must acknowledge that they will attach building to foundation per manufactures requirements.
	Offeror Response: Comply
42.	Offeror must acknowledge that they have included a 4 foot by 6-foot concrete apron outside exterior walk door in their proposal. Offeror must acknowledge that the top of foundation shall be flush with the foundation slab. Offeror must acknowledge that the concrete apron shall have a broom finish.
	Offeror Response: Comply
43.	Offeror must acknowledge that they will provide R-11 walls and R-19 roof insulation.
	Offeror Response: Comply
44.	Offeror must acknowledge that air infiltration into shelter shall be nonexistent when measured before installation of any through-the-wall items, floor items, or roof items when exposed to winds of up to 50 MPH.
	Offeror Response: Comply
	Walk-In Doors

45.	Offeror must acknowledge that there shall be one exterior walk-in door, 48 inches wide, steel door and one interior 36-inch-wide steel door. Exterior door and frame (thermally insulated) shall be ANSI/SDI-100 Grade II Model 1 and the interior door and frame (non-rated) shall also be ANSI/SDI-100 Grade II Model 1. Exterior door shall open to generator room.
	Offeror Response: Comply
46.	Offeror must acknowledge that the doors shall be equipped with a heavy duty mortise lock and automatic door closure.
	Offeror Response: Comply
47.	Offeror must acknowledge that the exterior door shall: a. Be equipped with weather stripping, sweep, threshold and door stop. b. Have lever-type door handles shall be utilized at each door. c. Have a non-master key supplied. d. Be dead bolt type.
	Offeror Response: Comply
48.	Offeror must acknowledge that both doors shall have locks keyed to the STATE'S master key system. Provide two master keys and two non-master keys for each building to STATE.
	Offeror Response: Comply Coordination will be completed at the time of shelter order.
49.	Offeror must acknowledge that the doors shall be primed and painted to match trim color prior to installation. Any scratches or scuffs resulting during installation shall be touched-up to restore door to original painted finish.
	Offeror Response: Comply
50.	Offeror must acknowledge that the generator room shall be equipped with generator ventilation hood including screen and wall exhaust feed through with interconnected louvers. Electric motor shall be used to open and close all louvers.
	Offeror Response: Comply
51.	Offeror must acknowledge that the HVAC system will have, two each wall mount units with controller in equipment room. HVAC (5kw heater each and ac sized to cool to 75 degrees minimum on 100-degree day) controller required to have working range from 35 degrees to 90 degrees. Identify if system provides positive ventilation.

	Offeror Response: Comply
52.	**Shelter Electrical Requirements** Offeror must acknowledge that service to existing buildings shall be maintained and be independent after the meter from new building. All electrical components installed after the meter shall be new. Offeror will allow the STATE to inspect all underground work prior to burial.
	Offeror Response: Comply
53.	Offeror must acknowledge that they will provide and properly install at a minimum the following electrical equipment: a. 20 KW LP Vapor 120/240v liquid cooled standby generator. (Equivalent to Cummins model GGMA) b. 10 Amp battery charger with temperature compensation option (equivalent to EnerGenius Sens Model NRG22-10-RC) c. 225 Amp automatic transfer switch (equivalent to Cummins OTECB) d. 200 Amp electrical service with 200-amp panel and breakers. All exterior electrical lines shall be underground from power pole/transformer to building. Work with electrical utility company to insure adequate service is available at site. It is the intent of this bid for power to be placed to the new shelters and be move in ready. All pole mounted AC breakers and boxes after the meter must be new. This is the Offeror's responsibility. e. 8 duplex outlets in equipment room. f. 6 separate J-boxes on ceiling with 2 separate circuits in each box. (12 total (20amp) circuit breakers- 2 per J-box. This is to allow for hardwiring of station equipment. g. 4 duplex outlets in generator room. h. 1 quad outlet in generator room. i. 1 GFCI exterior outlet. j. (8) 2 tube fluorescent light fixtures in equipment room (all fluorescent fixtures shall utilize instant start electronic ballasts and use 5000k-T8 lamps). k. (2) 2 tube fluorescent light fixtures in generator room. l. 1 exterior light fixture with on/off wall switch. m. Ground system halo with master ground bar (internal), provisioned to meet R56 standard. n. Ground connection system to halo for propane tank and Ice Bridge. o. 1 run of cable tray extending entire length of building. p. Waveguide entry, 8 port, 4-inch diameter port designed to accept rubber boot. q. 5 each rubber boots to fit one run of 7/8-inch coaxial cable each. r. Provide 3 kW electric wall mount heater in generator room with wall mount thermostat. s. Transtector-AC power surge suppression device.

	Offeror Response: Comply
54.	Offeror must acknowledge that power entrance must be stubbed out to edge of landscaping to prevent disturbing landscaping fabric and rock.
	Offeror Response: Comply
55.	**External Ground System** Offeror must acknowledge that all grounding materials shall be provided by the Offeror (10 each 10-foot copper ground rods ¾ inches, Cad Welds, cable, ground bars, lugs etc.).
	Offeror Response: Comply
56.	**External Ground System** Offeror must describe in detail all proposed grounding materials.
	Offeror Response: Comply
57.	**External Ground System** Offeror must acknowledge that the buried ring ground system around the shelter shall be #2AWG solid copper per R56 standards. Ring ground must be buried at a minimum depth not less than 30 inches below grade. The shelter ring ground must be attached to tower ring ground. Halo ground rings must be utilized according to applicable standards.
	Offeror Response: Comply
58.	**External Ground System** Offeror must acknowledge that all ice bridge support poles shall be Cad welded to the Halo ground system.
	Offeror Response: Comply
59.	**External Ground System** Offeror must acknowledge that one external ground bar, mounted below coaxial cable entrance port on shelter.
	Offeror Response: Comply
60.	**External Ground System** Offeror must acknowledge that one external ground bar, mounted at base of tower.

	Offeror Response: Comply
61.	**External Ground System** Offeror must acknowledge that three runs of #2 solid copper shall be installed from the Halo, one to each ground bar. **Note** Bar 1 inside shelter (usually provided by shelter manufacturer). Bar 2 outside shelter below waveguide port. Bar 3 at base of tower.
	Offeror Response: Comply
62.	**External Ground System** Offeror must acknowledge that one ground system access inspection well-PVC, must be provided.
	Offeror Response: Comply.
63.	**Bonded Halo** Offeror must acknowledge that The proposed solution complies with the following: a. Halo to be bare stranded #2 AWG. b. Halo will have a 4" spark gap installed opposite the entrance port. c. Ladder rack sections to be bonded with #6 jumpers and bonded to MGB. d. Metallic panels larger in size than a 4"X4" outlet box, door frames and HVAC grilles will be bonded to the perimeter halo ground with a green #6 WIRE, C-TAP and with a two hole lug.
	Offeror Response: Comply
64.	**Power Line Surge Suppression** Offeror must acknowledge that The proposed solution complies with the following: a. AC surge protector shall be provided and installed inside the shelter. b. An acceptable unit shall be an in-line type such as the AC Data Systems “integrated load center”. An alternate unit must meet or exceed all of the capabilities of this model unit. c. Minimum surge protector requirements: a. Built-in redundancy of dual stages per phase with filtering b. Surge energy shunted to ground, not to neutral c. Front panel indicator lamps d. Remote / local status contacts e. Fusible link protected so as not to interrupt power f. Field replacement protection blocks and fuses, if needed g. UL listed components h. 45 kA per phase ANSI C62.1 8/20 waveform

	i. EMI / RFI filtering per Mil-STD-220 j. The unit shall be capable of handling the full 240 Volt, 200 Amp capacity of the electrical system.
	Offeror Response: Comply
65.	Offeror must acknowledge that all underground work shall be inspected by the STATE before being covered.
	Offeror Response: Comply
66.	Offeror must acknowledge that all underground site connections will be made using the CAD Weld process.
	Offeror Response: Comply
67.	Offeror must acknowledge that Four corners of building steel frame must be attached to external Halo with #2 AWG solid copper wire.
	Offeror Response: Comply
68.	Offeror must acknowledge that HVAC units must be attached to external Halo system with #2 AWG solid copper wire.
	Offeror Response: Comply
69.	Offeror must acknowledge that all telephone connections shall be new from the telephone company pedestal to the new shelter. Telephone service entrance must be stubbed out past landscaping to prevent fabric and rock from being disturbed during telephone line installation. Telephone service to existing shelter shall remain in service. Owner will coordinate disconnect to existing building.
	Offeror Response: Comply
70.	**Wave guide bridge** Offeror must acknowledge that they will provide and install new 10-foot Ice Bridge (one section, sites with existing tower may require more than one section of bridge, refer to site layouts). Bridge sections will be 2 feet by 10 feet. Foundations for ice bridge poles must be 3 feet 6 inches deep and 12 inches in diameter minimum, in undisturbed soil. Concrete footings shall extend 6 inch above grade.
	Offeror Response: Comply
71.	**Propane Tank** Offeror must acknowledge that they will provide and install a new 1000-gallon propane tank. Anchor tank to foundation included in bid. Connect tank to building

	with buried line, fill and test system after completion. Gas line must be installed before rock is applied and landscaping is completed. Ground tank to external Halo system using #2 AWG solid copper wire.
	Offeror Response: Comply
72.	**Propane Tank** Offeror must acknowledge that they will provide a 6-inch concrete slab with #4 grade 60 rebar for placement of a 1000-gallon tank. Place bollards at each corner and one in the center, total of six (6) bollards, to protect tank. Bollards shall be 6-inch pipe bollards filled with concrete. These bollards shall extend 3 feet below grade and 4 feet above grade. Bollards shall be set in 18-inch diameter holes filled with concrete from surface to a minimum 6 inches below bottom of pipe. Provide and install yellow PVC covers.
	Offeror Response: Comply
73.	Offeror must describe in detail the shelter's finished interior.
	Offeror Response: Comply
74.	Offeror must describe in detail their ability to provide a shelter that is completely wired and ready for radio equipment installation
	Offeror Response: Comply
75.	Offeror must acknowledge that the exterior shall be natural stone aggregate materials with rodent shield.
	Offeror Response: Comply
76.	Offeror must provide for prefabricated structures—original working drawings, or copies of complete fabrication and erection drawings, material lists and detailed erection instructions.
	Offeror Response: Comply
77.	Offeror must provide for foundation work—detailed drawings for construction.
	Offeror Response: Comply
78.	Offeror must acknowledge that they will provide shop drawings of all major equipment being utilized in this project prior to ordering the material.

	Offeror Response: Comply
	Offeror must acknowledge that following construction, they will provide Operation and Maintenance Manuals including manufacturer's instructions, as-built drawings, warranty information and other operation and/or maintenance information for all necessary equipment.
79.	*Offeror Response:* Comply Operation and Maintenance manuals, As-Built drawings, warranty information and other operational and maintenance information will be provided for proposed equipment, as necessary.
	Base Station Equipment – Phases 2 and 3
	Offeror must acknowledge that: a. Base station equipment shall be solid State in design and function with standard site conditions for temperature, altitude and humidity. b. Equipment shall have alarm contact interfaces to provide status to a separate alarm system. c. The units shall be as compact as possible, with mounting configurations for standard relay racks or cabinets.
80.	*Offeror Response:* Comply Motorola Solutions has developed a state-of-the-art Base Station that is software definable with a dedicated hardware platform. The base station components are primarily solid state, with the exception of external cooling fans that helps regulate the hardware from overheating. The proposed GTR 8000 stations will interface to Motorola Solutions Unified Event Manager (UEM) application for centralized fault monitoring and management.
	Offeror must describe in detail the proposed repeaters modulation type and their performance and reliability.
81.	*Offeror Response:* Comply The following references the TIA specifications for the proposed GTR 8000 Base Radio. This includes the following Methods and Performance recommendations: P25 Phase 2: - Methods: TIA-102.CCAA, "Two-Slot Time Division Multiple Access Transceiver Measurement Methods" August 2011. - Performance: TIA 102.CCAB, "Two-Slot Time Division Multiple Access Transceiver Performance Recommendations" October 2011.

	IMPORTANT: Specifications are subject to change without notice. Compatible Quadrature Phase Shift Keying (H-DQPSK).
82.	Offeror must describe in detail how the equipment will have alarm interfaces to provide status to the Network Management System.
	Offeror Response: Comply The proposed GTR 8000 Bases are monitored and managed by Motorola Solutions Unified Event Manager (UEM) application utilizing SNMPv3 communication method. Unified Event Manager Active Alarm Window Analyzation The Unified Event Manager (UEM) Active Alarms Window is useful for troubleshooting because it captures alarms that may occur intermittently or during off-hours. For example, you can review the Active Alarms Window to correlate reported loss of service with patterns of critical alarms for links and equipment (i.e. GTR 8000s). When analyzing the Active Alarms Window, look for the following patterns: - Failures sent with time stamps on or about the same time. - Failures from related equipment: • Cards in the same device. • Equipment part of the same subsystem. Unified Event Manager Diagnostic Options The GTR 8000 base radio diagnostic options in the Unified Event Manager (UEM) are: - Restart - Requests that the base radio performs a reset. - Service - Requests that the base radio enters service mode, allowing a technician to make alignment adjustments and run other tests while the base radio is offline. - Enabled - Requests that the base radio enters the enabled mode and handle traffic. GTR 8000 Internal Diagnostic Test Alarm Log The GTR 8000 base radio has been designed with internal diagnostic tests that occur on power up and reset. Diagnostic tests are available for the control module and power supply. If a problem occurs during operation, it is reported as an alarm. All alarms are stored in the Alarm Log, accessible with Configuration/Service Software (CSS). The alarm log contains the name of the diagnostic test that failed and the time since the last power up.
83.	Offeror must describe in detail the proposed units, with mounting configurations for standard relay rack or cabinets.
	Offeror Response: Comply

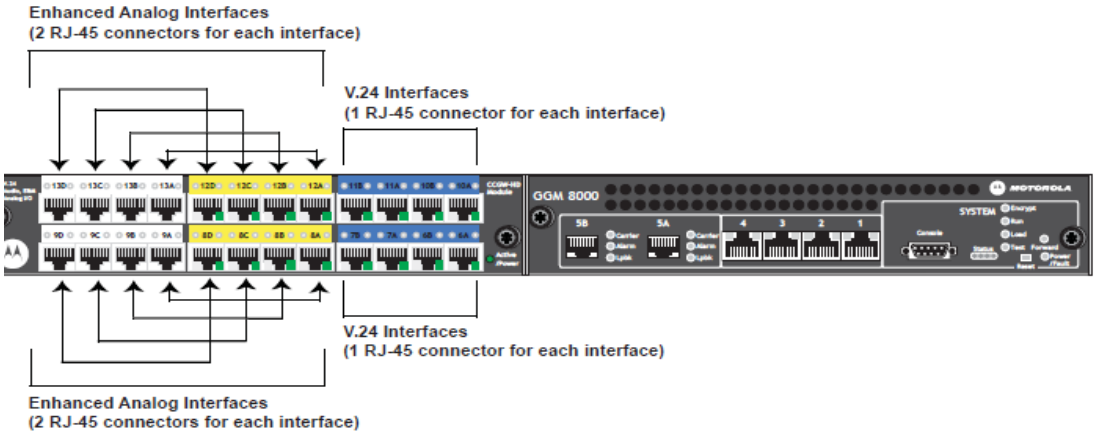
	The proposed GTR 8000 base repeaters are configured as Expandable Site Subsystem (ESS). The proposed ESS mounting is standard 7.5' open rack.
84.	Offeror must describe in detail if the proposed units consist of modular components or Field Replaceable Units (FRU) allowing for in the field repairs whenever possible.
	Offeror Response: Comply The proposed GTR 8000 base repeaters are composed of hot-swap capable modules. GTR 8000 Field Replacement Unit (FRU) spares are proposed.
85.	Offeror must acknowledge that the base station equipment shall comply with Part 90 of the FCC Rules and Regulations, as well as appropriate EIA and similar agency standards and be an FCC-type accepted for use in the VHF frequency band.
	Offeror Response: Comply
86.	Prior to implementation, the successful Offeror must acknowledge that they shall perform the following studies at each site. Offeror must describe in detail how they will perform the following studies: a. Intermodulation analysis – Offeror shall consider equipment from all tenants located at the proposed site, per FCC license information. b. Maximum Permissible Exposure (MPE) study (per latest revision of the FCC Office of Engineering and Technology [OET] Bulletin 65) – Offeror shall consider equipment from all tenants located at the proposed site, per FCC license information.
	Offeror Response: Comply The State is responsible for collecting all existing Transmit Antenna information for both existing LMR and Microwave per RF site including: - Tx antenna heights. - Antenna Model. - Electrical/Mechanical Downtilt if any. - Number of channels on each antenna. - ERP of each antenna. - Frequency Range of each antenna. Intermodulation Analysis – Phases 2 and 3 Motorola Solutions will perform an IM analysis to identify potential IM problems that will exist after all known transmitter and receiver information has been provided for each RF site. The IM analysis does consider the receiver bandwidth of the proposed solution to determine if any IM products fall within the proposed system receiver's IF selectivity and cause interference. Maximum Permissible Exposure Study – Phases 2 and 3

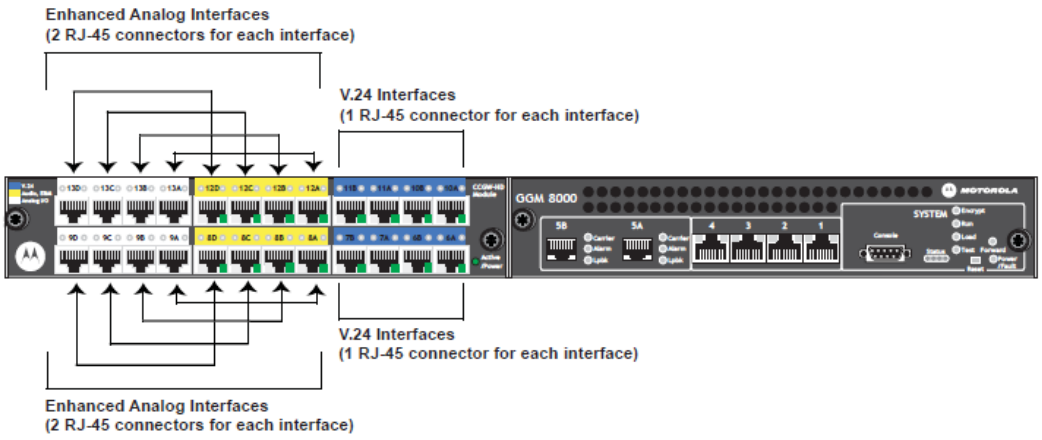
	The paper Electromagnetic Exposure studies that Motorola Solutions performs are a computational assessment to provide an estimation of the EME (Electromagnetic Energy) exposure. The compliance is established with respect to the US FCC regulations outlined in OET Bulletin 65. The assessment is carried out using the methodologies specified in OET Bulletin 65 and [1]. [1] R. Cicchetti and A. Faraone, "Estimation of the Peak Power Density in the Vicinity of Cellular and Radio Base Station Antennas," IEEE Transactions on Electromagnetic Compatibility, Vol. 46, No. 2, pp. 275-290, May 2004. The EME Assessment Report will contain Motorola Solutions' best estimate of EME exposure at each proposed RF tower site.
87.	Offeror must acknowledge that they have included detailed specification sheets for all proposed equipment in their proposal and indicate where in the proposal it can be found.
	Offeror Response: Comply Specification sheets for the proposed equipment were originally included in Section 9, Appendix. Key equipment specification sheets have been referenced in the Phase 2 Statement of Work, section 32, subsection b.
	Antenna Systems
88.	Offeror must describe in detail the antenna system equipment necessary for the proposed solution.
	Offeror Response: Comply IP Simulcast Site Antenna Network – Phase 3 Only The proposed transmit antenna network at each IP Simulcast site utilizes GTR 8000 Expandable Site Subsystem integrated six (6) port 800 MHz combiner, transmission line and 700/800 Antenna. The new 700/800 antennas will facilitate future 700 MHz channel system expansion (if desired). The proposed receive antenna network at each IP Simulcast site utilizes GTR 8000 Expandable Site Subsystem integrated six (6) port Cabinet and Site Receiver Multicoupler (RMC), TXRX Control Monitoring Unit (CMU)), transmission lines for receive and test line, TXRX Tower Top Amplifier (TTA) and 700/800 Antenna. - Per IP Simulcast Site Antenna Network • Three (3) RFI CC807-11T1 Antennas (one Transmit and two Receive Antennas for a second branch receiver diversity design) for all sites, except Fargo and 1038763 will use RFI CC807-06 Antennas. • One (1) TXRX 428 E Tower Top Amplifier (TTA). • One (1) 7/8" Coaxial transmit lines plus connectors and jumpers. • One (1) Coaxial transmit line surge suppressions. • Two (2) 7/8" Coaxial receive line plus connectors and jumpers.

	• One (1) 1/2” Coaxial test line plus connectors and jumpers. • Three (3) Coaxial receive line surge suppressions. <u>ASTRO 25 Site Repeater (ASR) Antenna Network – Phases 2 and 3</u> The proposed antenna network at each ASTRO 25 Site Repeater utilizes one GTR 8000 Expandable Site Subsystem integrated six (6) port 800 MHz combiner, transmission line and 700/800 Antenna. The new 700/800 antennas will facilitate future 700 MHz channel system expansion (if desired). Each new 800 MHz combiner can be expanded via another six channel 800 MHz combiner and combiner cable harness (provided the 12 transmit frequencies have minimum of 150 kHz of channel separations) or via another six channel 700 MHz combiner and a diplexer (if desired). The proposed receive antenna network at each ASTRO 25 Site Repeater utilizes one new GTR 8000 Expandable Site Subsystem integrated six (6) port Cabinet Receiver Multicoupler (RMC), TXRX Control Monitoring Unit (CMU), transmission lines for receive and test line, TXRX Tower Top Amplifier (TTA) and 700/800 Antenna. - Per ASTRO 25 Repeater Site Antenna Network • Three (3) RFI CC807-11T1 Antennas (One Transmit and two Receive Antennas, for second branch receiver diversity design). • One (1) TXRX 428 E Tower Top Amplifier (TTA). • One (1) 7/8” Coaxial transmit line plus connectors and jumpers. • One (1) Coaxial transmit line surge suppression. • Two (2) 7/8” Coaxial receive line plus connectors and jumpers. • One (1) 1/2” Coaxial test line plus connectors and jumpers. • Three (2) Coaxial receive line surge suppressions. All proposed antennas are rated for digital system’s Peak Instantaneous Power (PIP) and or Passive Intermodulation (PIM). The maximum number of channels per PIP rated antenna is 12 channels or stations.
89.	Offeror must acknowledge that all proposed antennas are appropriate to provide the required coverage and meet applicable FCC rules and regulations. *<u>Offeror Response:</u>* Comply
90.	Offeror must describe in detail the proposed transmission line type and length to provide the required coverage. *<u>Offeror Response:</u>* Comply The proposed transmission line types and lengths are: - Phases 2 and 3: Per ASTRO 25 Site Repeater Site Antenna Network: • One (1) 7/8” Coaxial transmit line, AVA5-50 HELIAX Andrew Virtual Air Coaxial Cable, Corrugated Copper, Black PE Jacket. • Two (1) 7/8” Coaxial receive line, AVA5-50 HELIAX Andrew Virtual Air Coaxial Cable, Corrugated Copper, Black PE Jacket.

	One (1) 1/2” Coaxial test line, LDF4-50A HELIAX Andrew Low Density Foam Coaxial Cable, Poly Jacket. - Phase 3: Per IP Simulcast Site Antenna Network: • One (1) 7/8” Coaxial transmit line, AVA5-50 HELIAX Andrew Virtual Air Coaxial Cable, Corrugated Copper, Black PE Jacket. • Two (1) 7/8” Coaxial receive line, AVA5-50 HELIAX Andrew Virtual Air Coaxial Cable, Corrugated Copper, Black PE Jacket. • One (1) 1/2” Coaxial test line, LDF4-50A HELIAX Andrew Low Density Foam Coaxial Cable, Poly Jacket.
91.	Duplexers are expected to minimize tower real estate. Offeror must describe in detail if transmit combiner/receiver multicouplers are included as part of the proposed solution for sites with multiple transmitters. *Offeror Response:* Comply Phases 2 and 3: ASTRO 25 Site Repeater (ASR) Antenna Network The proposed antenna network at each ASTRO 25 Site Repeater utilizes one GTR 8000 Expandable Site Subsystem integrated six (6) port 800 MHz combiner, transmission line and 700/800 Antenna. The new 700/800 antennas will facilitate future 700 MHz channel system expansion (if desired). Each new 800 MHz combiner can be expanded via another six channel 800 MHz combiner and combiner cable harness (provided the 12 transmit frequencies have minimum of 150 kHz of channel separations) or via another six channel 700 MHz combiner and a diplexer (if desired). The proposed receive antenna network at each ASTRO 25 Site Repeater utilizes one new GTR 8000 Expandable Site Subsystem integrated six (6) port Cabinet Receiver Multicoupler (RMC), TXRX Control Monitoring Unit (CMU), transmission lines for receiver branch diversity design and test line, TXRX Tower Top Amplifier (TTA) and 700/800 Antenna. Phase 3 Deployment: IP Simulcast Site Antenna Network The proposed transmit antenna network at each IP Simulcast site utilizes GTR 8000 Expandable Site Subsystem integrated six (6) port 800 MHz combiner, transmission line and 700/800 Antenna. The new 700/800 antennas will facilitate future 700 MHz channel system expansion (if desired). The proposed receive antenna network at each IP Simulcast site utilizes GTR 8000 Expandable Site Subsystem integrated six (6) port Cabinet and Site Receiver Multicoupler (RMC), TXRX Control Monitoring Unit (CMU)), transmission lines for receiver branch diversity design and test line, TXRX Tower Top Amplifier (TTA) and 700/800 Antenna. Duplexers are not utilized in the proposed Antenna Network designs.
92.	Offeror must acknowledge that they have included specification sheets for all proposed equipment, including, but not limited to, base stations, antennas and filters in their proposal and indicate where in the proposal it can be found.

	Offeror Response: Comply Specification sheets for the proposed equipment were originally included in Section 9, Appendix. Key equipment specification sheets have been referenced in the Phase 2 Statement of Work, section 32, subsection b.
93.	Offeror must describe in detail the option for a spare antenna at each tower site. Offeror must indicate on Attachment 5 if a spare antenna can be included at the tower site.
	Offeror Response: Comply Four (4) spare antennas (one per four regions within the State) are proposed.
	Conventional Radio Network Gateways
94.	Offeror must describe in detail the conventional gateway interfaces at each RF site/tower site for the interface to Legacy conventional equipment and to support current local legacy interoperability with neighboring States.
	Offeror Response: Comply GGM 8000 Enhanced Conventional Channel Gateway The GGM 8000 Enhanced Conventional Channel Gateway is comprised of a base module providing the base system plus the GGM 8000 Enhanced Conventional Gateway module. The GGM 8000 Enhanced Conventional Gateway module: - Consolidates the functionality of the analog/V.24 interface kit onto a single circuit board. The analog/V.24 interface kit implementation requires that five separate boards (the expansion module, the E&M daughterboard, two V.24 daughter boards and a DSP SIMM) be added to the base configuration to create the CCGW configuration. The Enhanced Conventional Gateway module creates the CCGW configuration with a single I/O module. - Maintains the V.24 signal interface functionality provided by the analog/V.24 interface kit and incorporates hardware design enhancements to the V.24 universal synchronous/asynchronous receivers/transmitters (USARTs) to substantially reduce interrupt overhead. - Supports a second set of analog connectors that provides a separate audio output on each connector for audio logging recorders, as well as additional signaling capabilities. GGM 8000 High Density Enhanced Conventional Gateway module supports eight analog and eight V.24 interfaces. High Density Enhanced Conventional Gateway Module The High Density Enhanced Conventional Gateway supports: - Eight enhanced analog interfaces, with two RJ-45 connectors per interface.

	• The first RJ-45 connector (located in the middle (yellow) group of connectors, which is labeled “Audio, E&M” on the Enhanced Conventional Gateway module front panel, supports 4-wire, 2- wire, or 4-wire/2-wire audio. • The second RJ-45 connector (located in the left (white) group of connectors, which is labeled “Analog I/O” on the Enhanced Conventional Gateway module front panel, supports additional audio and signaling functions. - Eight V.24 interfaces, with one RJ-45 connector per interface, located in the right (blue) group of connectors, which is labeled “V.24” on the Enhanced Conventional Gateway module front panel.  **Figure 6: High Density Enhanced Conventional Channel Gateway**
	Offeror must describe in detail how they will use conventional gateway interfaces for integration with existing equipment to create a migration path.
95.	*Offeror Response:* Comply Each proposed RF site /tower site deployed throughout Phases 2 and 3 includes one (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of interfacing up to 8 current/existing analog conventional channels. The supported analog conventional channels must be either 4-wire Tone Remote Control and/or E&M control. The design will allow current channels to traverse the ASTRO25 IP network and be able to be provisioned at the proposed MCC7500E radio dispatch console sites for interoperability.
	Offeror must describe in detail the proposed use of conventional gateway interfaces to support interoperability how it will not negatively impact current operations.
96.	*Offeror Response:* Comply The proposed GGM 8000 Enhanced Conventional Channel Gateway’s software based Guard Tone Notch Filter plus combination of analog port features listed below are designed for parallel non-MCC7500E consoles and analog conventional channels operation. - 2-Wire Input/Output.

	▪ 4-Wire Input. ▪ COR (Carrier Operated Relay) or CIU Coded/Clear Input. ▪ PTT Relay Output. ▪ VOX and COR Operation ▪ LOBL (Line Operated Busy Light) Detectors ▪ AGC (Automatic Gain Control), DLM (Digital Level Memory) and Fixed Gain Operation. Analog port features will prevent the dispatcher from hearing any guard tone mixed in with that transmit audio, received audio and identifying transmission on the channel via tone remote control.
97.	Offeror must describe in detail the number of devices controlled via analog four-wire E&M (earth and magneto, or ear and mouth) signaling and/or by analog 4-wire tone control signaling.
	Offeror Response: Comply The High Density Enhanced Conventional Gateway supports: ▪ Eight enhanced analog interfaces, with two RJ-45 connectors per interface. • The first RJ-45 connector (located in the middle (yellow) group of connectors, which is labeled “Audio, E&M” on the Enhanced Conventional Gateway module front panel, supports 4-wire, 2- wire, or 4-wire/2-wire audio. • The second RJ-45 connector (located in the left (white) group of connectors, which is labeled “Analog I/O” on the Enhanced Conventional Gateway module front panel, supports additional audio and signaling functions.  **Figure 7: High Density Enhanced Conventional Channel Gateway**
98.	Offeror must acknowledge that the Conventional Gateway devices shall connect to the system controllers, or dispatch subsystem via an IP connection and not require channel bank equipment.
	Offeror Response: Comply

8. DISPATCH CONSOLES

The dispatch console is a critical link for public safety personnel. It is here that the dispatch operator must relay critical information from the public to public safety personnel in the field. At times, the dispatcher may be in stressful conditions with lives at risk. It is imperative that the dispatch console be laid out in a manner that results in the operation of such consoles being second nature to the dispatching personnel. The dispatching console shall provide the operator with as much information as necessary without the screen being cluttered and shall be easily navigated to perform necessary functions.

No.	
	Console Locations
1.	Offeror must describe in detail their plan to provide dispatch console operator positions for the current PSAPS listed in Attachment 6.
	Offeror Response: Comply As part of the Phase 1 Deployment of the system, Motorola Solutions proposed our mission critical IP high-tier MCC7500E radio dispatch console system. It is intended for use in Motorola Solutions' ASTRO25 radio systems. The MCC7500E Dispatch Console features an intuitive, easy-to-use Graphical User Interface (GUI) that runs under a Microsoft Windows operating system, utilizing the industry standard PC platform. MCC7500E's highly recognizable icons are designed to reduce user training time and allow dispatchers to manage information more productively. Some of the important features include: - Seamless integration with ASTRO25 Radio systems: • Supports the IP protocols of the radio system's transport network. • Encryption and decryption in the dispatch positions which allows true end to end encryption in the radio system. • Configuration of the console sub system via the radio system's centralized configuration sub system so the customer has a single point for configuring the radio system. The configuration sub-system may be accessed from multiple remote locations so customers can still have convenient access while enjoying the benefits of centralized configuration. • Management of the console sub-system via the radio system's centralized network management sub-system so the customer has a single point for managing faults, accounting, performance and security of the radio system. The network management sub-system may be accessed from multiple remote locations so customers can still have convenient access while enjoying the benefits of centralized management. - Centralized logging of trunked radio audio. Capable of distribute logging (optional) is to support conventional channels or telephony recordings. - Participating in the radio system's agency partition functionality. The main components of a Motorola Solutions MCC7500E system are: - Redundant Network, Encrypted Routers and Switches.

	▪ Dispatch Positions. ▪ Archiving Interface Server (Optional). ▪ Conventional Channel Gateway. ▪ Auxiliary Input/Output (Aux I/O) Server. ▪ Conventional Site Controller.
2.	Offeror must describe in detail how they will provide connectivity between console subsystem locations and the system control and/or core equipment. *Offeror Response:* Comply Motorola Solutions proposed MCC7500E/MCC7500E VPM radio dispatch console system requires redundant Ethernet connectivity with path diversity between each IP dispatch console subsite and the Primary and optional Backup cores. Plan is to utilize the exiting Gold (with 99.999 reliability) Ethernet Transport Service (ETS). Backhaul Provider Reference Material The following provides quick reference material to the backhaul service provider. Bandwidths The bandwidths referenced are the minimums that need to be provided to ensure performance of a fully utilized site. The port speed and/or internal backhaul network may need to be greater to ensure the jitter specification is met. The System Required Minimum Bandwidth (BW) per link are: ▪ The Main and Optional Backup Core (InterZone Links) Min BW = 9736 kbps per link ▪ Redundant IP Console Site Links to Each Core (5 Ops or Under) Min BW = 5000 kbps per link ▪ Redundant IP Console Site Links to Each Core (5-10 Ops) Min BW = 6000 kbps per link ▪ Redundant IP Console Site Links to Each Core (10-15 Ops) Min BW = 10,000 kbps per link ▪ Optional ISSI 8000 Min BW = 3808 kbps per link ▪ Optional Analog or IP Logging Recorder Network Min BW = 5000 kbps per dispatch ▪ ASTRO25 Site Repeater (ASR) Site Link to Each Core Min BW = 1304 kbps per link (Phases 2 and 3) ▪ Redundant Prime IP Simulcast Site Links to Each Core Min BW = 3000 kbps per link (Phase 3) ▪ Remote IP Simulcast Site Link to IP Prime Min BW = 1304 kbps per link (Phase 3) Tolerance to backhaul network congestion or outage ▪ Repeater Site Links (including IP Trunked Simulcast Prime): 2 seconds. ▪ IP Trunked Simulcast Sub-Site Links: 800 milliseconds. ▪ MCC7500 Console/NM Dispatch Site Links: 1.2 seconds. Latency

Latency or IP Packet Transfer Delay is defined per RFC 2681.

Jitter

The measurement method for jitter is based on RFC 3393 (Section 2.4) and ITU-T Recommendation Y.1541. RFC 3393 specifies the calculation of inter-packet delay variation (IPDV). ITU-T Y.1541 uses IPDV to calculate jitter. All jitter specifications are 99th percentile values. The jitter specification must apply when passing standard 1500 byte packets.

Packet Loss

This refers to "Type-P-One-Way-Packet-Loss" as defined in RFC 2680, section 2.4. In the context of audio for the ASTRO25 network, reordered packets are also considered packet loss.

QoS mechanisms

Four QoS levels are recommended for optimal user experience, but at least 2 are required. The following QoS mechanisms are supported:

- Layer 3 (ToS or DSCP)

General

3. Offeror must describe the proposed IP wireline networked enabled consoles.

Offeror Response:

Comply

The proposed MCC7500E radio dispatch console sites and associated equipment that will be deployed in Phase 1 Deployment are as follows:

Stutsman County Communications Center

The proposed Stutsman County Communications Center's equipment located at [redacted], Jamestown includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Three (3) MCC7500E console operator positions.
- Three (3) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.

Barnes County Dispatch

The proposed Barnes County Dispatch's equipment located at [redacted] Valley City includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU.
- Two (2) MCC7500E console operator positions.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.
- One (1) CADI Firewall Interface

Richland County Communications/911

The proposed Richland County Communications/911 equipment located [redacted], Wahpeton includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Three (3) MCC7500E console operator positions.
- Three (3) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.
- One (1) CADI Firewall Interface

Traill/Steele 911

The proposed Traill/Steele 911 equipment located at [redacted], Hillsboro includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) GGM 8000 High Density Conventional Channel Gateways
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) MCC7500E console operator positions.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with

(CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.

Grand Forks Public Safety Answering Point

The proposed Grand Forks Public Safety Answering Point's equipment located at [redacted], Grand Forks includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Four (4) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 32 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- One (1) MCD 5000 Deskset and Two (2) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) GGM 8000 Gateways with Encryption.
- Four (4) and two (2) MCC7500E console operator positions.
- Six (6) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.
- One (1) CADI Firewall Interface

Walsh County Communications

The proposed Walsh County Communications' equipment located at [redacted], Grafton includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) MCC7500E console operator positions.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.
- One (1) CADI Firewall Interface

Pembina County 911

The proposed Pembina County 911 equipment located at [redacted], Cavalier includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) MCC7500E console operator positions.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.
- One (1) CADI Firewall Interface

<u>Cavalier County 911</u>

The proposed Cavalier County 911 equipment located at [redacted], Langdon includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) MCC7500E console operator positions.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.

<u>Lake Region 911 Center</u>

The proposed Lake Region 911 Center's equipment located at [redacted], Devils Lake includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Three (3) MCC7500E console operator positions.
- Three (3) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna

- analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.

Pierce County 911

The proposed Pierce County 911 equipment located at [redacted], Rugby includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) MCC7500E console operator positions.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

Rolette County 911

The proposed Rolette County 911 equipment located at [redacted] Rolla includes:

- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- Two (2) MCC7500E console operator positions.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) GGM 8000 Gateways with Encryption.

Bottineau/Renville 911

The proposed Bottineau/Renville 911 equipment located at [redacted], Bottineau includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).

- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- Two (2) MCC7500E console operator positions.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run..
- One (1) Aux I/Os

Minot Central Dispatch

The proposed Minot Central Dispatch equipment located at [redacted], Minot includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- One (1) MCD 5000 Deskset and Two (2) MCD 5000 Radio Gateway Units (RGU's).
- Five (5) MCC7500E console operator positions.
- Two (2) GGM 8000 Gateways with Encryption.
- Five (5) APX 7500 Backup Consolettes, an Eight (8) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.
- One (1) CADI Firewall Interface

Mountrail County Sheriff's Office

The proposed Mountrail County Sheriff's Office equipment located at [redacted], Stanley includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) GGM 8000 High Density Conventional Channel Gateway
- Upgrade Existing Two (2) MCC7500 VPM console operator positions.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) GGM 8000 Gateways with Encryption
- One (1) Conventional Channel Controller.
- One (1) CADI Firewall Interface

(CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) Aux I/Os.

Williston/Williams County 911

The proposed Williston/Williams County 911 equipment located at [redacted], Williston includes:

- Four (4) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) Aux I/Os.
- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).
- Four (4) MCC7500E console operator positions.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) Conventional Channel Controller.
- One (1) CADI Firewall Interface

Stark/Dickinson Dispatch

The proposed Stark/Dickinson Dispatch equipment located at [redacted] Dickinson includes:

- One (1) Conventional Channel Controller.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU)..
- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Four (4) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os
- Two (2) GGM 8000 Gateways with Encryption.
- Four (4) MCC7500E console operator positions.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).
- One (1) CADI Firewall Interface

MHA Communications Center

The proposed MHA Communications Center's equipment located at [redacted], New Town includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Four (4) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Upgrade Existing Four (4) MCC7500 VPM console operator positions.
- One (1) Conventional Channel Controller.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) CADI Firewall Interface

Mercer/Oliver 911

The proposed Mercer/Oliver 911 equipment located at [redacted], Stanton includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Three (3) New MCC7500E console operator positions.
- Three (3) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.

McLean County 911

The proposed McLean County 911 equipment located at [redacted], Washburn- includes:

- One (1) Aux I/Os.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit
- Two (2) GGM 8000 Gateways with Encryption.
- Two (2) New MCC7500E console operator positions.
- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).

- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control). (RGU).
- One (1) Conventional Channel Controller.
- One (1) CADI Firewall Interface

Central Dakota Communications Center

The proposed Central Dakota Communications Center's equipment located at [redacted], Bismarck includes:

- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Five (5) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 40 analog conventional channels (4-wire Tone Remote Control).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and Two (2) MCD 5000 Radio Gateway Units (RGU's).
- Eight (8) New MCC7500E console operator positions.
- Eight (8) APX 7500 Backup Consolettes, a Twelve (12) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- One (1) Aux I/Os.
- One (1) CADI Firewall Interface

State Radio

The proposed State Radio equipment located at [redacted], Bismarck includes:

- Ten (10) APX 7500 Backup Consolettes, a Twelve (12) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) MCD 5000 Deskset, Three (3) MCD 5000 Radio Gateway
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 18 analog conventional channels (4-wire Tone Remote Control) in order to facilitate transition. Additional RF Site CCGW's will be needed to fully integrate existing radio system
- Ten (10) New MCC7500E console operator positions.
-

Units (RGU's) and a 24 Port Ethernet Switch.
- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) GGM 8000 Gateways
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- One (1) CADI Firewall Interface

Backup State Radio

The proposed Backup State Radio equipment (location to be determined) includes:

- Five (5) APX 7500 Backup Consolettes, an Eight (8) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150' for each run.
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 18 analog conventional channels (4-wire Tone Remote Control) in order to facilitate transition. Additional RF Site CCGW's will be needed to fully integrate existing radio system
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Five (5) New MCC7500E Secure console operator positions.
- One (1) MCD 5000 Deskset, Two (2) MCD 5000 Radio Gateway Units (RGU's) and a 24 Port Ethernet Switch.
- One (1) CADI Firewall Interface
- Two (2) 7.5' Open Racks and Power Distribution Units (PDU's).
- Two (2) GGM 8000 Gateways
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.

Each MCC7500E operator position is equipped with the following:

- One (1) HP Z2 Mini Workstation Computer CPU with 24" Non-Touch Screen (Full HD, 1920 x 1080 HD at 60 Hz, 16:9 Standard Ratio), with Monitor/keyboard/Trackerball.
- One (1) Software Enhanced Instant Recall Recorder (IRR), second sound card and a pair of computer speakers.
- Optional Secure Operation. AES, DES-OFB Encryption Algorithms and Advanced Digital Privacy (ADP) Software Encryption.
- One (1) Audio Interface Module (AIM).
  - Two (2) Desktop Speakers.
  - One (1) Desktop Gooseneck Microphone.
  - Two (2) Headset Jacks.
  - Two (2) Headset Module Bases with PPT and 15' Cables.
    - Two (2) Plantronics SupraPlus Monaural (single ear headband style) with Noise Cancelling Microphone.
  - One (1) Dual Pedal Footswitch.

Optional Console Equipment:

	- Sixty-five (65) 24" Touch Screen (Full HD, 1920 x 1080 HD at 60 Hz, 16:9 Standard Ratio). - Sixty-five (65) MCC7500E Over the Ethernet Keying (OTEK) Operation Licenses. <u>Phase 1 Deployment: The proposed MCC7500E spare equipment include:</u> - Seven (7) MCC Series Desktop Speakers. - Seven (7) MCC Series Desktop Gooseneck Microphones. - Seven (7) MCC Series Headset Jacks - Seven (7) MCC7500E Workstations. - Seven (7) MCC7500E Voice Processor Module FRUs. • ADD: DES-OFB Algorithm. • ADD: MCC7500E Secure Operation. • ADD: AES Algorithm. • ADD: ADP Algorithm. - Seven (7) GR500 AC Power Cords. - Seven (7) Power Supplies 108W AC INP 12VDC OUT W18. - Seven (7) DC CABLE ASSY. - Seven (7) GCP 8000/GCM 8000/GPB 8000 FRU's. - Seven (7) Power Supply FRU's. - Seven (7) Fan Module FRU's. <u>Phase 2 Deployment: The proposed MCC7500E spare equipment include:</u> - Thirteen (13) MCC Series Desktop Speakers. - Thirteen (13) MCC Series Desktop Gooseneck Microphones. - Thirteen (13) MCC Series Headset Jacks - Thirteen (13) MCC7500E Workstations. - Thirteen (13) MCC7500E Voice Processor Module FRUs. • ADD: DES-OFB Algorithm. • ADD: MCC7500E Secure Operation. • ADD: AES Algorithm. • ADD: ADP Algorithm. - Thirteen (13) GR500 AC Power Cords. - Thirteen (13) Power Supplies 108W AC INP 12VDC OUT W18. - Thirteen (13) DC CABLE ASSY. - Thirteen (13) GCP 8000/GCM 8000/GPB 8000 FRU's. - Thirteen (13) Power Supply FRU's. - Thirteen (13) Fan Module FRU's. Note: New equipment backup power is the responsibility of the each Communications Center.
4.	Offeror must describe in detail how the dispatch console system integrates with all existing IP dispatch centers in the State using IP connectivity.
	<u>Offeror Response:</u> Comply

	The proposed MCC7500E and to be upgraded existing MCC7500E VPM radio dispatch console system will ultimately replace the existing equipment at twenty-two (22) dispatch centers and will utilize the exiting Gold Ethernet Transport Service (ETS) for redundant wireline links or connections to the proposed Primary and optional Backup cores. The proposed MCC7500E radio dispatch console system will interface with any existing 4-wire tone controlled analog conventional channels via Conventional Channel Gateways (CCGW's).
5.	Expansion Offeror must describe in detail the propose solution's ability to be expanded with additional radio operator positions and/or enhanced by adding additional hardware and/or software to increase capacity or features. Offeror must describe in detail the expansion capabilities of which the proposed solution is equipped capable.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console is expandable with additional MCC7500E User Licenses to the cores, plus additional hardware. The maximum capacities per Zone/System and per Site are listed below. **Proposed Dispatch Console Site Capacities:** Dispatch Consoles per Zone/System - Up to 500 dispatch consoles plus 63 archiving interface servers per Zone in a Multi-Zone Capable System (consoles deployed outside RNI count against overall dispatch consoles allowed). - Up to 2000 dispatch consoles per Multi-Zone Capable System (consoles deployed outside RNI count against overall dispatch consoles allowed). Dispatch Console Sites per Zone/System - Up to a combined total of 100 MCC7500E/7100/7500E Dispatch Console Sites per Zone in a Multi-Zone Capable System. - Up to a combined total of 500 MCC7500E/7100/7500E Dispatch Console Sites per Multi-Zone Capable System. - Up to 4 MCC7500E/7100/7500E Dispatch Console Sites per Zone in a Multi-Zone Capable System may be located at the zone core (these may contain only CCGW's, if desired). Devices per Dispatch Console Site - Up to 50 Dispatch Consoles (consoles deployed outside RNI count against overall dispatch consoles allowed at a console site). - Up to 4 AISs. - The sum of Dispatch Consoles inside the RNI and outside the RNI and AISs per Dispatch Console site must be less than or equal to 50. - Up to 4 Logging Recorders. - Up to 4 replay stations.

	- Up to 2 MKM 7000 Console Alias Managers (standalone). - One MKM 7000 Console Alias Manager (cohabitated) per MCC7500E. - Up to 1 Control Room Firewall. - Up to 5 Console Proxies. - Up to 10 MCC 7100 dispatch consoles per Console Proxy. <u>Auxiliary Input & Output Capacities</u> - Up to 16 Control Relay Outputs per MOSCAD RTU. - Up to 48 Inputs per MOSCAD RTU. - Up to 100 Dispatch Consoles may be supported by any MOSCAD RTU. - Up to 100 MOSCAD RTUs may be accessed by any MCC7500E Dispatch Console. - Up to 400 Aux I/Os simultaneously assigned to an MCC7500E Dispatch Console (does not include channel-related inputs and outputs such as Supervisor Takeover through Relay). - Up to 8000 Aux I/Os per zone. - Up to 5 MOSCAD RTUs per Console Site. Each proposed PSAPS support additional dispatch console operator positions (50 positions max per dispatch site) and Conventional resources up to 40 ports
6.	Offeror must describe in detail how the dispatch console system can be configured to support multiple encryption keys per console position equipment.
	<u>Offeror Response:</u> Comply The addition of Secure Capability and desired Encryption Algorithms to the MCC7500E radio dispatch position and the optional Archiving Interface Server (AIS) allows true end to end encryption in the radio system. This provides the highest degree of security possible to those customers who wish to take advantage of this feature. Putting the encryption and decryption services in the dispatch positions and Archiving Interface Servers also allows agencies to have greater control over their secure key material because they are not forced to share their keys in a centralized encryption/decryption device. The dispatch positions and Archiving Interface Servers support multiple encryption algorithms and multiple secure keys to allow them to access and control talkgroups from different agencies, if necessary. The supported encryption algorithms on MCC7500E are AES, DES-OFB and Advanced Digital Privacy (ADP) Software Encryption. Trunked radio resources (talkgroups and private calls) can be configured with the ability to work in the secure mode. Secure-capable resources on a dispatch position may be configured so they always operate in secure mode or so the user can manually change between secure and non-secure modes.

	The optional Key Variable Loader (KVL 4000) is utilized to provision each dispatch position with encryption keys. Each encryption key is saved to a specific Common Key Reference (CKR). The MCC7500E Dispatch Console/MCC7500E AIS support up to 250 CKR records, indexed from 1-4095. The MCC7500E Dispatch Console and the MCC7500E AIS may also have a key encryption key (KEK) for each algorithm if centralized key management is used. Up to 20 Key Management Systems can manage different sets of MCC7500E Dispatch Console/MCC7500E AIS and other devices in one system resulting in more than 250 CKRs total in a system. The dispatch positions and optional Archiving Interface Servers also support the optional OTEK (Over The Ethernet Keying) feature to simplify the management of the secure keys.
7.	Offeror must describe in detail how the dispatch console system can be configured to encrypt and decrypt AES and DES encryption algorithms. *Offeror Response:* Comply Once MCC7500E radio dispatch console system and P25 radios are equipped with AES and DES encryption algorithms, a digital audio voice transmission is sent as an AES or DES encrypted, digital signal. Digital encryption converts the digital audio, using an encryption key together with an encryption algorithm (AES or DES), into an encrypted message which is then transmitted. Receiving MCC7500E Dispatch Console positions, MCC7500E optional AISs, or radios must be programmed with the same key that was used for encoding the audio. Once the signal is received, it is decoded and converted back to its original format for reproduction at the receiving MCC7500E Dispatch Consoles or MCC7500E optional AISs. Other devices that do not have the proper key will not be able to receive intelligible information. If unauthorized persons were able to receive an encrypted voice call, they would not be able to understand it. An “unauthorized person” is anyone who does not share the same key material as the participants in the voice call. Conversely, a digital audio voice transmission from a MCC7500E dispatch console position to radios take an identical path. A digital audio voice transmission from MCC7500E operator is sent as an AES or DES encrypted using an encryption key together with an encryption algorithm (AES or DES). Receiving MCC7500E Dispatch Consoles, MCC7500E optional AISs, or radios must be programmed with the same key that was used for encoding the audio. Once the signal is received, it is decoded and converted back to its original format for reproduction at the receiving end.
8.	Offeror must describe in detail how the dispatch console system is capable of APCO P25 call processing and APCO P25 group and individual addressing modes, including but not limited to the following:

	a. APCO P25 Console Subsystem Interface (CSSI) specification (TIA-102 suite, a component of the APCO P25 ISSI). b. At least one unique trunked identity assigned to an operator position. c. An operator position must support the capability to affiliate with any valid trunked talkgroup configured for use. d. An operator position must have the capability to affiliate with multiple valid trunked talkgroups simultaneously.
	Offeror Response: Comply Full support for the APCO Project 25 trunking and conventional 12.5 kHz IMBE vocoder and the APCO Project 25 trunking Phase II TDMA 6.25e AMBE half rate vocoder is provided. Support for APCO Project 25 encryption is also provided to the extent it is supported in the Motorola Solutions radio system. The proposed Motorola Solutions ASTRO25 system supports P25 CSSI interface that allows third-party CSSI capable consoles to connect to an ASTRO25 system. ASTRO25 Trunked unit IDs are unique numbers assigned to each subscriber unit and dispatch position in Motorola Solutions trunked radio systems. Each Dispatch position is equipped to affiliate with any and multiple valid talkgroups provisioned per console operator position.

P25 TRUNKED SYSTEM FEATURE MATRIX

Last Updated: April 28, 2015	RELEASE 7.15		
TIA-102 STANDARD PUBLISHED P25 TRUNKED FEATURES	**FDMA CAI**	**TDMA CAI**	**TIA STANDARDS DOCUMENTS**
P25 CAI TRUNKING - PROJECT 25 COMMON AIR INTERFACE			
VOICE CALLS			
Group Voice Call	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Individual Voice Call	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Availability Check on Called Party	Yes	Yes	TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D/ TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA 102.BCAE
Broadcast Voice Call	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Announcement Group Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Emergency Group Voice Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Emergency Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1 / TIA-102.BCAE
Pre-Programmed Emergency Group Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.BCAE
Group Regrouping (part of P25 Dynamic Regrouping)	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABH
MOBILITY MANAGEMENT			
Roaming	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Intra-System Roaming (Automatic)	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1
Inter-System Roaming (Manual)	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1
Registration	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Restricting service access only to valid SU	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
De-registration	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Group Affiliation	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Call Restriction	Yes[1]	Yes[1]	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Call Routing	Yes	Yes	TSB102-B
Wide Area Call	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1 / TIA-102.CABC-B;B-1
Location Registration	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1
WUID Validity Timer	Yes	Yes	TIA-102.AABD-A;A-1 / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B/TIA-102.AABB-B/TIA-102.BBAC;-1
KEY MANAGEMENT			
KFD Based Key Management			
Manual Rekeying Features	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
Keyload	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
Key Erase	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
Erase all Keys	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
View Key Info	Yes	Yes	TIA-102.AACD-A / TIA-102.BBAC;-1
KMF Based Key Management			
Unique Key Encryption Key (UKEK)	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Individual Radio Set Identifier (Ind RSI)	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Key Management Facility Radio Set Identifier (KMF RSI)	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Message Number Period (MNP)	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Keyload	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
View Individual RSI	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Load Individual RSI	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
View KMF RSI	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Load KMF RSI	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
View MNP	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Load MNP	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
View Keyset Info	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A
Activate Keyset	Yes	N/A[2]	TIA-102.AACD-A / TIA-102.AACA-A

SECURITY SERVICES			
Confidentiality			
Encryption Transformation			
Traffic Encryption	Yes[3]	Yes[3]	TIA-102.AAAB-A, TIA-102.AAAD-A/ TIA-102.AAAC/ TIA-102.AAAD-A / TIA-102.BBAC;-1
Integrity			
Chronological Integrity	Yes[4]	Yes[4]	TIA-102.AAAB-A / TIA-102.BBAC;-1
Message Integrity	Yes[5]	Yes[5]	TIA-102.AAAB-A / TIA-102.BBAC;-1
SU Authentication	Yes	Yes	TIA-102.AACE-A / TIA-102.BBAC;-1
Key Management	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Physical Key Distribution	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Over-the-Air Key Distribution	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Key Download Procedures	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Key Activation Procedures	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Destruction of Keys	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Rekey Request	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Provisioning of the MR	Yes	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
Key Compromise	Yes[6]	N/A[2]	TIA-102.AAAB-A/ TIA-102.AACA-A
ENCRYPTION			
Encryption	Yes	Yes	TSB102-B / TIA-102.AAAB-A/TIA-102.AAAD-A / TIA-102.AACD-A / TIA-102.AACA-A/ TIA-102.BBAC;-1
DES-OFB Encryption of Voice	Yes	Yes	TSB102-B / TIA-102.AAAD-A / TIA-102.BBAC;-1
AES Encryption of Voice	Yes	Yes	TIA-102.AAAD-A / TIA-102.BBAC;-1
AES Encryption of Packet Data	Yes	Yes	TIA-102.AAAD-A / TIA-102.BBAC;-1
Multiple Encryption Algorithms	Yes	Yes	TIA-102.AACA-A / TIA-102.BBAC;-1
Multiple Encryption Keys	Yes	Yes	TIA-102.AAAD-A / TIA-102.BBAC;-1
SUPPLEMENTARY SERVICES			
Priority Call	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.BCAE
Preemptive Priority Call	Yes[7]	Yes[7]	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.BCAE
Dispatcher Audio Takeover	Yes	Yes	TSB102-BAGA / TIA-102.BBAC;-1 / TIA-102.BCAE
Emergency Alarm	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D/ TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.CABC-B;B-1
Silent Emergency	Yes	Yes	TSB102-B
Radio Unit Monitoring	Yes[8]	Yes[8]	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.CABC-B;B-1
Talking Party Identification	Yes	Yes	TSB102-B
Call Alerting	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.CABC-B;B-1
Radio Check	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.CABC-B;B-1
Radio Inhibit	Yes	Yes	TSB102-B/ TIA-102.AABD-B /TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.CABC-B;B-1
Radio Uninhibit	Yes	Yes	TSB102-B/ TIA-102.AABD-B /TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.CABC-B;B-1
Alert Tones	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1
SU Status Update	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA 102.BBAC;-1 / TIA-102.CABC-B;B-1
Dynamic Regrouping (part of P25 Dynamic Regrouping)	Yes	Yes	TSB102-B/ TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D / TIA-102.AABH
SYSTEM SERVICES			
Network Status Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
System Status Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
Channel Identifier Update Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
Adjacent Status Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
Backup Control Channel Broadcast Message	Yes	Yes	TIA-102.AABD-B / TIA-102.BBAC;-1
MISCELLANEOUS			
Electronic Serial Number	Yes	Yes	TSB102-B
Queuing	Yes	Yes	TIA-102.AABD-B / TIA-102.AABC-D/ TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 TIA-102.CABC-B;B-1
Message Trunking	Yes	Yes	TIA-102.AABD-B / TIA-102.AABC-D/ TIA-102.AABF-D / TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 TIA-102.CABC-B;B-1
Transmission Trunking	Yes	Yes	TIA-102.AABD-B / TIA-102.AABC-D / TIA-102.AABF-D TIA-102.AABA-B / TIA-102.AABB-B / TIA-102.BBAC;-1 TIA-102.CABC-B;B-1
Network Access Code	Yes	Yes	TIA-102.AABD / TIA-102.BBAC;-1
Extended hunt sequence	Yes	Yes	TIA-102.AABD / TIA-102.BBAC;-1

9.

PHYSICAL LAYER			
P25 Phase 1 FDMA			
P25 Phase 1 FDMA CAI	Yes	N/A	TSB102-B / TIA-102.BAAA-A/TIA-102.BAAC-C/TIA-102.BAAB-B
Enhanced Full Rate Vocoder	Yes	N/A	TIA-102.BABA / TSB-102.BABE / TIA-102.BABB / TIA-102.BABC / TSB-102.BABD /TIA-102.BAAB-B
Frequency Division Multiple Access (FDMA)	Yes	N/A	TSB102-B / TIA-102.BAAA-A /TIA-102.BAAB-B
9.6 kbps Gross Bit Rate	Yes	N/A	TSB102-B / TIA-102.BAAA-A/TIA-102.BAAB-B
C4FM and CQPSK Modulation	Yes	N/A	TSB102-B / TIA-102.BAAA-A / TIA-102.BAAC-C / TIA-102.CAAA-D / TIA-102.CAAB-D / TIA-102.BAAB-B
12.5 KHz Channel Bandwidth	Yes	Yes	TIA-102.CAAA-D / TIA-102.CAAB-D / TIA-102.BAAB-B
P25 Phase 2 TDMA			
P25 Phase 2 TDMA CAI	N/A	Yes	TIA-102.BBAB / TIA-102.BCAD / TIA-102.BCAE
Enhanced Half Rate Vocoder	N/A	Yes[9]	TIA-102.BABA-1 / TSB-102.BABE / TIA-102.BABB / TIA-102.BABC / TSB-102.BABD / TSB-102.BABF / TIA-102.BABG / TIA-102.BCAD / TIA-102.BCAE
Time Division Multiple Access (TDMA)	N/A	Yes	TIA-102.BBAB / TIA-102.CCAB-A / TIA-102.BCAD / TIA-102.BCAD
12 kbps Gross Bit Rate	N/A	Yes	TIA-102.BBAB / TIA-102.CCAB-A
HCPM and HDQPSK Modulation	N/A	Yes	TIA-102.BBAB / TIA-102.CCAB-A
12.5 KHz Channel Bandwidth	Yes	Yes	TIA-102.BBAB / TIA-102.CCAB-A
DATA SERVICES			
Packet Switched Confirmed Delivery Data	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
Packet Switched Unconfirmed Delivery Data	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
Packet Switched Data Network Access	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
TCP/UDP Port Number Assignments	Yes	N/A[10]	TIA-102.BAJD
Data Configuration - Radio to FNE	Yes	N/A[10]	TIA-102.BAEA-B / TIA-102.BAEB-B / TIA-102.BAEE-B
Packet Data Registration	Yes	N/A[10]	TIA-102.BAAD-A / TIA-102.BAEB-B
SU Registration	Yes	N/A[10]	TIA-102.BAAD-A / TIA-102.BAEB-B
SU Deregistration	Yes	N/A[10]	TIA-102.BAAD-A / TIA-102.BAEB-B
SU Location Tracking	Yes	N/A[10]	TIA-102.BAAD-A / TIA-102.BAEB-B
Mobile Data Interface (A)	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
Link Layer and Physical Layer Protocols	Yes	N/A[10]	TIA-102.BAEA-B / TIA-102.BAEB-B
SNDCP (Subnetwork Dependent Convergence Protocol)	Yes	N/A[10]	TIA-102.BAEB-B
Fixed Host Data Interface (Ed)	Yes	N/A[10]	TSB102-B / TIA-102.BAEB-B
Ethernet (802.3)	Yes	N/A[10]	TIA-102.BAEB-B
Internet Protocol Suite	Yes	N/A[10]	TIA-102.BAEB-B

Notes:

[1] Motorola Network Management provides the capability to provision the services available to both subscriber radios and talkgroups.

[2] The P25 KMF utilizes the Phase 1 FDMA data channel. There is no P25 Phase 2 TDMA data channel.

[3] Traffic Encryption is made up of two parts; Voice Traffic Encryption and Encrypted Integrated Data. Voice Traffic Encryption is defined by the P25 standard and Motorola offers. Today there is no published P25 standard for Encrypted Integrated Data however Motorola started offering this feature in the 7.8 release

[4] Today the Project 25 standard defines Chronological Integrity for OTAR, which Motorola offers

[5] Today the Project 25 standard defines Message Integrity for OTAR, which Motorola offers. The Project 25 standard will also support Message Integrity in the future Packet Data Security standard. Currently, Motorola supports Message Integrity for Encrypted Integrated Data.

[6] Zerorize and No Service procedures can be used in Key Compromise situation

[7] Motorola understands this feature to mean Emergency Priority will Pre-empt a Non-Emergency Call

[8] Motorola supports remote unit monitor for talkgroup calls however it will not support the U2U version of remote unit monitor.

[9] The APX subscriber uses the P25 enhanced vocoder. The XTS/XTL subscriber product portfolio uses the P25 baseline vocoder with added background noise reduction capability

[10] The P25 Phase 1 FDMA data channel is used for P25 Packet Data Delivery. There is no P25 Phase 2 TDMA data channel.

Overall Comment – This matrix includes Motorola ASTRO 25 System Release 7.13 System Infrastructure Capabilities. Motorola offers a diverse portfolio of P25 solutions to address a wide variety of customer needs. Customers should work with Motorola representatives to ensure that their specific requirements are addressed.

Offeror must describe in detail how the dispatch console system provides digital and analog (4-wire tone and E&M) interfaces to support dispatch console connectivity to the proposed trunked radio network and legacy radio resources via Telco lines, microwave, or optical fiber.

Offeror Response:

Comply

The proposed MCC7500E radio dispatch console system is designed with redundant links to the Primary and optional Backup cores. Control and audio IP packets traverse the private encrypted ASTRO25 IP network.

Each proposed MCC7500E radio dispatch console site architecture is capable of Conventional Channel Gateways (CCGW's) addition for seamless integration of ASTRO25 digital channels and legacy analog conventional channels into an ASTRO25 System.

	The CCGW's provide 4-wire Tone Remote Control (TRC) and E&M Controls of analog interfaces for analog channels and digital control via V.24, IP and ACIM for ASTRO25 conventional channels. Tone Remote Control (TRC) The Tone Remote Control feature allows a console sub-system to control various functions on an analog conventional channel by using tone sequences. The appropriate tone sequence activates when a dispatcher initiates a command which changes the State of a function on an analog conventional resource. The tone sequence may remain active for the duration the dispatcher "presses the button" which controls the channel function or it may be a brief tone sequence at the beginning and/or end of the "button press". The Tone Remote Control feature is capable of controlling multiple functions on an analog conventional channel. A single Tone Remote Control generator is used for each analog conventional channel controlled via the Tone Remote Control feature, regardless of the number of dispatch positions which are able to transmit on the channel. Configurable Tone Remote Control Sequences The Configurable Tone Remote Control Sequences feature allows the tone remote control (TRC) sequences used with analog conventional channels to be modified to suit unique customer needs. The following aspects of the TRC sequences can be modified: - What function the TRC sequence controls - Tone frequencies - Tone levels - Tone durations All portions of the TRC sequence (high level guard tone, function tone and low level guard tone) may be modified, but not all aspects (frequency, level, duration) of each portion are editable. Each analog conventional channel uses its own set of TRC sequences and these sets are modified independently of each other. Digital Control The Digital Control feature allows a console sub-system to control various functions on an ASTRO25 conventional channel by using digital commands. The appropriate digital command is sent when a dispatcher changes the State of a function on a conventional resource.
10.	Offeror must describe in detail a backup solution for dispatch consoles that maintains dispatch operations in the event of a dispatch hardware system failure or loss of the IP network connection.
	Offeror Response: Comply

	Each proposed MCC7500E radio dispatch console site is designed with redundant encrypted site links to the Primary and optional Backup cores. In the event of both links failures, the proposed Conventional Channel Controller will function as a local controller allowing each console operator at that site to be able to utilize local console channel resources. The proposed backup ASTRO25 APX 7500 consolettes interfaced via CCGW to a dispatch console site will further allow wireless dispatching of the proposed trunked talkgroup resources. Customer may additionally elect to utilize ASTRO25 APX portable radios for dispatching.
11.	Offeror must describe in detail how the back-up solution. provides 3 layers of redundancy (Example: IP console loss, RF Console loss, Portable subscriber): a. Maintains dispatch operation in the event of a connectivity failure between the console subsystem and the main system controllers. b. Allows Users to change channels/talkgroup at dispatch positions without affecting other dispatch positions. c. Is capable of operation in trunking, conventional modes and the legacy conventional systems. d. Is capable of surviving a total network loss while maintaining all primary talkpaths.
	Offeror Response: Comply Each proposed MCC7500E radio dispatch console site is designed with redundant encrypted site links to the Primary and optional Backup cores. In the event of both links failures, the proposed Conventional Channel Controller will function as a local controller allowing each console operator at that site to be able to utilize local console channel resources. The proposed backup ASTRO25 APX 7500 consolettes interfaced via CCGW to a dispatch console site will further allow wireless dispatching of the proposed trunked talkgroup resources. Customer may additionally elect to utilize ASTRO25 APX portable radios for dispatching. The proposed RF site and dispatch sites' GGM 8000 High Density Conventional Channel Gateways (CCGWs) support interface to the current/existing analog conventional channels. The supported analog conventional channels must be either 4-wire Tone Remote Control and/or E&M control. Each Dispatch position is equipped to affiliate with any and multiple valid talkgroups provisioned per console operator position. Each position's talkgroup selection is independent of other console positions.
12.	In the event of a PSAP evacuation, Offeror must describe in detail how an existing PSAP on the proposed solution could assume operation of evacuated PSAP.
	Offeror Response: Comply

	Since all proposed MCC7500E radio dispatch console sites utilize encrypted redundant site links to the Primary and optional Backup Cores, a “Backup Resource Folder” (on the MCC7500E GUI) could be provisioned at a certain proposed MCC7500E radio dispatch console site/operator positions to support an evacuated dispatch site. As an alternative, an MCC7500E radio dispatch console site is capable of supporting an optional Control Room Firewall and PRX 7000 Proxy to allow optional MCC 7100 dispatch console operator positions access and operation from outside of the ASTRO25 IP Network upon dispatch site evacuation.
13.	Offeror must describe in detail how they will obtain full duplex audio at the operator console such that the dispatch position can be transmitting on the selected channel while still hearing inbound audio from mobile units.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console positions provide a full duplex talk and listen to each of the ASTRO25 talkgroups it is responsible for controlling. This is achieved since the ASTRO25 trunking system utilizes a pair of frequencies for each RF channel (a unique transmit frequency and a unique receive frequency for a given channel). Inbound (radio user to infrastructure) and outbound (infrastructure to radio user) IP packets could traverse the ASTRO25 IP audio plane concurrently between source and destination.
14.	Offeror must describe in detail the limitations and operational characteristics of their proposed backup solution for dispatch consoles
	Offeror Response: Comply The notable limitation upon loss of both redundant site links to the Primary and optional Backup cores is the inability to support Network Management features such as provisioning, fault reporting and centralized IP recording of talkgroups.
15.	Offeror must describe in detail how the proposed solution will accomplish softpatching multiple talkgroups on demand.
	Offeror Response: Comply The patch is accessed via a set of dedicated folders on the Elite Dispatch GUI. There can be up to sixteen (16) patch folders. Clicking on one of the patch folder tabs brings it into view. The patch group is then opened by click in on the left-most button on the folder. Once the patch group is open, the patch group is editable and members may be added or removed from the patch group by clicking on the desired radio resources.

	Note that patch groups are active whenever there are members assigned to them. This is true even if the patch group isn't open. The members of the patch group are shown on the patch folder along with the status of each member (patched or pending). The resources in the patch also show an indication that they are in a patch group. A patch transmit button is provided on the patch folder to allow the dispatcher to easily transmit on all members of the patch group with a single button press. The size of the folders can be changed to 1, 2 or 3 times their normal size if desired. This is done on a per-dispatch position basis. The color of each folder and the text on each folder tab can be changed on a per-dispatch position, per folder basis to meet the needs of individual dispatchers. Some patch groups contain members which were pre-assigned by the Elite Admin application. These patch groups become active as soon as possible after the dispatch position begins using the configuration file which contains the pre-assigned patch groups. The dispatcher can add/remove members from the pre-assigned patch group, but these additions/removals are lost when the dispatcher either re-loads the configuration file or changes to a different configuration file. Pre-assigned patch groups can also be configured via the Elite Admin application to be "locked". When configured this way, the dispatcher cannot edit the patch group.
16.	Offeror must describe in detail the implications/limitations on dispatch system capacity.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console system is expandable with additional MCC7500E User Licenses to the cores, plus additional hardware. The maximum capacities per Zone/System and per Site are listed below. **Proposed Dispatch Console Site Capacities** Dispatch Consoles per Zone/System - Up to 500 dispatch consoles plus 63 archiving interface servers per Zone in a Multi-Zone Capable System (consoles deployed outside RNI count against overall dispatch consoles allowed). - Up to 2000 dispatch consoles per Multi-Zone Capable System (consoles deployed outside RNI count against overall dispatch consoles allowed). Dispatch Console Sites per Zone/System Up to a combined total of 100 MCC7500E/7100/7500E Dispatch Console Sites per Zone in a Multi-Zone Capable System. - Up to a combined total of 500 MCC7500E/7100/7500E Dispatch Console Sites per Multi-Zone Capable System.

	- Up to 4 MCC7500E/7100/7500E Dispatch Console Sites per Zone in a Multi-Zone Capable System may be located at the zone core (these may contain only CCGW's, if desired). <u>Devices per Dispatch Console Site</u> - Up to 50 Dispatch Consoles (consoles deployed outside RNI count against overall dispatch consoles allowed at a console site). - Up to 4 AISs. - The sum of Dispatch Consoles inside the RNI and outside the RNI and AISs per Dispatch Console site must be less than or equal to 50. - Up to 4 Logging Recorders. - Up to 4 replay stations. - Up to 2 MKM 7000 Console Alias Managers (standalone). - One MKM 7000 Console Alias Manager (cohabitated) per MCC7500E. - Up to 1 Control Room Firewall. - Up to 5 Console Proxies. - Up to 10 MCC 7100 dispatch consoles per Console Proxy. <u>Auxiliary Input & Output Capacities</u> - Up to 16 Control Relay Outputs per MOSCAD RTU. - Up to 48 Inputs per MOSCAD RTU. - Up to 100 Dispatch Consoles may be supported by any MOSCAD RTU. - Up to 100 MOSCAD RTUs may be accessed by any MCC7500E Dispatch Console. - Up to 400 Aux I/Os simultaneously assigned to an MCC7500E Dispatch Console (does not include channel-related inputs and outputs such as Supervisor Takeover through Relay). - Up to 8000 Aux I/Os per zone. - Up to 5 MOSCAD RTUs per Console Site.
17.	Offeror must describe in detail how the solution integrates all resources between the counties and State.
	<u>Offeror Response:</u> Comply Since all the proposed MCC7500E radio dispatch console sites (Counties and State) are linked to the Primary and optional Backup cores, all the control, audio and management IP packets traverse the private ASTRO25 IP network. The provisioned MCC7500E and upgraded existing MCC7500E VPM radio dispatch console positions will be able to utilize any of the available Counties and State resources (ASTRO25 Talkgroups).
18.	Offeror must describe in detail how the proposed solution integrates all RF resources in order to view unit ID on the system during an emergency and to achieve console-to-console intercom PSAP and across network to other PSAP's. At minimum, the proposed solution shall comply with the latest APCO P25 suite of standards.
	<u>Offeror Response:</u> Comply

	Since all the proposed MCC7500E and upgraded existing MCC7500E VPM radio dispatch console sites (Counties and State) are linked to the Primary and optional Backup cores, all the control, audio and management IP packets traverse the private ASTRO25 IP network. The Display Radio's Unit ID feature allows a dispatch position to display the unit ID associated with an inbound trunked radio call. Unit IDs are unique numbers assigned to each radio and dispatch position in Motorola Solutions trunked radio systems. A radio can send its unit ID when it makes a call. The dispatcher interface can be configured to display the unit ID of the source radio on inbound calls. This configuration is done at the local administration application. The unit ID can appear in a Received Call Stack, the Three Line Display, the Resource Header and the Activity Log window. Note that if an alias for the unit ID is available, the dispatch position will display the alias instead of the unit ID. The unit ID of a parallel dispatch position is also displayed on the dispatch position when the parallel dispatch position transmits on radio resources which are common to both positions or when the parallel dispatch position places a call to the dispatch position. An Emergency Alarm is sent by radio users to alert dispatchers of a critical situation needing immediate attention. The audible and visual emergency alarm indications, plus Unit ID and Alias are displayed at dispatch positions. The Console-to-Console Intercom is achieved via Individual Call feature allows one MCC7500E dispatcher to speak privately with another MCC7500E dispatcher through the dispatch positions. This feature is based on the Trunking Individual Call (Private Call) feature that allows a dispatcher and a radio user to engage in a private conversation. The only difference is that it does not consume any RF resources in the system. The Individual Call between the dispatch positions is routed across the radio system's ASTRO25 IP network. Inbound trunked audio is Motorola Solutions is compliant with the latest APCO P25 suite of standards.
19.	Offeror must describe in detail the Conventional Gateway Interfaces at local communication site for the interface to conventional equipment (legacy and/or new). *Offeror Response:* Comply Each proposed MCC7500E radio dispatch console site is equipped with Enhanced Conventional Channel Gateways (ECCGW's) for seamless integration of new ASTRO25 backup consolettes and legacy analog conventional channels into the ASTRO25 System. The ECCGW's provide 4-wire Tone Remote Control (TRC) and E&M Controls of analog interfaces for analog channels and digital control via V.24, IP and ACIM for ASTRO25 conventional channels.

The proposed ECCGW's are listed below per radio dispatch console subsite.

Stutsman County Communications Center
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).

Barnes County Dispatch
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Richland County Communications/911
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).

Traill/Steele 911
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).

Grand Forks Public Safety Answering Point
- Four (4) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 32 analog conventional channels (4-wire Tone Remote Control).

Walsh County Communications
- Two (2) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).

Pembina County 911
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Cavalier County 911
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Lake Region 911 Center
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).

Pierce County 911
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Rolette County 911

- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Bottineau/Renville 911

- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Minot Central Dispatch

- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).

Mountrail County Sheriff's Office

- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Williston/Williams County 911

- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).

Stark/Dickinson Dispatch

- Two (2) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

MHA Communications Center

- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Mercer/Oliver 911

- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

McLean County 911

- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

Central Dakota Communications Center

- Five (5) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 40 analog conventional channels (4-wire Tone Remote Control).

State Radio

Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 18 analog conventional channels (4-wire Tone Remote Control) in order to facilitate transition. Additional RF Site CCGW's will be needed to fully integrate existing radio system.

Backup State Radio

	Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 18 analog conventional channels (4-wire Tone Remote Control) in order to facilitate transition. Additional RF Site CCGW's will be needed to fully integrate existing radio system.
20.	Offeror must describe in detail how the proposed dispatch console solution. can be incorporated and interoperable with the FirstNet system.
	Offeror Response: Comply
	Operator Position Equipment
21.	Offeror must acknowledge that all equipment supplied for use by the dispatch operators will be capable of withstanding the rigorous 24 hours a day, 7 days a week environment of dispatch centers of equal or greater, size, call load and frequency load activity.
	Offeror Response: Comply
22.	Offeror must acknowledge that all equipment must be designed for installation on modular workstation furniture and provide operators with an ergonomic design permitting ease of operation over extended periods, typically 8-12 hours for each operator.
	Offeror Response: Comply
23.	Offeror must acknowledge that all console monitors must be a minimum of 23 inches, LCD/LED technology and with resolution. of 1920 x 1080 or greater.
	Offeror Response: Comply
24.	Offeror must acknowledge that they have included an optional console monitor that is touch screen equipped, a minimum of 23 inches, LCD/LED technology and with resolution. of 1920 x 1080 or greater.
	Offeror Response: Comply Optional sixty-five (65) 24" touch screen monitors are proposed.
25.	Offeror must describe in detail how the proposed solution's consoles display dispatch functions.
	Offeror Response: Comply Elite Dispatch Graphical User Interface The Motorola Solutions MCC7500E dispatch position uses the Elite Dispatch graphical user interface (GUI) for displaying information to and accepting commands

from the dispatcher. The Elite Dispatch GUI is efficient, easy to use and intuitive, having been refined and proven through years of use in public safety dispatch centers around the world.

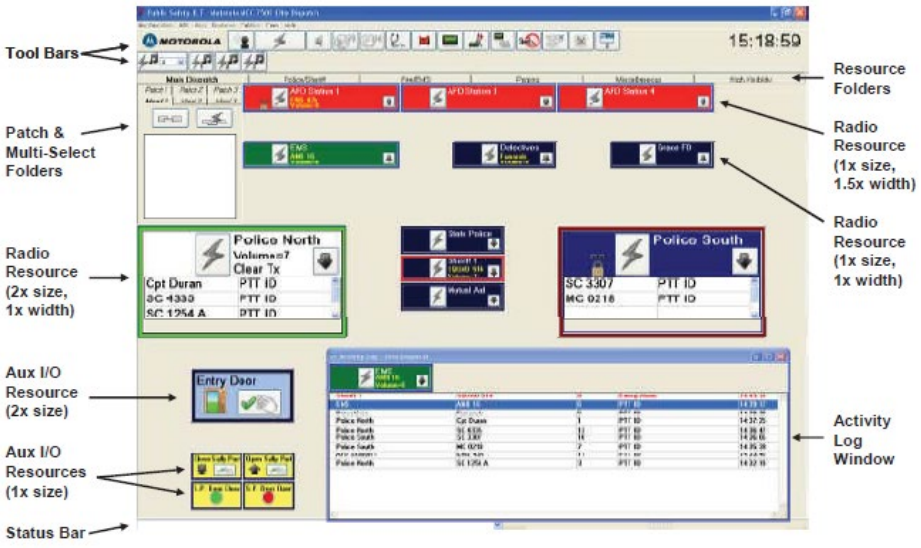


Figure 8: Example of Elite Dispatch GUI

The Elite Dispatch GUI is based on Microsoft Windows GUI programming standards and contains many controls, displays and features which are familiar to anyone who has used Windows-based applications. These features are described in greater detail in the following sections.

Pull Down Menus

The Elite Dispatch GUI provides the following pull down menus on a menu bar across the top of the dispatch window:

- Configuration - Provides access to the configuration files used by the Elite Dispatch GUI. Also allows the dispatch application to be exited.
- Edit - Allows various aspects of how audio, resources and features are presented to the user on the Elite Dispatch GUI to be edited. Changes made using this menu are not permanent and are lost when the dispatch application is exited. Also provides access to an on-screen keyboard for use when a hardware keyboard is not available.
- View - Allows the dispatcher to control whether or not the Activity Log, Auxiliary I/O and Inbound Event Display Windows are shown.
- Features - Provides access to various features of the dispatch position. Note that some of these features may also be available via buttons on the GUI if so configured. Also allows the System Status Window to be viewed, Tool Tips to be hidden and/or the Status Line to be cleared.
- Folders - Allows the dispatcher to switch between folders, add folders and delete folders. Changes made using this menu are not permanent and are lost when the dispatch application is exited.
- Page - Provides access to various features of the dispatch position's integrated paging encoder.

- Help - Provides access to detailed on-line help for using the Elite Dispatch GUI and information about the Motorola Solutions MCC7500E application software.

The user may customize which menus are displayed and what they contain via the Elite Admin application.

Tool Bars

Up to two tool bars may be present across the top of the dispatch window and may be used to provide quick access to frequently used features. The following are examples of the items which may be placed in the tool bars:

- Clock
- General Transmit Button
- Monitor Button
- All Mute Button

There are many other items which may be placed in the tool bars. The Elite Admin application is used to define how many tool bars are displayed and what they contain. Custom icons can be used on the buttons on the tool bars.

The sizes of the tool bars can be configured to be 1, 2 or 3 times their normal size. One tool bar's size can be configured independently of the other tool bar. This is configured on a per-dispatch position basis to allow the toolbars to meet the needs of individual dispatchers.

Status Bar

A status bar is provided across the bottom of the dispatch window for viewing the status of the dispatch position as well as various error messages. The most current status or error message is displayed in the status bar until cleared by the dispatcher. The dispatcher may scroll through the last 10 statuses and error messages to view them and may clear them by using the Features menu on the menu bar.

The size of the status bar can be configured to be 1, 2 or 3 times its normal size. This is configured on a per-dispatch position basis to allow the status bar to meet the needs of individual dispatchers.

Resource Folders

The Elite Dispatch GUI provides up to twenty (20) resource folders for organizing the various resources (radio resources, auxiliary input/output resources, etc.) which are assigned to the dispatch position. These folders may be given descriptive names to simplify the organization of the resources. The size of the folder tabs (not the entire folder, just the tab) may also be changed to 1, 2 or 3 times their normal size.

The resources on a folder are displayed when the dispatcher clicks on the folder tab. Resources on folders which are hidden behind the one being displayed continue to operate in a normal manner.

Radio resource audio on a hidden folder appears in the appropriate speakers/headsets along with a visual call indication on the folder tab. If an

emergency alarm or call is received on a radio resource which is located on a hidden folder, a visual emergency indication is displayed on the folder tab along with the normal emergency audible indication. If both emergencies and calls are being received on resources on a hidden folder, both icons will be displayed on the folder tab.

A resource may be placed on more than one folder at the same time. This allows customers to create folders for special situations without having to move resources back and forth between folders. A resource may be displayed in different ways (compressed or expanded) or in different widths or sizes on different folders.

The Elite Admin application is used to configure how many folders appear on the Elite Dispatch GUI and which resources appear on each folder. It is also used to put descriptive names on the folder tabs.

During dispatch operations the dispatcher may, if so configured by the Elite Admin application, be able to add, remove or move resources on the folders. If this is done, these changes are not saved if the user logs out of or changes configuration files for the dispatch application.

The Elite Dispatch GUI is designed to run in a minimum resolution. of 1024 x 768. It may not be run in a lower resolution because not all of the GUI would be visible on the screen. It may, however, be run in a higher resolution in order to fit even more information on the screen. With higher resolutions, the items on the screen appear smaller, so a larger monitor may be required.

Up to 36 normal sized compressed radio resources may be viewed on one folder when the program is run in the standard 1024 x 768 resolution and there are no patch or multi-select folders. If patch and multi-select folders are used and are set to the minimum height, then 31 normal sized compressed resources may be viewed. To figure the number of auxiliary input/output resources that could also be viewed, use the rule of thumb that 2 normal sized auxiliary resources can fit in the same space as 1 normal sized radio resource. In other words, instead of 10 radio resources, 20 auxiliary resources could fit in the same space. If the program is run in higher resolutions, there is room for even more radio and auxiliary resources per folder.

Resource Folder Colors

The resource folder color can be configured for each folder independently. This is configured on a per-dispatch position, per-folder basis to allow the resource folders to be configured to meet the needs of individual dispatchers.

The folder background color (along with the background color of the patch and multiselect folders and the toolbar area) is controlled by settings in the Windows operating system. This allows the background color to be changed if, for example, a dispatch position is being used in a darkened room and the default light background is too bright for comfort. Since it is done in the operating system, different dispatch positions can have different settings.

Radio Resources

Voice communication paths in the radio system are represented as radio resources on the Elite Dispatch GUI. Radio resources are also referred to as “tiles” on the Elite Dispatch GUI. These radio resources are used by the dispatcher to communicate on and control the radio system.

The following radio resources are supported:

- Trunked Talkgroups.
- Trunked Announcement Groups.
- Trunked Agency Groups.
- Trunked Private Calls.
- Analog Conventional Channels.
- ASTRO25 Conventional Channels.
- MDC 1200 Conventional Channels.
- ACIM Link Based Consolette Channels.

Radio resource tiles are highly configurable and can be customized to meet customer needs. The following aspects of a radio resource tile can be configured.

- Form factor (compressed, larger compressed or expanded).
- Width and Height.
- Magnification (1x, 2x or 3x).
- Background color (and gradient).
- Border color.
- Text color.
- Which controls and indicators are displayed on the tile.
- Location of controls and indicators on the tile.
- Which icons are displayed on the controls and indicators.
- What text-based information, if any, is displayed (including text from third-party applications using the console’s API)

Indicators and Controls

A radio resource contains indicators and controls which allow the dispatcher to monitor and control various aspects of the radio channel. Examples of the indicators and controls which may appear on a radio resource include:

- Instant Transmit Button
- Transmit Active/Transmit Busy Indications
- Patch Active/Patch Busy Indications
- Received Call Indication
- Received Call Stack
- Individual Volume Control

The types of indicators and controls which appear on the radio resource depend on the type of radio channel it represents and how it has been configured in the Elite Admin application. The radio resource may be configured to always show the indicators and controls or to allow the dispatcher to hide them when not in use to save space on the screen.

The icons used on the indicators and controls can be configured in the Elite Admin application to suit the customer's needs.

The background color of the controls can be changed and custom icons can be used on indicators and controls.

Compressed, Larger Compressed and Expanded Resources

Figure 9 below shows a radio resource which allows the dispatcher to hide the indicators and controls. This is also called a "compressed" resource. Notice the small arrow button which allows the resource to be opened and closed to show the controls and indicators.

Figure 9: Depiction of Compressed Resource

Figure 10 below shows a radio resource which always shows some of the indicators and controls, but allows the dispatch position to hide some of the others. This is also called a "larger compressed" resource.

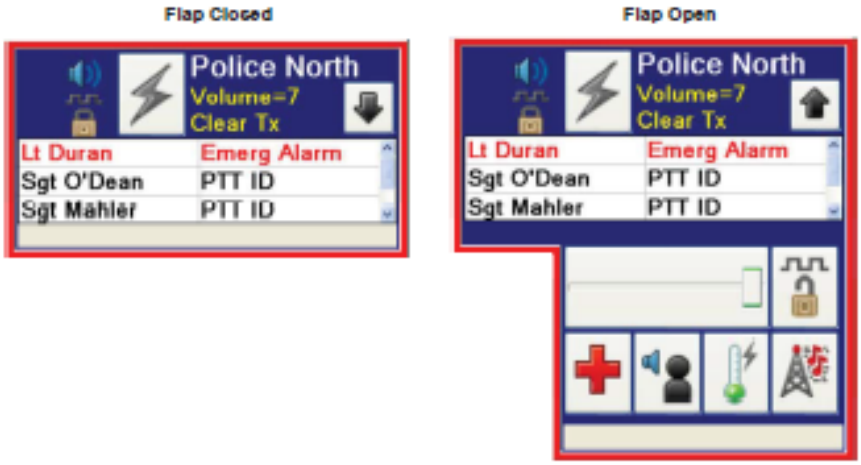


Figure 10: Depiction of Larger Compressed Resource

Figure 11 below shows a radio resource which always shows the indicators and controls. This is also called an "expanded" resource. Notice there is no arrow button on the resource.

Figure 11: Depiction of Expanded Resource

Full parallel status for radio resources is reflected across all the dispatch positions which have these radio resources assigned on them regardless of how they are displayed (compressed, larger compressed or expanded). That is, any activity or change on a radio resource appears on all dispatch positions which have that resource assigned on them.

Received Call Stack

The received call stack provides the dispatcher with a visual record of the most recent inbound calls on radio resources. This allows the dispatcher to keep track of calls during busy traffic periods.

Outbound calls on radio resources from dispatch positions (both the dispatch position containing the received call stack or parallel dispatch positions) are not shown in the received call stack.

The calls are displayed in list format on a radio resource with the most recent calls at the top of the list. Unacknowledged emergency alarms are kept at the top of the stack until they are acknowledged. Once they are acknowledged, they will scroll down the stack as new entries come in.

The number of calls displayed in the list is configurable, as is the type of information displayed in the right hand column. The types of information that can be displayed in the right hand column are site ID, zone ID, type of call and time. In addition to the previous types of information, the right hand column can be configured to display information about group text messages sent by parallel dispatchers. The left hand column always displays the unit ID or unit ID alias. If an alias is available for a piece of information, it is displayed; otherwise the raw information is displayed.

The received call stack provides a quick way for a dispatcher to respond to calls in the stack. A right mouse click on an entry in the stack will display a submenu of actions that can be taken, such as Send Call Alert or Acknowledge Emergency Alarm. A left mouse click on the right hand column of the stack will toggle the information displayed between the various types of information the stack is configured to display (see previous paragraph). Hovering the cursor over an entry in the stack will pop up a small window with a summary of the information for that entry.

The received call stack is configurable on a per-resource per-dispatch position basis, so a resource on one dispatch position can have it while the same resource on another dispatch position does not have it.

The received call stack has a fixed memory of 25 calls, but the number of calls which are displayed is configurable via the Elite Admin application. The number displayed may be set anywhere from 3 to 24 calls in increments of 3. Regardless of how many calls are actually displayed, the dispatcher can always scroll through all 25 calls in the stack's memory.

Stack display size is configured on a per-resource per-dispatch position basis. That is, each resource on a dispatch position may have different sized stack displays and the same resource on different dispatch positions may have different sized stack displays.

The dispatcher can delete individual calls from the received call stack. All of the calls listed in a received call stack can also be deleted with a single action.

Three Line Display

The three-line display can be placed on a radio resource to provide three lines in which information can be displayed. These lines are in addition to the two lines that come standard on the resource tile. Multiple instances of the three-line display can be placed on a resource tile to provide even more lines if needed. They may be placed in different locations on the resource tile to meet the needs of different customers.

Each line can be individually configured to display one of the following.

- Blank
- Channel Marker
- Priority Select
- Site
- Status/Message
- Transmit Mode
- Unit ID
- Unit ID Alias
- Volume
- Zone
- Group Text Message (sent by a parallel dispatcher)
- Group Text Alert Level (sent by a parallel dispatcher)
- Group Text Radio Display (sent by a parallel dispatcher)
- Customer-defined fixed text
- Dynamic text coming from a third-party application via the console's API

Figure 12 below shows an example of a three line display.

Figure 12: Depiction of a Three Line Display

Auxiliary Input and Output Resources

Control relays and input buffers are represented as auxiliary input and output resources on the Elite Dispatch GUI. These auxiliary input and output resources are used by the dispatcher to monitor the State of input buffers and monitor/control the State of control relays.

The auxiliary input and output resources are represented by various graphical icons which change their appearance based on the State of the resource. The particular icon which is associated with an input or output is configured by the Elite Admin application. Custom icons can be used on auxiliary input and output resources. The background color of auxiliary input and output resources can also be configured in the Elite Admin application.

Figure 13 below shows examples of some of the icons and background colors which may be used.

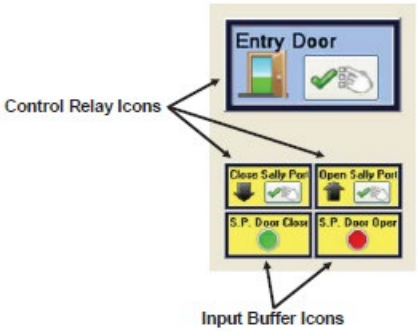


Figure 13: Examples of Icons and Background Colors

Auxiliary input and output resources may be grouped together so that they can be moved or assigned/de-assigned as a group. This is useful for situations where the auxiliary input output resources are being used to interface to comparators or other devices which require multiple control relays or input buffers.

Auxiliary output resources may be protected by a “safety switch” to help prevent unintended activation or deactivation. In order to activate or deactivate an auxiliary output that is protected by a safety switch, the dispatcher must first press the safety switch and then press the auxiliary output.

Latched auxiliary input resources may also be protected by a “safety switch” to help prevent unintended clearing of an active input. In order to clear a latched auxiliary input that is protected by a safety switch, the dispatcher must first press the safety switch and then clear the auxiliary input.

Full parallel status for auxiliary inputs and outputs is reflected across all the dispatch positions which have the auxiliary inputs and output resources assigned on them. That is, if an auxiliary input or output changes State, the change of State is reflected on all the other dispatch positions which have that auxiliary input or output assigned on them.

Radio Resource Associated Auxiliary Inputs and Outputs

Sometimes auxiliary inputs and outputs are used to perform functions associated with particular radio resources. For example, a relay may be used to switch between main and redundant base stations or an input may be used to display the status of some feature on a base station.

To make the dispatcher’s job easier and more intuitive, these auxiliary input and output resources may be placed on the radio resources they are associated with. When this is done, the auxiliary input or output resources are automatically assigned and deassigned as the radio resource is assigned and deassigned. If the radio resource is moved around the screen, the auxiliary input or output resources automatically move with it.

The association of an auxiliary input or output resource to a radio resource is done as part of the GUI configuration process. This provides a great deal of flexibility. For example, an auxiliary input or output resource can be associated with a radio resource on one dispatch position, associated with a different radio resource on a second dispatch position and appear as a traditional stand-alone auxiliary input or output resource on a third dispatch position.

Multiple auxiliary inputs or output resources can be associated with a radio resource.

An auxiliary input or output resource may be placed on multiple radio resources on a dispatch position. It may also appear both on a radio resource and as a traditional stand-alone auxiliary input or output resource. No matter where it appears, an auxiliary input or output resource that appears multiple times on a dispatch position will show the proper status everywhere it appears.

Auxiliary Input/Output Window

Auxiliary input and output resources may also be placed on a separate auxiliary input and output window which is capable of being hidden when not needed. A button on one of the tool bars is used to open and hide the window. This allows the dispatcher

to easily and quickly access auxiliary input and output resources which are infrequently used without permanently consuming space on the screen.

The size of the Auxiliary Input/Output Window can be configured to be 1, 2 or 3 times its normal size. This can be done on a per-dispatch position basis to meet the needs of individual dispatchers.

Patch and Multi-Select Folders

The patch and multi-select features are accessed via a set of dedicated folders on the Elite Dispatch GUI. These folders are smaller than the resource folders and may be located on the screen to suit the dispatcher's preferences. The placement is done in the Elite Admin application. There can be up to sixteen patch folders and sixteen multi-select folders.

Note that patch groups are active whenever there are members assigned to them. This is true even if the patch group isn't open.

The members of the patch group are shown on the patch folder along with the status of each member (patched or pending). The resources in the patch also show an indication that they are in a patch group.

Some patch groups contain members which were pre-assigned by the Elite Admin application. These patch groups become active as soon as possible after the dispatch position begins using the configuration file which contains the pre-assigned patch groups. The dispatcher can add/remove members from the pre-assigned patch group, but these additions/removals are lost when the dispatcher either re-loads the configuration file or changes to a different configuration file. Pre-assigned patch groups can also be configured via the Elite Admin application to be "locked". When configured this way, the dispatcher cannot edit the patch group.

A patch transmit button is provided on the patch folder to allow the dispatcher to easily transmit on all members of the patch group with a single button press.

The size of the folders can be changed to 1, 2 or 3 times their normal size if desired. This is done on a per-dispatch position basis.

The color of each folder and the text on each folder tab can be changed on a per-dispatch position, per folder basis to meet the needs of individual dispatchers.

Figure 14 below shows an example of a patch folder containing some radio resources.

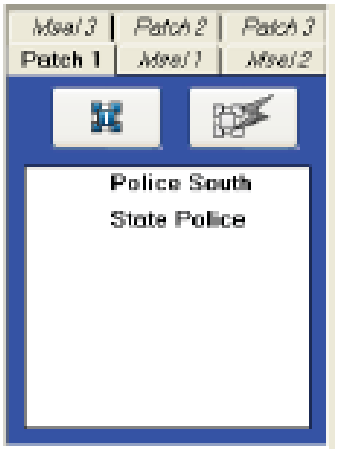


Figure 14: Example of Patch Folder Containing Radio Resources

Multi-Select Folder

Clicking on one of the multi-select folder tabs brings it into view. The multi-select group is then opened by clicking on the left-most button on the folder. Once the multi-select group is open, the multi-select becomes active and members can be added or removed from the group by clicking on the desired radio resources. Closing the multi-select folder (by clicking on the left-most button a second time) deactivates the multi-select group.

Note that this operation is different than that of the patch folders. A dispatch position can only have one multi-select group active at a time, but it can have multiple patch groups simultaneously active.

The members of the multi-select group are shown on the multi-select folder.

Some multi-select groups contain members which were pre-assigned by the Elite Admin application. The dispatcher can add/remove members from the pre-assigned multi-select group, but these additions/removals are lost when the dispatcher either re-loads the configuration file or changes to a different configuration file. Pre-assigned multi-select groups can also be configured via the Elite Admin application to be “locked”. When configured this way, the dispatcher cannot edit the multi-select group.

The size of the folders can be changed to 1, 2 or 3 times their normal size if desired. This is done on a per-dispatch position basis.

The color of each folder and the text on each folder tab can be changed on a per-dispatch position, per folder basis to meet the needs of individual dispatchers.

Figure 15 below shows an example of a multi-select folder containing some radio resources.

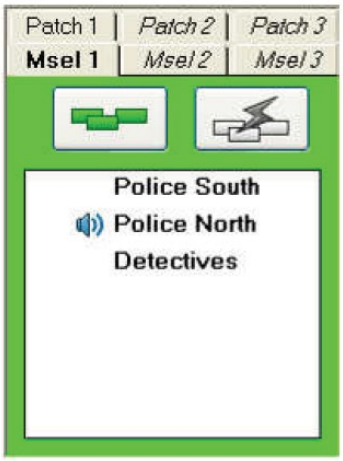


Figure 15: Example of a Multi-Select Folder Containing Radio Resources

Activity Log Window

The activity log window can be used by the dispatcher as a point of reference for all calls coming into the dispatch position. The activity log shows call information associated with all incoming radio calls such as the name of the radio resource and the time of the call. Incoming calls from all radio resources assigned to the dispatch position are displayed in the activity log.

The activity log can be configured to also display dispatcher initiated calls by other MCC7500E and MCC 7100 dispatchers.

Figure 16 below shows an example of an activity log window.

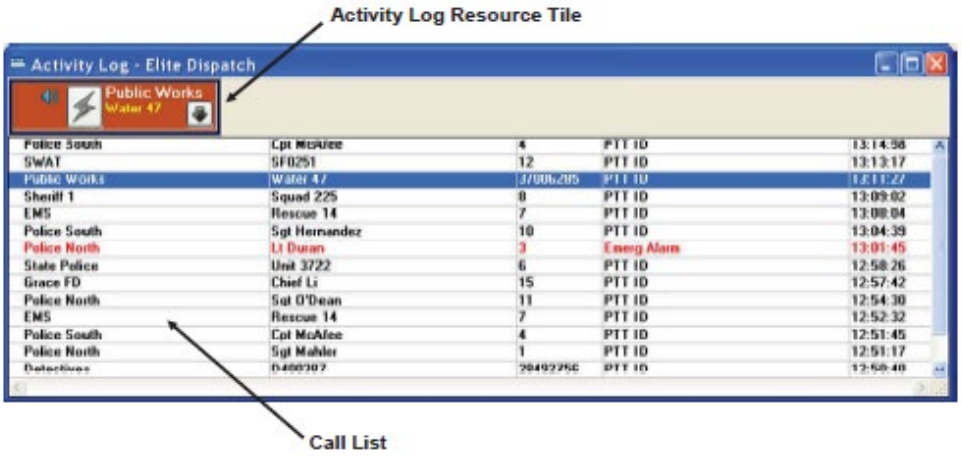


Figure 16: Depiction of an Activity Log Window

Up to 1000 calls can be held in the activity log. The most recent call is on the top of the list and the oldest at the bottom. Once the list is filled, the oldest calls are discarded as new calls come in. The dispatcher may resize the activity log to show various numbers of calls. For example, when there is light activity, the dispatcher may choose to only show a few calls. During busy hours, the dispatcher may view

more calls by simply dragging the lower right hand corner of the activity log (making it longer) to see additional calls.

Dispatchers may respond to incoming calls simply by clicking on a call in the list. When this is done, the entry appears highlighted and the name of the radio resource appears on the activity log resource tile at the top of the activity log. The dispatcher can then press the instant transmit button on the activity log resource tile to communicate with that radio resource.

The information displayed by the activity log can be customized to suit the dispatcher's needs. The activity log can be configured to show combinations of Resource Name, Unit ID or Alias, Status Number or Alias, Receiving Site ID, Receiving Zone ID, Time, Group Text Message, Group Text Alert Level and Group Text Radio Display. (Note that the group text information is for group text messages sent by parallel dispatchers, not messages from radios.) This configuration is done via the Elite Admin application and, if so configured, via the dispatcher interface.

There are two levels of control over whether or not the activity log is displayed on a dispatch position. The first level is via the Elite Admin application which controls whether or not a dispatch position has the capability of displaying the activity log. The second level is via the dispatcher interface where the dispatcher can choose to view or not view the activity log. Note that if the dispatch position has not been given the capability of displaying the activity log, then the dispatcher cannot see the activity log at all.

The number of lines that are initially displayed by the activity log is configurable via the Elite Admin application or the dispatcher interface. The number of lines that are displayed may also be changed in real time by changing the size of the activity log window using standard Microsoft Windows resizing techniques. The user can scroll through all the entries in the activity log even if they can’t all be displayed at once.

The information listed in the activity log can be stored in a text file on the dispatch position's hard disk. The size of the text file can be specified to be between 1 MByte and 20 MBytes. When the file fills up, new data overwrites old data beginning with the oldest data. All data associated with a call is logged to the file, regardless of what portion of the data is actually shown in the activity log window. If a resource has been configured to not display visual emergency indications, the emergency information will not be included in the file, either.

System Status Window

The system status window provides information on the status of various aspects of a dispatch position. The information displayed in the window includes the following:

- Status of the peripheral device ports on the dispatch position’s VPM.
- Status of the dispatch position’s connection to the radio system’s network manager and when the configuration database was last synchronized.
- Status of the dispatch position’s connection to the radio system’s controller.
- Information and status about the link ops at the console site.
- Time and date the dispatch position was last started up.

- Status of the dispatch position's connection to a local alias manager, if so configured.
- Time and date the dispatch position last synchronized its copy of the phone book.

Most of the fields in the system status window are self-explanatory, but the Console Site Link section requires some explanation. The Console Site Link section shows information about the "link ops" at the dispatch position's console site. Here is an explanation of the information provided in this section.

Controller

- The Primary controller refers to the active controller at the radio system's core. Only information related to the active controller is displayed. Information about any inactive controllers at the core is not displayed.
- The Secondary controller refers to the local conventional site controller (if present) at the console site.

Active

- This column shows the last octet of the IP address of the dispatch position that is acting as the active link op.

Inactive

- This column shows the last octet of the IP address of the dispatch position that is acting as the standby link op.

Status

- This column shows the link op status of the dispatch position.

"Active" means the dispatch position is the active link op for that controller.
"Inactive" means the dispatch position is the inactive link op for that controller.
"Passive" means the dispatch position is not a link op.
"Unknown" means the dispatch position either doesn't have any connections to any controllers, doesn't have any radio resources assigned on it or a conventional site controller is not configured for that console site or c-sub.

Figure 17 below shows is an example of a System Status Window.

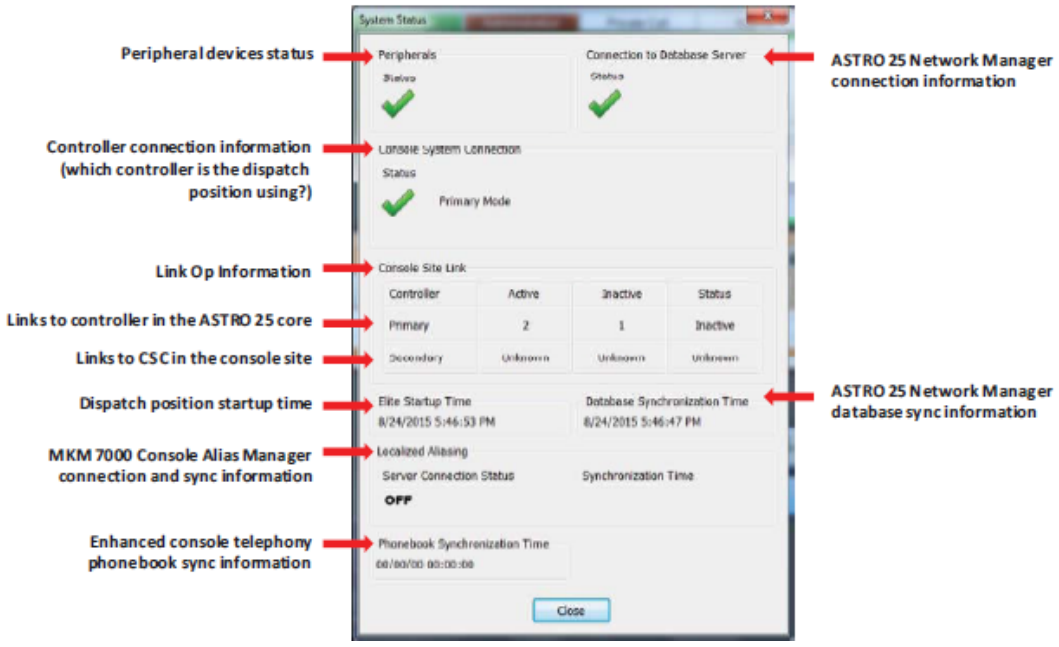


Figure 17: Depiction of a System Status Window

Help

The dispatch position is designed to allow the dispatcher to quickly access information on how to use its features. This help is available right on the dispatch position graphical user interface.

There are three types of help available to the dispatcher, On Line, Micro and Tool Tips.

On Line Help

On Line Help provides detailed information on how to use the dispatch position. The user accesses On Line Help via the Help menu on the menu bar. The user can search for topics or key words to quickly find the desired information or the user can use a table of contents to find the information. The information is displayed in a pop-up window on the dispatch user interface.

On Line Help allows new dispatchers to shorten their learning curve and more experienced dispatchers to quickly remember how to operate seldom-used features.

Micro Help

Micro Help provides information about the State of controls or indicators in a resource tile. When the cursor is placed over a control or indicator on a resource tile, a description of the control or indicator's State is given across the bottom of the resource tile.

Figure 18 below shows micro help text on a radio resource. The text across the bottom of the resource describes the icon the cursor is pointing to.

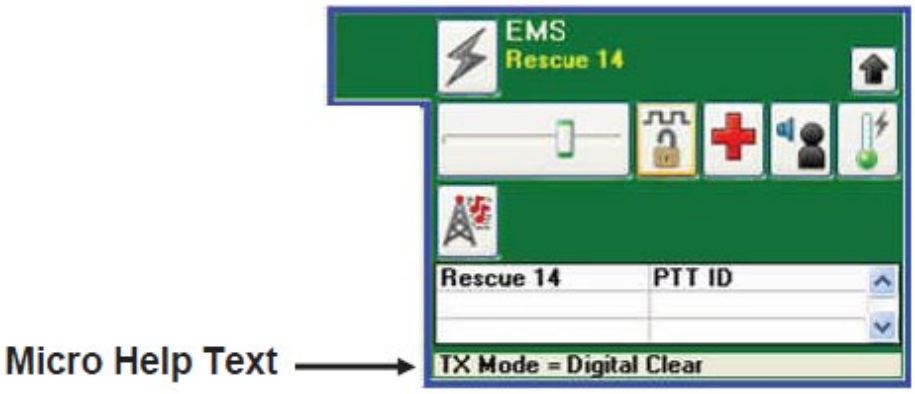


Figure 18: Depiction of Micro Help Text on a Radio Resource

The text displayed by the Micro Help feature may be edited via the Elite Admin application.

Micro Help allows a dispatcher to view the status of a control or indicator textually instead of graphically.

Tool Tips Help

Tool Tips Help provides information about tool bar buttons and menu bar menus to the dispatcher. When the cursor is placed over a tool bar button, the button's name appears in a small pop-up window next to the cursor and a short explanation of the button appears in the status bar at the bottom of the dispatch user interface window. When the cursor is moved across a menu item in a menu, a description of the menu item appears in the status bar at the bottom of the dispatch user interface window.

The text displayed by the Tool Tips feature may be edited via the Elite Admin application.

Tool Tips allow a dispatcher to quickly see a short explanation of the button or menu item of interest.

	Offeror must describe in detail how the proposed solution's consoles display dispatch functions can be customized per user.
26.	*Offeror Response:* Comply The Elite Admin application is used to define exactly which resources are available to the dispatcher and how they are presented to the dispatcher. The user may customize which menus are displayed and what they contain via the Elite Admin application. Elite Admin Application The manner in which resources and audio are presented to the dispatcher on the MCC7500E dispatch position is managed by the Elite Admin application. The look

and feel of the Elite Dispatch GUI as well as how received audio is routed on the dispatch position can be optimized to meet customers' needs.

The following sections describe how configurations for the Elite Dispatch GUI are managed and what can be configured on the dispatch position via the Elite Admin application.

Managing Dispatch Screens

When it first starts running, the Elite Dispatch GUI application reads a configuration file which tells it what should appear on the GUI and how received audio should be routed on the dispatch position. These configuration files are created by properly trained personnel using the Elite Admin application. They are often called "ELT" files because their file names have an ".elt" suffix.

Multiple ELT files may be created to address different situations. For example, different ELT files can be created for different shifts in a dispatch center if the scope of dispatching changes significantly between shifts. Or, different configuration files can be created for individual dispatchers to meet their personal preferences.

A dispatcher may switch between ELT files during normal operations, but cannot access any resources while the original file is being closed and the new file is being opened.

By default, when the Elite Dispatch GUI application starts up it asks the dispatcher to specify which ELT file it should use. If this is not the customer's preferred mode of operation, the dispatch position can be configured so that it automatically opens a particular ELT file.

Admin Capabilities

The Elite Admin application allows a properly trained user to do the following:

- Create new configurations.
- Save configurations.
- Determine where features are placed on each radio resource.
- Name the resource folders and patch/multi-select folders.
- Determine if dispatchers have the ability to assign and deassign resources.
- Determine the height of patch/multi-select folders (e.g., taller if there are many members in the groups).
- Determine whether selected radio audio stays in a speaker or moves to a headset when headsets are used (this is done on a per-
- Modify existing configurations.
- Determine how many toolbars are present.
- Determine the number of patch/multi-select folders.
- Determine the location of patch/multi-select folders.
- Determine the size of each radio resource (compressed, larger compressed or expanded).
- Determine if the activity log is shown initially and where on the screen it is shown (dispatchers may still hide or show the activity log).
- Determine location of radio and auxiliary input/output resources in the folders (dispatchers may temporarily change the locations

	resource per-dispatch position basis). - Determine the number of resource folders. - Add a safety switch on radio resources. - Determine if auxiliary outputs are safety switch protected. - Assign/deassign radio and auxiliary input/output resources to various folders. - Determine if auxiliary inputs and outputs appear in a separate window. - . Determine border color for each radio resource - Modify tool tips and micro help text. by dragging and dropping the resources). - Modify the icons used for resource features. - Create pre-assigned patch/multi-select groups. - Determine audio routing of resources to speakers. - Determine border color for each auxiliary input and output. - Determine icons used for auxiliary input and outputs. - Set initial volume level of each radio resource.
27.	Offeror must acknowledge that all keyboards must be a standard 101- key keyboard. *Offeror Response:* Comply
28.	Offeror must acknowledge that Operators must be able to perform console functions by positioning a screen pointer (cursor) over the appropriate icon and selecting, such as by pressing the mouse button or by touching the monitor screen. *Offeror Response:* Comply Optional touch monitors are proposed.
29.	As an option, Offeror must describe in detail the proposed solution's ability to use a single mouse and keyboard to operate phone, radio and CAD. *Offeror Response:* Comply Sixty five (65) BELKIN PRO3 4-Port KVM Switches (with USB Cable Compatibility Only) are proposed.
30.	Offeror must acknowledge that each operator position must have connections that will support a variety of noise cancelling microphones and headsets. *Offeror Response:* Comply Generic Transmit Input Port on a VPM is utilized to allow a third-party microphone to be connected to a dispatch position instead of the Motorola Solutions desktop gooseneck Microphone. Motorola Solutions certified Desktop Gooseneck Microphone and Plantronics headsets are proposed per console operator position.
31.	Offeror must describe a variety of compatible high quality noise cancelling microphones and headsets that can be used with the proposed solution.

	Offeror Response: Comply The dispatch position is capable of supporting a single desktop gooseneck microphone. The desktop microphone contains a microphone cartridge on a flexible shaft and two buttons in its base. One button controls the General Transmit feature and the other controls the Monitor feature. Motorola Solutions certified Desktop Gooseneck Microphone is proposed. The Generic Transmit Input Port on VPM allows a third-party microphone to be connected to a dispatch position instead of the Motorola Solutions desktop gooseneck microphone. The headsets that are certified for use with the MCC7500E dispatch position are listed below. - Plantronics SupraPlus Monaural (single ear headband style) with Noise Cancelling Microphone. - Plantronics SupraPlus Binaural (dual ear headband style) with Noise Cancelling Microphone. A complete headset is both a top and a bottom. The top consists of the earpiece(s), microphone and a short cable that connects to the bottom. The bottom consists of an audio amplifier, a push-to-talk switch and a long cord with a PJ7 long frame connector at the end. Note that while other headsets will likely work with the MCC7500E dispatch position, they have not been tested by Motorola Solutions so no guarantee as to their fitness for use or audio quality can be made.
32.	Offeror must describe in detail the proposed headset jacks and headsets provided and how they allow the operator to hear select audio and telephone via a headset and allow the operator to respond via a microphone attached to the headset.
	Offeror Response: Comply Each proposed MCC7500E radio dispatch console operator position is equipped with dual Headset Jacks and a SupraPlus Monaural (single ear headband style) with Noise Cancelling Microphone. <u>Headset Jack</u> A dispatch position is capable of supporting up to two headset jacks. A headset jack allows a dispatcher to use a headset while operating the dispatch position. The headset jack supports headsets which use either PJ7 (6-wire) or PJ327 (4-wire) long frame connectors. (6-wire headsets have a PTT button while 4-wire headsets do not have a PTT button.) The headset jacks ship from the factory configured for 6-wire headsets. If 4-wire operation is desired, the headset jack must be reconfigured in the field.

	The headset jack contains two volume controls; one for adjusting the level of received radio audio and one for adjusting the level of received telephone audio. The telephone audio can be associated with a console telephony phone resource on the dispatch position's GUI or an external telephone system that is sharing the dispatch position's headset. A small dimple is molded into the headset jack housing near the telephone volume control so the dispatcher can tell them apart without having to look at them. If two headsets are connected to a dispatch position, the same audio appears in the earpieces of both of them. A radio resource on a dispatch position can be configured to behave in one of three ways when the resource is selected and a headset is plugged into the headset jack. - The audio is removed from the speaker and routed to the headset earpiece. - The audio remains in the speaker and is not routed to the headset earpiece. - The audio remains in the speaker and is routed to the headset earpiece. If an external telephone set connected to a dispatch position's telephone/headset port is taken off hook while a headset is connected to a dispatch position, the selected radio audio is removed from the headset earpiece and routed to the appropriate speaker(s). The received telephone audio is routed to the earpiece of both headset jacks. Both microphones of the headsets go live and their audio is routed to the external telephone set. This allows the dispatchers to talk and listen on the telephone set in a hands free full duplex mode. On VPM-based dispatch positions, if the dispatch position's VPM cannot communicate with the call processing software on the PC for any reason (e.g., failure in the PC or an Ethernet cable is unplugged), the VPM will automatically establish connections between both headsets and the telephone/headset port. This allows both headsets to continue to be used with the external telephone system. The headset jack may be mounted either underneath a writing surface or on top of a writing surface. It is designed with a low profile and rounded edges to minimize "knee banging" when mounted underneath a writing surface. The MCC7500E Dispatch API will report when a headset is inserted or removed from the headset jack. This can be used by third-party software applications to know when a dispatcher is using a dispatch position. The headset jack allows customers to use headsets which both decreases the ambient noise in a control room and reduces the effect of any ambient noise on console transmissions. This improves the quality of the audio being transmitted from the control room and allows the dispatchers to hear received audio more clearly.
33.	Offeror must acknowledge that the headset plug inserted into the jack must automatically disconnect the console's dedicated microphone and mute the select speakers.

	Offeror Response: Comply If a desktop microphone is connected to a dispatch position while one or two headsets are connected, then the desktop microphone is only active during a transmit function if its transmit button is pressed. A radio resource on a dispatch position can be configured to behave in one of three ways when the resource is selected and a headset is plugged into the headset jack. - The audio is removed from the speaker and routed to the headset earpiece. - The audio remains in the speaker and is not routed to the headset earpiece. - The audio remains in the speaker and is routed to the headset earpiece.
34.	Offeror must acknowledge that dual volume controls will be provided on the headset jacks, one for radio volume control and one for telephone volume control.
	Offeror Response: Comply
35.	Offeror must acknowledge that by pressing the radio PTT will mute the microphone to telephone connection, not the telephone incoming audio.
	Offeror Response: Comply If the dispatcher transmits on any radio resources while the Off Hook signal is active, the headset microphone is re-routed to the radio system for the duration of the transmission. When the transmission is ended, the headset microphone is routed back to the Telephone/Headset Port's audio output. The headset earpiece audio routing is not changed during the transmission, so the dispatcher can still hear the telephone's received audio.
36.	Offeror must acknowledge that dual headset jacks will be provided at each operator position.
	Offeror Response: Comply
37.	Offeror must acknowledge that each operator position will have a heavy-duty footswitch to allow operators to key the selected channel hands free.
	Offeror Response: Comply
38.	Offeror must describe the operating system for the proposed solution.
	Offeror Response: Comply Microsoft Windows 10 Enterprise LTSB 64 Bit Operating System is proposed.

39.	Offeror must acknowledge that they are responsible for maintaining all supplied software, including operating system to current manufacturer recommended security patch levels.
	Offeror Response: Comply Security Update Services (SUS) is included for the initial contract term (years 1 - 5) which provides pre-tested anti-virus and OS security patches and updates for the State's system.
40.	Offeror must acknowledge that each operator position must interconnect to the dispatch console system via local and wide area IP network (LAN/WAN) client-server architecture.
	Offeror Response: Comply
41.	Offeror must acknowledge that PCs supplied must be present State-of-the-art PC technology and a current version from their manufacturer.
	Offeror Response: Comply HP Z2 Mini is proposed for MCC7500E radio dispatch console positions.
42.	Offeror must describe in detail how the proposed equipment is capable of RF cross-muting to prevent interference between transmitters and receivers.
	Offeror Response: Comply RF Cross Mute The RF Cross Mute feature automatically prevents feedback from occurring when dispatchers transmit on certain conventional channels. This is needed when a transmitter and a receiver both operate on the same RF frequency and the receiver is within the coverage area of the transmitter. If both the transmitter and receiver are assigned to the same dispatch position, the potential for feedback exists whenever the dispatcher transmits on the transmitter. To prevent this feedback, the RF Cross Mute feature mutes the audio coming from the receiver whenever a dispatcher transmits on the transmitter. In order for the feature to know which receiver should be muted, the two conventional channels are configured as an RF cross mute pair. When a dispatcher transmits on one member of the pair, all dispatch positions automatically mute the receive audio from the other member of the pair. The RF Cross Mute feature typically mutes the audio at all dispatch positions that are monitoring the receiving channel. It is possible, however, to link the RF Cross Mute and Acoustic Cross Mute features together. If this is done, then the audio coming

	from the receiver is only muted at dispatch positions that are acoustically cross muted with the transmitting dispatch position. The rest of the dispatch positions will continue to hear the audio coming from the receiver. A timer has been added to the RF Cross Mute feature that can be configured to delay the unmute time. This can be used to compensate for audio delays between the transmission of the audio over the air and the playing back of received audio in console speakers and headsets. The timer can be configured over a range of 0 to 5 seconds in increments of 100 milliseconds. This allows customers to compensate for delays due to the IP network and de-vocoding that can cause the last portion of a transmission to be heard at parallel dispatch positions. The timer is configured on a per dispatch position basis to allow it to be tuned to the needs of each dispatch position. Note that if the timer is used, it could cause portions of radio transmissions that tailgate on a dispatcher transmission to be muted. The RF Cross Mute feature is not supported on ASTRO25 conventional talkgroups. The console sub-system supports thousands of RF cross mute pairs. A conventional channel may be placed in multiple RF cross mute pairs.
43.	Offeror must describe in detail how the proposed consoles are capable of transmitting at least three distinctive alert tones (steady, warbling, pulsed) indicating to field units the priority or type of dispatch to follow.
	Offeror Response: Comply Enhanced Alert Tones The Enhanced Alert Tones feature provides the ability for dispatchers to send one of fifteen user-configurable alert tones on the selected radio resource(s). The radio resource(s) may be analog conventional channels, ASTRO25 conventional channels, ASTRO25 conventional talkgroups, trunked talkgroups, trunked announcement groups, trunked agency groups or trunked private calls. The enhanced alert tones are based on .wav files stored on the dispatch position's computer. The .wav files are mapped to alert tone buttons on the dispatch position's GUI and are played when the dispatcher presses the buttons. Fifteen default .wav files are provided with the dispatch position software, but any combination of these default files may be replaced with customized .wav files to meet the specific needs of the customer. The exact meaning of an alert tone is up to the user to define. For example, a particular alert tone may be used to signal a specific event or may be used to indicate that an important voice message is to follow. Regardless of their meaning, alert tones provide a consistent means of notifying radio users of a certain condition. Default Alert Tone Descriptions The descriptions of the fifteen default alert tone .wav files are as follows.

- Alert Tone 1 is a continuous 1004 Hz tone. The alert tone plays for a maximum of 6 seconds. (Same as legacy Alert Tone 1)
- Alert Tone 2 is an alternating 1500/800 Hz tone sequence. Each tone segment is 250 milliseconds long. The alert tone plays for a maximum of 6 seconds. (Same as legacy Alert Tone 2)
- Alert Tone 3 is a pulsed 1004 Hz tone. Each tone pulse is 250 milliseconds long followed by 250 milliseconds of silence. The alert tone plays for a maximum of 6 seconds. (Same as legacy Alert Tone 3)
- Alert Tone 4 is three pulses of 1004 Hz tone. Each tone pulse is 400 milliseconds long followed by 200 milliseconds of silence. The total length of the alert tone is 1600 milliseconds.
- Alert Tone 5 is four pulses of 1004 Hz tone. Each tone pulse is 300 milliseconds long followed by 150 milliseconds of silence. The total length of the alert tone is 1650 milliseconds.
- Alert Tone 6 is a pulsed 1004 Hz tone. Each tone pulse is 62.5 milliseconds long followed by 62.5 milliseconds of silence. The alert tone plays for a maximum of 6 seconds.
- Alert Tone 7 is DTMF "D" and Knox "1" tones alternating at a 2 Hz rate. DTMF “D” is composed of simultaneous 941 Hz and 1633 Hz tones and Knox “1” is composed of simultaneous 606 Hz and 1052 Hz tones. The alert tone plays for a maximum of 6 seconds.
- Alert Tone 8 is DTMF "#" and Knox "A" tones alternating at a 4 Hz rate. DTMF “#” is composed of simultaneous 941 Hz and 1477 Hz tones and Knox “A” is composed of simultaneous 606 Hz and 1430 Hz tones. The alert tone plays for a maximum of 6 seconds.
- Alert Tone 9 emulates the Fire Evacuation Tone that the XTS5000 portable can be configured to generate when commanded by an over-the-air message. The alert tone plays for a maximum of 9,690 milliseconds.
- Alert Tone 10 is an alternating 609/914 Hz sequence. Each tone segment is 500 milliseconds long. This emulates the Fire Evacuation Tone that the XTS5000 portable can be configured to generate when the user presses the orange button and PTT button simultaneously. The alert tone plays for a maximum of 5 seconds.
- Alert Tone 11 is a tone of 644 Hz ramping from silence to full volume over 950 milliseconds then playing at full volume for 1000 milliseconds.
- Alert Tone 12 is a tone of 839 Hz for two seconds.
- Alert Tone 13 is an alternating 644/473 Hz tone sequence that lasts 2 seconds. Each tone segment is 250 milliseconds long.
- Alert Tone 14 is an alternating 469/858 Hz tone sequence that lasts 2 seconds. Each tone segment is 125 milliseconds long.
- Alert Tone 15 is 800 milliseconds of 785 Hz and 1050 Hz playing simultaneously followed by 175 milliseconds of silence followed by 850 milliseconds of 575 Hz and 708 Hz playing simultaneously. The alert tone plays for a maximum of 1,825 milliseconds.

The first three alert tones in the list above are identical to the three legacy Motorola Solutions alert tones and are designed so they can pass through the Project 25 vocoder with minimal degradation. Alert tones 4 through 8 should also pass through the Project 25 vocoder with minimal degradation. The remaining seven alert tones may or may not be viewed by the customer as being acceptable for use with the Project 25 vocoder.

	Custom Alert Tones Any combination of the default .wav files can be replaced with custom .wav files. These files may contain other alert tones, speech or pretty much anything else the customer wishes to put in them. The .wav files are located on each dispatch position's computer, so different dispatch positions can have different sets of alert tones. The maximum duration of a custom .wav file based alert tone is 5 minutes. This is much longer than normal alert tones, but was chosen to allow customers to automate routine voice announcements by using speech in the alert tone .wav files. Obviously, alert tones can be much shorter than the maximum duration. The following criteria must be met when creating a custom alert tone file: - The audio file must have the .wav extension. - The audio must be sampled at 8000 samples per second. - The audio samples must be 16-bit PCM. - The audio must be mono (single channel). - The audio must be longer than 20 milliseconds and shorter than 5 minutes. - It is recommended that the audio have an average level of -28 dBov. It is important to make sure the level of the audio in the .wav file is correct. Motorola Solutions alert tones are designed to be 4 dB above the average voice level in the system so they will be noticeable, but not too loud, when received by the radio units. Making the average level of the alert tone audio -28 dBov will result in the alert tone being 4 dB above the average voice level. Some experimentation might be required to get the level of a custom alert tone to the desired loudness in the radio units. While the MCC7500E console can handle most .wav file formats, there are certain rarely used formats that it cannot handle. For example, files containing multiple data chunks or nested data chunks are not supported. A good (but not perfect) rule of thumb is that if a .wav file cannot be played using the Windows Media Player application, it won't work as an alert tone, either. While customers can put pretty much whatever they want into the .wav files, if the alert tones are to be sent on a Project 25 resource (trunking or conventional), then care must be taken to ensure the vocoder doesn't degrade the alert tones to unacceptable levels or shift the frequencies of the tones unacceptably. It might require some experimenting to tweak an alert tone so it can pass through the vocoder acceptably.
44.	Offeror must describe in detail how the proposed consoles are capable of interfacing with the telephone network and must provide for on-screen control of the telephone including a DTMF dial pad.
	Offeror Response: Comply **Enhanced Console Telephony**

Overview

The enhanced console telephony feature provides MCC7500E dispatchers with access to phone resources directly from the dispatch position without the need for external telephone sets. The dispatcher can initiate outgoing phone calls and answer incoming phone calls directly from the dispatch position's GUI and talk on phone resources using the dispatch position's headsets or speakers/microphone.

This feature enables the dispatcher to:

- Answer incoming phone calls.
- Place outgoing phone calls.
- Patch phone lines to radio resources (trunked and/or conventional).
- Transfer phone calls to another phone number.
- Automatically forward incoming calls to a different number.
- Place calls on hold.
- Use the dialing keypad to control automated attendant systems (e.g., voice mail systems).

Architecture

The enhanced console telephony feature is based on the SIP standard and uses console telephony media gateways from Cisco as interfaces to the telephone lines. The MCC7500E dispatch positions use SIP to interface to the console telephony media gateways. The console telephony media gateways use either E1, T1 or POTS lines to interface to the telephone lines.

Make & Receive Phone Calls

The Enhanced Console Telephony feature enables dispatchers to initiate and answer phone calls directly from their dispatch position without the need for any telephone equipment at the dispatch position. Dispatchers take phone lines on or off hook and dial phone numbers directly on the dispatch position's GUI. They use the dispatch position's headset or speakers/microphone to talk and listen on the phone line.

Selectable Ring Tones

The Selectable Ring Tones feature provides seven different pre-defined ring tones that can be assigned to the phone lines on a dispatch position. This enables the dispatcher to be able to tell which line is ringing without having to look at the dispatch position's GUI.

The same phone line can be assigned different ring tone on different dispatch positions to meet the needs of each dispatcher.

One of the ring tones is silence (that is, no tone at all). The silence ring tone can be used for situations where a dispatcher isn't concerned about calls coming in on a certain phone line and doesn't want to be disturbed by them.

Caller ID Display

The Caller ID Display feature enables dispatchers to see the phone number and name, if available, of the person calling on an incoming phone call. The caller ID information is displayed on the phone resource on the dispatch position's GUI.

The Caller ID feature can help dispatchers decide whether or not to answer incoming phone calls or it can help them be better prepared for the call.

Real Time Dialing

The Real Time Dialing feature provides a dialing keypad on the dispatch position GUI that enables dispatchers to manually dial a phone number. This is used when dialing a phone number that isn't in one of the phone books or on a speed dial. The maximum number of digits that can be dialed using real time dialing is 20.

Phone Book Dialing

The Phone Book Dialing feature enables dispatchers to select an entry from the central or local phone book and dial the associated phone number with a single button press. The maximum number of digits that can be dialed using phone book dialing is 20.

Speed Dial

The Speed Dial feature enables dispatchers to dial a phone number by pressing a speed dial button on the dispatch position's GUI. Different speed dials can be configured to appear on different dispatch positions to meet the needs of each dispatcher. The maximum number of digits that can be dialed using speed dialing is 20.

Last Number Redial

The Last Number Redial feature enables dispatchers to easily redial the last phone number they dialed. When the dispatcher opens the dialing keypad, the last number that was dialed is usually displayed in the phone number field. (There are some situations where a number isn't displayed. One example is if the dispatcher hasn't placed any phone calls since he/she logged in.) The dispatcher can use the redial button to quickly redial the displayed phone number.

This can be useful, for example, when repeatedly trying to reach a phone number that is busy.

DTMF Overdialing

The DTMF Overdialing feature enables dispatchers to use the dialing keypad to navigate automated attendant systems or voice mail systems. If a button is pressed on the dialing keypad when the chosen phone resource has an established call on it, a DTMF tone burst corresponding to the pressed button is sent on the phone line.

The tone burst has a fixed length of 200 milliseconds. Holding the button down does not change the duration of the tone burst. Sidetone of the tone burst is provided for the dispatcher and the digits appear in the display on the dialing keypad. There is no limit on the number of digits that can be dialed using DTMF overdialing.

Call Hold

The Call Hold feature enables dispatchers to put a phone call on hold while they attend to some other task. While a call is on hold, neither party can hear the other and the phone resource becomes unchosen. Removing the call from hold re-establishes the audio connection so both parties can hear each other again. A call is removed from hold by choosing the phone resource again.

When a headset is being used on the dispatch position, the selected radio audio does not move back to the headset earpiece when a chosen phone resource is placed on hold; it remains in the select speaker.

Only the dispatcher who puts a call on hold can take it off of hold.

Call Transfer

The Call Transfer feature enables dispatchers to transfer a phone call to another phone number. The other phone number can be another dispatcher at another dispatch position or some other telephone.

Transfers done using the enhanced console telephony feature are unattended (or blind) transfers. That is, the dispatcher cannot talk with the person the call is being transferred to. Attended transfers are not supported.

Call Forwarding

The Call Forwarding feature enables incoming phone calls to be automatically forwarded to a different phone number. There are two ways this can be done to address different scenarios.

The first way to forward calls addresses the scenario where a dispatcher wants to forward all calls directed at his/her dispatch position, regardless of which phone line the call comes in on. This is useful when a dispatcher is on break or needs to step away from his/her dispatch position for a period of time. When the forwarding is no longer needed, the dispatcher unforwards the calls. This type of call forwarding tends to be relatively short in duration.

The second way to forward calls addresses the scenario where a phone call comes in on a phone line and no one answers the phone call within a certain number of rings. The console telephony media gateway can be configured to automatically forward the call to a different phone number when this happens. This type of call forwarding is usually a long term function and it is not changeable by dispatchers.

Go Ahead Tones

The Go Ahead Tones feature enables phone callers who are not familiar with radio usage etiquette to easily communicate with radio users during phone/radio patches. Since telephones are typically hands free full-duplex, phone users are used to being able to talk at the same time the other party is talking and still be heard. Radio systems typically aren’t hands-free full-duplex, so it is important to have only one person at a time talking to ensure everyone hears everything that is said.

	The go ahead tones feature generates a beep for the phone user when the radio user finishes a transmission. This beep tells the phone user that it is okay for him/her to start talking. By always waiting for the beep before talking on a phone/radio patch, the phone caller is assured that the radio user will hear everything he/she says.
45.	Offeror must describe in detail how the proposed solution upon activation of an emergency alarm by field units, dispatch console system operator positions provides an audible alert, display unit ID of calling unit, provide a visual alert of an emergency activation and has the ability to acknowledge the emergency alarm. *Offeror Response:* Comply Emergency Alarm An Emergency Alarm is sent by radio users to alert dispatchers of a critical situation needing immediate attention. When an Emergency Alarm is received by a dispatch position an audible indication is sounded. A visual indication is also displayed to direct a dispatcher's attention to the specific resource with the emergency alarm active on the dispatch position. Any dispatcher can take responsibility for an emergency situation by Recognizing the Emergency Alarm. All dispatch positions are notified that the Emergency Alarm has been recognized. The audible emergency indications are typically ended once all Emergency Alarms at a dispatch position are recognized. The audible emergency indications may also be ended by the dispatcher without recognizing the Emergency Alarm. When an emergency situation is over, a dispatcher can end the Emergency Alarm. All dispatch positions are notified that the Emergency Alarm has been ended. The emergency mode persists on the initiating radio unit until it is ended by the radio user explicitly. The Emergency Alarm feature is used by radios to alert dispatchers of an emergency situation without the use of voice communication. This is generally followed by a voice transmission. Received Emergency Alarm Indications The Received Emergency Alarm Indications feature allows a dispatcher to be quickly informed that an emergency alarm has been received on a trunked resource. The indications are audible and visual in nature. The audible indication continues until either a dispatcher has recognized the emergency alarm or mutes it. The visual indication continues until the emergency alarm has been ended by a dispatcher.

The Received Emergency Alarm Indications feature allows the dispatcher to be quickly alerted that an emergency alarm has been received and to identify quickly on which resource it occurred.

Enable/Disable Emergency Indications

The Enable/Disable Emergency Indications feature allows a radio resource on a dispatch position to be configured to treat emergency alarms in the following ways:

- Both visual and audible emergency indications are generated.
- Only visual emergency indications are generated (no audible indications).
- No visual or audible emergency indications are generated.

Regardless of how a resource is configured to handle visual and audible indications for an emergency, the dispatch position still provides all of the emergency information for the resource through the dispatch position's API. This means an external system, such as a CAD system, can still receive all the emergency information even when it is not being presented to the dispatcher.

Enable/Disable Emergency Tones

The Enable/Disable Emergency Tones feature allows a radio resource on a dispatch position to be configured to either sound or not sound emergency tones when an emergency alarm is received on that resource. This configuration can be done on a per dispatch position basis to allow each dispatcher to only hear emergency tones for his/her primary resources. This allows the dispatcher to concentrate on his/her primary resources without being distracted by emergency tones on non-primary resources.

Emergency Recognize

The Emergency Recognize feature allows a dispatcher to assume responsibility for an emergency call or emergency alarm. When a dispatcher recognizes an emergency, all other dispatch positions are notified that the emergency has been recognized.

When an emergency has been recognized, the audible indications for that emergency are silenced at all dispatch positions monitoring the emergency.

The Emergency Recognize feature is often confused with the Acknowledge feature. Recognize is used when a dispatcher takes a specific action to assume responsibility for an emergency. Acknowledge is used when a piece of equipment (zone controller or dispatch position) automatically sends a message to a radio telling it that its emergency message was received.

Mute Tones at Single Op

The Mute Tones at Single Op feature allows a dispatcher to mute the tones associated with an emergency alarm only at his/her dispatch position. This feature does not recognize the emergency alarm, so other dispatch positions continue to generate the emergency tones.

	The Mute Tones at Single Op feature is used to silence the emergency alarm tones without recognizing the emergency. This would be used in a situation where one agency is monitoring a channel that belongs to another agency. If an emergency alarm comes in on the second agency's channel, the first agency could mute the tones at their dispatch positions without having to wait for the second agency to recognize it. Emergency End (Knockdown) The Emergency End feature allows a dispatcher to terminate an emergency alarm. All dispatch positions are notified that the emergency alarm has been ended and which dispatch position ended it.
46.	Offeror must acknowledge that the unit ID and alias for an unacknowledged emergency alarm must not scroll from the unit ID display.
	Offeror Response: Comply
47.	Offeror must describe in detail how the proposed solution allows for operators to manage door controls.
	Offeror Response: Comply **Auxiliary Inputs and Outputs** Overview Auxiliary inputs and outputs (Aux I/Os) allow customers to control external devices via relay closures and sense the State of external devices via input buffers from the dispatch position. There are two basic types of Aux I/Os: Public Aux I/Os are accessible by more than one dispatch position. A change in State of the Aux I/O is reflected across all of the dispatch positions which have it assigned on their user interfaces. These Aux I/Os are typically physically located in a common location that is shared by all the dispatch positions. Private Aux I/Os are accessible by only one dispatch position. A change in State of the Aux I/O is only reflected at the single dispatch position which has it assigned on its user interface. These Aux I/Os are typically physically located in the hardware of the dispatch position that is controlling it. Both Public and Private Aux I/Os are supported. Public Aux I/Os The Motorola Solutions MCC7500E console supports Public Aux I/Os by accessing and controlling MOSCAD RTUs and displaying the status of the RTUs' inputs and outputs on the dispatch position graphical user interface (GUI). The graphical user interface displays the inputs and outputs by using the same icons that are used with inputs and outputs on CENTRACOM Gold Series dispatch positions.

Graphical icons provided by the dispatch position GUI are used to represent both the function and State of relay outputs. For example, an icon consisting of a light bulb may be used to represent a relay output which is controlling lighting of some type. The dispatcher would click on the button associated with the icon to change the State of the relay output and the icon would change between a lighted bulb and an unlighted bulb to reflect the State of the lighting.

Graphical icons are also used to provide a visual indication of both the function and State of external inputs. For example, an icon consisting of a door may be used to represent an external input which is connected to a door position sensor. The door can be shown in the open State when the sensor says the door is open and it can be shown in the closed State when the sensor says it is closed.

Multiple dispatch positions may monitor and control the same relay output and/or external inputs. In this case, State changes are indicated across all dispatch positions simultaneously.

Individual relay outputs can be configured so that they require a safety switch to be pressed before they respond to any commands from the dispatcher. A relay output on one dispatch position can be protected by a safety switch while the same relay output on a different dispatch position isn't. The resetting of latched inputs may also be protected by using the safety switch.

Supported Aux I/O Configurations

The following Aux I/O configurations are supported.

- Momentary Input - This is an input where the user interface always shows the true State of the input. If the input is active, it is shown as active. If it is not active, it is shown as not active.
- Latched Input - This is an input where the user interface doesn't necessarily show the true State of the input. When the input goes active, the user interface shows the State as active. The display will continue to show the State as active even if the input changes to the inactive State. A dispatcher must manually reset the display to return it to the inactive State. Note that a dispatcher cannot clear the display until the input itself is in the inactive State.
- Momentary Output - This is an output relay which is activated when the dispatcher presses the button on the user interface and deactivated when the dispatcher releases the button.
- Latched Output - This is an output relay which changes State only when the dispatcher presses the button. The release of the button has no effect on the State of the relay. One press activates the relay; the next press deactivates the relay.
- Interlocked Latched Output - This is a latched output relay which is part of a group of latched output relays. Only one of the relays in the group may be active at a time. Pressing the button for a relay automatically deactivates the previously active relay. Pressing the same button twice does not deactivate that relay. There is always one and only one relay active in the group at all times. Interlocked relays work in a "break before make" fashion; that is, the previously active relay is deactivated before the new relay is activated. The maximum number of relays that

	can be grouped together in an interlocked group is the number of relays in the RTU hosting the interlocked group. Private Aux I/Os The operation of each private aux I/O on the AIM may be configured independently on each dispatch position. Any function can be assigned to any relay and can also be assigned to multiple relays. A relay can have only one function assigned to it. The functions supported are: - Op Push-To-Talk (PTT) or called PTT Relay. - Call on Selected Channel or called the Inbound Select Relay. - Emergency Beacon or called the Emergency Activity Relay. - Activate Private Relay when Public Aux I/O is Active or called the Aux I/O Alarm Relay. - Unused. A relay can only be configured for one function.
48.	Offeror must describe in detail how the proposed solution allows for operators to manage outdoor warning sirens.
	Offeror Response: Comply The proposed new MCC7500E and upgraded MCC7500E VPMs will transmit analog console tones out on current conventional analog VHF channels (Outdoor Warring Siren systems) interfaced via RF Site/Dispatch Site Conventional Channel Gateway (CCGW) ports.
49.	Offeror must describe in detail how the proposed solution allows for operators to manage paging.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console system utilizes an Integrated Paging Encoder feature which provides robust analog tone paging capabilities on analog conventional radio resources. This feature is required to provide tone and voice alert paging to the existing State and County Fire Stations that are alerted using analog conventional channels. At each MCC7500E radio dispatch console site (as applicable) 4 wire Tone Remote Control interface via Conventional Channel Gateway (CCGW) is utilized. Dispatch consoles may be configured for either sequential or simultaneous operation. In sequential operation, the individual members in group pages (whether manually created or preconfigured) are sent out on the radio resources in the exact order in which they were entered. This mode should be used when the order in which pages are sent is important. In simultaneous operation, the individual members are sent out as quickly as possible. Pages on different resources will be sent out in parallel. If more than one page is being sent on a resource, those pages will be sent

out sequentially. A dispatch console is capable of sending pages on up to 20 resources simultaneously.

Analog Tone Paging

Analog tone pages specify the target receiver (i.e., pager) via a series of analog tones. Over the years, various formats have been established for analog tone paging. Among other things, these formats vary in their number of page digits, the number of tones that represent a digit, the actual tone frequencies used and the durations of the tones and the inter-tone space. The digits may specify just the address of the target receiver, or they may additionally specify the tone group that is to be used for that page. A tone group is a particular set of tones (analog frequencies) to which the address digits are to be mapped. In some formats, the digits also identify the type of page (e.g. individual page or group page). Since the differing types of tone pages within a format usually require different timing characteristics (tone duration, inter-tone gap), the digits may also be considered to specify the timing variant to be used for the page. In general, analog tone pages are defined by the analog tone paging format to be used, the paging digits (including the target address) to be sent, the radio resource over which the page is to be sent and, if needed, the radio frequency to be used for the page transmission (applicable on multi-frequency conventional stations).

System Paging

System pages use digital signaling methods to send alert messages to the target receiver. Trunked Call Alerts are an example of system pages. System pages are defined by the system paging format to be used, the Unit ID of the target receiver and a radio resource associated with the trunking system over which the page is to be sent.

Supported Formats

The following analog tone paging formats are supported by the integrated paging encoder.

- Quick Call I.
- Quick Call II B–Tone & Voice.
- Quick Call II C–Tone Only.
- Quick Call II D–Battery Saver.
- Quick Call II E–Competitive.
- Touch Code/DTMF.
- Knox Single Tone 0.5
- Single Tone 1.5.
- Motorola Solutions 5/6 Tone.
- Digital Dial 1 (1500 Hz).
- Digital Dial 2 (2805 Hz).
- Digital Dial 3 (1500/2805 Hz).

Proposed integrated paging encoder supports the following:

- Up to 9100 pre-configured individual pages per system.
- Up to 1750 pre-configured groups pages per system.
- Up to 50 members in a group page.

	▪ Up to 20 pages sent simultaneously (when dispatch console is configured for simultaneous paging). Paging Nuances The MCC7500E console's integrated paging encoder has a few unique operational differences described in the following sections. No Dekey Between Sequential Pages on a Resource When the MCC7500E console sends sequential pages on the same conventional channel or talkgroup, it does not dekey and rekey the channel between pages. No Paging on Patched Resources on the Patching Op The MCC7500E console does not allow pages generated by the internal paging encoder to be sent on members of patch groups if the paging console also "owns" the patch. Paging on the Selected Resource The MCC7500E console can be configured to allow pre-configured individual pages to be sent on the "currently selected channel" on the dispatch console. This means the page will be sent on whatever channel happens to be selected on that dispatch console when the pre-configured page is chosen. Call Alert Paging When a MCC7500E is configured for simultaneous paging operation, the integrated paging encoder will only wait for 300 milliseconds between sending out pre-configured Call Alerts. It will not wait for an acknowledgement to be received from the target radio. This allows pre-configured Call Alerts to be sent much faster and thus makes them more suitable for use as a replacement for analog tone paging. When a MCC7500E console is configured for sequential paging operation, the integrated paging encoder will wait until it gets a resolution on the previous Call Alert (either acknowledged by the target, rejected by the Zone Core Controller, or timed out) before moving on to the next page.
50.	Offeror must describe in detail how the equipment has the ability to encrypt and decrypt secure voice communications and a distinctive icon must signify encrypted channels.
	Offeror Response: Comply The functionality available on the proposed MCC7500E radio dispatch console system when the console is using a wireline connection to the ASTRO25 trunking system is per following. The Secure Capability in the Dispatch Position feature allows radio voice messages to be encrypted and decrypted in the dispatch position itself. This feature allows the

	radio voice messages to be encrypted the entire time they are being transported between the dispatch position and the radio. The supported encryption algorithms on MCC7500E are AES, DES-OFB and ADP. - AES stands for Advanced Encryption Standard and is a United States government encryption/decryption standard defined in Federal Information Processing Standard 197 (FIPS-197). - DES-OFB stands for Digital Encryption Standard – Output Feed Back and is a United States government encryption/decryption standard defined in Federal Information Processing Standard 81 (FIPS-81). - ADP stands for Advanced Digital Privacy (ADP) Software Encryption and is an encryption/decryption algorithm developed by Motorola Solutions. Trunked radio resources (talkgroups and private calls) can be configured with the ability to work in the secure mode. Secure-capable resources on a dispatch position may be configured so they always operate in secure mode or so the user can manually change between secure and non-secure modes. The visual indication is a locked padlock icon that appears near either the receiving or transmitting indications. This allows the dispatcher to know which resources are transmitting or receiving secure audio.
51.	Offeror must acknowledge that the proposed consoles will support AES encryption algorithms.
	Offeror Response: Comply
52.	Offeror must acknowledge that the operators have a single headset enabling them to converse on the 911 system, telephone or radio system.
	Offeror Response: Comply The 911 system or telephone must provide off the hook indication.
53.	Offeror must describe in detail if the proposed dispatch console system provides an instant recall recording capability for each operator position.
	Offeror Response: Comply Each proposed MCC7500E radio dispatch console operator position includes Software Based Dual Instant Recall Recorder, a secondary sound card, a pair of desktop speakers and a USB Hardware Against Software Piracy (HASP) key. The Dual Instant Recall Recorder software (CD format) allows users to record two channels, radio, telephone, radio and telephone conversations, digitally on a personal computer. The software can also be configured to operate as single channel IRR. The system uses an individual PC where the recording files are stored on the PC's hard drive. Instant Recall keeps a database of all recordings, which

	allows for convenient “point and click” search and playback of any recordings. Once the software is installed on your PC the functions are controlled through a Graphical User Interface (GUI) icon. In addition, the Instant Retrieval Recorder has numerous special features such as the ability to attach text documents to recordings, a security system, multiple playback (which allows the user to playback more than one recording at the same time) and real time audio monitor (which allows the user to listen to the last ten minutes of a recording in progress without being required to stop recording to be able to listen). The Instant Retrieval window allows the user to immediately access the recordings. The Instant Retrieval window initially opens on the newest recordings, but allows access to any recordings on the system. The recording can also be saved to the WAV file that the user specifies. This is useful if the user wants to save a specific recording to a CD or hard disk.
54.	Offeror must describe in detail if the proposed interface provides connection to the console operators’ microphone/audio and the selected radio channel receiver and telephone audio.
	Offeror Response: Comply Instant Recall Recorder, a secondary sound card, a pair of desktop speakers and a USB Hardware Against Software Piracy (HASP) key. The Dual Instant Recall Recorder software (CD format) allows users to record two channels, radio, telephone, radio and telephone conversations, digitally on a personal computer. The software can also be configured to operate as single channel IRR. The system uses an individual PC where the recording files are stored on the PC’s hard drive. Instant Recall keeps a database of all recordings, which allows for convenient “point and click” search and playback of any recordings. Once the software is installed on your PC the functions are controlled through a Graphical User Interface (GUI) icon. In addition, the Instant Retrieval Recorder has numerous special features such as the ability to attach text documents to recordings, a security system, multiple playback (which allows the user to playback more than one recording at the same time) and real time audio monitor (which allows the user to listen to the last ten minutes of a recording in progress without being required to stop recording to be able to listen). The Instant Retrieval window allows the user to immediately access the recordings. The Instant Retrieval window initially opens on the newest recordings, but allows access to any recordings on the system. The recording can also be saved to the WAV file that the user specifies. This is useful if the user wants to save a specific recording to a CD or hard disk. The product ships standard with a USB HASP key.

55.	Offeror must describe in detail if the proposed playback is available on the operator position for a minimum of 60 minutes of inbound audio playback. *Offeror Response:* Comply The Software Based Dual Instant Recall Recorder proposed is equipped with playback or retrieval feature. Depending on the audio compression ratio, which is configurable and which affects sound quality, user can plan on saving between 50 and 500 hours of recordings per gigabyte of drive space. The recommendation is not to save large numbers of voice recordings, or storing files for long periods of time on the hard drive. A periodic backup to an external medium or purging files from hard drive is highly recommended.
56.	Offeror must describe in detail if the proposed dispatch console system includes an instant transmit switch for each conventional channel base station, or trunked talkgroup. *Offeror Response:* Comply The proposed MCC7500E radio dispatch console system utilizes radio resources with Instant Transmit buttons. A radio resource (conventional channel or trunked talkgroup) contains indicators and controls which allow the dispatcher to monitor and control various aspects of the radio channel. Examples of the indicators and controls which may appear on a radio resource include: - Instant Transmit Button - Transmit Active/Transmit Busy Indications - Patch Active/Patch Busy Indications - Received Call Indication - Received Call Stack - Individual Volume Control Instant Transmit Instant Transmit is a feature that allows a dispatcher to initiate a transmission on a specific resource regardless of its select State. It is the most direct method of transmitting on a resource. Instant Transmit is a high priority transmit. It is important to note that the dispatcher can Instant Transmit even when the dispatcher is currently performing a General Transmit or APB Transmit. In this case, microphone audio will be sent to both the selected resource(s) and the one that is being instant-transmitted upon. The Instant Transmit feature gives the dispatcher an additional level of control that is not available with the General Transmit feature. It gives a dispatcher the ability to transmit quickly on a resource that is not selected. It allows a dispatcher to monitor the audio from the selected resources in the headset and simultaneously transmit to another resource. It also allows a dispatcher to take over a lower priority transmit from a parallel dispatch position.

	Instant Transmit Safety Switch Instant Transmit Safety Switch is a feature that requires a dispatcher to press a "safety switch" before initiating an instant transmit on a specific resource (regardless of whether it is selected or not). This helps ensure the dispatcher doesn't accidentally instant transmit on a particular radio channel.
57.	Offeror must describe in detail if the proposed conventional resources capable of operating on multiple frequencies/modes, a control/indicator is provided to select the desired transmit frequency/mode /select channel.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console system is equipped to operate and control multi frequency conventional resources via Frequency Select feature. Frequency Select Certain types of conventional resources are capable of transmitting/receiving on multiple frequencies. Only one set of transmit/receive frequencies is active at any time. Frequency Select is a console feature which allows a dispatcher to select the active transmit/receive frequency of a conventional resource. Changing the transmit/receive frequency of a conventional resource causes all dispatch positions to be updated with the new frequency selection. Multi-frequency conventional base stations are used to allow access to many frequencies when access to only one frequency at a time is needed. Because only one set of frequencies is active on the base station at a time, the dispatch position only receives the audio associated with the active frequency. A single base station is used to access the multiple frequencies in order to reduce the hardware expenses. The Frequency Select feature allows a dispatch position to choose a set of transmit/receive frequencies on a resource to communicate with the radios using these frequencies. A Motorola Solutions MCC7500E console is capable of accessing and controlling the following types of analog and ASTRO25 conventional channels. - R1 - T1R1 - T2R2 - T4R4 - T8R8 - T12R12 - T14R14 - T16R16 - T255R255 (on ACIM link channels only) The above types of channels are referred to as TnRn channels. A TnRn channel has one n-frequency transmitter and one n-frequency receiver. The console can:

	▪ process audio received from the channel and present it to the dispatcher via speakers or headsets. ▪ key the channel's transmitter and provide it with audio to be transmitted over the air (except for R1 channels which don't have a transmitter). ▪ control various features on the channels such as frequency selection, PL selection, repeater on/off, etc.
58.	Offeror must describe in detail if the proposed select channel function causes the associated channel to switch channels/modes by emitting an EIA function-tone/guard-tone sequence for tone remote controlled stations. Offeror must describe in detail if the propose Once a channel has been selected, the operator must be able to transmit on this channel by pressing the footswitch or transmit button.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console system utilizes default tones for various commands on different types of conventional channels (Tone Remote Control Conventional channels). These tones may be modified to meet customer needs via the radio system's network manager. Only a single function tone is supported. The high level guard tone can be extended to a maximum of 600 milliseconds. Table below shows an example of T2R2 Channel Tone Table.

T2R2 Channel			
FREQ	W/O PL	W/4 PL	W/8 PL
2050	PL MON	PL MON	PL MON
1950	F1	F1	F1
1850	F2	F2	F2
1750	R2 OFF	R2 OFF	PL5
1650	R2 ON	R2 ON	PL6
1550	RPTR OFF	RPTR OFF	PL7
1450	RPTR ON	RPTR ON	PL8
1350	WC I ON	PL1	PL1
1250	WC I OFF	PL2	PL2
1150	WC II ON	PL3	PL3
1050	WC II OFF	PL4	PL4

Figure 19: Example of T2Rs Channel Tone Table

	Upon the specific frequency selection on a multi-frequency conventional channel resource, console operator is able to utilize footswitch or transmit button for audio transmission on the selected resource.
59.	Offeror must describe in detail if the proposed transmit audio level meter provided shows the level of transmitted voice. Offeror must describe in detail if the proposed meter must also indicate the level of receive audio present on the selected channel/talkgroup.
	Offeror Response: Comply

	The proposed MCC7500E radio dispatch console positions are equipped with VU Meter feature. <u>VU Meter</u> The VU Meter feature provides a visual indication of audible activity on a dispatch position. When a dispatcher is transmitting on a radio resource, the VU Meter shows the voice activity associated with the dispatcher's microphone. When the dispatcher is not transmitting, the VU Meter shows the voice activity associated with the selected radio resource(s). The activity is shown as a moving bar graph display on the dispatch position GUI. Note that the VU Meter does not show activity associated with an external telephone system that is sharing the dispatch position's headset. It will continue to show the activity of the selected radio resource(s) while the dispatcher is listening to or talking on the external telephone system. The default location for the VU Meter is on the Status Bar at the bottom of the dispatch position's GUI. It can be configured to appear on one of the toolbars at the top of the GUI or it can be configured to appear in a floating window that can be positioned anywhere on the dispatch position monitor's screen. The VU Meter feature provides intuitive feedback to the dispatcher as to whether they are too close to, too far from or just the right distance from the microphone. It can also show the dispatcher if there is something wrong with the microphone and no audio is being transmitted. And finally, it can alert them to activity on the selected resource(s) even if they can't hear it because the volume control has been turned down.
60.	Offeror must describe in detail if the proposed operator positions have the ability to independently set each channel/talkgroup's volume level. Offeror must describe in detail if the proposed minimum audio levels are capable of being set to avoid missed calls.
	<u>Offeror Response:</u> Comply The proposed MCC7500E radio dispatch console positions are equipped with Individual Resource Volume Control feature. <u>Individual Resource Volume Control</u> The Individual Resource Volume Control feature allows the dispatcher to change the level at which each resource is mixed into a speaker. (It is common to have the audio from many resources routed to the same speaker, especially when these resources are unselected.) The Individual Resource Volume Control feature can be used at individual dispatch positions to lower the volume level of less important resources and raise the volume level of resources as they become important.

	The initial volume level is set when the resource is assigned. The volume level for a resource is automatically raised to the full volume level when the resource is selected. If the volume level is adjusted while a resource is selected, it remains at the new volume level even after the resource is deselected. If the resource's volume level is not adjusted while the resource is selected, deselecting the resource restores its volume level to its volume level in effect prior to being selected. The minimum level of the individual volume control for each resource is independently configurable. This is done on a per dispatch position, per-resource basis via the Elite Admin application.
61.	Offeror must describe in detail if the operators have the ability to mute or un-mute audio from unselected channels/talkgroups. Offeror must describe in detail if the operator's monitor indicates muted audio status.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console positions are equipped with All Mute feature. All Mute The All Mute feature is used to mute all of the audio on resources that are not currently selected at a dispatch position. This includes enhanced console telephony resources that are not chosen (i.e., they are in patch groups). When the All Mute feature is activated, all audio on resources that are not selected is muted until the All Mute feature is deactivated or a certain amount of time elapses, typically 30 seconds. The amount of time the All Mute feature stays active and the amount of attenuation it applies to the audio are programmable through the radio system's configuration application. If a resource's individual volume setting is such that it is lower than the All Mute feature's attenuated level, the resource's volume setting will not be changed by the All Mute feature. That is, the dispatch position will not increase the resource's volume setting above the level set by the dispatcher. The All Mute feature is used when the dispatcher does not want to be disturbed by the audio from the unselect resources. Using the All Mute feature is better than turning down the volume of the unselect speaker because the volume is restored automatically when the All Mute feature is deactivated.
62.	Offeror must describe in detail if the selected audio and unselected audio is audible from separate speakers.
	Offeror Response: Comply

	The proposed MCC7500E radio dispatch console positions are provisioned such that select resource audio and unselect resources audio are routed to Select and Unselect desktop speakers respectively.
63.	Offeror must describe in detail if the operators have the ability to select multiple channels/talkgroups for broadcast to several channels/talkgroups at once.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console positions are equipped with Multi Select feature. Multi-Select Folder Clicking on one of the multi-select folder tabs brings it into view. The multi-select group is then opened by clicking on the left-most button on the folder. Once the multi-select group is open, the multi-select becomes active and members can be added or removed from the group by clicking on the desired radio resources. Closing the multi-select folder (by clicking on the left-most button a second time) deactivates the multi-select group. Note that this operation is different than that of the patch folders. A dispatch position can only have one multi-select group active at a time, but it can have multiple patch groups simultaneously active. The members of the multi-select group are shown on the multi-select folder. Some multi-select groups contain members which were pre-assigned by the Elite Admin application. The dispatcher can add/remove members from the pre-assigned multi-select group, but these additions/removals are lost when the dispatcher either re-loads the configuration file or changes to a different configuration file. Pre-assigned multi-select groups can also be configured via the Elite Admin application to be “locked”. When configured this way, the dispatcher cannot edit the multi-select group. The size of the folders can be changed to 1, 2 or 3 times their normal size if desired. This is done on a per-dispatch position basis. The color of each folder and the text on each folder tab can be changed on a per-dispatch position, per folder basis to meet the needs of individual dispatchers.
64.	Offeror must describe in detail if the operators have the ability to patch two or more conventional resource channels/talkgroups so that users may communicate directly.
	Offeror Response: Comply The proposed MCC7500E radio dispatch console positions are equipped with patch feature. Patch Folders

	Clicking on one of the patch folder tabs brings it into view. The patch group is then opened by clicking on the left-most button on the folder. Once the patch group is open, the patch group is editable and members may be added or removed from the patch group by clicking on the desired radio resources. Note that patch groups are active whenever there are members assigned to them. This is true even if the patch group isn't open. The members of the patch group are shown on the patch folder along with the status of each member (patched or pending). The resources in the patch also show an indication that they are in a patch group. Some patch groups contain members which were pre-assigned by the Elite Admin application. These patch groups become active as soon as possible after the dispatch position begins using the configuration file which contains the pre-assigned patch groups. The dispatcher can add/remove members from the pre-assigned patch group, but these additions/removals are lost when the dispatcher either re-loads the configuration file or changes to a different configuration file. Pre-assigned patch groups can also be configured via the Elite Admin application to be "locked". When configured this way, the dispatcher cannot edit the patch group. A patch transmit button is provided on the patch folder to allow the dispatcher to easily transmit on all members of the patch group with a single button press. The size of the folders can be changed to 1, 2 or 3 times their normal size if desired. This is done on a per-dispatch position basis. The color of each folder and the text on each folder tab can be changed on a per-dispatch position, per folder basis to meet the needs of individual dispatchers.
65.	Offeror must describe in detail if the operator positions are equipped such that a minimum of eight simultaneous patches must be available. *Offeror Response:* Comply The proposed MCC7500E radio dispatch console positions are equipped with patch and multi select features. There can be up to sixteen patch folders and sixteen multi-select folders.

9. SUBSCRIBER UNITS

Subscriber equipment for The proposed solution non-fixed user equipment includes:

a. *Portable subscriber units*
b. *Mobile subscriber units*
c. *Control stations*
d. *Vehicular Repeater System*
e. *Portable in vehicle subscriber conversion units*

No.	General
1.	Offeror must list all proposed user subscriber units and accessories. *Offeror Response:* Comply Motorola Solutions will be offering our APX4000 series portable subscriber for entry and mid-tier customers and the APX6000 & 8000 series for our high tier customers. We will also be offering the APX4500 mobile subscriber for our entry and mid-tier customers and the 6500 and 8500 series mobile subscribers for high tier applications. Please see attached configurations of APX portable subscribers based on customer requirements as well as APX mobile subscribers. These will respond to customer specific requirements on design, feature, function and ways to enhance the user experience utilizing both portable and mobile subscribers, as well as the vehicular repeater functionality. - Model 1: APX 4000 Model 2 Portable. - Model 2: APX 4000 Model 3 Portable. - Model 3: APX 4000 Model 3 Portable. • Programming Cables. • Single Unit IMPRES Charger. • Multi-Unit IMPRES Charger. • Vehicular Charger. • Travel Charger. • Antennas. • Batteries. • RSM's. • Headsets. • Carrying Case and Belt Clips. - Model 4: APX 8000 Portable. • IMPRES 2, 3A Single Unit Chargers. • IMPRES 2, Six Display Multi Unit Chargers. • IMPRES 2 Vehicular Chargers. • APX Travel Chargers. • Antennas. • Batteries. • RSM's and PSM's

	• Headsets. • Carrying Case and Belt Clips. - Model 1: APX 4500 Mobile with O2 Control Head. • Model 2: APX 4500 Mobile with O2 Control Head. • Model 3: APX 4500 Mobile with O2 Control Head. • Model 4: APX 8500 Mobile. - APX 7500 Consolettes.
2.	Offeror must acknowledge that all subscriber units and accessories are expected to be of high quality and intended to provide high reliability under heavy use in severe environments. Offeror must acknowledge that public safety users require a high tier subscriber unit while public works require a low tier subscriber. Offeror must acknowledge that all subscriber units are FCC type accepted in accordance with FCC Part 90 rules and regulations.
	Offeror Response: Comply Motorola Solutions APX subscribers are built with the customer in mind. From larger PTT's and control knobs for gloved operation, to knob spacing and top display operation for law enforcement, when our users pick up a Motorola Solutions subscriber, they know it was built for them. Our APX subscriber portfolio are built through voice of customer sessions that encompass customer feedback of what they view as important for daily use. Our subscribers for public safety feature IP68 ratings, enlarged controls for gloved operation, a third microphone for enhanced noise cancellation for high stress environments, as well as higher channel capacity. Every tier of subscribers goes through accelerated life testing. This will simulate the lifespan of a subscriber radio from number of PTT's, vibration testing for the housing & battery latches, to extreme stress on the screens of our radios to endure the toughest environments. For our mobiles, we simulate a 40G crash test for our mobile mounts in vehicle, as well as typical road vibration and extreme temperatures inside of a vehicle. During this testing if any defects or issues are discovered, the issue is corrected, redesign made and the process will start over to ensure all twenty-six points are met. Our housing is made of high strength polycarbonate which has been designed to an even higher level than our XTS series portables. All Motorola Solutions APX subscribers are FCC & P25 Standards compliant.

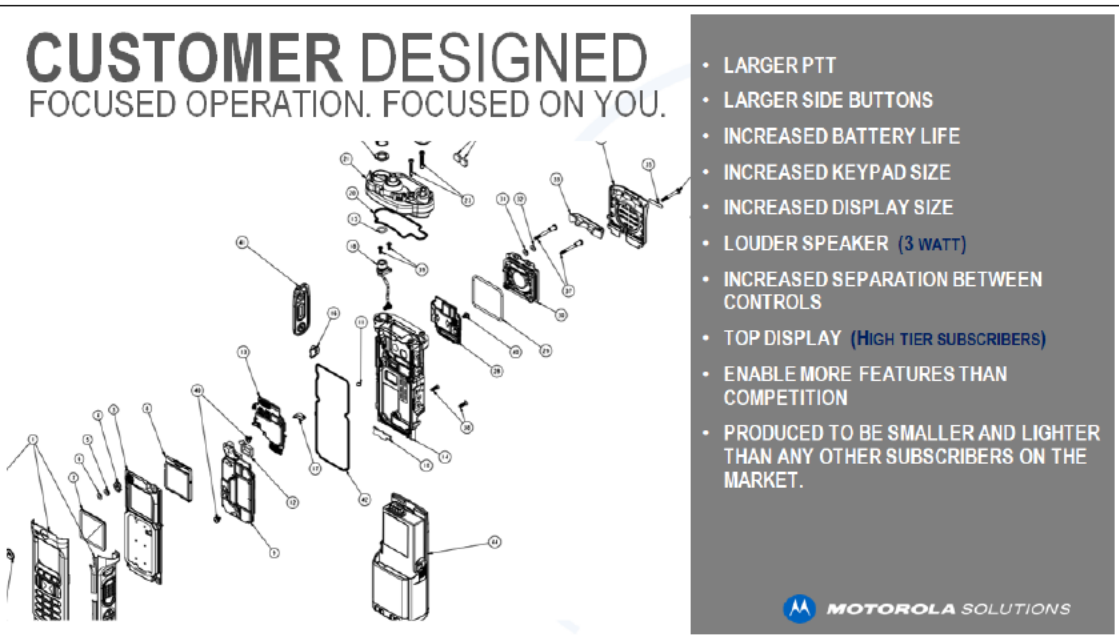


Figure 20: Customer Designed

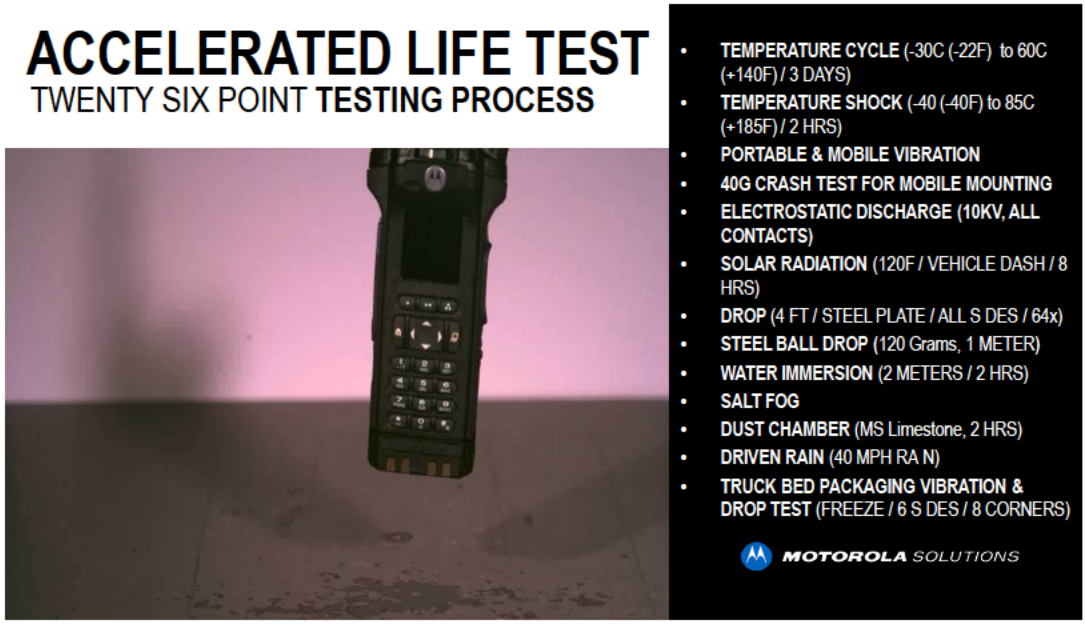


Figure 21: Accelerated Life Test

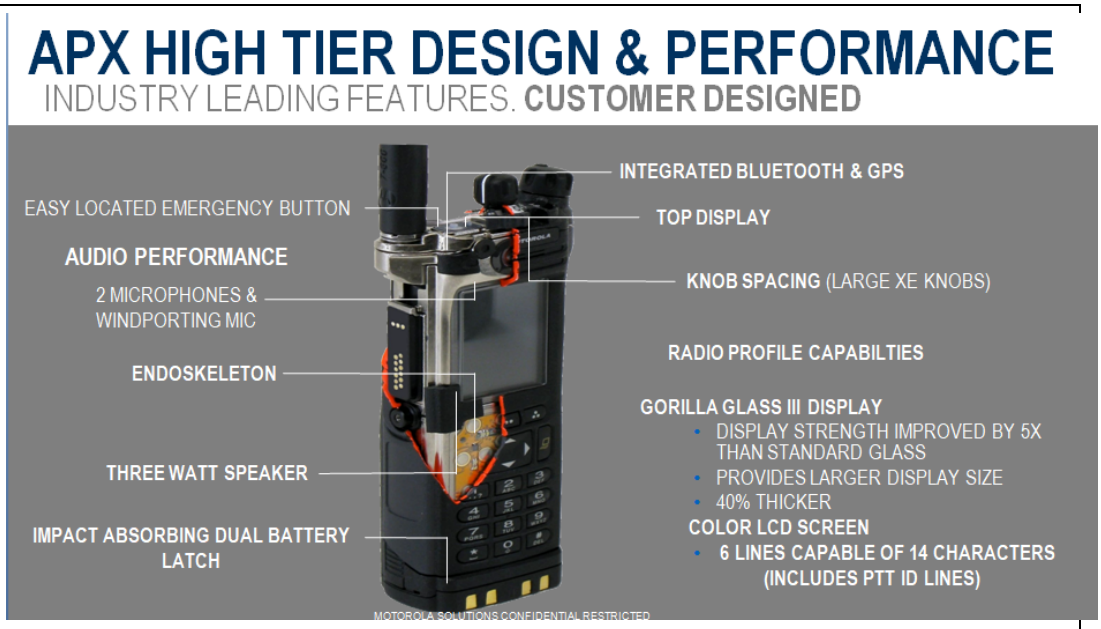
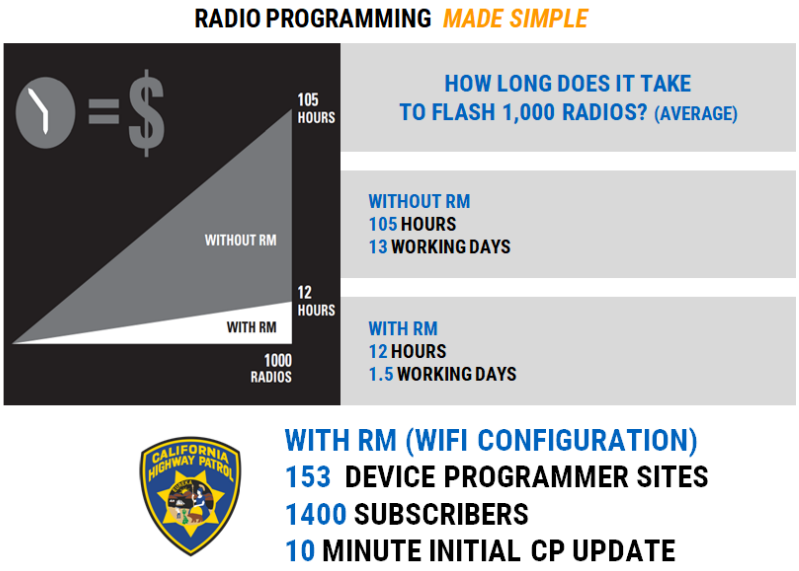


Figure 22: APX High Tier Design and Performance

3.	Offeror must acknowledge that all subscriber units will be capable for every feature and operational capability of the solution proposed including all software.
	Offeror Response: Comply Motorola Solutions subscriber offering for the State of North Dakota will provide solutions for all agency needs from channel capacity, mode of operation, mounting options for mobiles, control heads with enhanced operation & built in speakers for simplified installations, to optional features such as: AES encryption, OTAP, OTAR and multikey encryption operation. Our portable subscribers will comply with the request for specific features such as full and limited keypads with front displays.
4.	Offeror must acknowledge that all subscriber units shall meet the applicable portions of MIL-STD-810 C, D, E, F and G.
	Offeror Response: Comply Motorola Solutions APX subscribers both mobiles and portables meet and exceed the MIL STD specification.
5.	Offeror must acknowledge that all subscriber units shall be software programmable.
	Offeror Response: Comply Motorola Solutions APX subscribers share both firmware and programming software to allow for ease of use for management of any size radio deployment. Utilizing Motorola Solutions' Optional Radio Management solution., it allows all radio managers to set jobs for specific groups of radios, entire fleets, specific changes and be able to monitor the updates in an efficient manner. This will significantly cut the need for taking users

	and vehicles off the street for programming, adding to the customer of operation just for programming. Utilizing Optional Radio Management on a local network, device programmers can be setup to accept updates and users simply plug in their radio when an update is available and the radio manager can watch the status of upgrades. If the user operates Optional Over the Air Programming or Programming via Wi-Fi, the updates will build even while voice takes priority. Wi-Fi will allow for simultaneous voice traffic and update acceptance where optional OTAP will build in between voice calls.  **Figure 23: Radio Programming Made Simple**
6.	Offeror must acknowledge that all subscriber units shall be equipped to operate in the following operating modes: a. Conventional analog b. Conventional APCO P25 c. Trunked APCO P25 Phase 1 on-network d. Trunked APCO P25 Phase 2 on-network e. Encrypted (AES) and clear operation if encryption option is chosen
	Offeror Response: Comply Motorola Solutions proposed subscribers will adhere to the strict requirements for system and subscriber operation. Optional AES encryption will be available in all proposed units with the ability to “toggle” between clear and AES encryption radios channels maintain secure environments in all situations. APX 4000 Portable supports AES encryption algorithm only. APX 8000 Portables support AES and DES encryption algorithms. APX 4500 Mobile supports AES encryption algorithm only. APX 8500/7500 Mobiles support AES and DES encryption algorithms.

	Portable Subscriber Units
	Offeror must provide portable subscriber units that are highly reliable and intended for mission critical operations. Offeror must describe in detail their proposed subscriber units: a. Model 1: Low tier, typically identified with no keypad or display b. Model 2: Mid-tier, typically identified with limited keypad and display c. Model 3: High-tier, typically identified with full keypad and display. d. Model 4: High-tier Multi-band, capable of multiple frequencies typically identified with full keypad and display. e. Any others the Offeror wants to propose
7.	*Offeror Response:* Comply Motorola Solutions is responding with our APX 4000, 8000 ALL BAND portable subscribers and an optional 6000 & 6000XE subscriber. Our low and mid-tier APX4000 offering will be submitted as a Model 2 and Model 3 selection. This will mean a front display standard, intelligent light bar on the top of the unit to notify of emergency low battery and data messaging as well as a standard front display with the option of a limited or full keypad. Our high tier offering of the APX 8000 and 8000XE series will be equipped with a front display with full keypad, as well as a standard top display. Enhanced knob spacing for ease of use and halting accidental volume or channel changes. The 8000 series is our ALL BAND series which will have both 7/800. VHF and UHF equipped standard from the factory to operate multiple frequencies for interoperability across all systems, operation modes throughout the State of North Dakota. Motorola Solutions has also proposed the single band APX6000 and 6000XE enhanced model subscribers equipped with the full keypad, front display and standard top display and knob spacing design. The 6000 series, like the 8000 series proposed has the ability for Wi-Fi operation for programming and offloading GPS and data, our next generation adaptive audio engine which allows the user to enter any environment without the need for specific program templates for noise environments. **Model 1, 2, 3 APX4000 Portable Radios:** APX 4000 Portable Features AND Benefits: - Available in 700/800 MHz, VHF, UHF R1, UHF R2 and 900 MHz bands. - Analog MDC-1200 and Digital APCO P25 Conventional System Configurations. - Standard with 2 dedicated control knobs for volume and channel changes. - Man Down. - Lightbar with Intelligent Lighting. - Unified Call List. - ASTRO25 Integrated Voice & Data. - Full portfolio of accessories including IMPRES batteries, chargers and audio devices. - Narrow and wide bandwidth digital receiver (6.25 kHz equivalent / 12.5 kHz / 30 kHz / 25 kHz). - Embedded digital signaling (ASTRO & ASTRO25). - Available in 2 models. - Radio Profiles. - Software Key. - User programmable Voice Announcement.

- Meets Applicable MIL-STD-810C, D, E, F and G.
- Integrated GPS/GLONASS for outdoor location tracking.
- Trunking standards supported: Clear or digital encrypted ASTRO®25 Trunked Operation, Capable of SmartZone, SmartZone Omnilink, SmartNet.
- Supports USB communications.
- IP67 standard.
- Built in FLASHport support.
- Mission Critical Wireless Bluetooth.
- Rugged Submersible housing (2 meters for 2 hours).
- Superior Audio Features: 0.5 W high audio speaker, 2-mic noise canceling technology.
- Utilizes Windows XP, Vista and Windows 7 and 8 Customer Programming Software (CPS).

APX 4000 Portable Optional Features:

- AES Encryption.
- Programming Over Project 25.
- Text Messaging.
- Man Down.
- Site Selectable Alert Tones.
- P25 Over the Air Re-keying.
- P25 Link Layer Authentication.
- Enhanced Data.
- Rugged Option: Mil Std 512.X, Delta – T.

Model 4: APX8000 Portable Radios

APX 8000 Portable RF Bands:

- 700/800 MHz
- VHF
- UHF Range 1 & 2

APX 8000 Portable Operation Modes:

- 9600 Baud Digital APCO P25 Phase 1 FDMA and Phase 2 TDMA Trunking.
- 3600 Baud SmartNet®, SmartZone®, SmartZone, Omnilink Trunking.
- Digital APCO 25, Conventional, Analog MDC 1200, Quick Call II System Configurations.
- Narrow and wide bandwidth digital receiver (6.25 kHz equivalent/25/20/12.5 KHz).

APX 8000 Portable Standard Features:

- Mission Critical Wireless Bluetooth.
- LEX L10 Collaboration.
- Text-Messaging.
- ISSI 8000 Roaming.
- Intelligent Lighting.
- IP68 submersion (2 meters, 2 hours).
- ASTRO25 Integrated Voice & Data.
- Software Key.
- Voice Announcements.
- Radio Profiles, Dynamic Zone.
- Single-key ADP Encryption.
- IMPRES 2 Battery.

- Integrated GPS/GLONASS for outdoor location tracking.

APX 8000 Adaptive Audio Engine:

- 3 Watt Speaker with Adaptive Equalization.
- Adaptive Dual-sided Operation.
- Adaptive Noise Suppression Intensity.
- Adaptive Gain Control.
- Adaptive Windporting.

APX 8000 Programming:

- Utilizes Windows 7 & 8 Customer Programming Software (CPS) with Radio Management.

APX 8000 Optional Features:

- Wi-Fi® 802.11 b/g/n.
- Multi-key for 128 keys and multi-algorithm.
- Over the Air Rekey (OTAR).
- P25 Authentication.
- IP68 (2m/4hr), Mil Std 512.X Delta – T.
- RFID Volume Knob.
- Programming Over Project 25 (OTAP).
- Digital Tone Signaling.
- Man Down Sensor.

Listed by UL to non-incendive standards: ISA 12.12.01-2015 and CAN/CSA C22.2 No. 213-15 as safe for use in Class I, Division 2, Groups A, B, C, D; Class II, Division 2, Groups F, G; Class III, Division 2 Hazardous (Classified) Locations. Non-Incendive (Non Incendiaire) when used with Motorola Solutions Battery: PMNN4504A (Rated 7.4 V, 3400 mAh) or PMNN4505A (Rated 7.4 V, 4850 mAh).

Figure 24: APX600 – 8000 Series Design

Figure 25: APX4000 Series Design

8.	Offeror must describe all other proposed models of portable subscriber units capable of operating on the proposed solution including all proposed features.
	Offeror Response: Comply Motorola Solutions will be proposing our **APX4000** series for low and mid-tier radios. TDMA operation which agencies can double their voice capacity within their fixed allocation of frequencies. Additional channel capacity can be used for improved voice service or for optional integrating data applications such as GPS, OTAP and text messaging. Optional AES encryption offers 256-bit encryption and is defined in Federal Information Processing Standard 197 (FIPS-197). AES is currently the recommended and most robust type of digital encryption. Motorola Solutions APX subscribers being FIPS 104-2 Level 3 certified for the highest level of voice communication protection. Optional Multikey allows multiple encryption keys and multiple encryption algorithms to be loaded into a radio. These keys could be for different types of encryption algorithms or different keys associated with different talk-groups, personalities, or channels. Optional Enhanced Data offers 12x greater throughput of Supervisory Control and Data Acquisition (SCADA), machine telemetry and/or personnel biometrics. These signals are sent from radios into the system at a faster rate providing higher resolution and real-time status of electronic sensors, crash notifications, maintenance needs, vehicle speeds, environmental conditions and weather updates among others. Optional Over The Air Programming allows radios to support transmission and reception of data on an optional P25 Integrated Voice & Data (IV&D) channel, enabling optional features and applications such as OTAP, GPS, Text Messaging and Tactical OTAR. The feature is implemented such that voice always takes priority and can even interrupt data transmissions as needed. This ensures the added benefit of advanced data features does not compromise mission-critical voice. Optional Group Services is a subscriber feature offering conventional and trunking Alias updates and Trunking Group Messaging. 7.17 and G/S allows Over the Air codeplug Updates. Group Services delivers data to a talkgroups in a 1-to-many fashion. This is an efficient method to disseminate data to many radios. Compared to voice, the main difference here is group services only sends data in one direction direct to the radio. The radio only receives

broadcast data, but cannot broadcast. VOICE REMAINS PRIORTY with group services working in the background and pausing for voice traffic. Delta T offering will increase the IP rating from IP67 [1m/30min submersion] to IP68 [2m/2hr submersion] and offer enhanced durability in all environments**. The 36/9600 operation feature allows the 4000 series to interoperate on legacy and new Motorola Solutions P25 systems.** The 4000 series will also be equipped with a 5 year SFS warranty. Our APX4000 series comes standard with dual microphones, GPS for location, packet data for additional applications and Bluetooth operation that can utilize Motorola Solutions' mission critical one touch pairing and COTS devices.

Motorola Solutions will be proposing our **APX6000 and 6000XE** single band series for high tier requirements within this RFP. This model is IP68 rated for extreme environments standard from the factory. Our XE series is rated for submersion up to 4 hours up from the standard model offering of 2 hours and is equipped with a larger top display, larger control, volume & emergency buttons for gloved operation. Our APX 6000 series will come standard with an integrated evacuation tone, GPS, packet data and Bluetooth emergency find me. Our STANDARD Bluetooth 4.0 technology allows for mission critical pairing as well as the ability for COTS devices such the Scott Safety EPIC III RDI voice amplifier or the MSA G1 voice amplifier. This simplifies fire ground operation with the Bluetooth connection opened on the voice amplifier by the Bluetooth connection. Clear in mask audio will now be heard across the specified operation channel. The optional Green Housing offered on this subscriber is the last color the human eye can see before total darkness. This is a specific design feature brought to light from our voice of customer sessions with the fire service. This subscriber will be equipped with the Adaptive Noise Suppression technology. This operates based on the ambient noise level, the noise suppression intensity adapts to provide maximum noise cancellation while maintaining optimum voice clarity by adjusting the audio algorithm so you can cancel out the noise as it changes in the environment. TDMA operation which agencies can double their voice capacity within their fixed allocation of frequencies. Additional channel capacity can be used for improved voice service or for integrating data applications such as GPS, OTAP and text messaging. Optional AES encryption offers 256-bit encryption and is defined in Federal Information Processing Standard 197 (FIPS-197). AES is currently the recommended and most robust type of digital encryption. Motorola Solutions APX subscribers being FIPS 104-2 Level 3 certified for the highest level of voice communication protection. Optional Multikey allows multiple encryption keys and multiple encryption algorithms to be loaded into a radio. These keys could be for different types of encryption algorithms or different keys associated with different talk-groups, personalities, or channels. Optional Enhanced Data offers 12x greater throughput of Supervisory Control and Data Acquisition (SCADA), machine telemetry and/or personnel biometrics. These signals are sent from radios into the system at a faster rate providing higher resolution and real-time status of electronic sensors, crash notifications, maintenance needs, vehicle speeds, environmental conditions and weather updates among others. Optional Over The Air Programming allows radios to support transmission and reception of data on an optional P25 Integrated Voice & Data (IV&D) channel, enabling optional features and applications such as OTAP, GPS, Text Messaging and Tactical OTAR. The feature is implemented such that voice always takes priority and can even interrupt data transmissions as needed. This ensures the added benefit of advanced data features does not compromise mission-critical voice. Optional Group Services is a subscriber feature offering conventional and trunking Alias updates and Trunking Group Messaging. 7.17

and Group Services allows Over the Air codeplug updates. Optional Group Services delivers data to a talkgroups in a one-to-many fashion. This is an efficient method to disseminate data to many radios. Compared to voice, the main difference here is group services only sends data in one direction direct to the radio. The radio only receives broadcast data, but cannot broadcast. VOICE REMAINS PRIORTY WITH group services working in the background and pausing for voice traffic. The 6000 series is capable of Wi-Fi operation for simplified radio programming leveraging up to 20 Wi-Fi SSID's.

Motorola Solutions will be proposing our **APX8000 and 8000XE** ALL BAND series for high tier and multi-band requirements within this RFP. This model is IP68 rated for extreme environments standard from the factory. Our XE series is rated for submersion up to 4 hours up from the standard model offering of 2 hours The 8000 ALL BAND Series will come standard with an integrated evacuation tone, GPS, packet data and Bluetooth emergency find me. Our STANDARD Bluetooth 4.0 technology allows for mission critical pairing as well as the ability for COTS devices such the Scott Safety EPIC III RDI voice amplifier or the MSA G1 voice amplifier. This simplifies fire ground operation with the Bluetooth connection opened on the voice amplifier by the Bluetooth connection. Clear in mask audio will now be heard across the specified operation channel. This subscriber will be equipped STANDARD with the Adaptive Noise Suppression technology. This operates based on the ambient noise level, the noise suppression intensity adapts to provide maximum noise cancellation while maintaining optimum voice clarity by adjusting the audio algorithm so you can cancel out the noise as it changes in the environment. TDMA operation which agencies can double their voice capacity within their fixed allocation of frequencies. Additional channel capacity can be used for improved voice service or for optional integrating data applications such as GPS, OTAP and text messaging. Optional AES encryption offers 256-bit encryption and is defined in Federal Information Processing Standard 197 (FIPS-197). AES is currently the recommended and most robust type of digital encryption. Motorola Solutions APX subscribers being FIPS 104-2 Level 3 certified for the highest level of voice communication protection. Optional Multikey allows multiple encryption keys and multiple encryption algorithms to be loaded into a radio. These keys could be for different types of encryption algorithms or different keys associated with different talk-groups, personalities, or channels. Optional Enhanced Data offers 12x greater throughput of Supervisory Control and Data Acquisition (SCADA), machine telemetry and/or personnel biometrics. These signals are sent from radios into the system at a faster rate providing higher resolution and real-time status of electronic sensors, crash notifications, maintenance needs, vehicle speeds, environmental conditions and weather updates among others. Optional Over The Air Programming allows radios to support transmission and reception of data on an optional P25 Integrated Voice & Data (IV&D) channel, enabling optional features and applications such as OTAP, GPS, Text Messaging and Tactical OTAR. The feature is implemented such that voice always takes priority and can even interrupt data transmissions as needed. This ensures the added benefit of advanced data features does not compromise mission-critical voice. Optional Group Services is a subscriber feature offering conventional and trunking Alias updates and Trunking Group Messaging. 7.17 and Group Services allows Over the Air codeplug updates. Group Services delivers data to a talkgroups in a one-to-many fashion. This is an efficient method to disseminate data to many radios. Compared to voice, the main difference here is group services only sends data in one direction direct to the radio. The radio only receives broadcast data, but cannot broadcast. VOICE

REMAINS PRIORTY WITH group services working in the background and pausing for voice traffic. The 8000 series will be equipped with Wi-Fi operation for simplified radio programming leveraging up to 20 Wi-Fi SSID's The initial application is for Radio Management: updating your APX Portables more efficiently by eliminating the downtime associated with workshop reprogramming. Quickly update codeplug, firmware and FLASHport features using Wi-Fi 802.11n with WEP, WPA and WPA-2 security. All radio communications are maintained while the update is downloaded. With pre-provisioned Wi-Fi access, the APX 8000 can be pre-provisioned for ease right out of the box. Additional information is included in a manual with radios purchased with Wifi. This will allow initial power up to push the multiple radios the codeplug for operation within minutes.

APX 6000 Portable Features and Benefits:

APX 6000 RF Band:

- 700/800 MHz, VHF, UHF Range 1 & UHF Range 2.
- 9600 Baud Digital APCO P25 Phase 1 FDMA and Phase 2 TDMA Trunking.
- 3600 Baud SmartNet., SmartZone., SmartZone, Omnilink Trunking.
- Digital APCO 25, Conventional, Analog MDC 1200, Quick Call II System Configurations Narrow and Wide Bandwidth Digital Receiver (6.25 kHz Equivalent/25/20/12.5 kHz).

APX 6000 Standard Features:

- Mission Critical Wireless Bluetooth 4.0 (LE).
- Utilizes Windows 7 & 8 Customer Programming Software (CPS) with Radio Management.
- Voice Announcements.
- Radio Profiles.
- Intelligent Lighting.
- IP68 submersion (2 meters, 2 hours).
- Text Message.
- ASTRO25 Integrated Voice & Data.
- Emergency Find Me.
- Integrated GPS/GLONASS for Outdoor Location Tracking.
- ISSI 8000 Roaming.
- Dynamic Zone.
- Single-Key ADP Encryption.
- IMPRES 2 Battery (PMNN4485).
- Software Key.

APX 6000 Adaptive Audio Engine (Optional):

- 3-W Speaker with Adaptive Equalization.
- Adaptive Dual-Sided Operation.
- Adaptive Noise Suppression Intensity.
- Adaptive Gain Control.
- Adaptive Windporting.

APX 6000 Optional Features:

- Wi-Fi 802.11 b/g/n.
- RFID Volume Knob.
- Programming Over Project 25 (OTAP).
- LEX L10 Collaboration.
- Multi-key for 128 keys and Multi-Algorithm.
- Over the Air Rekey (OTAR).

	▪ Digital Tone Signaling. ▪ P25 Authentication. ▪ High Impact Green and Public Safety Yellow Colored Housing Options. ▪ Mission Critical Geofence. ▪ Man Down Capability. ▪ Rugged Option: IP68 (2m/4hr), Mil Std 512.X Delta – T. Listed by UL to the standards ANSI/TIA 4950-A and CAN/CSA C22.2 NO. 157-92 Classification Rating: Class I, Division 1, Groups C, D; Class II, Division 1, Group E, F, G; Class III, Hazardous (Classified) Locations. ANSI/ISA 12.12.01-2015 and CAN/CSA C22.2 No. 213-15; Class I, Division 2, Groups A, B, C, D; T3C. Tamb = -25° C to +60° C. when used with Motorola Solutions Battery: NNTN8921A NNTN8930A 7.4V.
9.	The Offeror is invited to describe in detail any portable subscriber units certified as intrinsically safe that is compatible with the proposed solution.
	Offeror Response: Comply APX 4000 Portable is certified by Underwriters' Laboratory when properly equipped with alternate battery options: ▪ IMPRES LI-ION 2500MAH UL/DELTA T Battery (NNTN8560A). ▪ IMPRES LI-ION 2500MAH RUGGED UL (NNTN8560). Motorola Solutions APX portable offering has radios of various UL certifications. Our APX4000 series is certified Division 1 and our APX8000XE series radio is Division 2 UL Certified.
10.	Offeror must indicate if the proposed portable subscriber units have the following features: a. Full compliance with APCO P25 features and operation b. PTT button c. Top-mounted on/off volume knob d. Talkgroup/channel selector e. Emergency button, protected from inadvertent activation f. Alphanumeric display (on applicable models), minimum of eight characters g. Transmit indicator h. Encryption (AES) Offeror must indicate if any of the proposed portable subscriber units do not have the above features.
	Offeror Response: Comply Full compliance with APCO P25 features and operation: Motorola Solutions is home to one of three P25 Compliance Labs in the United States.

	PTT button- Comply Large, recessed PTT button on ALL APX models for ease of PTT in any environment or operation. Top-mounted on/off volume knob – Comply. Our volume knobs are top mounted with compression rings for additional resistance for reduction in inadvertent volume adjustments. The proposed units can also be programmed for "soft powerdown" where if the volume is turned all the way off, the radio will only power down if one of the programmable buttons is depressed. Talkgroup/channel selector- Comply. Top mounted channel selector as well as the ability to have the menu keys programmed to channel up/down. Emergency button, protected from inadvertent activation - Comply. Emergency button is located at the base of the antenna for ease of use in dark environments and high stress environments. The emergency button can also be programmed for a long press to activate to avoid unnecessary emergency notifications. The XE series radios will have a larger emergency button for gloved use. Alphanumeric display (on applicable models), minimum of eight characters - Comply. Both our front and top displays [high tier top display only]. We also have RSM's capable of displays that will mimic the top displays of our high tier subscribers. These are compatible with our 4000 series to provide a user with a Top Display operation. Transmit indicator – Comply. There is the transmit and receive indicators which are easily visible to the user during operation. Optional Encryption (AES) – Comply. AES operation is being offered in all radios for the State of North Dakota and will have the ability to have AES strapped to channels for everyday operation and the ability to turn "clear" channels encrypted.
11.	Offeror must acknowledge that they will provide the following batteries (without cadmium): a. Nickel-Metal Hydride (NiMH) b. Lithium-ion c. Lithium-polymer
	Offeror Response: Comply The proposed batteries are IMPRES 2 Lithium-ion and as applicable IMPRES 2 Lithium-ion UL (Intrinsic Safety Rating). Motorola Solutions APX subscribers come equipped with Li-Ion batteries. Motorola Solutions does not offer NiMH batteries for our APX portable subscribers.
12.	Offeror must describe the minimum operational use time/hours of the proposed batteries.

Offeror Response:
Comply

The APX 4000 Portable comes standard with NNTN8128 IMPRES LiIon 1900 mAh battery. The NNTN8128 approximate operational time with 5/5/90 Duty Cycle is 8.5 hours.

IMPRES Battery Technology

They reduce the number of spare batteries you buy and increase the time before you need replacements. Only IMPRES batteries can be charged 150 additional times versus a standard battery. Motorola Solutions IMPRES technology has been a staple in XTS series subscribers providing enhanced battery performance between our radios and chargers. If you charge radios two to three times a week, you'll get more than an extra year out of every IMPRES battery. Motorola Solutions IMPRES technology is exclusive only to Motorola Solutions radios and has 26 patents filed to date. IMPRES technology allows the batteries and chargers to interact to provide advanced diagnostics through our IMPRES battery reader, real time capacity and charge cycles for enhanced management of your fleet of active and spare batteries. This technology is standard in all Motorola Solutions APX subscribers.

APX 4000 PMNN4448 IMPRES LiIon Battery:

a. Battery life: Approximately 13 Hours [5/5/90 Shift]
b. Total battery life-cycle expectancy: For lithium batteries, cycle life is highly dependent on the depth of discharge. Worst case is consistent full discharges. Lithium batteries that are fully discharged typically get approximately 400-500 cycles. As a general rule of thumb, consistently discharging to approximately half will approximately double the cycle life. Important to note that there is no industry standard for battery cycle life calculations. As a result, some battery competitors claim large (in the neighborhood of 800 to 900) battery cycles. Battery cycle life is also dependent on environmental exposure, batteries that are subjected to extreme hot or cold environments for extended periods of time will see a cycle life reduction.
c. Recharge time: NNTN8128 is a 2800maH battery. The desktop single and multi-unit chargers that we have for this battery have a max charge rate of 1.25A (1250mA), so the approximate recharge time from say 5% to 90% would be 2800 x 0.85 = 2350 / 1250 = approximately 1.9 hours.

APX 4000 NNTN8560 IMPRES LiIon Battery:

a. Battery life: Approximately 8.5 Hours [5/5/90 Shift]
b. Total battery life-cycle expectancy: For lithium batteries, cycle life is highly dependent on the depth of discharge. Worst case is consistent full discharges. Lithium batteries that are fully discharged typically get approximately 400-500 cycles. As a general rule of thumb, consistently discharging to approximately half will approximately double the cycle life. Important to note that there is no industry standard for battery cycle life calculations. As a result, some battery competitors claim large (in the neighborhood of 800 to 900) battery cycles. Battery cycle life is also dependent on environmental exposure, batteries that are subjected to extreme hot or cold environments for extended periods of time will see a cycle life reduction.

c. Recharge time: NNTN8560 is a 2500maH battery. The desktop single and multi-unit chargers that we have for this battery have a max charge rate of 1.25A (1250mA), so the approximately recharge time from say 5% to 90% would be 2500 x 0.85 = 2,125 / 1250 = approximately 1.7 hours.

APX 4000 NNTN8128 IMPRES LiIon Battery:

a. Battery life: 8.5 Hours [5/5/90 Shift]
b. Total battery life-cycle expectancy: For lithium batteries, cycle life is highly dependent on the depth of discharge. Worst case is consistent full discharges. Lithium batteries that are fully discharged typically get approximately 400-500 cycles. As a general rule of thumb, consistently discharging to approximately half will approximately double the cycle life. Important to note that there is no industry standard for battery cycle life calculations. As a result, some battery competitors claim large (in the neighborhood of 800 to 900) battery cycles. Battery cycle life is also dependent on environmental exposure, batteries that are subjected to extreme hot or cold environments for extended periods of time will see a cycle life reduction.
c. Recharge time: NNTN8128 is a 2000mAh battery. The desktop single and multi-unit chargers that we have for this battery have a max charge rate of 1.25A (1250mA), so the approximate recharge time from say 5% to 90% would be 2000 x 0.85 = 1700 / 1250 = approximately 1.5 hours.

APX8000 Portable Offering - All Batteries Listed In EQ Lists

IMPRES 2 Technology - High Tier Only

They reduce the number of spare batteries you buy and increase the time before you need replacements. Only IMPRES batteries can be charged 150 additional times versus a standard battery – a 43% increase in charge cycles. If you charge radios two to three times a week, you'll get more than an extra year out of every IMPRES battery. Motorola Solutions new IMPRES 2 technology improves over our industry leading battery performance from our XTS series of subscribers and enhances not only the battery capacity by adding between 300-450maH between our high tier battery tiers, but also adding an additional amp of power in both our single unit and multi-unit chargers. What does this mean for the user? 40% faster charge cycles and 60% longer battery life when utilizing the IMPRES 2 batteries and chargers together. We have also updated the warranty from the standard 1-year warranty to 2-year capacity warranty and 4-year workmanship warranty on our high tier subscriber batteries.

APX 6000XE IMPRES LiIon Battery

a. Battery life: Approximately 13.5 Hours [5/5/90 Shift]
b. Total battery life-cycle expectancy: For lithium batteries, cycle life is highly dependent on the depth of discharge. Worst case is consistent full discharges. Lithium batteries that are fully discharged typically get approximately 400-500 cycles. As a general rule of thumb, consistently discharging to approximately half will approximately double the cycle life. Important to note that there is no industry standard for battery cycle life calculations. As a result, some battery competitors claim large (in the neighborhood of 800 to 900) battery cycles. Battery cycle life is also dependent on environmental exposure, batteries that are subjected to extreme hot or cold environments for extended periods of time will see a cycle life reduction.

	c. Recharge time: NNTN8930 is 2650 mAH battery. The desktop single and multi-unit chargers that we have for this battery have a max charge rate of 3A (3000mA), so the approximate recharge time from say 5% to 90% would be 2650 x 0.85 = 2890 / 3000 = approximately 1 hour. <u>APX 8000XE NNTN8921 IMPRES LiIon Battery:</u> a. Battery life: Approximately 18.5 Hours [5/5/90 Shift] b. Total battery life-cycle expectancy: For lithium batteries, cycle life is highly dependent on the depth of discharge. Worst case is consistent full discharges. Lithium batteries that are fully discharged typically get approximately 400-500 cycles. As a general rule of thumb, consistently discharging to approximately half will approximately double the cycle life. Important to note that there is no industry standard for battery cycle life calculations. As a result, some battery competitors claim large (in the neighborhood of 800 to 900) battery cycles. Battery cycle life is also dependent on environmental exposure, batteries that are subjected to extreme hot or cold environments for extended periods of time will see a cycle life reduction. c. Recharge time: NNTN8921 is a 4500maH battery. The desktop single and multi-unit chargers that we have for this battery have a max charge rate of 3A (3000mA), so the approximate recharge time from say 5% to 90% would be 4500 x 0.85 = 3825 / 3000 = approximately 1.3 hour.
13.	Offeror must describe in detail the specifications for all batteries proposed, including the following at a minimum: a. Battery life b. Total battery life-cycle expectancy c. Recharge time d. Dimensions e. Weight f. Warranty g. Environmental conditions that will affect battery life h. Other
	<u>Offeror Response:</u> Comply <u>APX 4000 NNTN8128 IMPRES LiIon Battery:</u> a. Battery life: Approximately 8.5 hours (5/5/90 Shift) b. Total battery life-cycle expectancy: For lithium batteries, cycle life is highly dependent on the depth of discharge. Worst case is consistent full discharges. Lithium batteries that are fully discharged typically get approximately 400-500 cycles. As a general rule of thumb, consistently discharging to approximately half will approximately double the cycle life. Important to note that there is no industry standard for battery cycle life calculations. As a result, some battery competitors claim large (in the neighborhood of 800 to 900) battery cycles. Battery cycle life is also dependent on environmental exposure, batteries that are subjected to extreme hot or cold environments for extended periods of time will see a cycle life reduction.

	c. Recharge time: NNTN8128 is a 2800maH battery. NNTN8128 is a 2000mAh battery. The desktop single and multi-unit chargers that we have for this battery have a max charge rate of 1.25A (1250mA), so the approximate recharge time from say 5% to 90% would be 2000 x 0.85 = 1700 / 1250 = approximately 1.5 hours. d. Dimensions: 115 x 52 x 18 (H x W x D in mm) e. Weight: 160g f. Warranty: 12-month standard warranty, optional 3 or 5-year Service from the Start (SFS) g. Environmental conditions that will affect battery life: Operating temperature range of -10 to +60c h. Other: IP rating of IP67 <u>IMPRES 2 New Generation Batteries and Chargers</u> With IMPRES 2 chargers, you can charge IMPRES 2 batteries up to 40% faster. Customize your charging to extend the life of batteries in storage. And manage power more intelligently with enhanced diagnostics, so you get the most from each battery. IMPRES 2 batteries have been improved inside and out, so your team can tackle whatever the day brings. With higher capacity, you'll get more talk time. With better water resistance, you'll never think twice about submersion. And with the ability to charge up to 60% more times than standard Lithium Ion batteries, you will reduce costs. They reduce the number of spare batteries you buy and increase the time before you need replacements. Only IMPRES batteries can be charged 150 additional times versus a standard battery. Motorola Solutions IMPRES technology has been a staple in XTS series subscribers providing enhanced battery performance between our radios and chargers. If you charge radios two to three times a week, you'll get more than an extra year out of every IMPRES battery. Motorola Solutions IMPRES technology is exclusive only to Motorola Solutions radios and has 26 patents filed to date. IMPRES technology allows the batteries and chargers to interact to provide advanced diagnostics through our IMPRES battery reader, real time capacity and charge cycles for enhanced management of your fleet of active and spare batteries. This technology is standard in all Motorola Solutions APX subscribers.
14.	**Accessories** Offeror must list all available accessories including, but not limited to: a. Data cables b. Battery chargers: a. Single-bay battery charger (Multi-chemistry) b. Multiple-bay battery charger (Multi-chemistry) c. Vehicular charger (Multi-chemistry) d. Smart charger; deep cycling c. Alternate antennas d. Alternate batteries e. Remote speaker microphone f. Remote speaker microphone with antenna g. Headset:

e. Wired
f. Wireless/Bluetooth
h. Carrying cases/belt clips
i. Other

Offeror Response:

Comply

APX 4000 Portable Accessories Include:

- APX DATA CABLE, Q157
- PMKN4012B- Used to program the radio with Customer Programming Software and Tuner Software.
- PMKN4013C - Used to program and service the radio with Customer Programming Software and Tuner Software. Compatible on ALL APX Portable Radios
- CHGR DESKTOP SINGLE UNIT IMPRES, US/NA, PMPN4174A.
- CHARGER DESKTOP MULTI-UNIT IMPRES 2 1 DISPLAY EXT PS 100-240VACUS/N, PMPN4284A.
- VEHICULAR CHARGER, NNTN7616D.
- ASSEMBLY, CHARGER, MOTOTRBO TRAVEL, NNTN8525A.
- APX 7000 700/800- GPS ANTENNA, NAF5085A.
- ANT VHF, GPS whip antenna. 136-174 MHz, NAR6593A.
- ANT 1/4 WAVE 7/800 STUBBY, NAR6595A.
- BATT IMP STD LI ION 1900M 2000T, NNTN8128BR.
- BATT IMP LI ION 2300M 2350T, PMNN4424AR.
- BATT IMP STD LI ION 1250M 1300T, NNTN8305AR.
- IMPRES XP RSM FOR APX W/ DUAL MIC NOISE SUPPRESSION, NMN6271A.
- IMPRES XP RSM FOR APX W/ DUAL MIC NOISE SUPPRESSION, 3.5MM THRD JACK, NMN6274A.
- MPRES TEMPLE TRANSDUCER, PMLN5101A.
- HEAVY DUTY HEADSET, PMLN5275C.
- XBT HEADSET BTN, HEAVY DUTY HEADSET, BT, RLN6490A.
- XBT HEADSET HB, HEAVY DUTY HEADSET, BT, RLN6491A .
- APX2000/4000 TWO-KNOB, SWIVEL, LEATHER CARRY CASE, PMLN7182A.
- BELT CLIP 2", PMLN4651A.
- 2.5-INCH BELT CLIP, PMLN7008A.

APX 8000 Portable Accessories Include:

- PMKN4012B- Used to program the radio with Customer Programming Software and Tuner Software.
- PMKN4013C - Used to program and service the radio with Customer Programming Software and Tuner Software. Compatible on ALL APX Portable Radios.
- CHARGER, MULTI-UNIT, IMPRES 2, 6-DISP, NA/LA-PLUG, ACC USB CHGR, NNTN8844A.
- IMPRES MULTI UNIT CHARGER with DISPLAY US/NA/CA/LA, NNTN7073B.
- APX TRAVEL CHARGER, RLN6434A.
- CHARGER, SINGLE-UNIT, IMPRES 2, 3A, 115VAC, US/NA, NNTN8860A.
- KIT, ANTENNA, ALL-BAND, 20CM, KT000026A01.
- APX PSM 700/800MHZ ANTENNA, PMAF4002.

	- BATT IMPRES 2 LIION R IP68 4850T, PMNN4487. - BATT IMPRES 2 LIION R IP68 3400T, PMNN4486. - BATT IMPRES 2 LIION R IP68 2550T, PMNN4485. - BATT IMPRES 2 LIION R IP68 5100T, PMNN4494. - IMPRES XP RSM FOR APX W/ DUAL MIC NOISE SUPPRESSION, NMN6271A. - IMPRES XP RSM FOR APX W/ DUAL MIC NOISE SUPPRESSION, 3.5MM THRD JACK, NMN6274A. - PSM IP55 WITH 3.5MM JACK RX 18IN, PMMN4059B. - PSM IP55 WITH 3.5MM JACK RX 24IN, PMMN4060B. - PSM IP55 WITH 3.5MM JACK RX 30IN, PMMN4061B. - HEAVY-DUTY HEADSET, RLN6477A. - XBT HEADSET BTN, HEAVY DUTY HEADSET, BT, RLN6490A. - XBT HEADSET HB, HEAVY DUTY HEADSET, BT, RLN6491A. - APX6000 CC 2.75 SWLBL 2900&2150MAH, PMLN5657B. - APX6000 CC 3 FIX BL 2900&2150MAH, PMLN5658B. - APX6000 CC 2.75 SWL BL 4200MAH , PMLN5659B. - APX6000 CC 3 FIX BL 4200MAH, PMLN5660B. - APX6000 UNIVERSAL CARRY HOLDER, PMLN5709A.
	Portable Subscriber Units and Accessory Equipment Specifications
	Offeror must describe in detail the equipment specifications for all proposed portable subscriber units and accessories, including, but not limited to the following information: a. Radio dimensions b. Radio weight with battery c. Antenna type d. Frequency channel capacity e. General features, transmit/receive parameters and mechanical specs
15.	*Offeror Response:* Comply **PX 4000 RADIO MODELS, MODEL 2 / MODEL 3** - MODEL 2 Display • Full bitmap color LCD display. • 3 lines of text x 14 characters. • 1 line of icons. • 1 menu line x 3 menus. • White backlight. - MODEL 3 Display • Full bitmap color LCD display. • 3 lines of text x 14 characters. • 1 line of icons. • 1 menu line x 3 menus. • White backlight. - MODEL 2 Keypad • Backlight keypad.

- 3 soft keys.
- 4 direction Navigation key.
- Home and Data buttons.

- MODEL 3 Keypad
  - Backlight keypad.
  - 3 soft keys.
  - 4 direction navigation key.
  - 4x3 keypad.
  - Home and Data buttons.

Channel Capacity MODEL 2 / MODEL 3, 512 / 512.

- FLASHport Memory MODEL 2 / MODEL 3, 64 MB / 64 MB.
- Buttons and Switches, Large PTT button, Angled On/Off Volume Control, 16 position top-mounted rotary switch, Orange emergency button, 3 programmable side buttons.
- Power Supply, One rechargeable Li-Ion 1900 mAh battery standard, with alternate battery options available.
- Antenna Type, 700/800/GPS, or VHF/GPS.

<u>APX 4000 DIMENSIONS OF THE RADIOS WITHOUT BATTERY (Inches/ Millimeters)</u>

- Length 5.42 / 137.7.
- Width Push-To-Talk button 2.42 / 61.4.
- Depth Push-To-Talk button 1.41 / 35.75.
- Width Top 2.62 / 66.55.
- Depth Top 1.84 /46.7.
- Weight of the radios without battery 10.05 oz. / 285 g.

<u>APX 4000 RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS</u>

- Frequency Range/Bandsplits,
  - 700 MHz, 763-776 MHz, 800 MHz, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation,
  - 700/800 MHz, Full Bandsplit.
  - VHF, Full Bandsplit.
- Audio Output Power at Rated,
  - 700/800 MHz, 500mW.
  - VHF, 500mW.
- Frequency Stability (-30°C to +60°C; +25°C Ref.)
  - 700/800 MHz, ±0.00010 %.
  - VHF, ±0.00010 %.

<u>Analog Sensitivity (Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.)</u>

- 12 dB SINAD,
  - 700/800 MHz, 0.250µV.
  - VHF, 0.216µV.

Digital Sensitivity (Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions.)

- 1% BER,
  - 700/800 MHz, (800 MHz), 0.400µV.
  - VHF, 0.277µV.
- 5% BER,
  - 700/800 MHz, 0.250µV.
  - VHF, 0.188µV.

APX 4000 ENVIRONMENTAL SPECIFICATIONS

- Radio Operating Temperature, -30ºC / +60ºC.
- Radio Storage Temperature, -40ºC / +85ºC.
- Humidity, Per MIL-STD.
- ESD, IEC 801-2 KV.
- Water and Dust Intrusion, Mil Std 512.X, Delta – T.
- Battery storage is recommended at 25°C, ±5°C to ensure best performance.

APX 8000 Portables

APX 8000 TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700/800 MHz, 764-776, 794-806 MHz, 806-825, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/20/12.5 kHz.
  - VHF, 25/20/12.5 kHz.
- Maximum Frequency Separation,
  - 700/800 MHz, Full Bandsplit.
  - VHF, Full Bandsplit.
- Rated RF Output Power Adj,
  - 700/800 MHz, 700 MHz: 1-2.5 Watts, 800 MHz: 1-3 Watts.
  - VHF, 1-6 Watts.

BATTERIES FOR APX 8000

Battery Capacity / Type, Dimensions (HxWxD), Weight, Battery Part Number, Battery Capacity

- Li-Ion IMPRES 2, 3400 mAh(standard), 3.4” x 2.3” x 1.7”, 6.5 oz., PMNN4486, 3400 mAh.
- Li-Ion IMPRES 2, 4850 mAh, 5.0” x 2.3” x 1.7”, 11.0 oz. PMNN4487, 4850 mAh.
- Li-Ion IMPRES 2, 5100 mAh, 5.0” x 2.3” x 1.7”, 11 oz. PMNN4494, 5100 mAh.
- Li-Ion IMPRES UL2054 Div. 2 Rugged 3400 mAh IP68, 3.4” x 2.3” x 1.7”, 6.5 oz., PMNN4504, 3400 mAh.

- Li-Ion IMPRES UL2054 Div. 2 Rugged 4850 mAh IP68, 5.0” x 2.3” x 1.7” 10 oz. PMNN4505 4850 mAh.

APX 8000 RADIO MODEL 3.5

Display

- Top display plus:
- Full bitmap color LCD display.
- 4 lines of text x 14 characters.
- 2 lines of icons.
- 1 menu line x 3 menus.
- White backlight.

Keypad

- Backlit keypad.
- 3 soft keys.
- 4 direction navigation key.
- 4x3 keypad.
- Home and Data buttons.
- Channel Capacity, 3000.
- FLASHport Memory, 2 GB.
- Buttons & Switches, Large PTT button, Angled On/Off volume control, Orange emergency button, 16 position top-mounted rotary switch, 2-position concentric switch, Multi-color backlight, 3-position toggle switch, 3 programmable side buttons.

APX 8000 RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS

Frequency Range/Bandsplits,

- 700 MHz, 764-776, 794-806 MHz.
- 800 MHz, 806-825, 851-870 MHz.
- VHF, 136-174 MHz.
- Channel Spacing (700/800 or VHF), 25/20/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Audio Output Power at Rated (700/800 or VHF), 1 Watt.
- Frequency Stability (–30°C to +60°C; +25°C Ref.) (700/800 or VHF), +/- 1.0 ppm.
- Analog Sensitivity, 12 dB SINAD (Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.), (700 or 800 or VHF), 0.224 uV, 0.224 uV, 0.168 uV.

Digital Sensitivity (Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions.)

- 1% BER (700 or 800 or VHF), 0.316 uV, 0.316 uV, 0.251 uV.
- 5% BER (700 or 800 or VHF), 0.211 uV, 0.211 uV, 0.149 uV.
- 5% BER Faded (700 or 800 or VHF), 0.562uV, 0.562 uV, 0.562 uV.
- Antenna Type, all band /GPS.

APX 8000 DIMENSIONS OF THE RADIOS WITHOUT BATTERY (Inches / Millimeters)

- Length, 5.47 / 139.
- Width Push-To-Talk button, 2.39 / 60.7.
- Depth Push-To-Talk button, 1.40 / 35.6.

- Width Top, 2.98 / 75.7.
- Depth Top, 1.58 / 40.1.
- Depth Bottom of Battery, 1.24 / 31.5.
- Weight of the radios without battery, 11.25 oz. / 319 g.

APX 8000 ENVIRONMENTAL SPECIFICATIONS

- Radio Operating Temperature, -30ºC / +60ºC.
- Radio Storage Temperature, -40ºC / +85ºC.
- Humidity, Per MIL-STD.
- ESD, IEC 801-2 KV.
- Water and Dust Intrusion, IP68 (2 meters, 2 hours).
- Battery storage is recommended at 25°C, ±5°C to ensure best performance.

Antenna	Height (mm)	Diameter base (mm)	Diameter tip (mm)	Weight (g)
NAF5085	200MM	14.5mm	7.9MM	27.67 g
PMAE4065	142MM	14.5mm	12.7MM	4.54g
NAR6593	200MM	14.5mm	12.7MM	43.54g
FAF5259	93mm	14.5mm	12.7MM	25.40g
FAF5260	93mm	14.5mm	12.7MM	25.85g
NAR6594	200MM	14.5mm	11.11MM	45.35g
PMAT4001	218.05MM	14.5mm	11.11MM	45.35g
PMAS4001	193.675MM	14.5mm	12.7MM	45.35g
KT000026A01	220.25MM	14.5mm	11.11MM	44.45g

Figure 26: Antenna Specifications

ANTENNAS

PORTABLE RADIOS	ANTENNAS	DESCRIPTION	PART NUMBER	UHF / VHF / 700/800 MHz	FREQUENCY BAND (MHz)	INTEGRATED GPS	LENGTH (CM)	TYPE	INTRINSIC SAFETY RATING
APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 SRX 2200		700/800 MHz, GPS Whip Antenna	NAF5085	700/800	764-870	●	20	Whip	UL*
		UHF, GPS Whip Antenna	PMAE4065	UHF	380-520	●	14.2	Whip	UL*
APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 SRX 2200		VHF, GPS Whip Antenna	NAR6593	VHF	136-174	●	20	Whip	UL*
APX 4000		900 MHz, GPS Antenna	PMAF4008	800/900	896-941	●	6	Whip	
		800/900 MHz, GPS Combination Helical Antenna	PMAF4003	800/900	806-941	●	18	Helical	UL*
APX 8000/8000XE APX 7000 APX 6000/6000XE APX 4000 APX 1000		1/4 Wave, 700/800 MHz, GPS Stubby Antenna	NAR6595	700/800	764-870	●	9.8	Stubby	UL*
APX 6000 APX 6000XE APX 4000 APX 1000		UHF Range 1, GPS Stubby Antenna	FAF5259	UHF	380-470	●	9.3	Stubby	UL*
		UHF Range 2, GPS Stubby Antenna	FAF5260	UHF	470-520	●	9.3	Stubby	UL*
APX 8000 APX 8000XE APX 7000 APX 7000XE		VHF, 700/800 MHz Dual Band, GPS Whip Antenna	NAR6594	VHF, 700/800	136-174; 764-870	●	20	Whip	UL*
		VHF, UHF Dual Band, GPS Whip Antenna	PMAT4001	VHF, UHF	136-174; 380-520	●	21.8	Whip	UL*
		UHF 700/800 MHz Dual Band, GPS Whip Antenna	PMAS4001	UHF, 700/800	380-520; 764-870	●	19.7	Whip	UL*
APX 7000 (700/800 MHz only) APX 6000 (700/800 MHz only)		GPS Antenna (Directly connected to radio when a public safety microphone is used)	NAG4000	700/800		●	7	Stubby	
		700/800 Public Safety Microphone Only Stubby Antenna	PMAF4002	700/800	764-870		9	Stubby	
APX 8000		VHF, 700/800, UHF Range 1, UHF Range 2 GPS (radio only)	KT000026A01	VHF, 700/800		●		Whip	UL*
 APX 3000		Flexible Antenna, 700/800 MHz Includes one flexible antenna spacer	PMAF4006	700/800	764-870	●	41	Flexible	
		Flexible Antenna, UHF Includes three flexible antenna spacers	PMAE4080	UHF	308-470	●	77	Flexible	
		Flexible Antenna, VHF Includes two flexible antenna spacers	PMAD4125	VHF	136-174		44	Flexible	

Figure 27: Antenna Accessories

Mobile Subscriber Units and Control Station Units

16. Offeror must describe in detail a minimum of four tiers of Mobile Subscriber Units and Control Station Units.
    a. Model 1: Low Tier – Basic Mobile Subscriber Unit
    b. Model 2: Mid-Tier – Basic Mobile Subscriber Unit plus more features and limited keypad
    c. Model 3: High Tier – Capable of all options/feature sets available and full keypad
    d. Model 4: High-tier Multi-band, capable of multiple frequencies typically identified with full keypad and display.
    e. Any others the Offeror wants to propose

	Offeror Response: Comply APX4500 for Models 1 and 2, Low – Mid Tier, APX6500 for Model 3 High Tier and the APX8500 for Model 4 High Tier
17.	Offeror must describe in detail each model of mobile subscriber unit capable of operating on the system including all proposed features.
	Offeror Response: Comply Motorola Solutions will be proposing our **APX4500** mobile subscriber series for low and mid-tier radios. TDMA operation which agencies can double their voice capacity within their fixed allocation of frequencies. Additional channel capacity can be used for improved voice service or for optional integrating data applications such as GPS, OTAP and text messaging. Optional AES encryption offers 256-bit encryption and is defined in Federal Information Processing Standard 197 (FIPS-197). AES is currently the recommended and most robust type of digital encryption. Motorola Solutions APX subscribers being FIPS 104-2 Level 3 certified for the highest level of voice communication protection. Optional Multikey allows multiple encryption keys and multiple encryption algorithms to be loaded into a radio. These keys could be for different types of encryption algorithms or different keys associated with different talk-groups, personalities, or channels. Optional Enhanced Data offers 12x greater throughput of Supervisory Control and Data Acquisition (SCADA), machine telemetry and/or personnel biometrics. These signals are sent from radios into the system at a faster rate providing higher resolution and real-time status of electronic sensors, crash notifications, maintenance needs, vehicle speeds, environmental conditions and weather updates among others. Optional Over The Air Programming allows radios to support transmission and reception of data on an optional P25 Integrated Voice & Data (IV&D) channel, enabling optional features and applications such as OTAP, GPS, Text Messaging and Tactical OTAR. The feature is implemented such that voice always takes priority and can even interrupt data transmissions as needed. This ensures the added benefit of advanced data features does not compromise mission-critical voice. Optional Group Services is a subscriber feature offering conventional and trunking Alias updates and Trunking Group Messaging. 7.17 and Group Services allows Over the Air CODEPLUG Updates. Group Services delivers data to a talkgroups in a one-to-many fashion. This is an efficient method to disseminate data to many radios. Compared to voice, MAIN difference here is group services only sends data in one direction DIRECT to the radio. The radio only receives broadcast data, but cannot broadcast. VOICE REMAINS PRIORTY WITH group services working in the background and pausing for voice traffic. **The 36/9600 operation feature allows the 4000 series to interoperate on legacy and new Motorola Solutions P25 systems.** These mobiles will be equipped with a 5 year SFS warranty. The APX4500 mobile subscriber will also be configured in dash, remote or control station operation for various agency use. These will be equipped with the Motorola Solutions 02 Control Head. Motorola Solutions will be proposing our **APX6500** mobile subscriber series for low and mid-tier radios. TDMA operation which agencies can double their voice capacity within their fixed allocation of frequencies. Additional channel capacity can be used for improved voice service or for optional integrating data applications such as GPS, OTAP

and text messaging. Optional AES encryption offers 256-bit encryption and is defined in Federal Information Processing Standard 197 (FIPS-197). AES is currently the recommended and most robust type of digital encryption. Motorola Solutions APX subscribers being FIPS 104-2 Level 3 certified for the highest level of voice communication protection. Optional Multikey allows multiple encryption keys and multiple encryption algorithms to be loaded into a radio. These keys could be for different types of encryption algorithms or different keys associated with different talk-groups, personalities, or channels. Optional Enhanced Data offers 12x greater throughput of Supervisory Control and Data Acquisition (SCADA), machine telemetry and/or personnel biometrics. These signals are sent from radios into the system at a faster rate providing higher resolution and real-time status of electronic sensors, crash notifications, maintenance needs, vehicle speeds, environmental conditions and weather updates among others. Optional Over The Air Programming allows radios to support transmission and reception of data on an optional P25 Integrated Voice & Data (IV&D) channel, enabling optional features and applications such as OTAP, GPS, Text Messaging and Tactical OTAR. The feature is implemented such that voice always takes priority and can even interrupt data transmissions as needed. This ensures the added benefit of advanced data features does not compromise mission-critical voice. Optional Group Services is a subscriber feature offering conventional and trunking Alias updates and Trunking Group Messaging. 7.17 and Group Services allows Over the Air CODEPLUG Updates. Group Services delivers data to a talkgroups in a one-to-many fashion. This is an efficient method to disseminate data to many radios. Compared to voice, the main difference here is group services only sends data inone1 direction DIRECT to the radio. The radio only receives broadcast data, but cannot broadcast. VOICE REMAINS PRIORTY WITH group services working in the background and pausing for voice traffic. Optional OTAR with multikey provides encrypted systems with the ability to quickly deliver new encryption keys to secure radios over-the-air via a radio channel from a centralized key management server using a P25 standards-based interoperable solution. This allows system security administrators to efficiently and securely redistribute encryption keys on systems with highly sensitive voice and data communications, making it more difficult to eavesdrop, intercept, or hack communications. The MSU operation for the VRS allows the APX mobile radio to act as a Mobile Subscriber Unit (MSU) in a Digital Vehicular Repeater System (DVRS) environment to extend the system coverage to surrounding Portable Subscriber Unit (PSU) units. The MSU can be used in Local mode when only portable to portable communications are required, or it can be used in System mode which will enable full DVRS repeat locally and back into the system. The APX6500 will come equipped with both our 05 and 07 control head to meet the model 3 high tier requirements. This will be configured both remote or dash mount configurations. These subscribers will come equipped with our 07 control head that allows for enhanced operation with the full keypad included on the control head itself.

Motorola Solutions will be proposing our **APX8500** ALL BAND mobile subscriber series for high tier all band radio. TDMA operation which agencies can double their voice capacity within their fixed allocation of frequencies. Additional channel capacity can be used for improved voice service or for optional integrating data applications such as GPS, OTAP and text messaging. Optional AES encryption offers 256-bit encryption and is defined in Federal Information Processing Standard 197 (FIPS-197). AES is currently the recommended and most robust type of digital encryption. Motorola Solutions APX subscribers being FIPS 104-2 Level 3 certified for the highest level of voice

	communication protection. Optional Multikey allows multiple encryption keys and multiple encryption algorithms to be loaded into a radio. These keys could be for different types of encryption algorithms or different keys associated with different talk-groups, personalities, or channels. Optional Enhanced Data offers 12x greater throughput of Supervisory Control and Data Acquisition (SCADA), machine telemetry and/or personnel biometrics. These signals are sent from radios into the system at a faster rate providing higher resolution and real-time status of electronic sensors, crash notifications, maintenance needs, vehicle speeds, environmental conditions and weather updates among others. Optional Over The Air Programming allows radios to support transmission and reception of data on an optional P25 Integrated Voice & Data (IV&D) channel, enabling optional features and applications such as OTAP, GPS, Text Messaging and Tactical OTAR. The feature is implemented such that voice always takes priority and can even interrupt data transmissions as needed. This ensures the added benefit of advanced data features does not compromise mission-critical voice. Optional Group Services is a subscriber feature offering conventional and trunking Alias updates and Trunking Group Messaging. 7.17 and Group Services allows Over the Air CODEPLUG Updates. Group Services delivers data to a talkgroups in a one-to-many fashion. This is an efficient method to disseminate data to many radios. Compared to voice, the MAIN difference here is group services only sends data in one direction DIRECT to the radio. The radio only receives broadcast data, but cannot broadcast. VOICE REMAINS PRIORTY WITH group services working in the background and pausing for voice traffic. The 8000 series will be equipped with Wi-Fi operation for simplified radio programming leveraging up to 20 Wi-Fi SSID's The initial application is for Radio Management: updating your APX Portables more efficiently by eliminating the downtime associated with workshop reprogramming. Quickly update codeplug, firmware and FLASHport features using Wi-Fi 802.11n with WEP, WPA and WPA-2 security. All radio communications are maintained while the update is downloaded. With pre-provisioned Wi-Fi access, the APX 8000 can be pre-provisioned for ease right out of the box. Additional information is included in a manual with radios purchased with Wifi. This will allow initial power up to push the multiple radios the codeplug for operation within minutes. Optional OTAR with multikey provides encrypted systems with the ability to quickly deliver new encryption keys to secure radios over-the-air via a radio channel from a centralized key management server using a P25 standards-based interoperable solution. This allows system security administrators to efficiently and securely redistribute encryption keys on systems with highly sensitive voice and data communications, making it more difficult to eavesdrop, intercept, or hack communications. This will be configured both remote or dash mount configurations. These subscribers will come equipped with our 07 control head that allows for enhanced operation with the full keypad included on the control head itself.
18.	Offeror must acknowledge that the proposed mobile subscriber unit will be complete with microphone, external speaker, cables, fusing, mounting hardware, coaxial cable and antennas to provide for a complete installation.
	Offeror Response: Comply
19.	Offeror must acknowledge that the proposed control station units will be supplied complete with desk microphone, speaker, cables, coaxial cable and omnidirectional antennas to provide for a complete working package.

	Offeror Response: Comply Motorola Solutions will be offering control stations that will come standard with the desktop microphone, tray with speaker for the mobile transceiver as well as the antennas and cabling for a complete system. This will be achieved through both the APX4500 low and mid-tier offering, as well as the Model 3 high tier APX6500.
20.	Offeror must describe in detail any dash mounted units, remote mounted units and multi-head units that is capable of operating on the system.
	Offeror Response: Comply - APX 4500 Mobile is available in Dash Mount or Remote Mount configuration. - APX 8500 Mobile is available in Dash Mount, Remote Mount, or Multi Control Head configuration (Dual, Tri, or Quad). The O2, O5 or O7 Control Head hardware units only. The Control Head hardware cannot be mixed. - APX 7500 Mobile is only available in consolette configuration.
21.	Offeror must indicate if the propose subscriber units have the following features included: a. Full compliance with APCO P25 features and operation b. Front-mounted on/off volume knob c. Talk group/channel selector d. Emergency button, protected from inadvertent activation e. Alphanumeric display f. Transmit indicator g. GPS receiver (activated) h. Encryption (AES) Offeror must indicate if any of the mobile radios do not have the above features.
	Offeror Response: Comply The proposed mobile subscriber units (APX 4500 and APX 8500) are equipped with the listed features. Full compliance with APCO P25 features and operation Motorola Solutions is home to one of 3 P25 Compliance Labs in the United States. Front-mounted on/off volume knob, all APX control heads proposed have a dedicated power button in the top left of each control head. Talk group/channel selector Each control head offered has a dedicated group/channel selector knob, as well as the user can program the soft keys on each control head at the bottom of the menu can also be programmed for this function.

Emergency button, protected from inadvertent activation. As with our portables, there is a dedicated emergency button that can be configured for a long press to engage. This will reduce the accidental emergency triggers.

Alphanumeric display. The control heads are capable of 2 lines of text to 14 characters, row of soft key options and one row of indicator icons.

Transmit indicator The Transmit indicator will illuminate when the PTT on the palm microphone has engaged.

GPS receiver (activated) GPS can be activated in the radio as it is a standard feature. The satellite icon [pictured in top right corner] is blinking.

Optional Encryption (AES) AES encryption will show via indicator lights when zones, channels are encrypted for protected communication.

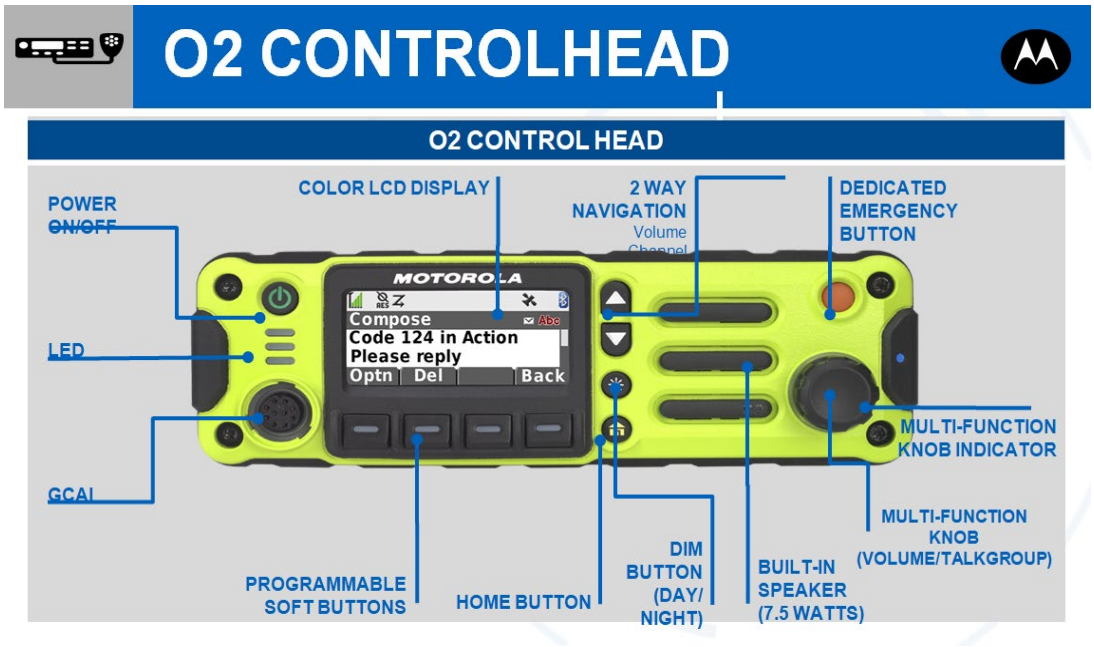


Figure 28: O2 Control Head

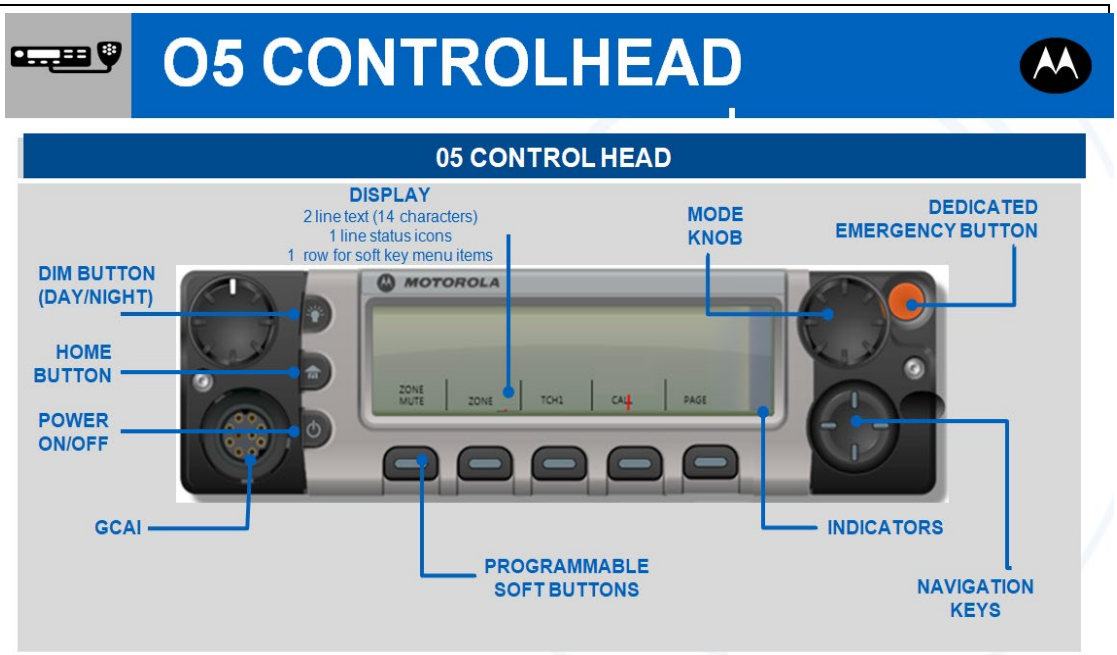


Figure 29: O5 Control Head

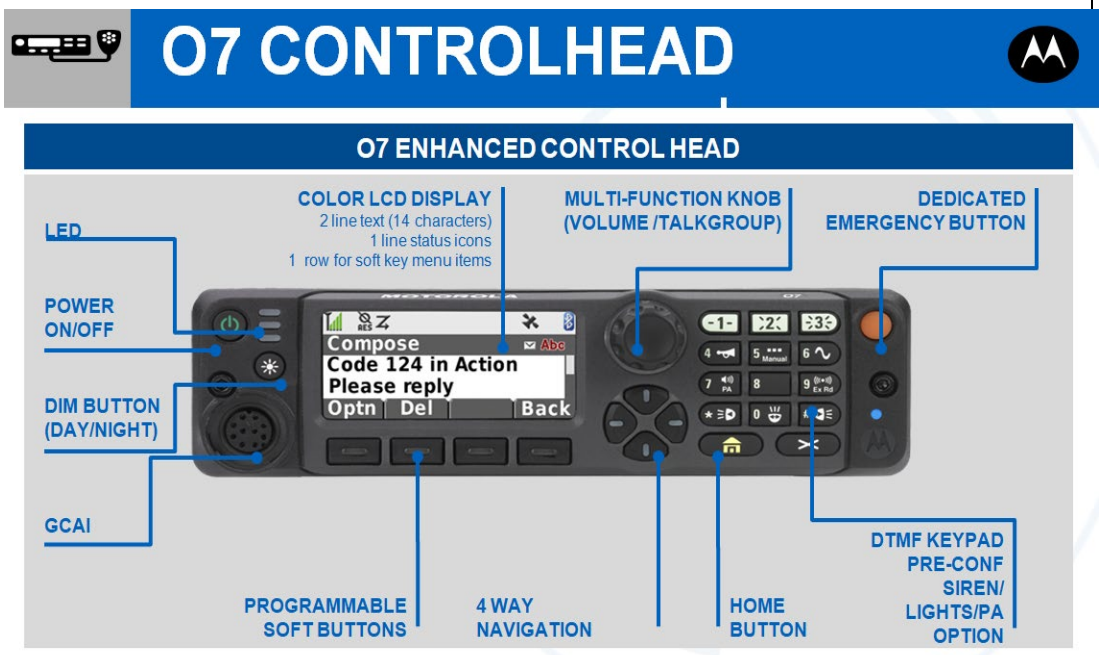


Figure 30: O7 Control Head

22. **Accessories**

Offeror must list all available accessories including, but not limited to:

a. Cables:
b. Data cables
c. Extension cables

	d. Adapters e. Power cables f. Antennas including GPS g. External Speakers h. Public address kits i. Remote speaker microphones j. Desktop microphone (control stations only) k. Other
	Offeror Response: Comply APX 4500 Mobile Accessories - CABLE CH, PROGRAMMING USB, HKN6184C. - EMERGENCY FOOT SWITCH, HLN5113. - EXTERNAL WATER RESISTANT SPEAKER 15 WATTS, HSN4040A. - MOBILE DESK TRAY HLN6042. - GPS ANTENNA KIT, HAG4000. - GPS ANTENNA KIT GLASS MOUNT PMAN4001. - CBL REMOTE MOUNT 75 FEET, HKN6166A. - WHELEN/MOTOROLA SIREN, TT2592. - Siren speaker, DDN1784A. - SIREN HARDWARE INSTALL KIT, TT05707AA. - ADD: SIREN TO RADIO CABLE (21-PIN D), DDN1833. APX 8500 Mobile Accessories - GPS/WI-FI ANTENNA, AN000163A01. - SPKR 15W WATER RESISTANT, HSN4040. - SPKR 7.5W WATER RESISANT, HSN4038. - CBL REMOTE MOUNT 75 FEET, HKN6166A. - RS232 DATA INTFC CABLE-DASH, 6 FT RS232 DATA CABLE, HKN6160A. - WHELEN/MOTOROLA SIREN, TT2592. - Siren speaker, DDN1784A. - SIREN HARDWARE INSTALL KIT, TT05707AA. APX 7500 Consolette Accessories - CONTROL STATION DESK GCAI MIC, RMN5070. - CABLE CH, PROGRAMMING, USB, HKN6184C.
23.	**Mobile and Accessory Equipment Specification** Offeror must describe in detail the equipment specifications for all proposed mobiles and accessories, including, but not limited to the following information: a. Radio dimensions b. Antenna type c. Frequency channel capacity d. General features, transmit/receive parameters and mechanical specifications e. Other

Offeror Response:
Comply

APX 4500 Mobile

APX 4500 TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776, 794-806 MHz.
  - 800 MHz, 806-825, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Rated RF Output Power Adj,
  - 700 MHz, 10-30 Watts.
  - 800 MHz, 10-35 Watts.
  - VHF, 10-50 Watts.

APX 4500 RECEIVER – TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776 MHz.
  - 800 MHz, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Audio Output Power at 3% distortion (700/800 or VHF), 7.5 W or 15 W.
- Frequency Stability (–30°C to +60°C; +25°C Ref.) (700/800 or VHF), ±0.8 PPM.
- Analog Sensitivity 12 dB SINAD (700/800 or VHF), –121 dBm, –121 dBm, Pre-Amp –123 dBm.
- Digital Sensitivity 5% BER (700/800 or VHF), –121.5 dBm, –121.5 dBm, –123 dBm.
- Antenna Type, 700/800, or VHF.

APX 4500 DIMENSIONS (Inches / Millimeters)

- Mid Power Radio Transceiver, 2 x 7 x 6.4 / 50.8 x 178 x 163.
- O2 Control Head, 2.7 x 8.1 x 2.1 / 69 x 207 x 53.
- Mid Power Radio Transceiver and O2 Control Head - Dash Mount 2.7 x 8.1 x 8.8 / 69 x 207 x 223.
- Mid Power Radio Transceiver and O2 Control Head Weight 5.28 lbs. / 2.45 kg.
- Operation 13.8V DC ±20% Negative Ground.

APS 4500 ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature, -30ºC / +60ºC.
- Storage Temperature, -40ºC / +85ºC.

- Humidity, Per MIL-STD.
- ESD, IEC 801-2 KV.
- Water and Dust Intrusion, IP56, MIL-STD.

APX 8500 Mobile

APX 8500 TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776, 794-806 MHz.
  - 800 MHz, 806-825, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/20/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Rated RF Output Power Adj,
  - 700 MHz, 10-30 Watts.
  - 800 MHz, 10-35 Watts.
  - VHF, 10-50 Watts.

APX 8500 RECEIVER – TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776 MHz.
  - 800 MHz, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/20/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Audio Output Power at 3% distortion (700/800 or VHF), 7.5 W or 15 W.
- Frequency Stability (–30°C to +60°C; +25°C Ref.) (700/800 or VHF), ±0.8 PPM.
- Analog Sensitivity 12 dB SINAD (700/800 or VHF), –121 dBm, –121 dBm, Pre-Amp –123 dBm.
- Digital Sensitivity 5% BER (700/800 or VHF), –121.5 dBm, –121.5 dBm, –123 dBm.
- Antenna Type, all band.

MOBILE APX 8500 (Inches / Millimeters)

- Mid Power Radio Transceiver, 2 x 7 x 8.4 / 50.8 x 178 x 213.
- O5 Control Head, 2 x 7 x 2.93 / 50.8 x 178 x 74.4.
- O2 Control Head, 2.7 x 8.1 x 3.8 / 68.4 x 206.3 x 96.4.
- O7 Control Head, 2 x 7 x 3.2 / 50.8 x 178 x 81.4.
- Mid Power Radio Transceiver and O5 Control Head - Dash Mount, 2 x 7 x 9.8 / 50.8 x 178 x 250.
- Mid Power Radio Transceiver and O2 Control Head - Dash Mount, 2.7 x 8.1 x 10.7 / 68.4 x 206.3 x 270.6.
- Mid Power Radio Transceiver and O7 Control Head - Dash Mount, 2 x 7 x 10.1 / 50.8 x 178 x 255.5.

- Mid Power Radio Transceiver and Remote Mount, 2.0 x 7 x 9.1 / 50.8 x 178 x 231.5.
- Mid Power Radio Transceiver and O5 Control Head Weight, 6.8 lbs. / 3.1 kg.
- Mid Power Radio Transceiver and O2 Control Head Weight, 7.23 lbs. / 3.28 kg.
- Mid Power Radio Transceiver and O7 Control Head Weight, 6.8 lbs. / 3.1 kg.

APX 8500 ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature, -30ºC / +60ºC.
- Storage Temperature, -40ºC / +85ºC.
- Humidity, Per MIL-STD.
- ESD, IEC 801-2 KV.

APX 7500 Consolette

AP X 7500 Transmitter - Typical performance specifications

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776, 794-806 MHz.
  - 800 MHz, 806-824, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Rated RF Output Power Adj,
  - 700 MHz, 10-30 Watts.
  - 800 MHz, 10-35 Watts.
  - VHF, 10-50 Watts.

APX 7500 RECEIVER – TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776 MHz.
  - 800 MHz, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Audio Output Power at 3% distortion (700/800 or VHF), 2.5 W.
- Frequency Stability (–30°C to +60°C; +25°C Ref.) (700/800 or VHF), ±0.00015 PPM.
- Analog Sensitivity 12 dB SINAD (700/800 or VHF), 0.25 µV, 0.25 µV, Pre-Amp 0.2 µV.
- Digital Sensitivity 1% BER (700/800 or VHF), 0.3 µV, 0.3 µV, Pre-Amp 0.25 µV.
- Digital Sensitivity 5% BER (700/800 or VHF), 0.25 µV, 0.25 µV, Pre-Amp 0.2 µV.
- Antenna Type, 700/800 or VHF.

APX 7500 Consolette

- Dimensions (W x D x H)

	- Full Featured Front Panel Configuration 16” x 18.75” x 4.2” (406 x 476 x 107mm) - Weight Full Featured Front Panel Configuration 19.5 lbs. (8.9 kg)
24.	**Multiband Mobile Subscriber Units** If The proposed solution includes multiband mobile subscriber units, Offeror must describe in detail the proposed frequency bands and use within the proposed solution.
	Offeror Response: Comply Motorola Solutions is offering the APX8500 ALL BAND mobile subscriber for the high tier, model 4 ALL BAND requirement. The 8500 series mobile will come with the full 7/800, VHF & UHF spectrum RF bands enabled from the factory at time of build. The user can custom order these units as single, dual or all band configurations.
25.	Offeror must describe in detail the specifications for the proposed radios and all accessories.
	Offeror Response: Comply
	Multiband Subscriber Units Mobile and Portable
26.	If The proposed solution includes multiband subscriber units, Offeror must describe in detail the proposed frequency bands and use within the proposed solution.
	Offeror Response: Comply The APX 8000/ 8500 multiband portable/mobile are applicable to the 800Mhz only solution. The 800 MHz band will support the SIRN repeater and simulcast sites, while the VHF band will support the existing system Site Repeater sites during transition and neighboring VHF Systems going forward.
27.	Offeror must describe in detail the use of multiband subscriber units in solution.
	Offeror Response: Comply The APX 8000/ 8500 multiband portable/mobile are applicable to the proposed 800Mhz only solution. The 800 MHz band will support the SIRN repeater and simulcast sites, while the VHF band will support the existing system Site Repeater sites during transition and neighboring VHF Systems going forward.
28.	Offeror must describe in detail why multiband subscriber units are being proposed vs. single band subscriber units and the overall impact to the system and user experience.
	Offeror Response: Comply

29.	Offeror must describe in detail how multiband and single band users interact and how will coverages be affected between the subscribers in a multi-agency response where the single band subscriber response to the multiband subscribers home coverage area.
	Offeror Response: Comply
30.	Offeror must describe in detail the specifications for the multiband subscriber units and all accessories.
	Offeror Response: Comply **APX 8000 Portables** APX 8000 TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS - Frequency Range/Bandsplits, • 700/800 MHz, 764-776, 794-806 MHz, 806-825, 851-870 MHz • VHF, 136-174 MHz. - Channel Spacing, • 700/800 MHz, 25/20/12.5 kHz. • VHF, 25/20/12.5 kHz. - Maximum Frequency Separation, • 700/800 MHz, Full Bandsplit. • VHF, Full Bandsplit. - Rated RF Output Power Adj, • 700/800 MHz, 700 MHz: 1-2.5 Watts, 800 MHz: 1-3 Watts. • VHF, 1-6 Watts. BATTERIES FOR APX 8000 Battery Capacity / Type, Dimensions (HxWxD), Weight, Battery Part Number, Battery Capacity - Li-Ion IMPRES 2, 3400 mAh(standard), 3.4” x 2.3” x 1.7”, 6.5 oz., PMNN4486, 3400 mAh. - Li-Ion IMPRES 2, 4850 mAh, 5.0” x 2.3” x 1.7”, 11.0 oz. PMNN4487, 4850 mAh. - Li-Ion IMPRES 2, 5100 mAh, 5.0” x 2.3” x 1.7”, 11 oz. PMNN4494, 5100 mAh. - Li-Ion IMPRES UL2054 Div. 2 Rugged 3400 mAh IP68, 3.4” x 2.3” x 1.7”, 6.5 oz., PMNN4504, 3400 mAh. - Li-Ion IMPRES UL2054 Div. 2 Rugged 4850 mAh IP68, 5.0” x 2.3” x 1.7” 10 oz. PMNN4505 4850 mAh. APX 8000 RADIO MODEL 3.5 - Display • Top display plus: • Full bitmap color LCD display. • 4 lines of text x 14 characters. • 2 lines of icons. • 1 menu line x 3 menus.

- White backlight.

- Keypad
  - Backlit keypad.
  - 3 soft keys.
  - 4 direction navigation key.
  - 4x3 keypad.
  - Home and Data buttons.
- Channel Capacity, 3000.
- FLASHport Memory, 2 GB.
- Buttons & Switches, Large PTT button, Angled On/Off volume control, Orange emergency button, 16 position top-mounted rotary switch, 2-position concentric switch, Multi-color backlight, 3-position toggle switch, 3 programmable side buttons.

APX 8000 RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776, 794-806 MHz.
  - 800 MHz, 806-825, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing (700/800 or VHF), 25/20/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Audio Output Power at Rated (700/800 or VHF), 1 Watt.
- Frequency Stability (–30°C to +60°C; +25°C Ref.) (700/800 or VHF), +/- 1.0 ppm.
- Analog Sensitivity, 12 dB SINAD (Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.), (700 or 800 or VHF), 0.224 uV, 0.224 uV, 0.168 uV.
- Digital Sensitivity (Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions.)
  - 1% BER (700 or 800 or VHF), 0.316 uV, 0.316 uV, 0.251 uV.
  - 5% BER (700 or 800 or VHF), 0.211 uV, 0.211 uV, 0.149 uV.
  - 5% BER Faded (700 or 800 or VHF), 0.562uV, 0.562 uV, 0.562 uV.
- Antenna Type, all band /GPS.

APX 80000 DIMENSIONS OF THE RADIOS WITHOUT BATTERY (Inches / Millimeters)

- Length, 5.47 / 139.
- Width Push-To-Talk button, 2.39 / 60.7.
- Depth Push-To-Talk button, 1.40 / 35.6.
- Width Top, 2.98 / 75.7.
- Depth Top, 1.58 / 40.1.
- Depth Bottom of Battery, 1.24 / 31.5.
- Weight of the radios without battery, 11.25 oz. / 319 g.

APX 8000 ENVIRONMENTAL SPECIFICATIONS

- Radio Operating Temperature, -30ºC / +60ºC.
- Radio Storage Temperature, -40ºC / +85ºC.
- Humidity, Per MIL-STD.

- ESD, IEC 801-2 KV.
- Water and Dust Intrusion, IP68 (2 meters, 2 hours).
- Battery storage is recommended at 25°C, ±5°C to ensure best performance.

APX 8500 Mobile

APX 8500 TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776, 794-806 MHz.
  - 800 MHz, 806-825, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/20/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Rated RF Output Power Adj,
  - 700 MHz, 10-30 Watts.
  - 800 MHz, 10-35 Watts.
  - VHF, 10-50 Watts.

APX 8500 RECEIVER – TYPICAL PERFORMANCE SPECIFICATIONS

- Frequency Range/Bandsplits,
  - 700 MHz, 764-776 MHz.
  - 800 MHz, 851-870 MHz.
  - VHF, 136-174 MHz.
- Channel Spacing,
  - 700/800 MHz, 25/20/12.5 kHz.
  - VHF, 30/25/12.5 kHz.
- Maximum Frequency Separation (700/800 or VHF), Full Bandsplit.
- Audio Output Power at 3% distortion (700/800 or VHF), 7.5 W or 15 W.
- Frequency Stability (–30°C to +60°C; +25°C Ref.) (700/800 or VHF), ±0.8 PPM.
- Analog Sensitivity 12 dB SINAD (700/800 or VHF), –121 dBm, –121 dBm, Pre-Amp –123 dBm.
- Digital Sensitivity 5% BER (700/800 or VHF), –121.5 dBm, –121.5 dBm, –123 dBm.
- Antenna Type, all band.

MOBILE APX 8500 (Inches / Millimeters)

- Mid Power Radio Transceiver, 2 x 7 x 8.4 / 50.8 x 178 x 213.
- O5 Control Head, 2 x 7 x 2.93 / 50.8 x 178 x 74.4.
- O2 Control Head, 2.7 x 8.1 x 3.8 / 68.4 x 206.3 x 96.4.
- O7 Control Head, 2 x 7 x 3.2 / 50.8 x 178 x 81.4.
- Mid Power Radio Transceiver and O5 Control Head - Dash Mount, 2 x 7 x 9.8 / 50.8 x 178 x 250.
- Mid Power Radio Transceiver and O2 Control Head - Dash Mount, 2.7 x 8.1 x 10.7 / 68.4 x 206.3 x 270.6.
- Mid Power Radio Transceiver and O7 Control Head - Dash Mount, 2 x 7 x 10.1 / 50.8 x 178 x 255.5.

	- Mid Power Radio Transceiver and Remote Mount, 2.0 x 7 x 9.1 / 50.8 x 178 x 231.5. - Mid Power Radio Transceiver and O5 Control Head Weight, 6.8 lbs. / 3.1 kg. - Mid Power Radio Transceiver and O2 Control Head Weight, 7.23 lbs. / 3.28 kg. - Mid Power Radio Transceiver and O7 Control Head Weight, 6.8 lbs. / 3.1 kg. APX 8500 ENVIRONMENTAL SPECIFICATIONS - Operating Temperature, -30ºC / +60ºC. - Storage Temperature, -40ºC / +85ºC. - Humidity, Per MIL-STD. - ESD, IEC 801-2 KV.
	Vehicular Repeater System (VRS)
31.	Offeror must describe in detail if they deem necessary to obtain coverages as a temporary solution to provide APCO P25 compliant VRS equipment to bridge the gap between contract award and the system implementation.
	Offeror Response: Comply P25 Digital Vehicular Repeater Extender (VRX1000) from Futurecom is proposed in order to enhance the predicted 10 dB loss building coverage in the rural areas. As required Futurecom VRX1000 is necessary solution. to improve the 10 dB loss building coverage. The in band 700/800 VRX1000 is proposed for all 800 MHz solution.
32.	Offeror must describe in detail if the proposed equipment is leased equipment or loaner equipment to be returned when the system is placed into operation.
	Offeror Response: Comply P25 Digital Vehicular Repeater Extender (VRX1000) from Futurecom is proposed in order to enhance the predicted 10 dB loss building coverage in the rural areas. As required, the Futurecom VRX1000 can be a solution to improve the 10 dB loss building coverage. The in-band 700/800 VRX1000 is proposed for the 800 MHz solution.
33.	Offeror must describe in detail if the proposed leased or loaner equipment is new or used equipment provided that it meets public safety grade requirements.
	Offeror Response: Comply P25 Digital Vehicular Repeater Extender (VRX1000) from Futurecom is proposed in order to enhance the predicted 10 dB loss building coverage in the rural areas. As required, the Futurecom VRX1000 can be a solution to improve the 10 dB loss building coverage.

	Installed in the trunk of a car, fire truck, or other vehicles, the VRX1000 extends your ASTRO25 network when portable users are outside of your vehicle, inside of a building or in any marginal coverage area. Some P25 VRX1000 General Specifications: - WATER AND DUST INTRUSION, IP54. - MILITARY STANDARDS COMPLIANCE (MIL-STD-810G) - High Temperature, 501.6 I – A1, 501.6 II (Operational). - Low Temperature, 502.6 I – C3, 502.6 II (Operational). - Temperature Shock, 503.6 – C Procedure I. - Rain, 506.6 III. - Humidity, 507.6 Procedure II (Aggravated). - Salt Fog, 509.6. - Vibration, 514.7 – I category 24. - Mechanical Shock, 516.7 Procedure I (Function), 516.7 Procedure VI (Bench Handling)..
34.	Offeror must acknowledge that all VRS units supplied are complete with all components required for an operational unit. *Offeror Response:* Comply Final frequencies are required prior to placing the order for either in band or cross band VRX1000's.
35.	Offeror must describe in detail to what level the proposed VRS units are compliant with APCO P25. *Offeror Response:* Comply **P25 Digital Vehicular Repeater Extender** P25 Digital Vehicular Repeater Extender VRX1000 from Futurecom is a radio system component that provides repeater capability between portable subscribers and RF base station infrastructure, extending radio coverage of your network. Extend Radio Coverage The VRX1000 is a simplex radio coverage extender, which is interfaced to a compatible remote mount Motorola Solutions Mobile Radio and enables Portable Subscriber Units (PSUs) to be used in areas where only Mobile Subscriber Unit (MSU) coverage is available and PSU coverage is either intermittent or completely absent. Installed in the trunk of a car, fire truck, armored vehicle, ambulance, the VRX1000 extends radio communications to the PSU users who are outside of the vehicle, inside a nearby building or in any marginal portable radio coverage areas. The VRX1000 extends voice (analog, P25 clear or P25 encrypted) communications and supports key trunking system features. The VRX1000 can be configured to provide various advanced options to the users.

	The VRX1000 supports only simplex mode and can't extend local PSU-to-PSU communications. When using the VRX1000, the Local PSUs communicate with each other in Talk Around (TA) mode and with the System users via the VRX1000. The DVRS is required in applications where local radio coverage extension is needed (between the Local PSUs) in addition to the System-to-Local PSU and Local PSU-to-System coverage extension. Key Features and Benefits: - Programmable output power: 0.5-3 watts. - Simplex operation. - P25 Digital / Analog operation - Available in VHF, UHF, 700 MHz AND 800 MHz bands. - In-Band or Cross-Band configurations. - Integrates to the remote mount Motorola APX 4500, APX 5500, APX 6500 and APX 7500 mobile radios - Operated through mobile radio control head. - Transparent P25 encryption pass-through. - Superior multi-unit operation. - Extends key P25 trunking features onto conventional simplex channel. - Sold exclusively through Motorola Solutions. - Field proven by many of the largest federal, state and provincial agencies in North America.
	Offeror must describe in detail the equipment specifications for all proposed VRS units and accessories including, but not limited to the following: a. Unit dimensions b. Unit weight c. Antenna type d. Frequency channel capacity e. General features, transmit/receive parameters and mechanical specifications
36.	*Offeror Response:* Comply P25 VRX1000 Transmitter Specifications: - 700 MHz, 764-776 MHz. - 800 MHz, 851-869 MHz. - Frequency Band [MHz] 136-174 MHz. - Power Output at Antenna Port, 3W (programmable per channel from 0.5W to 3W). - Frequency Stability (-30°C to +60°C; +25°C Ref), +/- 0.75 ppm. P25 VRX1000 Receiver Specifications: - 700 MHz, 764-776 MHz, 794-806 MHz. - 800 MHz, 806-824 MHz, 851-869 MHz. - Frequency Band [MHz] 136-174 MHz. - Receiver Sensitivity Analog 12 dB SINAD, -115 dBm.

	- Digital P25 5% BER, -115 dBm. - Frequency Stability (-30°C to +60°C; +25°C Ref), +/- 0.75 ppm. - Dimensions: Height / Width / Depth: 45mm x 175mm x 160mm (cross band, no filters) - Weight: 2kg / 4.4 lbs. (cross band, no filters) P25 VRX1000 General Specifications: - CHANNEL SPACING, 12.5 or 25 kHz programmable. - NUMBER OF CHANNELS, 192. - CTCSS / DCS, Programmable per channel. - POWER SUPPLY, 13.8V DC +/- 20%, negative ground only. - DC CURRENT DRAIN (VRX1000 ONLY) - VRX1000 Off, 0.01 A Max. - VRX1000 Standby, 0.8 A Max. - VRX1000 Receive, 0.8 A. - Transmit, 3.0 A. - OPERATING TEMPERATURE, -30°C to +60°C. - STORAGE TEMPERATURE, -40°C to + 85°C. - WATER AND DUST INTRUSION, IP54. - MILITARY STANDARDS COMPLIANCE (MIL-STD-810G) - Antenna: Unity Gain Antenna Quarterwave Roof Mount.
37.	**Portable Subscriber Unit Vehicular Adapter** As an option, the Offeror must describe in detail the ability to provide handheld unit vehicular adapter, vehicle powered, that will accept the portable subscriber unit and convert it to mobile use. The features desired consist of the following: a. Handheld microphone b. External speaker c. Charger for portable (while in unit) d. External antenna Offeror describe in detail the features included in the proposed units.
	Offeror Response: Comply with Clarification APX Vehicular Adapter includes fused power cable, two (2) keys for the lock, screws for attaching VA to the trunion and quick start guide. Trunion mounting bracket must be ordered separately. The APX Vehicular Adaptor (APX VA) is compatible with APX 6000, APX 6000Li, APX 6000XE and SRX 2200 radios. VHF is not supported. APX 6000 portable price will be provided upon request.

10. FREQUENCY COORDINATION AND LICENSING

For the duration of the contract, the Offeror will provide all frequency coordination, new licensing, relicensing, current licensing modifications with the FCC. Offeror will also provide all FAA coordination and approvals.

No.	
1.	Offeror must describe in detail their frequency plan for the proposed solution. *Offeror Response:* Comply Motorola Solutions plans to utilize 800 MHz frequencies at all sites for both simulcast and ASR sites deployed in Phases 2 and 3. The 800 MHz channels will need to be coordinated with State coordinator and later with the FCC. As such, the following frequencies will be required: Phase 2 and 3: 800 MHz ASR Sites require a total of 363 frequencies across the 121 sites *NOTE: Frequencies may be reused / reassigned due to physical separation of simulcast sites in the State.* This includes 3 channels at each site. Phase 3: 800MHz Simulcast Sites require a total of 29 frequencies *NOTE: Frequencies may be reused / reassigned due to physical separation of simulcast sites in the State.* - Bismarck/Mandan: 5 frequencies at 4 sites - Dickenson: 4 frequencies at 2 sites - Fargo/W Fargo: 4 frequencies at 3 sites - Grand Forks: 4 frequencies at 2 sites - Jamestown: 4 frequencies at 2 sites - Minot: 4 frequencies at 2 sites - Williston: 4 frequencies at 3 sites
2.	**FCC Licenses** Offeror must describe in how they will provide the following services: a. frequency coordination, b. frequency planning, c. new licensing, d. relicensing and renewal, e. current licensing modifications and f. applicable Frequency Coordination and FCC License forms The Offeror must acknowledge that the STATE will review and approve all LMR licenses.

	Offeror Response: Comply Motorola Solutions has included the services defined below for the original licensing submission. If service is purchased for 10+ years, the required FCC renewals can be calculated and quoted based upon the final system design and rollout schedule. Motorola Solutions acknowledges the State will review and approve all LMR licenses. Motorola Solutions has provided frequency associated services for the customer provided frequencies which will be designated for use as part of the radio network proposed offering. Below is a list of services which are included for the original submission of the designated frequencies. 1. Motorola Solutions will assist the State with frequency coordination/modification and licensing (re-licensing) by providing any required technical details and parameters necessary for proper licensing or modifications to existing State FCC license(s), as applicable. 2. Motorola Solutions will complete 601 forms requesting the proposed sites with the proposed channels, apply and work with coordinator, RPF (Regional Plan Chairman) and FCC. 3. Provide licensing research and site surveys, as applicable. 4. Work with Public Safety RPC (Regional Plan Chairman) 5. Complete contour studies and coverage analysis, as needed. 6. Work to prepare Slow Growth letter request and implementation schedule if more than one year is needed to become fully constructed and operational. 7. Complete final licensing package file with FCC, track FCC processing, handle FCC correspondence until FCC issues license grants and include associated FCC fees, as required.
3.	**FCC Licenses** Offeror must describe in detail their ability to be responsible for any additional frequency research, support, preparation and apply if necessary. Offeror must acknowledge that the STATE is the final license holder for all new licenses.
	Offeror Response: Comply Motorola Solutions has included services for the original submission. Should additional frequency research, support and preparation be required this can be quoted separately. Motorola Solutions acknowledges the State is the final license holder for all new licenses.
4.	Offeror must describe in detail how they will conduct an intermodulation analysis and how they will report the findings.
	Offeror Response:

	Comply The State is responsible for collecting all existing Transmit Antenna information for both existing LMR and Microwave per RF site including: - Tx antenna heights. - Antenna Model. - Electrical/Mechanical Downtilt if any. - Number of channels on each antenna. - ERP of each antenna. - Frequency Range of each antenna. <u>Intermodulation Analysis – Phases 2 and 3</u> Motorola Solutions will perform an IM analysis to identify potential IM problems that will exist after all known transmitter and receiver information has been provided for each RF site. The IM analysis does consider the receiver bandwidth of The proposed solution to determine if any IM products fall within the proposed system receiver's IF selectivity and cause interference. Each IM analysis report will include input data, results of analysis and conclusion summary.
	FAA Offeror must describe in detail their ability to complete FAA forms as necessary and provide the forms to the STATE for review and approval. The STATE shall execute and submit all forms following approval.
5.	*<u>Offeror Response:</u>* Comply As applicable for the proposed sites, Motorola Solutions will include the completion of any FAA forms, if needed. Forms will be provided to the State for review and approval and submission.

11. ENCRYPTION

As an option, the Offeror must include encryption for both infrastructure and subscriber units in The proposed solution Any encryption proposed must be interoperable between hardware manufacturers and standards based. Proprietary encryption is not acceptable.

No.	
1.	Offeror must describe in detail what type of standards based encryption is being proposed. *Offeror Response:* Comply The proposed ASTRO25 radio system infrastructure (including base stations) is transparent to secure encryption algorithms. The proposed MCC7500E radio dispatch console operator positions and optional Archiving Interface Servers (AIS's) can be equipped with optional AES and DES-OFB encryption algorithms. Advanced Encryption Standard (AES) The Advanced Encryption Standard (AES) is an improvement over DES algorithms, using keys of 128, 192 bits, or 256 bits to encrypt blocks of 128-bit traffic. The Motorola Solutions secure voice solution. uses a 256-bit key. AES uses the Rijndael algorithm with symmetric block cipher. Between 3.4 x 10E38 and 1.1 x 10E77 possible unique keys can be used with this algorithm, depending on the size of the key used. This enhances communication security by providing a range of at least 10E21 more unique keys than DES. The Advanced Encryption Standard is defined in FIPS publication 197. AES allows interoperability, like DES-OFB. Data Encryption Standard (DES/DES-XL/DES-OFB) The Data Encryption Standard (DES) was developed by IBM for the federal government and is approved to provide security for sensitive, unclassified radio communication. This standard uses 56-bit keys, with each byte of the key having odd parity (odd number of binary 1s). 7.2 x 10E16 unique keys can be used with this algorithm. While several varieties of DES exist, the ASTRO25 system supports DES-XL and DES-OFB. The DES-OFB algorithm has been selected as the APCO 25 digital encryption standard. DES-OFB utilizes the output feedback (OFB) method of encryption synchronization and is only compatible with systems using the APCO 25 specified Advanced Multi-Band Excitation (AMBE) vocoder. For DES-OFB, data is divided into blocks of bits and encrypted output from one block of data is used as an additional input for encrypting the next block of data. DES-OFB is not self-synchronizing. The Data Encryption Standard is defined in FIPS publications 46-2, 46-3 and 81.
2.	Offeror must describe in detail how encryption can be deployed system wide without limiting interoperability between agencies within the same discipline on any talk group or channel.

	Offeror Response: Comply To support interoperation between agencies, each end point must be provisioned with a common key. The common key would be used for an interoperable call, where each secure device that participates in the call, regardless of its agency association, can perform the correct encryption and decryption. In systems that use the MCC7500E, end-to-end encryption is supported, making it unnecessary to separate agencies by zones in order to maintain a level of cryptographic (or physical) separation. Each console unit can be provisioned separately with key material, thereby allowing consoles from different agencies to share the same zone.
3.	Offeror must describe in detail the proposed encryption key management on a Statewide, multi-tenant system.
	Offeror Response: Comply There are two ways to manage secure keys in an ASTRO25 system: - Non-centralized, using an optional key loading device (i.e. KVL 4000). - Centralized, using the optional Key Management Facility (KMF). (Part of the Optional Over The Air Rekeying feature) Initial Key Loading Initial encryption key distribution is performed manually using a key loader device. An optional key loader is a handheld portable device that connects through a cable to a secure device. There are two ways to handle initial key loading for a device: - Manual key loading. - Store and Forward. (Part of the Optional Over-the-Air Rekeying (OTAR) feature) Key Management Once keys are initially loaded into the correct radios and other system entities, you must manage key material to ensure that your encryption scheme remains effective. Effective management of keys requires changing them regularly. Rekeying in ASTRO25 Systems One way to change keys is by loading new keys into existing units, known as rekeying. Before the existence of the optional KMF, changing the encryption keys meant bringing radios into the shop or carrying a hand-held device into the field to load the new keys. With the help of the optional KMF, new keys can be loaded into radios using Over-the-Air Rekeying (OTAR) or other devices using Over-The-Ethernet Keying (OTEK), both optional features. The Full Update command sends all OTAR information, including keys, for the selected unit, regardless of currency status. The CKR Update command uses OTAR to assign new encryption keys to a CKR group. All radios that use the CKR are updated by the KMF and acknowledgments are tracked and reflected in the CKR currency display.

A Rekey Request is a message sent from a radio to the optional KMF requesting an update to the key management information. This request can be encrypted or clear. The optional KMF automatically sends a response to the radio and begins an update, full or optimized, without any actions required by the operator. The Operations Status view in the KMF Client application displays the status of Rekey Requests and Full Updates.

Non-Centralized Key Management Using KVL (Optional)

The Motorola Solutions non-centralized key management solution. allows you to manage encryption keys for your entire system using one or more optional key loading devices, such as the KVL 3000, KVL 3000 Plus, or KVL 4000. The KVL is a handheld portable device that connects to a secure device through a cable.

The optional KVL supplies the encryption keys the secure device needs to perform encryption and decryption operations. The optional KVL uses Traffic Encryption Keys (TEKs) to encrypt voice or data. To load keys manually, do one of the following:

- Take the KVL to the secure device (such as a radio).
- Bring the secure devices to the KVL.

If you have many portable or mobile radios in your system, this process can take a considerable amount of time, especially if the radios are widely dispersed.

Management and Administration of keys, key IDs and radio user IDs in a Non-Centralized configuration are manual.

Centralized Key Management Using the KMF (Optional)

Centralized key management uses the optional KMF to associate groups of devices with specific keys. When these associations have been created, the keys must be loaded into the correct devices for the encryption scheme to function. There are four methods of transporting keys using the KMF:

- Optional Over-The-Air Rekeying (OTAR).
- Optional Store and Forward rekeying.
- Optional Over-The-Ethernet Keying (OTEK).
- Optional Exported Encrypted Key File.

The key transport method you use depends on the types of secure devices you have and the capabilities of your system.

Each Agency within the Statewide system is responsible for manually keeping track of the encryption keys deployed and periodic rekeying of impacted console operator positions and radio subscribers. Statewide Mutual Aid talkgroups and keys are to be identified and managed by the State. Key Mapping is an integral part of system Fleetmapping development.

Key Mapping

The key map is the basic plan your organization creates so that the relationships between groups, encryption keys, keysets and Common Key References (CKRs) can be planned out and understood.

	Before setting up the system, your organization needs to consider such questions as: - What groups must talk to each other on a regular basis? - Are there groups within groups that must be able to communicate securely? - Are there groups that must communicate securely, but not as often? - What group or groups is the console communicating with? For example, the start of such a plan may include the following three groups that need secure communications. Within each group, subgroups that must maintain secure communications separate from the larger group are identified. - Fire Department • Fire Company #1 • Fire Company #2 - Police Department • Precinct 1 • Precinct 2 - Search and Rescue • Harbor Area • Mountain Villas Once the various groups are determined, keys and CKRs can be set up.
4.	Offeror must describe in detail the proposed encryption key management on a Statewide, multi-tenant system with multiple subscriber manufacturers and multiple dispatch console manufactures utilizing standards based CSSI connections.
	Offeror Response: Comply The Provisioning Manager (PM) Foreign Group Capabilities Profile object defines a set of parameters that are common for a specific foreign group. Each Foreign Group Capabilities Profile contains capability parameters that can be customized per configured profile. Every foreign group is assigned a Foreign Group Capabilities Profile. The configuration of this object impacts the following devices: - Zone Controller. - VPM Archiving Interface Server. - Console. As part of Security Group definition for the Foreign group, secure communication mode selections are: - Clear - allows a radio user to transmit clear (non secure) talkgroup calls only. - Secure - allows the radio user to transmit secure (encrypted) talkgroup calls only. - Both - allows the radio user to transmit both clear and secure talkgroup calls.

	During Phase 1, Motorola Solutions proposes ASTRO25 MCC7500E at twenty (20) console dispatch sites and an upgrade for two (2) existing MCC7500E console dispatch sites.
5.	Offeror must describe in detail user, key management, key ID and administrator training.

Offeror Response:
Comply

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO 25 IV&D Secure Communication Workshop (OTAR) to include KMF (Optional) ACS7171207 (Instructor-led)	System Administrators	1	4.5 days	ND	Prior to maintaining	Up to 12

Course Synopsis:
This workshop describes planning, installation, configuration, operations and troubleshooting of Secure Communications within the ASTRO 25 Integrated Voice and Data (IV&D) System.

12. OVER-THE-AIR REKEYING

As an option, the Offeror must include a Statewide solution. for OTAR for both infrastructure, dispatch consoles and subscriber units in The proposed solution

No.	
1.	Offeror must acknowledge that the System shall be configured to enable over the air rekeying for the management of encryption keys.
	Offeror Response: Comply with Clarification When the optional encryption options (for IP consoles, optional Archiving Interface Servers (AIS's) and radio subscribers) and optional OTAR are purchased, the dispatch console operators and optional AIS's are capable of either manual rekeying (via KVL 4000s) and or optional Over the Ethernet keying (OTEK) only.
2.	Offeror must describe in detail the success rate in percentages of subscribes successfully rekeyed when used in an active system.
	Offeror Response: Comply Many variables impact success rate of subscribers successful rekeying. Automatic Rekey Opportunities When devices are out of OTAR range and or powered down automatic rekey opportunities will intelligently update the devices when they are back on the system or powered back on so devices never miss a key update. Automatic rekey opportunities ensures your entire fleet of devices are loaded with current encryption keys. Extend the Capability of OTAR with Store and Forward When devices are out of OTAR range but require an immediate update you can take advantage of our Key Variable Loader (KVL 4000). The KVL 4000 provides a more localized tool for key distribution. The KVL 4000 transfers key management messages to out of range devices and acts as an intermediary between the KMF server and the device. Encryption key currency is maintained when the KVL 4000 is connected back to the KMF. **Have Greater Visibility of Your Devices** KMF HELLO With KMF Hello you can visually see whether your devices are within range of the system network without introducing unnecessary voice traffic. Group Key Currency Group Key Currency ensures greater visibility of your devices in the field and allows you to know exactly which devices are not up to date with the latest encryption key.

	Note: The predicted OTAR success rate is 95% reliable as long as the subscriber unit's physical location is located on the painted/colored portion of Motorola submitted coverage prediction maps (configuration dependent).
3.	Offeror must describe in detail any system wide enhancements to include networking and RF data capacities needed to be successful with rekeying 25,000+ subscribers without disrupting PTT sessions.
	Offeror Response: Comply The proposed optional mid-tier Key Management Facility (KMF) server is capable of software expansion to support rekeying of 25,000+ subscribers. Optional OTAR feature utilizes ASTRO25 Data pipe known as Integrated Voice and Data (IV&D) channels. The proposed ASTRO25 infrastructure is equipped with IV&D feature. Optional Intelligent Middleware (IMW) is proposed. IMW is the Motorola Solutions software platform that provides common services, such as Presence (i.e. POP25 and OTAR) and Location for multiple Motorola Solutions networks. As required RF voice channels and subscribers can be provisioned for IV&D. IV&D channels can be further provisioned to give voice priority, allowing PTT sessions to complete. The ASTRO25 subscriber must be equipped and provisioned with IV&D, and optional features such as: Secure Encryption Algorithm (s), OTAR and multikey features.
4.	Offeror must acknowledge that the OTAR feature shall allow for partitioning of encryption keys so that the option is available to restrict entities to their designated keys.
	Offeror Response: Comply
5.	Offeror must describe in detail the limitations of the proposed OTAR solution. including the number of keys and partitioned users allowed by the proposed solution.
	Offeror Response: Comply The mid-tier Key Management Facility (KMF) server with software and client licenses upgrades can supports up to 65 KMF Client Licenses, up to 64,000 users and up to 64 Agencies. The supported Encryption Keys in the proposed system and devices (some optional) are listed below (Device / Encryption Keys Supported). - Fixed Network Infrastructure / Transparent to System. - MCC7500E or AIS Console System / 250 (AES and DES, P25 OTAR not supported, optional Over the Ethernet Keying (OTEK) feature is proposed). - APX 4000 / 48 (AES only, P25 OTAR not supported). - APX 8000 / 128 (AES and DES). - APX 4500 / 48 (AES only, P25 OTAR not supported).

	▪ APX 8500 / 128 (AES and DES). ▪ APX 7500 / 128 (AES and DES).
6.	Offeror must acknowledge that if the number of keys, or authorized users is restricted by licensing the Offeror must provide the number of licenses supplied.
	Offeror Response: Comply The proposed optional mid-tier Key Management Facility (KMF) server (one at Primary and one at optional Backup Cores) is equipped with: ▪ 64,000 Radio Users. ▪ 64 Agency Licenses. ▪ One (1) Client License and Workstation. The proposed optional Intelligent Middleware (IMW) is equipped with: ▪ 25,000 Presence Services.
7.	Offeror must describe in detail the operation of their OTAR in a mixed-vendor network environment (considering multi-vendor subscribers, as well as multi-vendor consoles).
	Offeror Response: Comply The ASTRO25 and LTE Key Management Facility (KMF) provides a robust and feature rich platform for effectively managing secure interoperable communications across all of your devices from a single centralized platform. Motorola Solutions propose ASTRO25 MCC7500E at twenty (20) console dispatch sites, plus upgrade for two (2) existing MCC7500E Voice Processing Module (VPM) console dispatch sites. The ASTRO25 MCC7500E console dispatch sites do not support OTAR feature. Optional Over-the-Ethernet Keying (OTEK) is proposed. LTE LEX L10 with CRYPTR micro is the only device capable of proposed optional KMF management (provided ASTRO25 Infrastructure and LTE subscribers are properly provisioned).
8.	Offeror must describe in detail the ability and willingness of the Offeror to integrate other vendors OTAR solutions into their infrastructure.
	Offeror Response: Comply The proposed solution does not include the integration of other vendor OTAR solutions.
9.	Offeror must list what vendors they can provide OTAR services for.
	Offeror Response: Comply

	LTE LEX L10 with CRYPTR micro is the only device capable of the proposed optional KMF management (provided ASTRO25 Infrastructure and LTE subscribers are properly provisioned.)
10.	Offeror must describe in detail how The proposed solution can be scaled to accommodate additional users. *Offeror Response:* Comply The proposed optional solution includes a mid-tier Key Management Facility (KMF) server capable of software expansion to support up to 64,000 users and up to 64 Agencies. The KMF client license expansions are available to allow up to 10, from 11-32 and 33-65 or 11-65 KMF clients. The proposed optional Intelligent Middleware (IMW) that provides common services, such as Presence (i.e. POP25 and OTAR) and Location can be expanded by additional Presence Device/User licenses in multiple bundles of 100, 200, 500 or 1000.
11.	Offeror must describe in detail their ability to leverage OTAR through LTE or STAGEnet Wi-Fi services. *Offeror Response:* Comply The proposed optional Key Management Facility (KMF) is capable of provisioning to support Over-the-Ethernet Keying (OTEK). System administrators can provide the same mechanisms for managing encryption keys as OTAR with the exception that messages are delivered over an Ethernet connection. This is ideal for agencies with infrastructure products such as dispatch consoles and optional Archiving Interface Servers (AIS's). Optional OTEK eliminates the need to physically touch any of the dispatch positions and ensures that your dispatchers can communicate across multiple talk groups enabling secure interoperable communications.
12.	Offeror must describe in detail the administrator training. *Offeror Response:* Comply

Table 1: Optional OTAR Administration

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO 25 IV&D Secure Communication Workshop (OTAR) to include KMF (Optional) ACS7171207 (Instructor-led)	System Administrators	1	4.5 days	ND	Prior to maintaining	Up to 12

	Course Synopsis: This workshop describes planning, installation, configuration, operations and troubleshooting of Secure Communications within the ASTRO 25 Integrated Voice and Data (IV&D) System.

13. OVER-THE-AIR PROGRAMMING

As an option, the Offeror must include a Statewide solution. for OTAP for both infrastructure, dispatch consoles and subscriber units in The proposed solution

No.	
1.	Offeror must describe in detail how the proposed system will be configured for over-the-air programming of subscriber units.
	Offeror Response: Comply The proposed optional Over the Air Programming or Programming Over P25 (POP25) feature utilizes ASTRO25 Data pipe known as Integrated Voice and Data (IV&D) channels. The proposed ASTRO25 infrastructure is equipped with IV&D feature. Optional Intelligent Middleware (IMW) is proposed. IMW is the Motorola Solutions software platform that provides common services, such as Presence (i.e. POP25 and OTAR) and Location for multiple Motorola Solutions networks. Optionally required is an Advanced System Key. The Advanced System Key is a physical hardware key that grants access to the POP25 feature. It is connected to a parallel port or USB port of the laptop computer running the Customer Programming Software (CPS). The CPS will verify that the proper key is attached before every subscriber unit read, write and clone operation. As required RF voice channels and subscribers can be provisioned for IV&D. IV&D channels can be further provisioned to give voice priority, allowing PTT sessions to complete. The ASTRO25 subscriber must be equipped and provisioned with IV&D and optional Programming Over P25 (OTAP) features.
2.	Offeror must describe in detail the success rate in percentages of subscribes successfully reprogrammed when used in an active system.
	Offeror Response: Comply An overview of the OTAP process is listed below: - Current radio configuration read over the air and reviewed. - Send new or updated configuration information and acknowledgement. - User is notified and accepts changes. Note: Voice Traffic is prioritized and programming will occur during idle times. Optional POP25 allows for scheduled batch programming and can make specific programming changes instead of requiring a full code plug rewrite. The system will

	automatically generate a report, showing which radios were successfully programmed. Note: The predicted OTAP or POP 25 success rate is 95% reliable as long as the subscriber unit's physical location is located on the painted/colored portion of Motorola submitted coverage prediction maps (configuration dependent).
3.	Offeror must describe in detail any system wide enhancements to include networking and RF data capacities needed to be successful with reprogramming 25,000+ subscribers without disrupting PTT sessions.
	Offeror Response: Comply The proposed optional Over the Air Programming or Programming Over P25 (POP25) feature utilizes ASTRO25 Data pipe known as Integrated Voice and Data (IV&D) channels. The proposed ASTRO25 infrastructure is equipped with IV&D feature. The proposed optional Intelligent Middleware (IMW) that provides common services, such as Presence (i.e. POP25 and OTAR) and Location can be expanded by additional Presence Device/User licenses in multiple bundles of 100, 200, 500 or 1000. The ASTRO25 subscriber must be equipped and provisioned with IV&D and Optional Programming Over P25 (OTAP) features.
4.	Offeror must describe in detail if the proposed OTAP system includes a mechanism, or method of authenticating subscribers to ensure the integrity of reprogramming commands and provide a "fallback" capability for incomplete, aborted, or unsuccessful programming attempts.
	Offeror Response: Comply Provisioned IV&D subscriber units context activate with IMW periodically. One of the key features of POP25 is being able to make and receive calls during the process: - Retain full use of the radio during the configuration data transfer without interrupting communication. - Voice always takes priority over POP25 data transfers. - When a voice call ends, POP25 starts where it paused programming; there's no need to restart. - Users do not have to switch to a non-busy or conventional channel. - User do not have to stay in an area with high signal strength during the download. - All radio functions and capabilities are accessible and enabled.

	POP25 allows for scheduled batch programming and can make specific programming changes instead of requiring a full code plug re-write. The system will automatically generate a report showing which radios were successfully programmed. The CPS connects to the IMW, query for the subscriber unit and if the subscriber unit is present, gets the IP address of the subscriber unit. - After getting the subscriber unit IP Address, the CPS user can proceed to read / write / clone operation. Normally the CPS user may read the complete codeplug from the subscriber unit. This step may take few minutes to complete. - After performing the read, the CPS user may modify one or more parameters. The CPS user can then perform a full write to the same subscriber unit or multiple different subscriber units. A saved codeplug can also be used for a full over the air write. Cloning is also allowed in with some exception (POP25 does not update the Dispatch Console configuration data). - After receiving all the data required for writing, the subscriber unit verifies the received content. If the verification fails, the subscriber unit clears the received codeplug. If the verification is successful, then it informs the radio user that a new codeplug is available through beeps and/or display. In case of a radio with display and configured for “Alert and Display”, the radio user has two/three options. - The user may accept the new codeplug with delay. The radio continues to use its current codeplug until the next power-on. - The user may accept the new codeplug immediate effect. The new parameters received over the air replace the old parameters. The radio indicates “success” to the radio user, resets itself and the new code plug becomes effective. - The user may reject the new codeplug. The radio clears the received codeplug. The option of rejection is configurable. - The reading of the codeplug and receiving the parameters for writing are transparent to the radio user and always happens on the background. Note that the voice communication can be configured to interrupt data. - The radio has two partitions in its memory for keeping codeplug. The POP25 always reads the codeplug that the radio is currently operating with (i.e. codeplug in active partition) and stores the codeplug received for updating in non-active partition. - Once the received codeplug is written in the radio, there is no way to revert back. The radio knows if the download was successful when it's complete. - If the CPS starts a new codeplug download and there is already an available upgrade that the radio user has not accepted then the new transfer will overwrite the available codeplug.
5.	Offeror must describe in detail the operation of their OTAP in a mixed-vendor radio network environment (considering multi-vendor subscribers, as well as multi-vendor core). *Offeror Response:* Comply The proposed optional Over the Air Programming or Programming Over P25 (POP 25) does not support multi-vendor subscribers. Motorola Solutions has proposed the ASTRO25 MCC7500E console at twenty (20) console dispatch sites, plus upgrades for two (2) existing MCC7500E Voice

	Processing Module (VPM) console dispatch sites. The ASTRO25 MCC7500E console dispatch sites do not support OTAP feature.
6.	Offeror must describe in detail the ability and willingness of the Offeror to integrate other vendors OTAP solutions into their infrastructure.
	Offeror Response: Comply The proposed solution does not include integration with other vendors' OTAP solutions.
7.	Offeror must describe in detail the ability to permanently or temporarily disable subscriber units.
	Offeror Response: Comply The Radio Control Manager (RCM) is a Private Radio Network Management (PRNM) Suite web application used primarily by dispatchers to monitor and manage radio events, issue and monitor commands and make informational queries of the system database. One of RCM's radio commands is Selective Inhibit. User enters the Radio ID or alias of the target radio to which user wishes to send the command. RCM displays the successful Radio Inhibit. If the radio is powered down, passive Selective Inhibit could be initiated to inhibit the radio upon power up. Cancel Inhibit could be initiated to reverse the action. RCM feature is proposed in Phase 2 (not optional).
8.	Offeror must list what vendors they can provide OTAP services for.
	Offeror Response: Comply The proposed optional Over the Air Programming or Programming Over P25 (POP 25) does not support multi-vendor subscribers.
9.	Offeror must describe in detail how The proposed solution can be scaled to accommodate additional users.
	Offeror Response: Comply The proposed ASTRO25 infrastructure is equipped with IV&D feature. As required RF voice channels and subscribers can be provisioned for IV&D. IV&D channels can be further provisioned to give voice traffic priority, allowing PTT sessions to complete. The proposed optional Intelligent Middleware (IMW) that provides common services, such as Presence (i.e. POP25 and OTAR) and Location can be expanded by

	additional Presence Device/User licenses in multiple bundles of 100, 200, 500 or 1000. The ASTRO25 subscriber must be equipped and provisioned with IV&D and Programming Over P25 (OTAP) features.
10.	Offeror must describe in detail their ability to leverage OTAP through LTE or Wi-Fi services.
	Offeror Response: Comply The optional APX Radio Management (RM) is a suite of software applications shipping with the APX Customer Programming Software (CPS) that provides the ability to manage the entire fleet of ASTRO APX radios through one central database. Radio Management (RM) can help reduce fleet programming time and improve overall radio asset management. Radio Management allows: - Manage and track radio codeplugs through a central database. - Make changes to a shared codeplug template and push to multiple radios. - Manage and update radios without taking them out of service. - Schedule programming updates to radios ahead of time. On–Line Radio Management Delivery Method This method is for customers that would like to receive their Radio Management licenses electronically from the Motorola Solutions Radio Management license system. This method will deliver an email with the Radio Management Entitlement ID for the purchased Radio Management Application licenses that can be used on the Radio Management Client to download and activate the license entitlements. You will need to supply an email address at time of order for this delivery method. License entitlements will be delivered to the email address provided. APX RM could utilize IV&D pipe, customer wireless network, or wired multiport USB Hub connections as method of delivery. A quote for APX Radio Management (RM) could be prepared upon request.
11.	Offeror must describe in detail the administrator training.
	Offeror Response: Comply

Table 2: Optional OTAP Administrator Training

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
APX CPS Programming and Template Building with Radio Management and OTAP (Optional) APX7001 & RDS2017 (Instructor-led)	Radio Programmers	1	4 days	ND	Prior to programming radios	Up to 12

CPS Course Synopsis:

The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX portable/mobile subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and APX mobile.

Radio Management Course Synopsis:

Participants will learn the capabilities, features and functions of the APX Radio Management Suite. This course will cover an APX CPS overview, APX Radio Management Overview, Basic Networking Primer, ASTRO25/CEN Networking and UNS Overview and APX Radio Management Installation, Configuration and Operations. In addition, the course will contain labs that will focus on installation, configuration and operation using both wired and POP25 updates to APX Subscriber radios in both a LAN and WAN environment.

14. GPS LOCATION

As an option, the Offeror must include a Statewide GPS Location tracking for both infrastructure and subscriber units in The proposed solution

No.	
1.	Offeror must describe in detail how the proposed system will be configured to provide the location of GPS enabled subscriber units.
	Offeror Response: Comply The proposed Statewide ASTRO25 radio infrastructure and RF sites are equipped to support Trunked Integrated Voice and Data (IV&D) feature. The IV&D feature provides packet data service using the same radio infrastructure that is used for trunked voice communications. It also provides significant savings in that the same radio can be used for both voice and data services. The components that make up the data network of the Trunked IV&D system which are mostly the same components that comprise the voice network with a few additions. At a high level, the Trunked IV&D system requires the following components: Trunked IV&D Radio Subscriber Unit – the Trunked IV&D radio is a device that can act as either a voice radio, a data radio or both. The radio can be configured to give priority to voice calls so that if the radio is transmitting or receiving data messages and a voice call starts, the radio can revert to the voice call. ASTRO25 APX IV&D Subscriber Units require GPS, IV&D and optional Enhanced Data and Location on PTT enabled features. Note: The IV&D and GPS features are standard in new APX radios. Optional Enhanced Data feature will improve inbound data channel efficiency. Base Stations (RF Channels) – the base stations are located at each RF site and provide coverage over a geographical area. The number of base stations at the site can vary. Each base station operates as either a control channel, voice channels or as a packet data channel (PDCH). Site Controller – each RF site requires a site controller that manages the control, voice and data communications between the portable and mobile radios and the rest of the communications infrastructure. Site Router – a site router is responsible for consolidating all control, voice and data traffic, converting it to IP packets and feeding it into a central site where the information is further processed and routed. Zone Controller – a zone controller is responsible for the allocation of resources for control, voice and data services over a given number of RF sites.

	Core Routers, Exit Routers (part of Optional Dynamic System Resilience), WAN Switches – these network transport components are the backbone of the packet-switched network that route all control, voice and data traffic from site-to-site and even from zone-to-zone. Packet data is treated in relatively the same manner as voice traffic within the Trunked IV&D system as they are all converted to IP packets for transport on the network. Packet Data Gateway – the PDG acts as a collection point for all of the RF sites that support packet data services. The PDG is also the wireless network gateway device that interfaces with the Gateway GPRS Support Node (GGSN) which communicates with the routers that bridge the gap to a customer's enterprise network. Gateway GPRS Support Node – the GGSN provides the physical connection to peripheral router that exists on the edge of the DMZ (De-Militarized Zone). Through the DMZ, Motorola is able to isolate the radio system's Fixed Network Equipment (FNE) from the customer's private network. Intelligent Middleware (IMW) – the IMW solution. is a suite of network services across different types of radio networks with a common Application Programming Interface (API). Third-party applications that use this API can transparently track and communicate with wireless devices regardless of access network protocols and device types. The IMW API is a restricted and licensed interface. Only third-party applications developed by licensed application developers may gain access to the interface. The IMW framework enables interoperability between third-party applications, such as mapping applications and Radio Access Networks (RANs), including ASTRO25 systems, and Public Safety Long-Term Evolution (PS LTE) systems. IMW provides the following services to track and manage data sent by devices: - Location Service that allows users and applications to receive device location information. - Presence Service that allows users and applications to receive a device or user presence status. Note: A third-party mapping application is not proposed. Optional Zone Level Licenses are: - One (1) Operational Data Capability License, Trunked Enhanced Data. - 126 Enhanced Data P25 Trunk Site licenses (per RF Site proposed in all 800 solution.). - 25,000 Total Enhanced Trunked Data User Licenses. The optional Enhanced Data feature improves the inbound data channel efficiency. Optional Intelligence Middleware (IMW) Server Supporting: - 25,000 Presence Services. - 25,000 Location Services. - IMW API for the third-party Mapping Application provider.

	Note: The 25,000 user licenses are to comply with the STATE submitted Subscriber Unit Inventory, per RFP Attachment 3. Data service provisioning will be required for Infrastructure, Subscriber database, Packet Data Gateway (PDG), IMW and CEN Firewall. Note: The Optional Enhanced Data feature is highly recommend to improve the inbound channel efficiency.
2.	Offeror must describe in detail how they will enhance system capacity to handle GPS data over the air for up to 25,000 subscribers.
	Offeror Response: Comply The proposed Statewide ASTRO25 radio infrastructure and subscriber units can be configured to give priority to voice calls so that if the radio is transmitting or receiving data messages and a voice call starts, the radio can revert to the voice call. The proposed infrastructure is capable of supporting up to 48,000 Trunking IV&D context activated users per zone or 48,000 users per system. The following P25 Trunking IV&D message profile was utilized for 48,000 users design: - 1% of radios are in active POP25 session. - 10% in an active OTAR rekey transmission. - 10% using Outdoor location at a 60 sec cadence (Can move to Enhanced data if purchased). - 20% of users are sending a text message to the dispatch operator (Optional). Optional Zone Level, IMW, CompassCom User Licenses are: - 25,000 Total Zone Level Enhanced Trunked Data User Licenses. - 25,000 IMW Presence and Location Services. Note: The 25,000 user licenses are to comply with the STATE submitted Subscriber Unit Inventory, per RFP Attachment 3. The proposed Statewide ASTRO25 radio infrastructure can be further equipped by 23,000 User Licenses and Services (for total of 48,000). Note: The Enhanced Data feature is highly recommend to improve the inbound channel efficiency.
3.	Offeror must describe in detail how the GPS offered works within the open standards and describe operations between subscriber manufactures.
	Offeror Response: Comply

	The infrastructure of a Trunked IV&D system consists of integrated radio and computer components that use an IP protocol to pass packet data as well as voice traffic from each of the base sites to the rest of the radio network and beyond into a customer's private data network, or Customer Enterprise Network (CEN). At each of the endpoints to the system, application packet data utilizes industry standard IP protocols for transmission to the respective computing devices. In addition, the protocols used on the air interface between the wireless users and the base sites follow an industry standard for two-way radio communication as defined by the Association of Public-Safety Communications Officials (APCO). Not only does APCO define the protocol for voice communications, but for packet data as well. This provides the distinct advantage to the public safety market in that they can choose from a number of radio manufacturers for the radios they wish to use for voice and data communications. However, IMW supports only the ASTRO25 APX radios and Motorola LTE (Public Safety LTE) Handheld and VSM radios. VSM provides GPS receiver for in-vehicle MDT.
4.	Offeror must describe in detail the GPS location features provided with the proposed system.
	Offeror Response: Comply Global Positioning System (GPS) Location Service is a resource tracking solution. that obtains geographic coordinates from User Equipment to enable operators to locate and track outdoor personnel and vehicles. It provides the ability for third-party applications to monitor and archive the current location of GPS-based location reporting devices that are deployed in different types of Radio Access. Note: A third-party mapping application is not proposed. GPS allows Location Services use satellites to enable operators to locate and track outdoor personnel and vehicles. The service acts as a gateway, translating location data received from mobile device messages and forwarding the data to interested applications. The Intelligent Middleware (IMW) offers an application interface to manage presence and location functionality. The IMW provides the presence and absence information of subscriber radios to any compatible data applications located in the Customer Enterprise Network (CEN). Additionally, it provides for intelligent routing of messages to the devices and thus lowers traffic over the network. GPS equipped subscriber units are available in a portable or mobile configuration with the features already enabled. For portable configurations, GPS is embedded within the radio, however, the GPS antenna is selected as either on the radio or via the Radio Speaker Microphone (RSM). The mobile devices are designed to

	accommodate an external GPS antenna with the GPS receiver built into the GPS equipped APX Mobile. Note: A third-party mapping application is not proposed. <u>Optional ASTRO25 Location on PTT Feature</u> The Location on Push to Talk (PTT) (or on emergency calls only) is an optional feature of the latest ASTRO25 system release and provides a trunking APX radio (with APX software release R15.00.00 available since 4Q 2016) user's location to a third-party mapping application when radio user PTTs on an emergency call. It utilizes an embedded signaling mechanism to allow the currently transmitting APX radio to send location data during a call or an emergency voice call. A single press of the PTT button generates one location report. Every new voice transmission sends a new location report. The optional Enhanced Data (inbound only) and Classic Integrated Voice and Data (IV&D) services are utilized for Location on PTT feature. A dispatcher will hear the emergency call and two to seven seconds later (depending on the mapping application loading) will see the radio's location on the mapping application. Location on PTT is sent with the voice content during the emergency call. Subscriber reads GPS from satellites but sends a reduced location with voice resulting in: - No altitude. - Latitude and longitude 6-foot resolution instead of inches. - Time is in 15 second increments, instead of 1 second increments. - Direction is 45 degree increments, instead of 2 degree increments. - Speed is 4.5 mph increments with maximum of 134 mph, instead of 2.25 mph increments with functionally no speed limit. - GPS readings older than 30 minutes will not be sent. Note: One location update will appear on the mapping application per an emergency call PTT. This feature is not intended for quick key PTTs without talking. A minimum voice call duration of two seconds is required. Note: The Enhanced Data feature is highly recommended to improve the inbound channel efficiency. A quote for Location on PTT feature can be prepared upon request.
5.	Offeror must describe in detail their ability to develop APIs for current mapping systems within current PSAP's.
	<u>Offeror Response:</u> Comply The proposed optional Intelligent Middleware (IMW) includes an API. The existing third-party mapping application providers interested in writing applications to Intelligent Middleware API should contact Motorola Solutions directly.

6.	Offeror must list all mapping systems they currently integrate with and provide details on how the integration is achieved. *Offeror Response:* Comply The following location mapping systems successfully achieved integration via Intelligent Middleware (IMW) API: - PremierOne CAD 4.2+ - ARL & RLT. - CompassCom – CompassTrac. - CommandCentral INFORM. - Spillman Flex CAD. - Intergraph. - TriTech. - Genesis. Note: The mapping systems list is continuously evolving.
7.	Offeror must describe in detail how The proposed solution can be scaled to accommodate additional users. *Offeror Response:* Comply Optional Zone Level and IMW Licenses are: - 25,000 Total Zone Level Enhanced Trunked Data User Licenses. - 25,000 IMW Presence and Location Services. The proposed Statewide ASTRO25 radio infrastructure can be further equipped by 23,000 User Licenses and Services (for total of 48,000). Note: A third-party mapping application is not proposed.

15. LOGGING RECORDER

As an option, the Offeror must propose a central core (geo-redundant), multi-tenant IP-based networked APCO P25 compatible, digital logging recorder system. It must be capable of supporting all radio traffic and 911 calls Statewide.

No.	
	Offeror must describe in detail an option for providing a central core (geo-redundant) voice recorder in the proposed solution that can support radio and 911 voice recordings, text and possible future next generation 911 requirements at a minimum for the current PSAPs.
1.	*Offeror Response:* Comply The proposed optional IP logging recorder solution. (for trunked talk groups, voice recording) at the centralized Bismarck site (Primary Core) includes: - Four (4) Clear MCC7500E Archiving Interface Servers (AIS's). - OR Eight (8) Secure MCC7500E Archiving Interface Servers (AIS's), Secure with AES and DES-OFB Encryption Algorithms. Note: An AIS supports up to 256 affiliated trunking plus conventional resources (via CCGW's if desired) and up to 120 clear simultaneous calls. Optional MCC7500E AIS's/IP trunked talkgroup recorders are proposed at the optional Backup Core (Fargo Site). **NICE IP Trunked Logging Recorder** NICE Replacements Analog Recorders The existing NICE analog recorders are located at the Grand Forks Public Safety Answering Point, Walsh County Communications, Pembina County 911, Cavalier County 911, Pierce County 911, Rolette County 911, Bottineau/Renville 911, Mountrail County, Sheriff's Office, Stark/Dickinson Dispatch, Mercer/Oliver 911, McLean County 911 and State Radio. Existing analog recorders fall into four different configurations: - Configuration A – Eight (8) 16 Analog Chanel NexLog Replacements. - Configuration B - Two (2) 32 Analog Chanel NexLog Replacements. - Configuration C - Four (4) 40 Analog Chanel NexLog Replacements. - Configuration D - One (1) 64 Analog Chanel NexLog Replacement. Each NexLog 740 Hardware Replacement Includes: - NexLog 740 base system: 3U rack-mount, Intel Core2 Quad CPU, Dual NIC, Embedded Linux, NexLog base software, web-based configuration manager and 1st year warranty. - Integrated 7" Color LCD Touch Screen Display for NexLog 740. - Dual Hot-Swap power supplies, 120/240 VAC (standard-no charge). - Upgrade to 2 x 1TB Hot Swap h/w-RAID1, 1TB storage. - Equipped with 1 Blu-Ray Drive (Archive to Blu-Ray or DVD-RAM).

- Rack Mount Slides - 4 Post, 3U (for NexLog 740).
- Single-port 100/GB PCI Network Card.

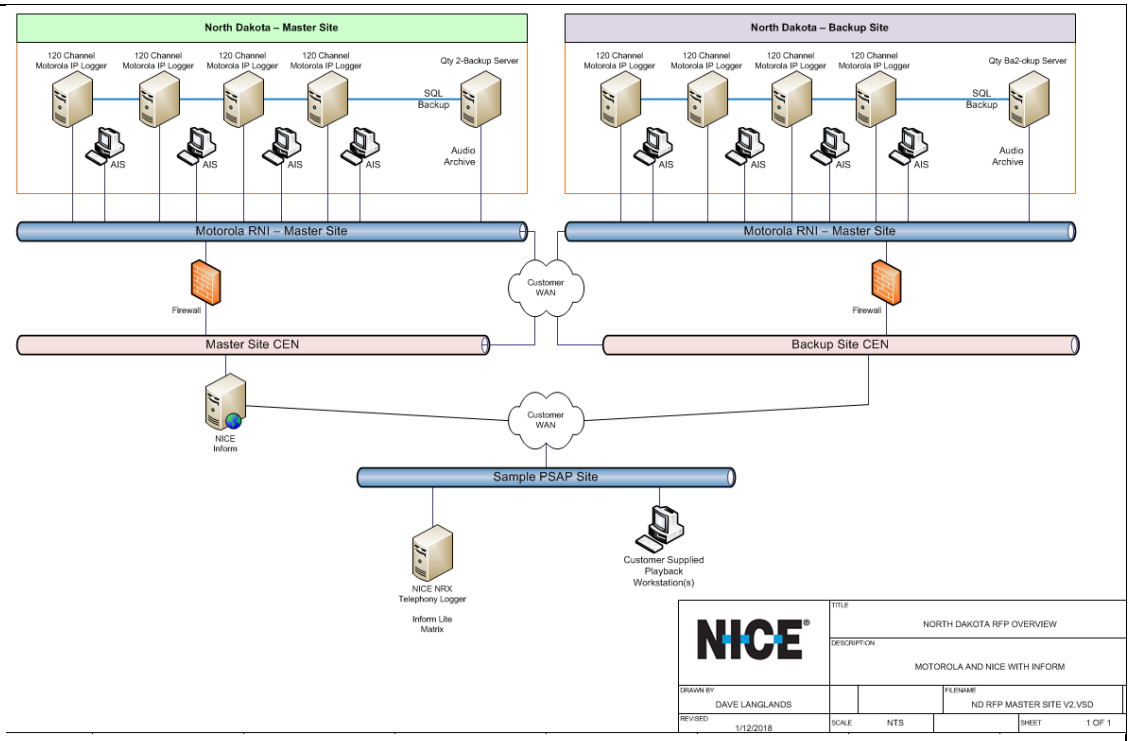
Each NexLog Web Access Playback Licenses Include:
- Eight (8) pack MediaWorks PLUS (web) concurrent license.
- Enhanced Reporting Package.
- 911 NENA ANI/ALI CAD Spill Integration - USA/Canada only.

The optional 911 voice and text recordings can be quoted once the number of trunk lines are known and the optional recording solution is chosen.

Optional MCC7500E IP Trunked Logging Recorder and NICE NRX

The proposed optional solution includes phone and radio recording to cover the current needs (please refer to the diagram for a depiction):

1) Primary Core
   a. Four (4) 120-channel Motorola IP Loggers.
   b. Two (2) logger backup servers (LBS).
      i. Audio and SQL Database BU.
   c. Full Inform with 480 Primary Voice Licenses and 480 Parallel Licenses.
2) Backup Core
   a. Same as above.
3) PSAPs
   a. Single NRX each.
   b. Dual 1TB drives for resilient backup of audio on each server.
   c. No local external storage (cost conscious in the proposed design, expandable)
   d. Inform Lite installed on NRX.
      i. NICE Inform Reconstruction License.



As an optional upgrade, the recording solution. can also capture text-to-9-1-1 communications and associated metadata. It can link and synchronize text interaction recordings with all other forms of communications that flow into agencies, facilitating comprehensive searches, reporting, incident reconstruction, quality evaluation and more.

NICE text recording solution. logs text messages in compliance with NENA i3 standards, supporting MSRP (Message Session Recording Protocol) and ATIS J-STD-110 standards. Text logging captures SMS and the text portion of an MMS. The system logs message content, the texter's phone number, location information and timestamp with each message. This metadata is incorporated into the central repository of all data associated to all forms of captured media and can be used for searching for text interactions, including keyword searches based on words mentioned in any of the text messages.

The optional 911 voice and text recordings could be quoted once number of trunk lines are known and the optional recording solution. is chosen.

Note: The required Ethernet MPLS transport (outside the RNI, Radio Network) among Bismarck Site Primary Core, optional Fargo Site Backup Core and twenty two dispatch sites will be provided by DCN.

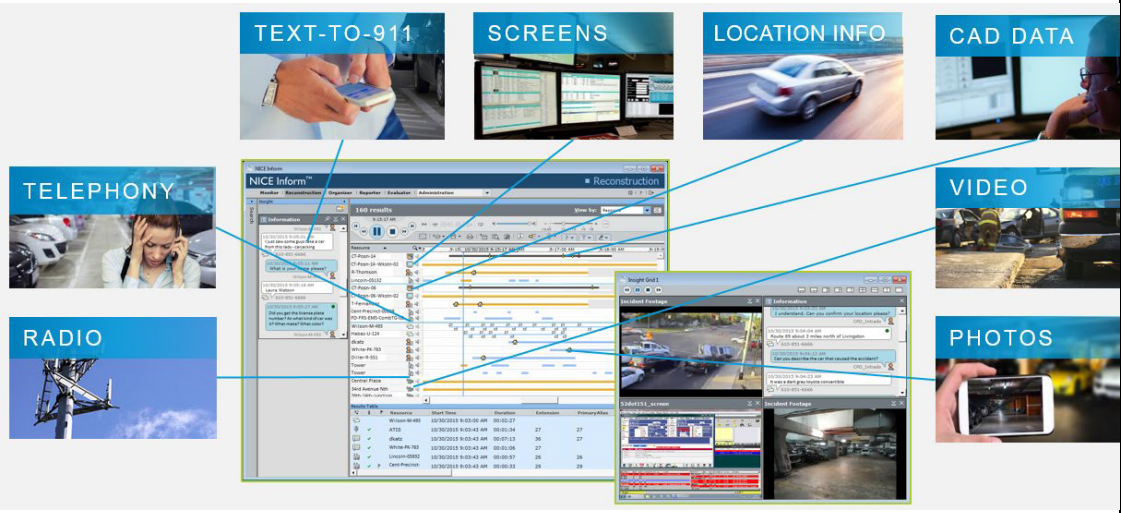
2.	Offeror must describe in detail the logging recorder's ability to log/record the following: All trunked radio traffic (encrypted and non-encrypted) All conventional radio traffic (encrypted and non-encrypted) All telephone traffic

Offeror Response:
Comply

The MCC7500E Archiving Interface Servers (AIS's), including the optional AIS, can be equipped with optional AES and DES-OFB encryption algorithms. AIS processes the decryption of encrypted trunked talkgroups voice recordings for IP recorder.

Optional MCC7500E IP Trunked Logging Recorder and NICE NRX

The proposed solution provides the capability to record any combination of inputs, such as those listed under a., b. and c. Trunked IP radio traffic is recorded by dedicated Motorola IP loggers, while other types of audio communications are recorded via the NRX loggers. Telephony loggers (NRX) are located at each PSAP. NICE Inform provides a unified user interface for combined access to all communications. Should additional means of communications recording be added in the future (such as text-to-911 and more), they would also be accessed by the same Inform interface.



Offeror must describe in detail the logging recorder's ability to archive radio traffic to various storage media including, but not limited to: hard disk, USB, optical media and/or IP network storage devices.

Offeror Response:
Comply

3. **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX**

The recording system will initially store recorded communications on the internal redundant hard drives. It supports external storage for archiving recordings, including 'mapped' network drive, Network Attached Storage (NAS) and Storage Area Network (SAN).

The solution. can also save recordings onto removable media (RDX) and users may export any number of recordings onto external media (e.g. USB drive).

4.	Offeror must describe in detail how the logging recorder will be configured for redundant operation so that a single recorder failure does not result in any loss of recorded audio. *Offeror Response:* Comply **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX** The proposed logging recorder offers high-value options for redundancy and resiliency of both, hardware and software components of the recording solution. Parallel recording redundancy (2N) offers the most secure data protection as all recording hardware and software components are at least duplicated. This is proposed for radio recording. Telephony recording servers, while currently not configured for 2N recording, offer multiple degrees of internal redundancy – all major components (moving parts) are redundant for increased reliability and performance. Complete redundancy of these recording servers is available as an optional upgrade.
5.	Offeror must acknowledge that the logging recorder shall be capable of storing audio in variable bit rate, industry standard digital formats such as WAV, WMA, MP3, etc. *Offeror Response:* Comply The logging recorder is capable of storing audio in either standard WAV file (*.wav), or Windows Media Audio (*.wma).
6.	Offeror must describe in detail the architecture that will be utilized that allows for the access, playback and transfer of digital audio files across an IP network. *Offeror Response:* Comply **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX** The proposed solution includes NICE Inform server (see the diagram) to allow centralized access to recordings (to the extent of each user's access rights), which includes both search and retrieval. From this interface, users may also choose to export recordings and save them locally or across your network. Note also that the NICE Inform solution. provides a modular framework that allows key components to be deployed in a unified or distributed architecture. The NICE Inform Matrix solution. allows shared access to recordings between servers in a controlled manner with Multi-tenancy, involving Agency Partitioned servers linked to local recorders. NICE Inform Matrix system consists of multiple sites that require access to recorded content on their own systems and from other systems. Customizable configuration allows for various combinations of access rights. An example scenario might be when a central agency has the rights for controlling and recording calls at a regional level while local agencies control and record their own calls. The local agency may require

	access to the calls that were made within the local jurisdiction but were recorded at the central agency.
7.	Offeror must acknowledge that the logging recorder will be constructed so as to meet the requirements of 24 hour, seven day a week operation.
	Offeror Response: Comply **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX** To assure reliable, uninterrupted performance, the proposed logging recorder is supplied with industrial grade servers that contain internal component-level redundancy of all critical parts. Additionally, radio loggers are fully redundant (2N redundancy), while NRX loggers provide component-level redundancy. The proposed logging recorder offers high-value options for redundancy and resiliency of both, hardware and software components of the recording solution. Parallel recording redundancy (2N) offers the most secure data protection as all recording hardware and software components are at least duplicated. This is proposed for radio recording. Telephony recording servers, while currently not configured for 2N recording, offer multiple degrees of internal redundancy – all major components (moving parts) are redundant for increased reliability and performance. Complete redundancy of these recording servers is available as an optional upgrade. The optional MCC7500E AISs/IP trunked talkgroup recorders are proposed at the optional Fargo Backup Core Site. The redundant or backup AIS/NICE IP trunked recorder will be provisioned with the identical talkgroup recordings, recording trunked talkgroups in parallel.
8.	Offeror must acknowledge that the logging recorder meets or exceed all FCC, IEEE, EIA/TIA and APCO standards.
	Offeror Response: Comply **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX** The proposed logging recorder meets or exceeds all listed standards, to the extent that is applicable to the solution. Note that the same solution has been verified by and is in operation at over 3,000 highly demanding public safety and government sites.
9.	Offeror must describe in detail the maximum amount of concurrent talkpaths capable of being recorded by a single recorder.
	Offeror Response: Comply An Archiving Interface Server (AIS) supports up to 256 affiliated trunking plus conventional resources (via CCGW's if desired) an up to 120 clear simultaneous calls.

	Optionally four (4) clear MCC7500E Archiving Interface Servers (AIS's) are proposed, for a total of 480 clear simultaneous calls. OR Optionally eight (8) secure Archiving Interface Servers (AIS's) are proposed (with AES and DES-OFB Encryption Algorithms) for total of 480 secure simultaneous calls. **NICE** The optionally proposed NICE IP Voice Recorder is equipped with 504 channels. The replacement NICE analog conventional recorders concurrent channels are listed below: - Configuration A – Eight (8) 16 Analog Chanel NexLog Replacements. - Configuration B - Two (2) 32 Analog Chanel NexLog Replacements. - Configuration C - Four (4) 40 Analog Chanel NexLog Replacements. - Configuration D - One (1) 64 Analog Chanel NexLog Replacement. **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX** A single Motorola Solutions MCC7500E IP recorder has a maximum capacity of 120 talkpaths. When this limit is exceeded, another logger is added to the solution. The loggers are simply added until the total count of the loggers meets or exceeds the number of talkpaths needed to be recorded.
10.	Offeror must describe in detail all of the required licenses for The proposed solution *Offeror Response:* Comply Archiving Interface Server Licenses - Secure Operation - AES and DES-OFB Encryption Algorithms. **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX** The proposed solution includes licensing for each of the recording servers (master and backup site, primary and parallel servers), plus licensing for NICE Inform server and associated application licensing: 1) Primary Core a. Four (4) licensing for 120-channel Motorola IP Loggers. b. Full Inform with 480 Primary Voice Licenses and 480 Parallel Licenses. 2) Backup Core a. Same as above. 3) PSAPs a. Existing NICE recorders will stay in place, with necessary upgrades. b. Single NRX each. c. Inform Lite installed on NRX.

	i. One (1) NICE Inform Reconstruction License. ii. Matrix drivers.
11.	Offeror must describe in detail the ability of multiple search and playback techniques shall include, but not be limited to: Console position APCO P25 emergency call activation Subscriber unit ID Talkgroup Individual Call RF channel (for conventional repeaters/base stations only) Date Time
	Offeror Response: Comply **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX** The Reconstruction module within the Inform application provides the basis of the search and replay activities within the system. It is from here that the user is able to perform precision searches for the recorded multimedia communications they wish to review, organize, manage or distribute. All of the listed attributes (and many more) are captured as metadata that is associated with appropriate recordings, to be subsequently used as search criteria for the retrieval of radio communications. The search function within the Reconstruction module includes powerful filters that enable the user to utilize all metadata parameters captured by the Inform application and associated recording platform. Users can search by items such as time, date, channel number, channel name, Radio ID, talkgroup name, specific recorded resources, annotations/bookmarks and any other metadata field captured by the recording layer.

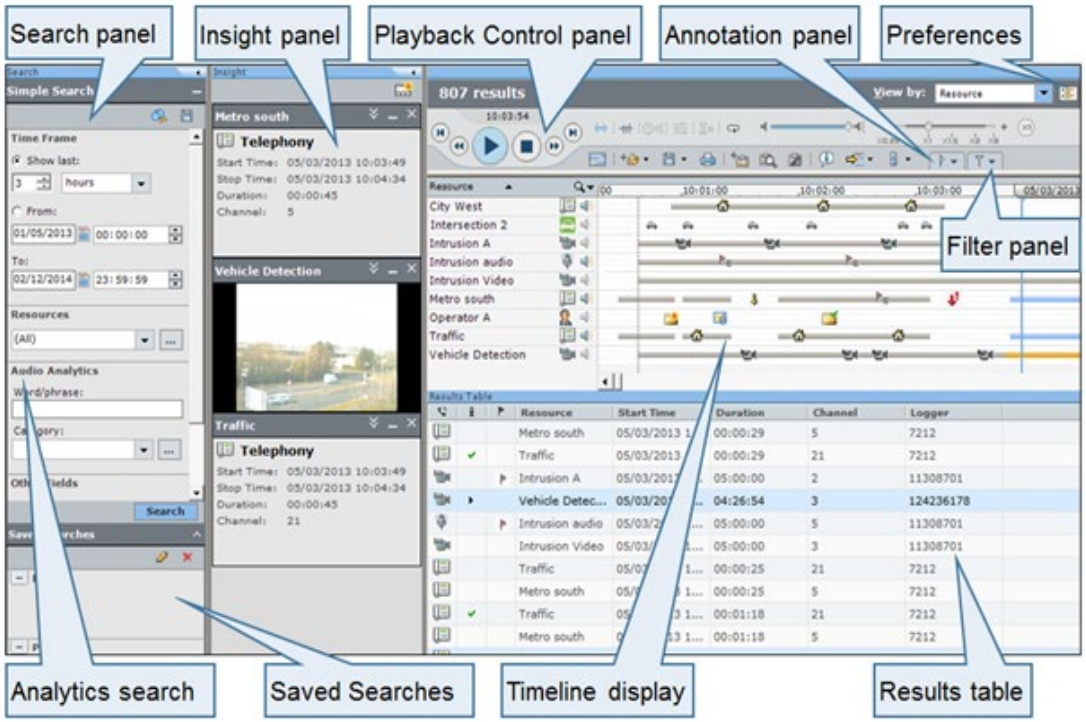


Figure 31: Depiction of Metadata Fields Captured by the Recording Layer

Table 3: Examples of Data Captured by the Proposed Logger with IP Radio Recording & Made Available for Subsequent Searches

- Start Time
- Stop Time
- Rec Start Time
- Duration
- Duration Hi Res
- Call Handle
- Call Priority
- Encryption State
- Call Type
- Secure Key
- Secure Key Alias
- Unit ID
- Individual Alias
- Console System ID
- Foreign System Alias
- URID
- Resource Alias
- Audio Availability
- Zone ID
- Zone Alias
- Site ID
- Site Alias
- End of Call Reason
- Call Shed Status
- Frequency
- Frequency Alias
- Private Line Code
- Private Line Alias
- Network ID
- Console Network ID
- Target Unit ID
- Target Individual Alias
- Conventional Talk Group ID
- Radio Status Alias

	▪ Foreign Console System Alias ▪ System ID
12.	Offeror must acknowledge that the logging recorder subsystem shall share the common timing reference with the proposed system.
	Offeror Response: Comply he proposed Core's TRAK 9100 site reference will be utilized for NTP to assure proper synchronization.
13.	Offeror must acknowledge that the logging recorder shall be capable of being mounted in an EIA/TIA standard 19" wide rack.
	Offeror Response: Comply
14.	Offeror must describe in detail how the logging recorder interfaces directly with the proposed system for audio and APCO P25 data. Recorders that interface through the dispatch consoles or the console subsystem are not allowed. This may require a stand-alone encrypt/decrypt device.
	Offeror Response: Comply MCC7500E Archiving Interface Servers (AISs) with optional Secure and AES/DES-OFB encryption algorithms are proposed to support APCO 25 trunked talkgroup recordings (clear and encrypted talkgroups). **MCC7500E IP Trunked Logging Recorder and NICE NRX** The Motorola interface is a certified connection through the Motorola Solutions Archive Interface Server (AIS) which are both located on the Motorola Solutions Radio Network (RNI). The AIS provides the audio and metadata for each Push to Talk (PTT) made on the system. Audio is archived on the hard drives in the logger and corresponding data is inserted into the database.
15.	Offeror must describe in detail the redundancy for The proposed solution
	Offeror Response: Comply The optional MCC7500E AISs/IP trunked talkgroup recorders are proposed at the optional Fargo Backup Core Site. The redundant or backup AIS/NICE IP trunked recorder will be provisioned with the identical talkgroup recordings, recording trunked talkgroups in parallel. **Optional MCC7500E IP Trunked Logging Recorder and NICE NRX** The proposed logging recorder offers high-value options for redundancy and resiliency of both, hardware and software components of the recording solution.

	Parallel recording redundancy (2N) offers the most secure data protection as all recording hardware and software components are at least duplicated. This is proposed for radio recording. Telephony recording servers, while currently not configured for 2N recording, offer multiple degrees of internal redundancy – all major components (moving parts) are redundant for increased reliability and performance. Complete redundancy of these recording servers is available as an optional upgrade.
16.	Offeror must describe in detail how the logging recorder is capable of individual user logon and various levels of access to channels and authorized permissions.
	Offeror Response: Comply **CC7500E IP Trunked Logging Recorder and NICE NRX** Each and every user (including administrators and maintenance staff) requires a security account with a unique set of logon credentials, which is used to control access to all Inform modules, module features and recorded channels and resources in the system. Users are given permission to use NICE Inform modules by attaching a profile to them. The profile defines the applications, features and recordings the user can access. Without a profile, the user is not able to access any functions or recordings. Profiles define the roles the users perform, such as Director, Supervisor, Dispatcher, Call-Taker, etc. The user administrator can override the profile for a specific user if required.
17.	Offeror must describe in detail how concurrent licenses are handled for play back operation.
	Offeror Response: Comply **MCC7500E IP Trunked Logging Recorder and NICE NRX** Any number of users can “share” each concurrent license sequentially. Up to 10 concurrent user licenses can be accommodated by each Inform server.
18.	Offeror must describe in detail the audio storage capacity. Offeror must describe in detail as to how the storage capacity was calculated.
	Offeror Response: Comply **MCC7500E IP Trunked Logging Recorder and NICE NRX** There is no information directly provided in the request to allow for an accurate calculation of storage. To that end, the traffic analysis was used to provide an estimate of the amount of audio that will be generated system-wide. Based on this analysis, a total of 349 hours of audio is estimated to be generated system-wide per day. Using a retention period of 90 days, 349 hours X 90 days = 31,416 Hours. 31,416 X 2.06 MB/hour compression = 64,718 MB of storage capacity is required for 90-day retention..

19.	Offeror must describe in detail all maintenance options available.
	Offeror Response: Comply The proposed optional NICE logging solution offers maintenance packages based on the State's desired service. Based on the State's requirements, once a package is selected, the NICE logging solution. equipment will be managed with the same approach as the P25 System in that the State will utilize the same System Support Call Center for any NICE product related issues and Motorola Solutions will manage and track any cases as applicable, as with any of the Motorola Solutions P25 equipment: NICE REMOTE ONLY MAINTENANCE PACKAGE - Phone/Remote Support -Twenty-four (24) hours, seven (7) days per week Only - On-Site Support - None - Callback Response time is based on Severity Level of the issue (see Response Time Severity Level Chart below) - On-Site Response Time for Critical (Severity Level 1) issues is 4 hours NICE SILVER MAINTENANCE PACKAGE - Eight (8) hours, five (5) days per week. (8 to 5) for both remote support and on-site support. - Callback Response time is based on Severity Level of the issue (see Response Time Severity Level Chart below) - On-Site Response Time for Critical (Severity Level 1) issues is 6 hours NICE GOLD - LITE MAINTENANCE PACKAGE - Phone/Remote Support -Twenty-four (24) hours, seven (7) days per week - On-Site Support - Eight (8) hours, five (5) days per week. (8 to 5) - Callback Response time is based on Severity Level of the issue (see Response Time Severity Level Chart below) - On-Site Response Time for Critical (Severity Level 1) issues is 6 hours NICE GOLD MAINTENANCE PACKAGE - Phone/Remote Support -Twenty-four (24) hours, seven (7) days per week - On-Site Support -Twenty-four (24) hours, seven (7) days per week - Callback Response time is based on Severity Level of the issue (see Response Time Severity Level Chart below) - On-Site Response Time for Critical (Severity Level 1) issues is 4 hours

Severity Level	Response Time
Severity 1	A Motorola SSC Technician will make contact with the customer technical representative within one hour of the request for support being logged in the issue management system. Continual effort will be maintained to restore the system or provide a workaround resolution. Response provided 24 x 7.
Severity 2	A Motorola SSC Technician will make contact with the customer technical representative within four hours of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 3	A Motorola SSC Technician will make contact with the customer technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 4	A Motorola SSC Technician will make contact with the customer technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

Figure 32: Security Level Response Time Commitments

Severity Level	Standard Response Time
Severity 1*	Within 4 hours from receipt of notification continuously
Severity 2	Within 4 hours from receipt of notification Standard Business Day
Severity 3	Within 8 hours from receipt of notification Standard Business Day
Severity 4	Within 12 hours from receipt of notification Standard Business Day

Figure 33: Onsite Response Times

Offeror must describe in detail user and administrator training.

20.

Offeror Response:
Comply

Prior to implementation, the NICE Project Manager will schedule remote training sessions at dates that are mutually agreed upon by all parties.

Table 4: OPTIONAL NICE Logger Integration Training

ASTRO25 IV&D NICE System User Admin Training, Inform Lite 7.x Training and End User Training AST1002 (Instructor-led)	**1st Echelon**	**1**	**5 days**	**ND**	**Prior to cutover**	**Up to 12**
Course Synopsis: This workshop covers the tasks and knowledge to implement a NICE logging solution. in an ASTRO25 system. Learning activities in this course focus on both initial installation and configuration and operation and troubleshooting the components after installation. Participants will be provided with an opportunity to demonstrate with available lab equipment tasks required to install and maintain the related subsystem components.						

16. STATION ALERTING

As an option, the Offeror must propose a central core (geo-redundant), multi-tenant, IP-based networked APCO P25 compatible, fire station alerting system.

No.	
1.	Offeror must acknowledge that the proposed station alerting system complies with NFPA 1221.
	Offeror Response: Comply with Clarification Our design provides for a single link instead of a dual link per station. The proposed Statewide ASTRO25 radio system is leveraging existing/current VHF FNE using DTMF Tones. One Conventional Channel Gateway is proposed per RF site and multiples at dispatch sites to support current VHF channel interface(s). Optionally at each applicable Fire Station a new APX 7500 consolette and antenna network could be installed to utilize the proposed ASTRO25 trunking system's Call Alert feature. The primary backhaul could be the local owned and managed private Ethernet IP network (Wired/Fiber). The parallel backhaul could be the proposed ASTRO25 optional IV&D data pipe.
2.	Offeror must describe in detail how the proposed station alerting system complies with NFPA 1221.
	Offeror Response: Comply with Clarification Our design provides for a single link instead of a dual link per station. The proposed Statewide ASTRO25 radio system is leveraging existing/current VHF FNE using DTMF Tones. One Conventional Channel Gateway is proposed per RF site and multiples at dispatch sites to support current VHF channel interface(s). Optionally at each applicable Fire Station a new APX 7500 consolette and antenna network could be installed to utilize the proposed ASTRO25 trunking system's Call Alert feature. The primary backhaul could be the local owned and managed private Ethernet IP network (Wired/Fiber). The parallel backhaul could be the proposed ASTRO25 optional IV&D data pipe.
3.	Offeror must describe in detail the proposed multi-tenant station alerting system solution. that could be implemented by each of the PSAPs.
	Offeror Response: Comply

	The proposed Statewide ASTRO25 radio system is leveraging existing/current VHF FNE using DTMF Tones. One Conventional Channel Gateway is proposed per RF site and multiples at dispatch sites to support current VHF channel interface(s). Optionally at each applicable Fire Station a new APX 7500 consolette and antenna network could be installed to utilize the proposed ASTRO25 trunking system's call alert feature. Motorola will work with interested Fire Departments to provide a tailored MACH Alert Fire Station Alerting and Automation (FSAA) system design meeting individual requirements. The system solution. could include redundant Fire Station Alerting (FSA) servers, redundant Alerting Interface Controllers (AIC's), plus ACE3600 Station Controllers (SC's) and MACH Alert client software. The primary backhaul could be the locally owned and managed private Ethernet IP network (Wired/Fiber). The parallel backhaul could be the proposed ASTRO25 optional IV&D data pipe.
4.	Offeror must describe in detail how The proposed solution could be accessed by a back-up PSAP.
	Offeror Response: Comply Provisioned IP console operator positions at a backup PSAP will be able to send out either DTMF tones on the existing/current VHF FNE interfaced to the proposed Statewide ASTRO25 radio system via Conventional Channel Gateway(s), or send out ASTRO25 trunked Call Alert tone to a specific radio unit.
5.	Offeror must describe in detail how The proposed solution could be integrated with each of the different CAD systems
	Offeror Response: Comply The proposed MCC7500E radio dispatch console positions provide the right to use MCC7500E Dispatch API for any future third-party i.e. CAD system integration if required. The Software Development Kit (SDK) for the MCC7500E Dispatch API requires a license agreement to be executed between the software developer and Motorola Solutions. Motorola will provide instruction, quote license fee and plant technical support quote upon request.
6.	Offeror must describe in detail how each PSAP is capable of operating independently in the event that the link between the console system and the core is lost.
	Offeror Response: Comply With failure of both redundant site links to core, the proposed Conventional Channel Controller will function as a local zone controller for all local audio/control processing

	including the proposed and existing backup consolettes. The provisioned backup consolettes will facilitate transmission on MCC7500E console talkgroup recourses.
7.	Offeror must describe in detail the methods of alerting, each offering positive acknowledgment.
	Offeror Response: Comply Trunked Call Alert tone can go out to any ASTRO25 subscriber unit. The initiating radio will receive notification from the trunked system as to whether or not the page was received by the target radio.
8.	Offeror must describe in detail how The proposed solution can be expanded to accommodate additional users.
	Offeror Response: Comply Trunked Call Alert tone can go out to any ASTRO25 subscriber unit.
9.	Offeror must describe in detail how The proposed solution is able to: a. Zone alerting b. Opening apparatus bay doors, c. Shut down appliances, d. Control lighting, e. Operate other sensory devices. f. Other
	Offeror Response: Comply with Clarification Motorola Solutions is providing an interface which will enable the State's current capabilities.
10.	Offeror must describe in detail how The proposed solution is able to simultaneously transmit alerts over multiple redundant communications paths, data and audio radio networks
	Offeror Response: Comply with Clarification We will transmit alerts to simultaneous locations over the air.
11.	Offeror must describe in detail how The proposed solution is able to alert by group, station, or unit.
	Offeror Response: Comply with Clarification We will transmit alerts to simultaneous locations over the air.

12.	Offeror must describe in detail how The proposed solution is able send distinct tones for the different units and classes of equipment, such as engines, ladders, rescue vehicles and battalion chiefs.
	Offeror Response: Comply with Clarification One single tone can go out to any ASTRO25 subscriber unit.
13.	Offeror must describe in detail how The proposed solution allows for all alert tones to configurable to meet the users' needs.
	Offeror Response: Comply with Clarification Alert tones are configurable to drive a relay.
14.	Offeror must describe in detail how The proposed solution is able to process multiple distinct alert notifications that may be generated in very rapid succession due to multiple events occurring.
	Offeror Response: Comply with Clarification Alert tones are configurable to drive a relay.
15.	Offeror must describe in detail if The proposed solution has a "day"/ "night" mode.
	Offeror Response: Non Compliant
16.	Offeror must describe in detail how The proposed solution is able to restrict control to permissions-based users.
	Offeror Response: Comply with Clarification One single tone can go out to any ASTRO25 subscriber unit.
17.	Offeror must describe in detail the proposed solution's operating system.
	Offeror Response: Comply The operating system is the ASTRO25 infrastructure.
18.	Offeror must describe in detail how The proposed solution is able to conduct a test of the equipment at the fire station through the use of a push button or similar device.
	Offeror Response: Comply with Clarification A one way call outbound alert tone is provided.
19.	Offeror must describe in detail how The proposed solution is able to automatically detect when a critical event or failure occurs within the system and automatically alert support

	personnel using all or a combination of the following methods: visually, audibly, email, pager or phone call.
	Offeror Response: Non Compliant
20.	Offeror must describe in detail how The proposed solution could offer a method to allow fire station personnel to manually acknowledge that a notification was received. This notification back to the dispatcher is a preferred.
	Offeror Response: Comply The initiating radio or dispatch operator position will receive notification from the trunked system as to whether or not the Call Alert page was received by the target radio. Additionally, a subscriber user at the fire station can manually acknowledge via voice transmission.
21.	Offeror must describe in detail how The proposed solution provides a means of notifying dispatchers that all components are operating properly; self-diagnosis, system health check (per NFPA 1221).
	Offeror Response: Comply A control station is provided for a relay output via the call alert function to the fire station.
22.	Offeror must describe in detail how The proposed solution indicates the success or failure of each dispatched station, unit or group for the given alert.
	Offeror Response: Comply The initiating radio or dispatch operator position will receive notification from the trunked system if Call Alert page was not received by the target radio.
23.	Offeror must describe in detail any other options or functionality available.
	Offeror Response: Comply This is not applicable to Motorola Solutions 800 MHz solution. All features are described within this section's point by point response.
24.	Offeror must describe in detail all maintenance options available.
	Offeror Response: Comply Motorola Solutions has proposed re-use of the existing State fire station alerting solution and includes replacement of consolettes with antenna and line. The 12-month standard warranty is included. If desired, a 5-year SFS is also available as an option.

	5 Year Service From The Start (SFS) Comprehensive provides all-component level service for the consolette equipment. Services are performed at the Motorola Radio Support Center (RSC), or Federal Technical Support Center. A radio model may be added to an SFS Comprehensive service agreement while it is currently being manufactured by Motorola, or for up to one (1) year after manufacturer cancellation date of said model. SFS Comprehensive includes: - Repair and or replacement of cracked housings, frames, covers, crushed components, shields, missing components, circuit boards, warped circuit boards - Damage to LCD screens (cracks to screen, or any damage that does not pass Motorola test parameters) - Damaged foils/traces/lands - Electrical damage - Water/chemical corrosion - Contaminants visible which cannot be cleaned up reliably
25.	Offeror must describe in detail user and administrator training. *Offeror Response:* Comply with Clarification. Additional training is not required for Fire Station Alerting since Motorola Solutions has optionally proposed re-use of the State's existing State fire station alerting solution. This optional solution includes replacement of consolettes with antenna and line only. If the reuse of the existing Fire Station solution is desired with the optional consolettes utilizing the call alert functionality training for call alert functionality is already proposed within the MCC 7500E training dispatcher training. If a separate fire station alerting solution (i.e. Mach Alert Fire Station Alerting) is desired separate training will be provided, as applicable.

17. PAGING SYSTEM

As an option, the Offeror must propose a multi-tenant paging system.

No.	
1.	Offeror must describe in detail the proposed multi-tenant paging system solution. that could be implemented by each of the PSAPs.
	Offeror Response: Comply G-Series P25 Voice Paging Solutions The proposed Unication G-Series Voice Pager is the industry's first and only P25 voice pager. P25 Digital paging allows migration from a legacy 2-tone network to a P25 Network; which provides improved coverage, excellent voice clarity and superior reliability. G-Series Pagers now support three methods for P25 paging: TGID, Call Alert and Quick Call II over P25. The G4 (available in 700/800 MHz) supports multiple P25 systems, including Conventional, P25 Trunking and P25 Conventional. The G5 (dual band available in 700/800 MHz and VHF) supports everything the G4 supports in addition to 2 Tone and 5 Tone on either of its two bands. Unication's G-Series Trunked Voice Pagers (G4/G5) Support: - Multiple IDs. - 2 Tone, 5 Tone and MDC 1200 (G5 Only). - Site Trunking. - Full Spectrum Scan. - Linear Simulcast Modulation for Simulcast Applications. - Priority TGIDs. - Multi-select. - 800MHz, 20kHz channel spacing and 4kHz deviation for Direct mode communications. Unication's G-Series Trunked Voice Pagers will utilize the proposed Statewide ASTRO25 radio system, RF sites (with redundant voice and control channels) and MCC7500E IP console dispatch paging recourses. Note: Predicted Grade of Service (GoS) calculations is based upon a typical public safety voice profile and the State's subscribe counts per RFP Attachment 3 Subscriber Unit Inventory.
2.	Offeror must describe in detail how The proposed solution could be accessed by a back-up PSAP.
	Offeror Response: Comply

	Unication's G-Series Trunked Voice Pagers, their assigned site lists and MCC7500E IP console dispatch paging recourses (at both Primary/Main and Backup PSAP) will be provisioned on the proposed Statewide ASTRO25 radio system. Either PSAP will be equipped with the required MCC7500E IP console paging groups. Any MCC7500E console operator will be able to select the appropriate MCC7500E console paging recourse and when they send the page the system will send out the pre-programmed TGID.
3.	Offeror must describe in detail how The proposed solution could be integrated with each of the different CAD systems
	Offeror Response: Comply The proposed MCC7500E radio dispatch console positions provide the right to use MCC7500E Dispatch API for any future third-party i.e. CAD system integration if required. The Software Development Kit (SDK) for the MCC7500E Dispatch API requires a license agreement to be executed between the software developer and Motorola Solutions. Motorola Solutions will provide instruction, quote license fee and plant technical support quote upon request.
4.	Offeror must describe in detail how each PSAP is capable of operating independently in the event that the link between the console system and the core is lost.
	Offeror Response: Comply With failure of both redundant site links to core, the proposed Conventional Channel Controller will function as a local zone controller for all local audio/control processing including the proposed and existing backup consolettes. The provisioned backup consolettes will facilitate transmission on MCC7500E console paging recourses.
5.	Offeror must describe in detail the methods of paging.
	Offeror Response: Comply Unication's G-Series Trunked Voice Pagers now support three methods for P25 paging: TGID, Call Alert and Quick Call II over P25 trunked infrastructure. The Unication's G-Series Trunked Voice Pager will decode the TGID and emit an alert tone (user programmable) while it stores the associated message on the assigned Traffic Channel. At the end of the alert tone duration (user programmable) the pager will play the stored voice message from the beginning.
6.	Offeror must describe in detail how The proposed solution can be expanded to accommodate additional users.
	Offeror Response: Comply

	Additional Unication G-Series Trunked Voice Pagers (G4/G5) and Core Radio User ID licenses can be provisioned on the proposed Statewide ASTRO25 radio system to facilitate paging system user expansion. Note: Predicted Grade of Service (GoS) calculations is based upon a typical public safety voice profile and the State's subscribe counts per RFP Attachment 3 Subscriber Unit Inventory.
7.	Offeror must describe in detail how The proposed solution is able to restrict control to permissions-based users.
	Offeror Response: Comply All Unication G-Series Trunked Voice Pagers require provisioning on the proposed Statewide ASTRO25 radio system in order to allow for system utilization.
8.	Offeror must describe in detail the proposed solution's operating system.
	Offeror Response: Comply Unication's G-Series Pager Programming Software (PPS) is Windows based operating system. The micro-USB cable that is used for charging the Unication's G-Series Trunked Voice Pager is also used for programming it. Pager programming software can be downloaded, at no charge, from www.unicationusa.com web site. In addition, Unication offers webinars on programming and the features of the G4/5 pagers on YouTube channel https://www.youtube.com/c/UnicationUSA for free.
9.	Offeror must describe in detail any other options or functionality available including, but not limited to phone activation, tone activation through radio designated activation tones, other.
	Offeror Response: Comply **Key Features:** G4 Model Includes: - Accommodates Multiple P25 Trunked and P25 Conventional Systems. - Supports the 800 MHz Analog Frequencies. - Supports up to 256 Control Channels/ per Trunked System. - Supports Full Spectrum Scan for P25 Trunked System. - Supports Multiple TGIDs for Monitoring and Alerting. - Supports Priority TGID Scan. - Supports Multiselect for Efficient Use of Traffic Channels. - Allows for Customized Alerts using WAV/MP3 Files. - Alerting Options based on a Selector Knob Setting. G5 Model Has All of the Above Features Plus: - Each Band Supports P25 Trunking, P25 Conventional, Conventional Channel Monitoring and 2 Tone Decoding.

	▪ Full 2 Tone Function Mode Support (Selective Call, Monitor, Scan Options). ▪ Supports Multiple 2 Tone Codes per Frequency. <u>Both Model Features:</u> ▪ Up to 256 Channels. ▪ IP67 Rating Waterproof and Dustproof. ▪ Submersible up to 3ft for 30 Minutes. ▪ High Impact Resistance Color Screen. ▪ Rugged Housing. ▪ 2-year Standard Warranty/ 3 Year Addition Available. ▪ Customer WAV File Alerts. ▪ Out of Range Alert. ▪ Text Messaging/Image Transfer. ▪ Bluetooth. ▪ 32 Minutes Voice Storage. ▪ 32 Minutes Voice Memo. The G4/5 pagers come with a heavy-duty Lithium Polymer 2800mAH battery. The pager includes a micro-USB charging cable with 2-amp power supply. Battery life greatly depends on the amount of traffic one is monitoring. Some Users are getting more than 24 hours and heavy Users are getting around 14-16 hours.
10	Offeror must describe in detail all maintenance options available.
	<u>Offeror Response:</u> Comply Unication Paging Equipment: ▪ Warranty includes any defect in materials or workmanship. ▪ G4/G5 pager 2 yr. std warranty ▪ Charger 12 months' warranty ▪ Programmer 12 months' warranty ▪ G series LiIon battery 12 months Conditions not Covered under warranty: Alterations, unauthorized repairs, Abuse including broken housings and displays, damage caused by fire, or flood and any natural/man-made calamity.
11	Offeror must describe in detail user and administrator training.
	<u>Offeror Response:</u> Comply User training for the proposed pagers can be performed with a one hour course to review pager functionality. If desired this training be provided to the user(s) on site or remotely. Administrator training is not applicable for the Unication pagers. A pager training quote has not been proposed but, can be provided separately upon request.
	<u>Added via Solicitation Amendment 1 issued November 24, 2017</u>

12	Offeror must acknowledge that The proposed solution shall provide each region with 85% portable coverage, with 95% reliability. *Offeror Response:* Comply with Clarification For the 800 MHz solution, the coverage will be similar to that of the state and regional 800 MHz portable on-street design.
13	*Added via Solicitation Amendment 1 issued November 24, 2017* As an option, Offeror must describe in detail a proposed solution to provide each county with 85% portable coverage, with 95% reliability. *Offeror Response:* Comply with Clarification For the 800 MHz solution, the coverage will be similar to that of the regional and state 800 MHz portable on-street design.

18. VALUE ADDED FEATURES

Offerors are strongly encouraged to propose and describe in detail any functionality, products and services that are not part of the RFP and demonstrate added value to the STATE.
Add lines below as needed.

Offeror Response:
Comply

While there are a number of features the State has expressed a desire to have for future considerations, ours includes additional enhancements to improve operation, performance, deployment and support.

Improved User Safety Features inherent in the Motorola solution:

- **Emergency** – only the originating user can clear an emergency to ensure the public safety personnel who initiate an emergency are safe when the emergency is cleared
- **Individual Priority with Emergency** – individual's priority changes with emergency (not just talkgroup priority) - Emergency Call Setup & Duration stays at Highest Priority. This feature provides the ability for the system to assign Emergency activation and emergency calls to be assigned the highest priority level above all other call types. The intent of this enhancement is to prevent non-emergency high priority users to override in-process emergency communications.
- **Redundant Path Emergency over Bluetooth** – for radios equipped with Bluetooth, Emergency is able to go over your emergency designated talkgroup and any talkgroup with radio in proximity of Bluetooth
- **Evacuation tone** – a specialized tone to signal evacuation
- **Out of range Tone** – a tone to let you know if you are losing coverage
- **Out of Range vs. Busy/Talk Prohibit Tones** – different tones so you know difference between a busy channel and no coverage. This feature provides for a different out of range tone along with a faster cadence rate. The intent of this feature is to allow the users to better differentiate when the radio is out of range vs. the channel being busy.
- **No Voice Detection** –This feature allows users to communicate in the event there is a situation where a mic is stuck open. The radio will detect lack of communications below a particular threshold and wait a pre-configured amount of time before displaying the PTT. If there is no human voice but still background noise, the radio will dekey during it's set time. This feature would work in conjunction with the overall time out timer feature. This feature is intended to reduce the effects a stuck PTT has during their operations.
- **Quick Key** – Allows for the transmission sequence to occur only when the PTT is intentionally pressed and will apply to Trunking. This feature is intended to reduce inadvertent PTTs from initiating the call-setup and tear down process that can result in accidentally tying up a channel on the system. The customer has the option to enable or disable this feature as desired in CPS.

Improved Roaming Features Unique to Motorola

Motorola Solution provides roaming with site preferences and an adjacent channel notification to the user radios that improves automatic roaming and user operations

Inter-State Interoperability (via the optional, Phase 3 ISSI offering) – Above and Beyond the Standard

The State of North Dakota is surrounded by Motorola Solutions Statewide systems. The surrounding states of Minnesota, Montana, Iowa and South Dakota all utilize our Project 25 networks. This benefits North Dakota with experienced personnel and the ability share resources, as well as benefitting from interoperability above and beyond the TIA-102 ISSI standard. Because the surrounding States use Motorola Solutions technology, the State of North Dakota's automatic roaming will be greatly improved with features beyond the standard such as adjacent channel broadcast (should North Dakota decide to enable roaming between states). Other features that improve interoperability with Motorola Solutions' common ISSI across state borders is user identification with alias name information, FDMA/TDMA, busy queue/call back and fast start/all start.

OPTIONAL ITEMS:

In addition to the Baseline Offering with the inherent features described above, Motorola has proposed Optional features such as Enhanced Data, Integrated Voice and Data and Group Services. Incorporating Enhanced Data and Integrated Voice and Data into the State system allows the State to add features such as Group Services. The Group services applications include features such as:

- **On-the-Fly-Alias-Updates (aka caller ID**) – no longer do you have to update a radio template to update the alias on a user radio. When the alias of the radio is updated in provisioning manager, the next time a radio in the talkgroup hits their PTT, there is an update for that user to all other users in that talkgroup.
- **Location on PTT** – Location on PTT provides GPS information for a radio as a trailing transaction, thus increasing the efficiency of the capacity of the system.
- **Over-the-Air-Application Updates** – this provides user radio FIRMWARE updates over the Project 25 system (not codeplug templates, but firmware). This has no impact on system capacity or user radio operation. When radios are idle, they receive firmware updates in packets over the air. They assemble the packets and update the radio. Instead of touching 10,000 radios over a year, the entire fleet can have a firmware update in a matter of days. This is managed and tracked via Radio Management

<u>Integrated Voice and Data Feature</u>

The Integrated Voice and Data IV&D "Classic" data channel utilizes FDMA protocol and supports two-way data messaging (inbound & outbound data packets) through the ASTRO25 Infrastructure to a host application (separately required) in a Customer Enterprise Network. Data can also be transmitted outbound to the subscriber unit from the host application. Recommended IV&D Usage is for non–mission critical, short messages, information which is not time critical, i.e. Over The Air Programming and Text Messaging.

<u>Optional Enhanced Data Feature</u>

Enhanced Data is a Motorola proprietary data solution. based on Phase 2 voice protocol. Enhanced data allows data transmission inbound only through the ASTRO25 infrastructure to a separately provided, Host Application. It uses TDMA phase 2 Protocol and supports more users sending short inbound only data packets (i.e. Location). Enhanced Data supplements Classic IV&D data. As such, Enhanced Data users will require both Classic IV&D and Enhanced Data on their system/subscriber units.

Recommended Enhanced Data Usage is for short message, periodic messages sent at a specified cadence–Location and Telemetry with infrequent updates being sent into the network.

Note: The Enhanced Data feature (Infrastructure and Subscriber units) is highly recommend to improve the inbound data channel efficiency.

Optional Intelligent Middleware (IMW)

The Intelligent Middleware (IMW) solution. is a suite of network services across different types of radio networks with a common Application Programming Interface (API). Third-party applications that use this API can transparently track and communicate with wireless devices regardless of access network protocols and device types. The IMW API is a restricted and licensed interface. Only third-party applications developed by licensed application developers may gain access to the interface. The IMW framework enables interoperability between third-party applications, such as mapping applications and Radio Access Networks (RANs), including ASTRO25 systems, and Public Safety Long-Term Evolution (PS LTE) systems.

IMW provides the following services to track and manage data sent by devices:

- Location Service that allows users and applications to receive device location information.
- Presence Service that allows users and applications to receive a device or user presence status.

19. TRAFFIC LOADING ANALYSIS (PHASE 3 DEPLOYMENT)

a. Capacity

Motorola Solutions used the proprietary subscriber information supplied by the State of North Dakota, as the foundation to developing a detailed statewide traffic analysis. Once the new system is deployed, actual system statistic data can be used to refine the existing radio network based on agency usage. In determining capacity, it was assumed that all county traffic would primarily utilize sites within and surrounding sites as their primary coverage. Using what Motorola Solutions considers average call data and survey estimates for call volume, the required channel capacity was determined using an Erlang C calculation table in relationship to Grade of Service (GoS). Capacity was added to each site that would provide primary coverage to the area served. Capacity was also considered to sites that provide overlapping or secondary coverage.

b. Capacity Calculation Overview

Motorola Solutions used industry Average Call Lengths based on the main categories of radio users: Law Enforcement, Fire, Emergency Medical Services and Public Works.

Table 5: Industry Average Call Lengths

TG Type	Average Call Length (s)
Law Enforcement	5.4
Fire	6
EMS	11.5
Public Works	9.2

Busy Hour Calls is an engineering calculation derived from the total number of calls placed for an Average Call Length. The total number of calls placed was derived from the subscriber inventory broken down my State agencies (wide coverage range) and County agencies (countywide coverage range) and City agencies (local coverage range). It was assumed that these calls occur during a 24-hour window each day for a period of 356 days (12 months). The following assumptions were made based on the inventory supplied to determine active users:

- Created Mobile and Portable Totals for each County based on inventory supplied by the State of North Dakota
- Assumed 40% of the users have two devices and only use one at a time (Multiplied Subscriber totals by 60%)
- Assumed a radio distribution of between agencies: LAW (50%), FIRE (25%), EMS (18.75%) and Public Works (6.25%)
- Assumed only 30% of each type of users are working during the Busy Hour of the total available users

- Created a temporary fleetmap, accounting for tactical Talkgroups for each County and STAGEnet agencies. In addition, interoperable tactical Talkgroups by Region and Statewide

To account for the number of calls during a Busy Hour, basic assumptions on different Arrival Rates for tactical TG assignments by dispatch, giving lower values of as more tactical channels are assigned by dispatch. By multiplying the Arrival Rates by the number of active users, a Busy Hour was calculated by site. The Busy Hour was used to determine an Erlang-C value for each site in the system. Then by using the Erlang C Traffic Table below, which provides a correlation between an Erlang-C value to a desired Grade of Service (GoS), then determines the number Talkpath required. Motorola Solutions determined the number of Talkpaths needed to offer a 1% GoS for the State of North Dakota, based on all the above assumptions.

Maximum Offered Load Versus B and N
B is in %

N/B	0.01	0.05	0.1	0.5	1.0	2	5	10	15	20	30	40
1	.0001	.0005	.0010	.0050	.0100	.0200	.0500	.1000	.1500	.2000	.3000	.4000
2	.0142	.0319	.0452	.1025	.1465	.2103	.3422	.5000	.6278	.7403	.9390	1.117
3	.0860	.1490	.1894	.3339	.4291	.5545	.7876	1.040	1.231	1.393	1.667	1.903
4	.2310	.3533	.4257	.6641	.8100	.9939	1.319	1.653	1.899	2.102	2.440	2.725
5	.4428	.6289	.7342	1.065	1.259	1.497	1.905	2.313	2.607	2.847	3.241	3.569
6	.7110	.9616	1.099	1.519	1.758	2.047	2.532	3.007	3.344	3.617	4.062	4.428
7	1.026	1.341	1.510	2.014	2.297	2.633	3.188	3.725	4.103	4.406	4.897	5.298
8	1.382	1.758	1.958	2.543	2.866	3.246	3.869	4.463	4.878	5.210	5.744	6.178
9	1.771	2.208	2.436	3.100	3.460	3.883	4.569	5.218	5.668	6.027	6.600	7.065
10	2.189	2.685	2.942	3.679	4.077	4.540	5.285	5.986	6.469	6.853	7.465	7.959
11	2.634	3.186	3.470	4.279	4.712	5.213	6.015	6.765	7.280	7.688	8.336	8.857
12	3.100	3.708	4.018	4.896	5.363	5.901	6.758	7.554	8.099	8.530	9.212	9.761
13	3.587	4.248	4.584	5.529	6.028	6.602	7.511	8.352	8.926	9.379	10.09	10.67
14	4.092	4.805	5.166	6.175	6.705	7.313	8.273	9.158	9.760	10.23	10.98	11.58
15	4.614	5.377	5.762	6.833	7.394	8.035	9.044	9.970	10.60	11.09	11.87	12.49

Figure 34: Erlang C Traffic Table

c. Capacity Calculation Results

SIRN20/20 System Total Load Analysis											
Site #	Site Name	County	Site Type	Region NE	Region SE	Region NW	Region SW	Total Erlangs (2s Hangtime)	Talk Paths for GOS of 1%	Min. Total RF Channels Per Site	Designed RF Channels
Site001	1223130	Rolette	ASR	0.63	0.00	0.00	0.00	0.63	4	5	5
Site002	1028308	Towner	ASR	0.57	0.00	0.00	0.00	0.57	4	5	5
Site003	1271013	Towner	ASR	0.50	0.00	0.00	0.00	0.50	4	5	5
Site004	Milton	Cavalier	ASR	0.65	0.00	0.00	0.00	0.65	4	5	5
Site005	Wales	Cavalier	ASR	0.37	0.00	0.00	0.00	0.37	3	4	5
Site006	1043121	Pembina	ASR	0.59	0.00	0.00	0.00	0.59	4	5	5
Site007	Esmond	Pierce	ASR	0.51	0.00	0.00	0.00	0.51	4	5	5
Site008	1049782	Benson	ASR	0.62	0.00	0.00	0.00	0.62	4	5	5
Site009	Devils	Benson	ASR	0.70	0.00	0.00	0.00	0.70	4	5	5
Site010	1277210	Ramsey	ASR	0.60	0.00	0.00	0.00	0.60	4	5	5
Site011	1018171	Walsh	ASR	0.67	0.00	0.00	0.00	0.67	4	5	5
Site012	1043119	Nelson	ASR	0.45	0.00	0.00	0.00	0.45	4	5	5
Site013	Petersburg	Nelson	ASR	0.61	0.00	0.00	0.00	0.61	4	5	5
Site014	Grand F	Grand Forks	SIM4	1.20	0.00	0.00	0.00	1.20	5	6	6
Site015	Grand F	Grand Forks	SIM4	1.20	0.00	0.00	0.00	1.20	5	6	6
Site016	1264559	Wells	ASR	0.48	0.00	0.00	0.00	0.48	4	5	5
Site017	Carrington	Wells	ASR	0.57	0.17	0.00	0.00	0.74	4	5	5
Site018	1046473	Eddy	ASR	0.55	0.00	0.00	0.00	0.55	4	5	5
Site019	Hannaford	Griggs	ASR	0.47	0.25	0.00	0.00	0.71	4	5	5
Site020	Finley	Steele	ASR	0.42	0.00	0.00	0.00	0.42	3	4	5

SIRN20/20 System Total Load Analysis											
Site021	Hillsboro	Traill	ASR	0.69	0.00	0.00	0.00	0.69	4	5	5
Site022	1051848	Bottineau	ASR	0.00	0.00	0.51	0.00	0.51	4	5	5
Site023	Bottineau	Bottineau	ASR	0.00	0.00	0.46	0.00	0.46	4	5	5
Site024	1032565	Burke	ASR	0.00	0.00	0.74	0.00	0.74	4	5	5
Site025	Columbus	Burke	ASR	0.00	0.00	0.47	0.00	0.47	4	5	5
Site026	1266935	Divide	ASR	0.08	0.00	0.30	0.00	0.38	3	4	5
Site027	Fortuna	Divide	ASR	0.00	0.00	0.30	0.00	0.30	3	4	5
Site028	1049781	McHenry	ASR	0.00	0.00	0.36	0.00	0.36	3	4	5
Site029	1251946	McHenry	ASR	0.00	0.00	0.36	0.00	0.36	3	4	5
Site030	1038866	McKenzie	ASR	0.00	0.00	0.16	0.00	0.16	3	4	5
Site031	Arnegard	McKenzie	ASR	0.00	0.00	0.39	0.00	0.39	3	4	5
Site032	1291675	McKenzie	ASR	0.00	0.00	0.39	0.00	0.39	3	4	5
Site033	Peer Cr	McKenzie	ASR	0.00	0.00	0.39	0.00	0.39	3	4	5
Site034	1018755	McLean	ASR	0.00	0.00	0.49	0.17	0.67	4	5	5
Site035	1256374	McLean	ASR	0.00	0.00	0.49	0.00	0.49	4	5	5
Site036	1262906	McLean	ASR	0.00	0.00	0.49	0.00	0.49	4	5	5
Site037	Butte	McLean	ASR	0.00	0.00	0.73	0.00	0.73	4	5	5
Site038	1279819	Mountrail	ASR	0.00	0.00	0.44	0.00	0.44	4	5	5
Site039	Blaisdell	Mountrail	ASR	0.00	0.00	0.76	0.00	0.76	4	5	5
Site040	KXV345	Mountrail	ASR	0.00	0.00	0.44	0.00	0.44	4	5	5
Site041	Mohall_	Renville	ASR	0.00	0.00	0.74	0.00	0.74	4	5	5
Site042	Denhoff	Sheridan	ASR	0.00	0.00	0.25	0.00	0.25	3	4	5
Site043	Ryder	Ward	ASR	0.00	0.00	0.80	0.00	0.80	4	5	5
Site044	Minot_M	Ward	SIM6	0.00	0.00	1.22	0.00	1.22	5	6	6
Site045	Minot_W	Ward	SIM6	0.00	0.00	1.22	0.00	1.22	5	6	6
Site046	1038697	Williams	ASR	0.00	0.00	0.48	0.00	0.48	4	5	5
Site047	1267330	Williams	ASR	0.00	0.00	0.52	0.00	0.52	4	5	5

SIRN20/20 System Total Load Analysis											
Site048	1291196	Williams	ASR	0.00	0.00	0.40	0.00	0.40	3	4	5
Site049	Tioga	Williams	ASR	0.00	0.00	0.60	0.00	0.60	4	5	5
Site050	Williston	Williams	ASR	0.00	0.00	0.48	0.00	0.48	4	5	5
Site051	Williston	Williams	SIM7	0.00	0.00	0.56	0.00	0.56	4	5	6
Site052	Williston	Williams	SIM7	0.00	0.00	0.56	0.00	0.56	4	5	6
Site053	Williston	Williams	SIM7	0.11	0.00	0.56	0.00	0.67	4	5	6
Site054	Valley	Barnes	ASR	0.00	0.47	0.00	0.00	0.47	4	5	5
Site055	1244730	Cass	ASR	0.00	0.75	0.00	0.00	0.75	4	5	5
Site056	Fargo_1	Cass	SIM3	0.00	1.64	0.00	0.00	1.64	6	7	7
Site057	Fargo_F	Cass	SIM3	0.00	1.64	0.00	0.00	1.64	6	7	7
Site058	Fargo_O	Cass	SIM3	0.00	1.64	0.00	0.00	1.64	6	7	7
Site059	1214000	Dickey	ASR	0.00	0.59	0.00	0.00	0.59	4	5	5
Site060	Merricourt	Dickey	ASR	0.00	0.63	0.00	0.00	0.63	4	5	5
Site061	1037007	Kidder	ASR	0.00	0.38	0.00	0.00	0.38	3	4	5
Site062	Driscoll	Kidder	ASR	0.00	0.32	0.00	0.45	0.76	4	5	5
Site063	1224826	Lamoure	ASR	0.00	0.37	0.00	0.00	0.37	3	4	5
Site064	1249403	Logan	ASR	0.00	0.29	0.00	0.00	0.29	3	4	5
Site065	1283705	Logan	ASR	0.00	0.31	0.00	0.00	0.31	3	4	5
Site066	1290708	McIntosh	ASR	0.00	0.30	0.00	0.00	0.30	3	4	5
Site067	Wishek	McIntosh	ASR	0.00	0.30	0.00	0.00	0.30	3	4	5
Site068	1038150	Ransom	ASR	0.00	0.52	0.00	0.00	0.52	4	5	5
Site069	1208391	Ransom	ASR	0.00	0.57	0.00	0.00	0.57	4	5	5
Site070	Wahpeton	Richland	ASR	0.00	0.64	0.00	0.00	0.64	4	5	5
Site071	Cayuga	Sargent	ASR	0.00	0.45	0.00	0.00	0.45	4	5	5
Site072	1053013	Stutsman	ASR	0.00	0.32	0.00	0.00	0.32	3	4	5
Site073	Cleveland	Stutsman	ASR	0.00	0.64	0.00	0.00	0.64	4	5	5
Site074	Jamestown	Stutsman	SIM5	0.00	0.84	0.00	0.00	0.84	5	6	6

SIRN20/20 System Total Load Analysis											
Site075	Jamestown	Stutsman	SIM5	0.00	0.84	0.00	0.00	0.84	5	6	6
Site076	1260792	Adams	ASR	0.00	0.00	0.00	0.33	0.33	3	4	5
Site077	GREENFIELD_7	Adams	ASR	0.00	0.00	0.00	0.33	0.33	3	4	5
Site078	Mott	Adams	ASR	0.00	0.00	0.00	0.35	0.35	3	4	5
Site079	1224915	Billings	ASR	0.00	0.00	0.00	0.22	0.22	3	4	5
Site080	GREENFI	Billings	ASR	0.00	0.00	0.00	0.22	0.22	3	4	5
Site081	1057670	Bowman	ASR	0.00	0.00	0.00	0.39	0.39	3	4	5
Site082	Bowman	Bowman	ASR	0.00	0.00	0.00	0.39	0.39	3	4	5
Site083	Marmarth	Bowman	ASR	0.00	0.00	0.00	0.39	0.39	3	4	5
Site084	1031568	Burleigh	ASR	0.00	0.00	0.00	0.62	0.62	4	5	5
Site085	1059676	Burleigh	ASR	0.00	0.00	0.00	0.74	0.74	4	5	5
Site086	1253428	Burleigh	SIM1	0.00	0.00	0.00	2.02	2.02	7	8	8
Site087	Bismarck	Burleigh	SIM1	0.00	0.00	0.00	2.02	2.02	7	8	8
Site088	1055715	Dunn	ASR	0.00	0.00	0.00	0.16	0.16	3	4	5
Site089	1263524	Dunn	ASR	0.00	0.00	0.00	0.35	0.35	3	4	5
Site090	1292068	Dunn	ASR	0.00	0.00	0.00	0.35	0.35	3	4	5
Site091	Killdeer	Dunn	ASR	0.00	0.00	0.00	0.35	0.35	3	4	5
Site092	WQEB919	Dunn	ASR	0.00	0.00	0.00	0.35	0.35	3	4	5
Site093	1264232	Emmons	ASR	0.00	0.00	0.00	0.34	0.34	3	4	5
Site094	1293278	Emmons	ASR	0.00	0.00	0.00	0.50	0.50	4	5	5
Site095	Emmons_	Emmons	ASR	0.00	0.00	0.00	0.34	0.34	3	4	5
Site096	Linton	Emmons	ASR	0.00	0.00	0.00	0.34	0.34	3	4	5
Site097	GREENFI	Golden Valley	ASR	0.00	0.00	0.00	0.27	0.27	3	4	5
Site098	Sentinel	Golden Valley	ASR	0.00	0.00	0.00	0.27	0.27	3	4	5
Site099	1258537	Grant	ASR	0.00	0.00	0.00	0.31	0.31	3	4	5

SIRN20/20 System Total Load Analysis											
Site100	1287619	Grant	ASR	0.00	0.00	0.00	0.31	0.31	3	4	5
Site101	Elgin_N	Grant	ASR	0.00	0.00	0.00	0.31	0.31	3	4	5
Site102	Raleigh	Grant	ASR	0.00	0.00	0.00	0.31	0.31	3	4	5
Site103	1241612	Hettinger	ASR	0.00	0.00	0.00	0.28	0.28	3	4	5
Site104	1266936	Hettinger	ASR	0.00	0.00	0.00	0.35	0.35	3	4	5
Site105	1267112	Mercer	ASR	0.00	0.00	0.00	0.53	0.53	4	5	5
Site106	1274056	Mercer	ASR	0.00	0.00	0.00	0.47	0.47	4	5	5
Site107	1274057	Mercer	ASR	0.00	0.00	0.00	0.47	0.47	4	5	5
Site108	1059677	Morton	ASR	0.00	0.00	0.00	0.71	0.71	4	5	5
Site109	1255021	Morton	ASR	0.00	0.00	0.00	0.71	0.71	4	5	5
Site110	1264616	Morton	ASR	0.00	0.00	0.00	0.71	0.71	4	5	5
Site111	New Sal	Morton	ASR	0.00	0.00	0.00	0.71	0.71	4	5	5
Site112	Bismarck	Morton	SIM1	0.00	0.00	0.00	2.02	2.02	7	8	8
Site113	Bismarck	Morton	SIM1	0.00	0.00	0.00	2.02	2.02	7	8	8
Site114	1210301	Oliver	ASR	0.00	0.00	0.00	0.28	0.28	3	4	5
Site115	Hannover	Oliver	ASR	0.00	0.00	0.00	0.44	0.44	4	5	5
Site116	1201974	Sioux	ASR	0.00	0.00	0.00	0.37	0.37	3	4	5
Site117	GREENFI	Sioux	ASR	0.00	0.00	0.00	0.37	0.37	3	4	5
Site118	1256210	Slope	ASR	0.00	0.00	0.00	0.25	0.25	3	4	5
Site119	1291735	Slope	ASR	0.00	0.00	0.00	0.30	0.30	3	4	5
Site120	1050833	Stark	ASR	0.00	0.00	0.00	0.61	0.61	4	5	5
Site121	1057662	Stark	ASR	0.00	0.00	0.00	0.65	0.65	4	5	5
Site122	1220363	Stark	ASR	0.00	0.00	0.00	0.61	0.61	4	5	5
Site123	Dickinson	Stark	ASR	0.00	0.00	0.00	0.61	0.61	4	5	5
Site124	Dickinson	Stark	SIM2	0.00	0.00	0.00	0.61	0.61	4	5	6
Site125	Dickinson	Stark	SIM2	0.00	0.00	0.00	0.61	0.61	4	5	6
Site126	1278177	Burleigh	ASR	0.00	0.00	0.00	0.62	0.62	4	5	5

SIRN20/20 System Total Load Analysis											
										Total System Talk Paths:	470

20. SOLUTION SUPPORT

The proposal must completely describe the support of the proposed system including:

a. *Project Management, Contract Schedule and Deliverables*

b. *System Implementation, Test and Acceptance*

c. *Customer Service, experience, Product Support*

d. *Maintenance and management*

e. *Training*

If the Offeror is successful, the Offeror agrees that it shall comply with all items throughout the full term of the Contract. Offerors must provide a full response to each item without cross referencing other sections of the proposal. Offerors must use the table format and maintain numbering provided by the STATE to respond to each item. Attachments, documents, or samples must be clearly referenced where in the response they can be found in the in the applicable Item Number.

In addition, the Offeror Response must include any specific references and/or supportive materials as described in the Offeror Response.

The STATE reserves the right to determine whether the supportive materials submitted by the Offeror demonstrate the Offeror will be able to comply with the items below.

a. Project Management, Contract Schedule and Deliverables

No.	Project Management
1.	Offeror must acknowledge that the STATE and Offeror will be required to comply with the State's requirements related to Project Management of Large Information Technology Requirements, including: - Standard for the Project Management of Large Information Technology Projects, https://www.nd.gov/itd/standards/project-management-information-technology-projects - Project Management Homepage, https://www.nd.gov/itd/services/project-management - ITD Project Management Tools and Templates, https://www.nd.gov/itd/service-info/customized-project-management-tools-and-templates - The project shall follow the Project Management Institute's (PMI) Project Management Body of Knowledge The Technology Contract - Attachment 7 includes provisions related to Project Management.
	Offeror Response: Comply

	Motorola Solutions has reviewed the above documents and will comply with the State Project Management requirements.
2.	Offeror must acknowledge that: a. The STATE'S project manager will prepare a Project Plan using the State's methodology and applicable template: https://www.nd.gov/itd/node/655. b. Offeror will need to provide information necessary to prepare the Project Plan. c. The State's project manager will direct and manage the project on a day-to-day basis and will have the primary responsibility for management of the project. The Offeror's project manager and lead consultants will report to the STATE'S project manager within the project's governance structure.
	Offeror Response: Comply Motorola Solutions has reviewed and will utilize the State's methodology and templates as required.
3.	Offeror must acknowledge that they have reviewed all project management and large project oversight related information.
	Offeror Response: Comply Motorola Solutions has reviewed all project management and large project oversight related information.
4.	Offeror must provide examples of project management methodologies, tools and templates used in previous projects that support Offeror's ability to function successfully within North Dakota's project management framework. a. Project management methodologies; b. Quality management plan; c. Testing management plan; d. Work breakdown structure and schedule.
	Offeror Response: Comply **a. Project Management Methodologies:** Motorola Solutions has years of experience in managing large, statewide projects and meeting budgetary and schedule goals. Implementing mission critical public safety systems is our core business; this ensures that we can dedicate personnel with direct relevant experience in successfully implementing systems comparable in size and complexity as the State of North Dakota project.

	Six Sigma (Quality Management) Using Six Sigma process improvement, we continue to refine our project management methodology to reduce our customers' costs and mitigate project risk. Customer satisfaction surveys show that our customers consistently rate us, "very satisfied" because we deliver our projects on time and on budget and always see our projects through to a successful completion. During the project, we will continually review and update our project implementation plan to ensure that we are meeting the expectations of the State. Our Systems Integration teams use a fully aligned and integrated project management process. This process aligns PMP-certified personnel with a systems integration methodology that is ISO-9001 compliant. It is tested on an on-going basis with performance metrics that emphasize satisfying our customers, achieving budgetary goals and meeting project deadlines. Our project management team will use project tasks, deliverables and project milestones to capture the State's requirements and establish them as "meet-and-beat" goals. **SI-Gates (Project Management Methodologies)** By tracking the requirements against a rigorous application of process management techniques, our team of project managers will enforce technical, quality and safety standards to successfully complete the project. SI-Gates is Motorola Solutions' next generation System Integration Methodology. Through our continuous Six Sigma process improvements, SI-Gates has not only optimized the integration process and received National Quality Award recognition, but also achieved certification from the International Organization for Standards (ISO) 9001 as well. SI-Gates incorporates the Program Management Institute (PMI) model showing consistent, repeatable processes, deliverables and checkpoints as shown in our Motorola Solutions Services Framework diagram shown in Figure 35 below.

Figure 35: Motorola Solutions Services Framework

b. Quality Management Plan:

Quality audits can be used to verify that the project team is following prescribed processes/procedures and to develop corrective/preventative actions as required. The audit takes into consideration the status and importance of the processes and areas to be audited, as well as the results of previous audits.

Table 6: Quality Audits

Project Quality Audit Review	Purpose	Planned Frequency
Documentation Reviews	Review of the project's management plans and other project documentation to determine if the project's documentation standards are being followed.	As Needed
Quality Audits	Project deliverables subject to quality audits and reviews: - Master Project Management Plan - Risk Plan - Communications Management Plan - Technical Plan - Change Management Plan - Financial Plan	As Needed

Other reviews and audits may be held throughout the course of the project on an as-needed basis.

Table 7: Project Quality Reviews

Deployment	System	Assurance
Project Management	SI-Gates Status Reports Status Meetings Project Schedule Issue Tracking Log	Supervision Sample Inspection Project Reviews
Equipment Installation	Motorola R56 Standards System Design Diagrams/Documentation Optimization Procedures	Supervision Sample Inspection
Mobile/Portable Installation (as applicable)	Programming Templates Installation Checklists	Supervision Sample Inspection Installation Logs
System Acceptance	- Equipment Verification - Feature/Functionality Testing - Coverage Testing – Phase 3 Only	- Sample Inspection - Contract Review

Our Systems Integration (SI) process offers that value by incorporating quality control methodologies such as Six Sigma and ISO-9000. Motorola Solutions invented Six Sigma as an internal metric for measuring defects and improving quality. Since then, it has become an industry-standard, recognized as a robust business improvement methodology. Six Sigma helps focus an organization on its customer requirements, process alignment, analytical rigor and timely execution.

Using Six Sigma process improvement, we continue to refine our project management methodology to reduce our customers' costs and mitigate project risk. Customer satisfaction surveys show that our customers consistently rate us, "very satisfied" because we deliver our projects on time and on budget and always see our projects through to a successful conclusion. During the project, we will continually review and update our project implementation plan to ensure that we are meeting your expectations.

We have multiple ISO quality certifications and our Systems Integration Organization has been granted ISO certification, as well as our CCSi, Customer Support Service and manufacturing. Using Six Sigma, ISO and other quality control techniques, we were the first two-time recipient of the Malcolm Baldrige National Quality Award, the nation's most prestigious recognition for corporate excellence.

Adherence to the goals of Six Sigma and ISO-9000 ensure that we will provide the State with the most cost-effective, efficient and reliable deployment possible.

Quality Commitment

Motorola Solutions believes that developing, executing and adhering to a sound Quality Assurance Plan (QAP) is critical to running a Statewide mission critical communications project and ensures that your project will achieve its objectives with the level of excellence you expect from us. We understand the importance of a Quality Assurance Plan that addresses all stages of the project including procurement, detailed system design, installation, implementation, testing and cutover.

Quality Assurance Program

The purpose of the Project Quality Assurance Plan (PQAP) is to provide a framework for implementing quality management and ensuring successful execution of the project. The audience of this plan is the project stakeholders and the project team members. The PQAP is integrated into each phase of the project, from pre-sale and contract execution through delivery of the final solution. and transition to on-going service and maintenance activities.

Our System Integration-Gates (SI-Gates) project methodology is the foundation for our PQAP. SI-Gates is a disciplined approach, methodology and repository of our Project Management and System Integration team's activities and best practices. Using this SI-Gates approach facilitates the incorporation of our quality management system through policy and procedure so project quality remains at the forefront throughout the project's lifecycle.

SI-Gates represents a comprehensive set of cross functional processes separated into a Phase/Gate scheme to ensure proper project execution. This integrated framework maps closely to the Program Management Body of Knowledge Processes as shown in the table below. In addition, SI-Gates Monitoring and Controlling is not a phase but a comprehensive and complimentary collection of mutually supporting plans, control measures, review points, documentation and activities that occur throughout the Project's Lifecycle.

c. Testing Management Plan:

The State of North Dakota Radio System will be staged in the Motorola Solutions facility in Elgin, IL. Before the equipment leaves the staging facility, pre-installation performance and functionality tests will be executed to verify that the system is operating properly. Representative of the State are welcome to attend the official Factory Test Acceptance demonstration during which all key elements and functionalities are tested against a jointly-approved list of tests and procedures.

After the equipment has been installed in the field, functional and system acceptance tests as well as coverage testing will be executed to verify that the system has been installed correctly and is ready for use. Through the use of a Requirements Traceability Matrix (RTM), the Project Team will be able to correlate

	system design and performance parameters from design through testing and delivery for traceable requirements management. **d. Work Breakdown Structure and Schedule:** **Work Breakdown Structure (WBS)** The following approach is a typical overview of the work breakdown structure utilized for Motorola Solutions Projects. - Contract Initiation and Kick-off. - Design Review. - Coverage Design - FCC Licensing - Order Processing, Manufacturing and Staging. - Civil Work - Site Development and Construction. - Backhaul. - Infrastructure Installation. - Systems Integration and Optimization. - Coverage Acceptance Testing. - Subscriber Installation - Documentation. - Training. - Acceptance Testing. - Cutover and User Migration. - Warranty Begins. - Project Completion. The table shown on the following pages is an example of typical tasks within the WBS. <u>Contract Initiation – Kickoff Meeting and initiation Activities</u>

Task	Motorola Solutions	State of North Dakota	Deliverable
Initiate the Project 25 (P25) Trunking System project with a Kickoff Meeting. Objectives: - Introduce and exchange contact information of all project participants. - Review roles of key participants and project review procedures. - Establish a clear chain of communication and authority. - Review overall project scope & objectives. - Review resource & scheduling requirements. - Review preliminary project schedule with the State of North Dakota. - Review teams' interactions (Motorola and the State), meetings, reports, milestone acceptance and the State's participation in particular phases.	X	X	Documented Project Personnel Names, Responsibilities, Contacts and Project Review Procedures
A communication plan will be developed to address types of communication that will be established, such as weekly status meetings and status reports. The communications plan will also indicate appropriate points of contact for different types of communications.	X	X	Communications Plan
Provide information and status on site MOUs and leases.		X	Site Status
State of North Dakota to provide current system documentation.		X	State of North Dakota Existing System Documentation

State of North Dakota to provide meeting facility		X	
Motorola Solutions will develop meeting notes including identification of the next action items. Motorola Solutions will submit this document electronically to the State's project manager within five full working days after the meeting	X		Meeting Notes
Completion Criteria: This task is considered complete when the Project Kickoff Session has been held with Motorola Solutions and the State of North Dakota representatives in attendance and project scope, schedules, procedures, roles and responsibilities are documented and agreed upon within ten calendar days of the Project Kickoff Meeting.			Kickoff Meeting Completion

Design Review

Task	Motorola Solutions	State of North Dakota	Deliverable
Finalize Coverage Design and Sites: State of North Dakota and Motorola Solutions will work together to finalize site selection and approval based upon coverage criteria and site availability.	X	X	Final Site Selection and Coverage Design
Develop a final frequency plan once the site selection and coverage design is finalized.	X	X	Frequency Plan Complete

		Conduct site survey to capture site details of the system design and to determine site readiness	X		Site Readiness Report
		Provide an initial cutover plan for State of North Dakota review. The State will provide existing system and user information (e.g., shift information, specific vehicle information), which must be taken into account to develop a Cutover plan. This plan is refined throughout the lifecycle of the project.	X	X	Cutover Plan
		Review Acceptance Test Plans (ATPs)	X	X	ATPs
		Create Project Management Plan to include Quality Assurance/Quality Commitment Plan.	X		Project Management Plan
		Finalize the project implementation schedule.	X	X	Project Schedule
		Review the Training Plan	X	X	Training Plan
		If required, prepare and submit EME plans for the site (as a licensee) to demonstrate compliance with FCC RF Exposure guidelines.		X	EME
		State of North Dakota will provide comment on the resulting design documents to Motorola Solutions.		X	Design Document Comments

Motorola Solutions will edit the design documents and deliver a final Design Document that reflects changes in design and scope, as well as definition of details determined during the Design Review. Motorola Solutions will: - Update the System Design, to include equipment lists, drawings and System Description, as necessary to accommodate the specifics of the Design Review. - Update the Acceptance Test Plans (ATPs) to reflect changes in the system design. - Update the Project Schedule. - Update the WBS to reflect changes in the implementation scope.	X		Equipment List System Description System Drawings – as defined in the documentation section of the SOW ATPs Work Breakdown Structure Project Schedule
State of North Dakota will review work performed by Motorola Solutions and sign an approval document for the Design Review.		X	Approval Statement
Completion Criteria: This task is considered complete when: The Design Review subtasks listed below are all completed. Any deviations from the proposed system have been incorporated into the contract documents accordingly. The system design is "frozen" in preparation for subsequent project phases such as Order Processing and Manufacturing. The schedule is baselined.	X	X	Design Review Completion

Finalize Project Schedule

Task	Motorola Solutions	State of North Dakota	Deliverable
Review with State of North Dakota personnel the identified implementation tasks, priorities, inter-dependencies and other requirements needed to establish the final Project Schedule. The final Project Schedule depends on finalization of radio sites and cannot be completed with a high degree of certainty until radio sites are secured and permitted for construction where necessary. Leases for sites in which the State will be a tenant are also required. The project schedule will identify key project milestones, in addition to tasks that will require interruption of existing communications, to move the new system into live operations.	X	X	Project Schedule Review
Prepare final Project Schedule Motorola Solutions deliverables and deliver it to State of North Dakota as a deliverable of the Design Review. Review Project Schedule with State of North Dakota personnel and make changes and/or corrections mutually agreed upon through the change order process.	X		Project Schedule Finalization
Review the final Project Schedule and identify in writing any specific deficiencies found within five (5) business days of receipt.		X	Project Schedule Approval
Completion Criteria: This task is considered complete upon mutual agreement of the parties			Project Schedule Finalized

to implement in accordance with the final Project Schedule that has been developed within the Design Review. This Project Schedule will become the governing Project Schedule incorporated into the contract, but is subject to change on mutual agreement of the parties as discussed during the weekly status meetings.			

Schedule

Motorola Solutions has developed a preliminary project schedule for the system implementation of the three deployment phases. The project schedule will be reviewed in detail and modified as necessary during the design review with the State. The final approved project schedule will be base-lined and become the basis for all reporting and status activities during the project. We will also develop a detailed schedule including State's team member tasks and subcontractor tasks to ensure that all schedules support the implementation plan.

The schedule with its detailed Work Breakdown Structure (WBS) will also show tasks and activities that will require the State's support during the project. Any dependencies between tasks and a critical path analysis will be used to show the impact of any potential delays during the project. This critical path analysis in conjunction with the risk mitigation plan will ensure that all team members understand the importance of supporting the work effort and completing the tasks on time.

Successful schedule management depends on these key approaches:

- Schedule development in collaboration with the State and subcontractors is further refined during the Design stage.
- Effective scope and change management plans.
- Accurate and timely status reporting.

The schedule will reflect all project work activities.

An accurate project schedule will identify the critical path for the project and focus the team on ensuring the tasks are completed on time. The project schedule and the visibility it offers allows a transparent view of the project timeline and tasks so the State's stakeholders are kept informed of the project progress. It also allows the State to view the potential impact of any requirements or scope changes to the overall project schedule.

5.	Offeror must acknowledge that the Project Management for the awarded contract will be done following the State Project Management methodology as described in standard STD009-005. *Offeror Response:* Comply Motorola Solutions will leverage the North Dakota Project Management Guidebook for project management purposes. A project repository will be maintained and documentation will be stored per requirements as defined.
6.	Offeror must describe in detail the methodology pertaining to Project Management and how the Offeror will provide project management of the initial and future implementation efforts of this project. *Offeror Response:* Comply Motorola Solutions' Project Management Methodology utilizes Project Management Institute, Six Sigma and ISO9001 certified processes; and has been proven in 36 Statewide deployments and over 1,100 TDMA standard based systems. The State of North Dakota will benefit from our years of experience in managing large, Statewide projects while meeting budgetary and schedule goals. Implementing mission critical public safety systems is our core business; this ensures that we can dedicate personnel with direct relevant experience in successfully implementing systems comparable in size and complexity of this project. Specific to North Dakota, the implementation plan proposed is focused on mitigating risk, expediting deployment and improving user operations with a low risk, feasible design. We are proposing the following deployment scenario: - Phase 1 – Primary Core Site and Dispatch Console System Deployment for Immediate Interoperability • Phase 2 - Deployment of forty-five (45) 800MHz ASR sites for mobile coverage utilizing State sites • Phase 3 - Deployment of seven (7) simulcast cells with eighteen (18) sites and seventy-six (76) ASR sites to Supplement Coverage for Portables Six Sigma Using Six Sigma process improvement, we continue to refine our project management methodology to reduce our customers' costs and mitigate project risk. Customer satisfaction surveys show that our customers consistently rate us, "very satisfied" because we deliver our projects on time and on budget and always see our projects through to a successful completion. During the project, we will continually

	review and update our project implementation plan to ensure that we are meeting the expectations of the State. Our Systems Integration teams use a fully aligned and integrated project management process. This process aligns PMP-certified personnel with a systems integration methodology that is ISO-9001 compliant. It is tested on an on-going basis with performance metrics that emphasize satisfying our customers, achieving budgetary goals and meeting project deadlines. Our project management team will use project tasks, deliverables and project milestones to capture North Dakota's requirements and establish them as "meet-and-beat" goals. <u>SI-Gates</u> By tracking the requirements against a rigorous application of process management techniques, our team of project managers will enforce technical, quality and safety standards to successfully complete the project. SI-Gates is our next generation System Integration Methodology. Through our continuous Six Sigma process improvements, SI-Gates has not only optimized the integration process and received National Quality Award recognition, but also achieved certification from the International Organization for Standards (ISO) 9001 as well. SI-Gates incorporates the Program Management Institute (PMI) model showing consistent, repeatable processes, deliverables and checkpoints as shown in our Motorola Solutions Services Framework diagram shown in **Figure 36** below.  **Figure 36: Motorola Solutions Services Framework**
7.	Offeror must describe in detail any risks that could impact a timely and fully successful completion of the project.

	Offeror must describe in detail what measures will be taken to avoid or minimize these risks. Offeror must describe in detail how any additional measures will be identified so the STATE can mitigate these risks.
	Offeror Response: Comply **Risk Management** The success of this project will be measured by the ability to meet the user expectations and deliver a system that meets the operability and interoperability needs of the first responders in the State of North Dakota. By gathering this data Motorola is able to provide an offer that is highly accurate in terms of coverage design, project costs, risk identification and mitigation and reduced implementation times of the North Dakota system. Motorola's experience allows us to offer the State of North Dakota specific benefits that are unmatched by other vendors: - Schedule and Cost Predictability - Expedited implementation schedule with Immediate User Benefit. - Local North Dakota residents and business partners to provide unparalleled service during the design and implementation of the system. - Ease of Governance with user acceptance, improved user safety, balanced urban-rural representation in the design and long term support. Our risk mitigation plan that follows includes a discussion of the risks and associated mitigation for: - Transition with Legacy Support - User Operational Benefit Aligned with Budget - Site Construction and Development – Phases 2 and 3 - Systems Integration Methodology - Schedule - User Acceptance and Governance - Long Term Support and Operations **Transition with Legacy Support**

	The State has made it clear that end-users require legacy support on their existing systems while maintaining interoperable communications during the migration to SIRN. To mitigate this risk, we have included conventional gateways at each existing site to enable parallel operations between legacy VHF and the new Project 25 SIRN during the user transition and for on-going interoperability. By deploying the consoles first, users will gain immediate Statewide interoperability with legacy systems, familiarization with the new consoles and parallel operations during transition. ***Motorola Solutions has mitigated user transition risk by including gateways and early console deployment during the transition.*** **<u>User Operational Benefit and Deployment Aligned with Budget</u>** The deployment plan includes a three-phase approach. ***The initial console operational phase focuses on holistic user benefit aligned with budget.*** Deploying consoles first enables parallel operations of legacy systems and SIRN with the immediate benefit of Statewide interoperability among PSAPs, thus allowing users to retain what they have and better manage their migration. All State sites have been selected in the second operational phase because the State sites are less expensive to deploy due to reuse of existing shelters and the State sites provide functional mobile coverage with the benefit of simplified operations, automatic roaming and the ability for users to communicate with their PSAP as they operate across the network. Portable coverage will be provided as supplemental sites are added in the third deployment phase. The phases were established to provide an operational demarcation that simplifies user operations during the transition and aligns with budget. **<u>Site Construction and Development</u>** The State's risk for site construction and development is mitigated by our proposed use of State sites, due diligence and inclusion of new towers as well as remediation costs. Site construction risk is associated with the tower remediation necessary to hold the antenna load necessary to support the system, the feasibility of reusing shelters and the ability to build a tower or shelter. Identifying and mitigating construction risks is primarily a function of analyzing the site data available for sites, physically walking sites and auditing them for feasibility.

Leveraging State Sites

Motorola Solutions' proposed SIRN design leverages assets that are currently owned or used by public safety, with 45 State sites. Thirty-four (34) of the State's 45 towers that are proposed are close to 60 years old. Using existing State owned sites eliminates the risk of land acquisition, but introduces a risk associated with tower loading. Tower standards have evolved and become more stringent. Towers built 15 years ago, let alone 50 years ago, may have passed previous site construction standards, but not the latest tower standard ANSI/TIA-222-G which was first published in 2006 with the latest addendum to rev G in 2014.It is not possible to know if a tower needs to be remediated until a tower analysis is performed, however, a qualitative analysis can be utilized based on age of the tower. As a result, 34 new towers have been proposed for use on State land with existing towers due to the age of the existing towers. A tower remediation budget for the newer state sites is included in the separately bound cost proposal as required by the RFP specification. The table below summarizes the risk analysis related to site feasibility that was completed for State sites. ***Motorola Solutions has mitigated the State's construction risk with an in-depth feasibility analysis and best practice approach towards replacing existing towers and shelters due to age, loading, or conditions.***

	State Site	Feasibility Note	Tower	Shelter	Generator
			34 New 11 Existing	0 New 45 Existing	10 New 35 Existing
1	Arnegard	Constructed 1961	New	Existing	New
2	Bismarck	Building Top	Rooftop	Existing	Existing
3	Blaisdell	Constructed 1982	New	Existing	Existing
4	Bottineau	Constructed 1962	New	Existing	Existing
5	Bowman	Constructed 1961	New	Existing	Existing
6	Carrington	Constructed 1961	New	Existing	Existing
7	Cayuga	Constructed 1961	New	Existing	Existing
8	Cleveland	Constructed 1961	New	Existing	Existing
9	Columbus	Constructed 1961	New	Existing	Existing
10	Denhoff	Constructed 1961	New	Existing	New
11	Devils Lake	Constructed 1961	New	Existing	New
12	Dickinson	Constructed 1961	New	Existing	New
13	Dogden Butte	Constructed 1961	New	Existing	Existing
14	Driscoll	Constructed 1961	New	Existing	Existing
15	Elgin (Lipzig)	Constructed 2007	Remediation	Existing	Existing

16	Emmons / Westfield	Constructed 2016	Remediation	Existing	Existing
17	Esmond	Constructed 2013	Remediation	Existing	Existing
18	Fargo	Constructed 2002	Remediation	Existing	Existing
19	Finley	Constructed 1961	New	Existing	Existing
20	Fortuna	Constructed 1961	New	Existing	Existing
21	Grand Forks	Constructed 1961	New	Existing	New
22	Hannaford	Constructed 1961	New	Existing	Existing
23	Hannover	Constructed 1961	New	Existing	Existing
24	Hillsboro (Mayville)	Constructed 2015	Remediation	Existing	Existing
25	Killdeer	Constructed 1961	New	Existing	Existing
26	Linton	Constructed 1996	Remediation	Existing	New
27	Marmarth	Constructed 2009	Remediation	Existing	Existing
28	Merricourt	Constructed 1961	New	Existing	Existing
29	Milton	Constructed 1961	New	Existing	New
30	Minot	Constructed 1961	New	Existing	Existing
31	Mohall	Constructed 2013	Remediation	Existing	Existing
32	Mott	Constructed 1961	New	Existing	Existing
33	New Salem	Constructed 1961	New	Existing	Existing
34	Peer Creek (Trotters)	Constructed 2012	Remediation	Existing	Existing
35	Petersburg	Constructed 1961	New	Existing	Existing
36	Raleigh	Constructed 1961	New	Existing	Existing
37	Ryder	Constructed 1961	New	Existing	Existing
38	Sentinel Butte	Constructed 1961	New	Existing	Existing
39	Tioga	Constructed 1961	New	Existing	New
40	Valley City	Constructed 1961	New	Existing	New
41	Wahpeton	Constructed 1973	New	Existing	Existing
42	Wales	Constructed 2011	Remediation	Existing	Existing
43	Williston	Constructed 1961	New	Existing	New
44	Wishek	Constructed 1961	New	Existing	Existing
45	Mylo	Constructed 1961	New	Existing	Existing

Use of Third-Party Sites

After anchoring the system design with State sites, the design was completed based on strategically situated, existing third-party sites, with only eight (8) green sites out of 139. The rationale for utilizing third-party sites after State owned sites is to mitigate site acquisition risk and cost with a predictable schedule and implementation budget. Third-party tower remediation mitigation is included in the separately bound cost proposal as required by the RFP specification.

Systems Integration Methodology

Our extensive experience as a prime contractor of large complex systems with multiple subsystems provides the State with the lowest risk associated with system implementation. Deploying unproven technology that has not been repeatedly tested in mission-critical Statewide, regional systems incurs risks to timeline, functionality and user confidence. We have mitigated this risk with a Project Management approach and solution that includes:

- Award winning, certified Project Management Processes.
- Seasoned team with experience implementing Project 25 systems.
- Local resources familiar with the environment that will remain to support the system, eliminating the risk of using “fly teams” that depart after implementation.

We have developed a *Systems Integration Gates* process with best practices to ensure that as a team we use a standard process to integrate and support our customers’ solutions. This standard process drives quality assurance, improves cycle time and increased cost savings to ultimately exceed our Customer’s Expectations. *SI Gates* requires customer review and approval at critical checkpoints in the project to ensure that we are providing Total Customer Satisfaction to each of our customers.

We follow the industry standard Program Management Body of Knowledge (PMBOK), which was established by the Project Management Institute (PMI).The PMBOK® Guide is an internationally recognized standard (IEEE Std 1490-2003) that provides the fundamentals of project management. This approach is consistent with other management standards such as ISO 9000 and *SI Gates*.These quality tools and processes provide the State of North Dakota with an implementation approach that lowers risk and cost through effective management of the project implementation.

Schedule

Deployment of wireless communications systems is a complex endeavor, made more complex by the size and scope of North Dakota’s planned system. Motorola Solutions has proposed a realistic, feasible schedule with equipment available, feasible design and experienced project team resources.

Project 25 TDMA Equipment Availability

We have mitigated equipment availability risk by having equipment shipping today, with proven

Statewide implementations, which fulfills the RFP and design requirements for the proposed P25 Phase 2 TDMA system. Our P25 equipment is available today and meets the future needs of the State, mitigating the risk associated with unproven equipment delivery and fork-lift upgrades in the future.

Development of a Feasible Design

Motorola Solutions is proposing a realistic, feasible design that will deliver the reliability, coverage and seamless operations that the State needs in the moments that matter. During the proposal phase of the project, we conducted extensive research and analysis to propose a design that is feasible. A feasible design means that realistic sites and scope have been proposed that can be implemented. All of the proposed sites have been assessed. The critical path on the timeline is site acquisition/development and frequency planning. Motorola Solutions has confirmed the availability of 800MHz spectrum in North Dakota.

Project Team Resources and Experience

Having proven equipment and a design that fulfills the specific needs of the State is one piece of the

puzzle; having a team that is experienced in implementation and committed to the State of North Dakota is another piece. Our North Dakota team has implemented many Project 25 networks, including the State of Minnesota, as well as all many surrounding Project 25 Statewide systems.

We have an experienced Program Management, Engineering and System Technologist team that, as well as Motorola Solutions Service partners, some of which have been in business for over 50 years. Our experienced team has provided the State of North Dakota with a feasible design that is able to be implemented within the proposed timeline. ***Motorola Solutions is committed to be a true partner of the State to ensure a successful implementation that is on or ahead of schedule.***

User Acceptance and Governance

Projects can be successful technically and still fail to satisfy user expectations creating user dissatisfaction, project delays, additional resource commitments and change orders. Risks that impact user acceptance include:

- Coverage and Transition
- User Options
- Operational Parameters
- Training

Coverage is critical to user acceptance. We conducted an extensive engineering analysis to evaluate the parameters in the design and user acceptance to propose a solution with Statewide coverage and improved user operations and safety.

Operational parameters include talkgroup structure, individual features and the ability to implement them within a desired governance structure. Our solution includes autonomy and control features to enable the governance the State desires. We have extensive experience working with public safety agencies across the United States and can apply lessons learned to aid in the development of the operational fleetmap and parameters.

Comprehensive user training is very important to the operation of the network and user acceptance. Education and user training early and often is critical. We have proposed dispatch training during the console early deployment and additional refresh training after the trunking sites are available. In addition, we have several training options for user radios. During training, professional instructors explain the system, its capabilities and how users can maximize benefit and prepare users for operation on new system.

The cutover and transition to the new system is very important. The first experience on the network sets the stage for the user perception going forward. We will develop custom cutover plans for every agency that transitions to the system.

Our vast experience in North Dakota and across the country can provide the State with confidence that risk associated with user acceptance is mitigated.

Long Term Support and Operations

Our comprehensive warranty and support plan mitigates risk associated with operations over the 15-year life of the system. The proposed solution includes a one-year System Warranty with a suite of system support services designed to maximize network uptime with on-site response, preventative maintenance, dispatch service, technical support, remote monitoring, security monitoring and security update service. The warranty provides repair without charge of any new component of the proposed system that fails because of defective materials or workmanship, or becomes defective through normal use. ***During warranty, Motorola Solutions will utilize four regional Motorola Solutions Service Centers to provide systems personnel to support daily maintenance and to mitigate risk associated with response time.***

	The post-warranty operations and maintenance functions are proposed to leverage existing SIRN personnel for on-site response and we provided remote monitoring, security monitoring, technical support, dispatch, case management and infrastructure repair parts with a Motorola Solutions Customer Support Manager (CSM). ***Motorola Solutions has included a full suite of training for SIRN technicians that will be conducted to mitigate risk associated with SIRN providing on-site response.*** Our System Upgrade Agreement (SUA), if purchased, can provide hardware and software refreshes to ensure the network is up-to-date and supported for 15 years. The proposed solution is an IP based network with servers and work stations. ***The optional System Upgrade Agreement mitigates SIRN's risk associated with hardware and software refreshes necessary in an IP based network.***
8.	Offeror must acknowledge that Offeror shall be responsible for the project management related tasks/information specified below. <u>Offeror Primary Responsibilities:</u> 1. Provide a Quality Management Plan to include the methodology for maintaining quality of the code and workmanship and related subcontractor(s) activities where appropriate. 2. Provide a Test Management Plan which describes how the Offeror and the STATE shall verify the product meets the requirements. <u>Offeror Secondary Responsibilities:</u> 1. Assist in the development of detailed schedule with fixed deadlines to include: a. A work breakdown structure; b. Schedule including tasks, activities, activity duration, sequencing and dependencies; c. Completion date of each task; d. Milestones; including entrance and exit criteria for specific milestones; 2. Assist in the development of the Human Resources Plan to include: a. Staff assigned and their location and schedule; b. The project resources required; c. Resource allocation percentage by role; d. Offeror's resources; e. STATE'S resources. 3. Assist in the development of a Communication Plan including: a plan for generation, documentation, storage, transmission and disposal of project information. 4. Assist in and review of the Risk Management Plan to ensure that risks are identified, planned for, analyzed, communicated and acted upon effectively. 5. Assist in the development of the Training Plan.

6. Assist in the development of the Implementation Plan.
7. Assist in the development of the Transition Plan. This plan shall describe the steps necessary to turn the final deliverables over to the STATE. The plan shall contain sufficient information to assure that all necessary steps are identified and that each step has sufficient resources assigned.
8. Assist in the development of the Project Closeout Report to include participation in the lessons learned exercise.

Offeror Response:

Comply

Motorola Solutions will complete the reports and plans identified above.

Contract Schedule and Deliverables

9. The Awardee shall be required to sign a contract substantially similar to the contract attached to this RFP (Attachment 7). Offeror must acknowledge that the STATE and the awarded Offeror will execute one contract for the services necessary to deliver The proposed solution

Offeror must acknowledge that they have reviewed Technology Contract – Attachment 7.

Offeror also must acknowledge that the proposal includes a copy of the Technology Contract – Attachment 7 completed according to the instructions in the attachment. Per the instructions in Section Eight – Proposal, Subsection 6 Contract Provisions of the RFP.

Offeror Response:

Comply

Motorola will execute the contract for the services necessary to deliver the proposed solution

Motorola has reviewed and aligned radio specific requirements with the RFP Attachment 7 Exhibit A deliverables. The Table below reflects the alignment.

DELIVERABLES	TECHNOLOGY CONTRACT - SIRN Attachment 7 Exhibit A –SOW	MOTOROLA SOLUTIONS RADIO NETWORK SOW OVERVIEW
1	Project Kick Off Meeting	State of ND/Motorola Solutions Kick Off Meeting
2	Project Plan	P25 Radio Network Project Plan
3	Data Conversion Plan	Backhaul Plan, Equipment List, Install Plan, Power, Alarm, Civil Work Plan
4	Data Conversion Design	Backhaul Drawings, Install Drawings, Power Calculations, Alarm definition, Civil Definition

		5	Data Conversion Validation	R56 Communication Site Audits, Loading Test, Site Checklist Review
		6	Interface Design	CCGW Design, CEN Design, as applicable
		7	Interface Development and Release	Install CCGW per Site, CEN interface install
		8	Gap Analysis	Review of System Design
		9	System Configuration	Civil Work; FNE, Dispatch and Backhaul Install and Optimize
		10	Test Management Plan	System Acceptance Test Plan (including Coverage Test Plan, Staging Test Plan, Backhaul Test Plan, 60-day Burn-in Plan, as applicable by deployment phase)
		11	Acceptance Test	Complete Acceptance Test
		12	Training Management Plan	Dispatch, FNE, Subscriber Radio Training plans, as applicable by deployment phase
		13	Training	Dispatch, FNE End User and Administrator training (as applicable by deployment phase)
		14	Training	Dispatch, FNE Train the Trainer and Administrator training (as applicable by deployment phase)
		15	Implementation & Transition Plan	Cutover Plan, Service Plan
		16	Implementation	Cutover, Punchlist Resolution.
		17	Post Implementation Report	Project Documentation, Service Warranty Transition
		18	Project Close Out Meeting	Final Review - System Documentation, Reports, Service Warranty Transition
		19	Final Acceptance	Final Radio Network Acceptance
10.	Offeror must acknowledge that they have included any additional contract language in Attachment 7 for the STATE'S review. *Offeror Response:* Comply			

	Additional language has been included in Attachment 7 (Section 7, Contract Provisions of the proposal submission) for the State's Review. As noted above, the intent is for a mutually agreed upon version of this document and Exhibit B that corresponds with each deployment Phase to be utilized for the contract.
11.	Offeror must describe in detail their approach to a functional phased implementation of The proposed solution
	Offeror Response: Comply Motorola Solutions' proposed system design provides a phased approach which aligns with the SIRN report goals of addressing interoperability while meeting both rural and urban needs. This phased approach provides the State of North Dakota with interoperability via Dispatch operations across the State during the first phase and then progressively adds RF sites during the second and third phases. **Statewide Interoperability – 800 MHz Solution**: The initial deployment phase includes the replacement of all Dispatch Sites and the installation of the Core site. This rollout provides the Radio Network Core with Dispatch Console operation in both the rural and urban areas for State and Local dispatch interoperability. The Radio Network Core, the Main State dispatch center in Bismarck and dispatch sites having existing dispatch End of Life issues will be replaced first. The remaining dispatch center replacements will take place subsequently. By prioritizing dispatch interoperability this assists with bridging communication needs from the old to new system as the proposed RF site rollout work is completed during Phases 2 and 3. In parallel with the dispatch installations the upfront architectural and engineering work will begin as needed for any required Civil Work at the 45 sites. The advantage in this RF site selection is that all 45 sites are State sites. As such, this reduces implementation time since zoning and site acquisition is not needed. This provides expediency as the new RF site rollout begins throughout the rural and urban areas. The 45 RF site deployment provides mobile coverage by leveraging nearly all the same sites in use today but, with better quality audio over a larger coverage area by eliminating interference compared to what the State has today. The third phase is the Supplemental Coverage deployment. The Supplemental Coverage deployment in the 800 MHz solution includes the rollout of the urban simulcast sites and additional ASR sites. As noted in the SIRN Report, moving to 800 MHz will provide improved urban in-building coverage for portables. In addition to this final RF site rollout during the Supplemental Coverage deployment, if purchased the optional ISSI Gateways will be installed to interface and provide interoperability with other Statewide systems, as applicable. Any other contracted "optional" applications / offerings will also be provided during this period (i.e. DSR, Logging, etc.).

12.	Offeror must describe in detail how the implemented portion of The proposed solution will: a. improve interoperability, b. will be useable and functional in the event that the project goes no further than the initial phase.
	Offeror Response: Comply Motorola Solutions immediately addresses interoperability by prioritizing Dispatch console deployment first. This enables parallel operations of legacy systems and the SIRN with the immediate benefit of Statewide interoperability among PSAPs while still operating on their existing systems and for the duration of the P25 RF site migration. This permits immediate interoperability for both urban and rural users with no need for immediate upfront subscriber replacement. As part of the second deployment phase, Motorola Solutions will install RF sites for the 800 MHz solution; further promoting interoperability. The installation of the forty-five (45) Statewide RF sites will provide the State with mobile coverage. The 45 RF site deployment provides mobile coverage by leveraging nearly all the same sites in use today but with better quality audio over a larger coverage area by eliminating interference compared to what the State has today.
13.	Offeror must submit a draft schedule that addresses the deliverables and milestones specifically described in the Statement of Work for the initial phase. The proposed schedule may incorporate other deliverables, work products, milestones, or work breakdown that the offeror feels are significant in the project. The draft work schedule will cover both offeror and the STATE tasks and responsibilities. Describe any expectations from the STATE related to each deliverable or milestone. The draft schedule must contain: 1. A timeline in the number of days or weeks with start and stop dates for deliverables; 2. The number of STATE staff required to perform work in proposed schedule. Upon award, the successful offeror's proposed project schedule will be reviewed and refined during the planning phase.
	Offeror Response: Comply

Motorola Solutions has provided a Preliminary Schedule for the three phases of deployment. A final schedule will be jointly defined with the State during the Contract Design Review.

The information below includes initial estimates only. Resource requirements can vary based on final project scope decisions, individual experience and based upon State's desired level of participation.

RESOURCE TITLE	QUALIFICATION RECOMMENDATIONS	TIME REQUIRED TO
Project Manager		
Lead Project Manager	Project Management Certification, Experienced 5+ years	100% All phases
Subscr ber Project Manager	Project Management Certification, Experienced 5+ years	100% All phases
Site Project Manager	Project Management Certification, Experienced 5+ years	100% All phases
Technical Resource	Radio Communications Experience, Technical Training, 5+ years	100% All phases
Networking Resource	Experience with State Networking 5+ years	25-50% All phases
Dispatch Operator(s)	Dispatch Operator	0.5 days
Dispatch Operator/Administrator(s)	Dispatch Operator/Administrators	1 day
Senior Management	State Management as Applicable	10% Planning, Testi Final Acceptance
Outreach/User Group Lead	Radio Communications Experience, Technical Training, 5+ years	25% Planning, Configuration, Trainir 15% Other Phases
Users	Current Radio System Users	.5 day+60 Day Burn

A summary of resources and associated tasks are further detailed below.

RESOURCE TITLE	PROJECT RESPONSIBILITIES	PHASE
Project Manager	Customer Contact for all Project Related Items	All Phases
	Complete all required State Project Management requirements for Large Projects, Projects >$250,000, Other As applicable	All Phases
	Work with Motorola to develop Plans (per North Dakota State requirements)	All Phases
	Provide reviews of all Motorola completed deliverables	All Phases
	Provide decision making as needed	All Phases
	Assist with obtaining State approvals as needed (ie Executive Steering Committee	All Phases
	Provide administrative activities and coordination	All Phases
	Identify and assist with obtaining local entities approval and assistance throughout project	All Phases
	Work with 3rd party sub-contractors utilized by State, as applicable (ie DCN, others)	All Phases
	Attend site surveys	Planning
	Attend R56 Site Audits	Testing
	Participate at Motorola System Staging, if desired	Staging (Installatio
	Attend proposed radio training courses (as needed)	Training
Technical Resource	Site Survey initial	Planning
	Fleetmapping Training and Configuration	Planning/Configurati Training
	Work with Motorola to Develop Dispatch Console Configuration / Screen Layout Definition	Planning/Configurat
	Participate in Technical Planning	Planning
	- coverage test plan, staging test plan, function test plan, system acceptance test plan development	
	Participate in Technical decision making as needed.	All Phases
	Participate in Technical Review during planning	All Phases
	Participate in Coverage Testing	Testing
	R56 Site Audit with Motorola	Testing
	Participate at Motorola System Staging, if desired	Staging (Installatio
	Training – technical resource to attend technical system training/system administrator formal	Training
	Train the Trainers to provide training for State Subscriber Users (as applicable)	Training
	Subscribers - Project subscriber and paging unit templates, programming, alignment, installations as needed.	Installation
	Provide Tecnnical Review during testing	Testing
	Provide Onsite Support after Year 1 Warranty	Post Warranty
Networking Resource	Provide Technical Review during planning for Motorola and State 3rd party providers (ie backhaul)	Planning
	Availability for ongoing support/information during installation (as needed) for Motorola/State 3rd party providers	Installation
	Provide Technical Review during testing for Motorola and State 3rd party providers	Testing
Outreach/User Group Lead	Gather input from various user groups regardings Subscr ber Requirements	Planning
	Gather input from various user groups regardings Dispatch Console Requirements	Planning
	Schedule and Coordinate Meetings to Communicate/Share Project Information	All Phases as Applic
Senior Management	Review and Approvals As Needed	Planning, Testing, F Acceptance
State Radio System Users	Receive Subscriber Training from State Trained Employee (Train the Trainer(s)) for Subscribers	60 Day Burn In
	Radio System usage (on the job) - Provide Testing input	60 Day Burn In
Other	Provide other support and management overview as applicable / desired by State	All Phases

14.	The Offeror is encouraged to provide a schedule (such as a Gantt chart) that describes in detail the proposed timeline of the remaining proposed phases.
	Offeror Response: Comply Preliminary schedules for each deployment phase are included with Exhibit B.
15.	Offerors must acknowledge that they will work in good faith on behalf of the STATE in any discussion or issue resolution with a terminating service provider.
	Offeror Response: Comply Motorola Solutions will provide support in discussions and proactively communicate with designated terminating service providers as needed to ensure a smooth transition from existing services to the proposed offering.
16.	The Offeror is encouraged to outline a suggested transition period at no cost to the STATE for beneficial use. The transition period will be negotiated upon contract award.
	Offeror Response: Comply The use of the Core and Dispatch Sites will be provided to the State upon completion of the Core and Dispatch implementation and testing during phase one deployment. This will permit the State to begin utilizing dispatch operation immediately to address existing dispatch lifecycle issues. In addition, dispatch operation will not be reliant upon the completion of the RF site implementations which are planned during the second and third deployment phases.

b. System Implementation, Test and Acceptance

No.	General
1.	Offeror must describe in detail their ability to attend and participate in project conference calls as deemed necessary by the STATE prior to and during installation. Additional meetings may be scheduled at the discretion of the STATE.
	Offeror Response: Comply. Motorola Solutions has assigned experienced project team members to address project implementation requirements throughout the project. As needed, the applicable team members will be available to participate in planned project conference calls prior and during installation as well as during the other implementation phases.

2.	Offeror must acknowledge they will keep the STATE informed if any changes in the overall timeline occur. Offeror must describe in detail how they will work with the STATE on the impact of the change.
	Offeror Response: *Comply* Motorola Solutions will inform the State of any timeline changes. The project schedule will reflect all project work activities and will identify the critical path for the project to ensure tasks are completed on time. The project schedule allows a transparent view of the project timeline and tasks so the State's stakeholders are kept informed of the project progress. The project schedule will be updated and shared with the team during the status update meetings. This allows the State to view the potential impact of any requirements or scope changes to the overall project schedule. When a change is found to be required, we will first analyze the potential impact to the entire project and determine whether any adjustments can be made to scope, schedule or cost to mitigate, neutralize, or offset the impact of the change. We will then jointly work with the State to review any alternatives and impact. Any resultant change will be documented in a Change Request document (per State Template and Motorola Solutions Template as required) and sent to the State's project team for approval prior to the change being implemented. Due to our extensive pre-contract investment with our customers, as well as experience with managing large projects, we have demonstrated success in minimizing the need for change orders. This minimizes the impact on our customers' schedules and budgets.
3.	Offeror must acknowledge they will provide written minutes of all meetings no later than five business days after the meeting.
	Offeror Response: Comply
	Cutover Plan
4.	Offeror must describe in detail their ability to plan and coordinate the implementation of all equipment, subsystems and the overall system.
	Offeror Response: Comply The implementation of any system of this size and complexity is a significant undertaking. Motorola Solutions has implemented and coordinated many large, Statewide systems with multiple zones, multiple simulcast sites and systems with more than 350 sites. Additionally, we continue to provide these same systems with ongoing lifecycle upgrades.

	Motorola Solutions understands the importance of planning upfront and utilization of trusted partners. Careful planning of cutover is critical and is completed jointly with the State and other users, as deemed applicable by the State, to ensure a transition that minimizes user disruption. As important as the planning is the communication of the plan to all affected radio network users. We will ensure a detailed plan will be documented, shared and all training is complete prior to the agreed upon cutover implementation. As the cutover plan is developed the impact to users and ensuring a smooth transition from the current system to the new system is a priority. During actual implementation of the cutover, we will provide multiple technical teams along with our local installers to assist with final cutover tasks in parallel across the State sites to reduce the duration of cutover. We are experienced with cutovers and upgrades and will work with the State to ensure successful migration to the proposed new system.
5.	Offeror must describe in detail their ability to ensure that the upgraded systems are brought online with minimum interruption to all existing systems and communications.
	Offeror Response: Comply To ensure upgraded systems are brought online with minimal disruption Motorola Solutions will review all existing systems and users. In the case of the proposed North Dakota offering, we will install equipment in parallel with any sites that are located at existing sites to allow for existing system operation. Coordination of testing and test times will be per agreement with the State to ensure existing system user disruption is minimized. In the case of a dispatch site, the dispatch equipment will be installed in parallel. This allows for training time on the new positions and ensures a smooth transition from existing to new for the dispatch operators. At the time of final cutover, the full dispatch site will be converted and the existing dispatch equipment will be removed. We will provide multiple technical teams along with our local installers to assist with final cutover tasks in parallel across the State sites to reduce the duration of cutover. Our team will follow the developed cutover plan from start to finish. Having years of experience migrating customers, we will review lessons learned and work with the State and its users to develop a jointly agreed upon cutover plan for a successful migration to the proposed new system.
	Offeror must describe in detail their ability to create a preliminary cutover plan describing how The proposed solution will be phased into a fully operational system.

6.	*Offeror Response:* Comply We have cut over many systems similar to North Dakota's in size. During actual implementation of the cutover, we will provide multiple technical teams along with our local installers to assist with final cutover tasks in parallel across the State sites to reduce the duration of cutover. We have vast experience with cutovers and will work with the State to ensure successful migration to the proposed new system. The following summary provides the proposed high level cutover plan for the State: **800 MHz System – Cutover Plan** Phase 1 Core and Dispatch: Dispatch backroom equipment will be installed in parallel with existing equipment. Applicable dispatch testing will then be done. Upon completion of testing the remaining operator positions will be cutover. 1. Install the System Core 2. Install Core Dispatch Licenses 3. Install and Optimize Dispatch Site with Conventional Channel Gateway (CCGW) and /or Consolette(s), as applicable per dispatch site. 4. Test the Core, Dispatch Site and the interface to the Legacy System. 5. Complete Dispatch Functional Testing. 6. Complete Cutover. Phase 2 RF Sites (45 State Sites): Proposed RF site equipment will be installed. At any existing VHF sites which are being used, the legacy equipment will remain in place and the new P25 equipment will be installed in parallel. Upon completion of testing the site will be ready for cutover. 1. Install and Testing at RF Sites 2. Test and Cutover 800 MHz State and Local Subscribers (State provides subscribers/services) Phase 3 RF Sites (94 Sites):

	Install remaining sites / Test and Cutover (applicable to both solutions) 1. Install and Test RF Sites as defined per State/Motorola 2. Program, Test and Cutover Subscribers 3. P25 System Cutover to new system complete
	Staging
7.	Offeror must acknowledge that each individual assembly or equipment unit shall undergo factory testing prior to shipment. *Offeror Response:* Comply Motorola Solutions equipment, whether staged or not, is factory tested prior to shipment to meet our stringent quality requirements. In addition, third-party equipment provided by Motorola Solutions is also required to undergo quality checks and testing prior to shipment. The State's proposed master site with dispatch equipment will also be staged at our facility in Elgin, IL as part of Phase 1. Before the equipment leaves the staging facility, performance and functionality tests will be executed to verify that the system is operating properly. After the equipment has been installed in the field, but prior to beneficial use, functional testing as well as an acceptance test will be executed to verify that the system meets requirements and is ready for use.
8.	Offeror must acknowledge that standard factory test documentation that indicates the tests performed and the successful completion of testing, shall be submitted to the STATE. *Offeror Response:* Comply Factory Test Sheet Results will be provided for the proposed Base Station and Subscriber equipment. In addition, the Staging Acceptance Test Plan and completed test documentation will be provided to the State for the Staged Master site and Dispatch equipment. **SIRN Proposed Solution Acceptance Test Plan (ATP)** Functional Acceptance Test Plans The following describes the Functional Acceptance Test Plan that will be conducted during the implementation of the proposed system. Staging Acceptance Testing The factory functional acceptance testing will be conducted at our Customer Center for Solutions Integration (CCSi) (located in Elgin, IL) and completed prior to installation

at the State's sites. At CCSi, representatives from the State will be able to see their equipment assembled and participate in functional testing of the system prior to shipment to the State's sites. The Factory Acceptance Test will verify the functionality of the SIRN system.

Staging at the Customer Center for Solutions Integration (CCSi)

As part of our commitment to quality, we will stage the solution's Fixed Network Equipment (FNE) systems at CCSi. We achieve our high levels of customer satisfaction by assembling and testing every communications system sold to stringent quality and by conducting functional performance tests prior to the system shipping. As part of system staging, the State's personnel will have the opportunity to witness the LMR system in operation prior to field deployment.

Our dedicated staging center for all large-scale systems, CCSi, is a 40,000+ square foot center, in which our customers, field teams, engineering groups and integrators come together to participate in the final manufacturing process. Integrating the system components and performing function testing prior to shipment from CCSi reduces cycle time from Contract Design Review to system operation.

Factory staging at CCSi includes the initial assembly and testing of all Motorola Solutions-manufactured radio system components, along with the third-party equipment required for a successful system demonstration. System components will be staged and tested to simulate final operation; this allows the system to be configured as closely as possible to its final configuration during factory staging. Factory staging will allow testing of the functional capabilities of the communications system. This process will enable the State to witness factory testing in a controlled environment and facilitate smooth and easy field installation.

Factory Staging Process

The radio system equipment will be installed in racks and cabled. After installation in the racks, the staging technicians and engineers will power up the equipment, load software, set parameters, program, configure and optimize the radio equipment. Radio parameters will be set according to inputs from the project team. System software and system features will be tested and validated. Additionally, MCC7500E dispatch positions will be assembled, configured and optimized in order to execute all the ATP tests. All system parameters will be set according to specifications to verify proper operation and functionality. These parameter settings will be recorded and documented to provide baseline information to the field integration team.

Major equipment serial numbers and firmware/software versions, if applicable, will be recorded during the staging process to create a baseline for future reference. In the unlikely event that a change needs to be made after the start of testing to correct a deficiency, the baseline will be revised to reflect the current State of the system. After each test, the equipment will be returned to its original operating condition.

	Factory Functional Acceptance Testing Process The system will be exercised while in factory staging, which will allow testing and burn-in of components and boards for proper operation as a complete system prior to shipping to the State's locations. Once the system or subsystem has been assembled, optimized and integrated as a complete working unit, the system will be tested according to the Factory Functional Acceptance Test procedures. The staging of the system will simulate the final configuration of the SIRN to the extent possible with the State's personnel participating. During testing, all measurements or outcomes will be recorded within the test script, as indicated in the test. The result of a test procedure will be "Pass", "Fail", or a measured value. Upon satisfactory completion of installation and optimization, Motorola Solutions will coordinate with the State for a factory visit to participate in radio subscriber and system testing. This visit will provide the State with the opportunity to observe the radio subscriber equipment programmed and optimized as an integrated system and to test in a hands-on manner, most functionality and features of the radios that are capable of operation in a factory environment. Factory acceptance testing will comprise all major systems in the radio solution. Field Functional Acceptance Testing (FATP) Following the Staging ATP, the equipment will be shipped to the field for installation. As part of the installation process, Motorola Solutions will perform site audits to ensure that the equipment will function properly and that the site is ready for installation. Post-install site audits will be performed to confirm the proper installation of the new equipment and in accordance to code. Field Functional Acceptance Testing will be conducted to verify that each subsystem delivers the features and functions as defined in the State's contract and during Contract Design Review. These tests primarily represent user operations on the voice subsystem and will be performed during system field testing in each implementation phase and as part of the final system acceptance testing. The major subsystems will be tested utilizing test scripts to demonstrate their functionality as part of the Radio System. In addition, the system redundancy and reliability will be verified to ensure that the system users will have continuous communication should a system failure occur. These tests will be performed prior to beneficial use of the system. The Acceptance Tests are guided and completed through the execution of test scripts. These scripts will be finalized with the State during the detailed Contract Design Review. These test scripts will be reviewed and finalized during the Contract Design Review Process. Field Acceptance Testing will include site measurements to ensure that all appropriate levels have been set and that the equipment is functioning according to the system

	design and manufacturer's specifications. Functional testing, which is typically an extended version of the factory ATP previously completed at staging, will be performed to ensure the system is functioning properly. This testing will include testing the roaming capabilities of the system. The Design Review process will be utilized as an opportunity to confirm the functionalities that are required from the various subsystems needing to be integrated into the proposed ASTRO25 system. Details regarding the specific tests will be developed and incorporated into a comprehensive test plan. In addition to the tests conducted at the factory, additional testing will be conducted to confirm the system's operation to ensure it performs per the configuration determined during the Design Review process. Motorola Solutions has provided an implementation schedule that is based on the proposed scope. Integration of third-party subsystems not included in this RFP response are outside the scope and schedule proposed. Therefore, it is the State's responsibility to ensure that other third-party vendors are able to meet the proposed project schedule. We will demonstrate, to the greatest extent possible, the functionalities that are required of the system to support third-party vendors. However, completing the integration is not a condition for the project's schedule not being met. <u>Installation Quality Audit</u> After equipment has been installed at each of the sites in the system, Motorola Solutions will verify the installation. For quality control, we will maintain strict adherence to documented procedures, including Motorola Solutions' R56 Manual, Standards and Guidelines for Communication Sites; ISO 9000/1, EIA 632, the Uniform Building Code, the National Fire Protection Association's National Electric Code and all applicable federal, State and the State codes and ordinances. This testing ensures that the quality of the installation will support the system's performance and safeguard against site safety issues. <u>Field Functional Acceptance Testing Process</u> Under the direction of our Project Manager, teams consisting of representatives from the State and Motorola Solutions will execute agreed-upon test procedures to confirm that the communications system has been designed and installed to meet the features and performance capabilities agreed upon in the contract. The table below provides a preliminary outline of the functional testing to be completed. Prior to attending customer witnessed staging a complete Factory Acceptance Test Plan (FATP) along with each individual test scrip will be submitted to the State for review. The final demonstrated FATP along with successful completion signatures will be presented to the State.

Table 8: Preliminary Functional Acceptance Test Plan Procedures	
Wide Area Trunking – Phases 2 and 3	- Talkgroup Call. - Secure Operation. - Continuous Assignment Updating. - Call Alert. - Private Call. - Multigroup Call in Wait Mode. - Audio Interrupt/Interrupt Never Mode. - Busy Queue Conversion. - Emergency Alarm and Call. - Priority Monitor/Non-Priority Scan. - Site Access Control/ Site Access Denial
Site Trunking - Phases 2 and 3	- Site Trunking Indication. - Talkgroup Call. - Call Alert. - Private Call. - Continuous Assignment Updating. - Emergency Alarm and Call. - Wide Area Recovery.
MCC7500E Trunked Resources – Phase 1	- Instant Transmit - Talkgroup Selection and Call. - PTT Unit ID/Alias Display. - Emergency Alarm and Call Display. - Multigroup Call - Multi-Select Operation. - Talkgroup Patch. - Alert Tones. - Call Alert. - Console Priority.

	- Console Initiated Private Call to a Console. - Instant Recall Recording (IRR). - Acoustic Crossmute. - Alarm Input / Outputs (Aux I/O Option).
Radio Control Manager – Phases 2 and 3	- Radio Check - Radio Snapshot - Selective Radio Inhibit - Emergency Alarm Display
Fault Management – Phase 1	- Unified Event Manager – Base Views. - Console PC - Voice Processing Module Link Failure Reports to the Unified Event Manager. - Core Router Failure Reports to the Unified Event Manager. - Site Path Failure (Ethernet) Reports to the Unified Event Manager.
Unified Event Manager Fault Management System – Phase 2 and 3	- Unified Event Manager. - InTouch Alarm Processing - Acknowledged Alarm. - InTouch Alarm Processing - Unacknowledged Alarm. - Station Power Amp Failure Reports to the Unified Event Manager (UEM). - GCP 8000 Multisite Controller. – Phase 3 - GCM 8000 Comparator. – Phase 3 - Physical Inputs/Outputs - Digital Inputs. - Physical Inputs/Outputs - Digital Outputs. - MSBR (Multisite Base Radio) Diagnostics - Reset Station. - MSBR (Multisite Base Radio) GTR 8000 Diagnostics-Ext. Ref. Status. - TRAK GPS - GPS Fault. – Phase 3 - TRAK Communication Status Fault (UEM). – Phase 3 - TRAK GPS - Power Supply Fault. – Phase 3
System Reliability Features – Phase 1 and 2	- Multiple Control Channels. – Phase 2 - Receiver Interference Shutdown. – Phase 2

	- Transmitter Power Failure Shutdown. – Phase 2 - Station Failure. – Phase 2 - Link Failure between CCGW and Zone Controller. – Phase 1 - Link Failure between MCC7500E site and Zone Controller. – Phase 1 - Redundant Console Site Link Failure. – Phase 1 - Redundant Site Controller Switching - Automatic Switchover. – Phase 2 - Redundant Site Link Failure. – Phase 2 - Site Failsoft. – Phase 2 - Comparator Site Link Failure. – Phase 3
Audio IP Logging - OPTIONAL	- Logging Trunking Talkgroup Call. - Logging Secure Trunking Talkgroup Call. - Logging Subsystem - Emergency Events and Calls-Emergency Alarm. - Logging Subsystem - Logging User Can Search Recorded Calls by Various Fields.
Integrated Voice and Data (IV & D) - OPTIONAL	- Context Activation. - Over the Air Programming (POP25). (If Purchased) - Context Deactivation - Initiated from the Network Manager. - Context Reject - Radio Not Enabled for Data Service.
Over The Air Rekeying (OTAR) (Optional)	- CKR Update (Bulk Update). - Full Update to Subscriber. - Radio Reports. - KMF Summary Report. - Subscriber Zeroize.
System Management Tests - Phase 2	- ZoneWatch. - Affiliation Display. - Configuration Management - Access Permissions. - Configuration Management - Subscriber Capabilities.

	- Configuration Management - Talkgroup Capabilities. - Unified Event Manager - Diagnostics - Multisite Site. - Unified Event Manager - User Actions Create Audit Trails. - Unified Network Configurator Device Management - Channel Parameter. - Unified Network Configurator Device Management - Site Parameter.
Dynamic System Resilience - OPTIONAL	- Dual Link RF Site Router Failure - Primary Core Failure - Switchover to Back-up Core (Voice and Data Services) - Primary Core Link Failure - Ethernet Console Site Link - Single Ethernet Link RF Site Router Path Failure - Provisioning Manager and Unified Network Configurator Switchover - Zone Controller 1 and 2 Failure - Packet Data Gateway 1 Failure - Gateway GPRS Support Node 1 Failure
Site Measurements – Phase 2	- Base Station Transmit Output Power (GTR) - Receiver Multicoupler Gain - Effective Receiver Sensitivity - Transmitter Antenna Network Reflected Power - Time Domain Reflectometer (TDR)/Frequency Domain Reflectometer (FDR) of Transmission Line

Successful completion of functional acceptance testing requires the system to be operational and the necessary parties to be available to participate in the testing. During testing, all measurements or outcomes will be recorded within the test script, as indicated in the test. The result of a test procedure will be “Pass”, “Fail”, or a measured value. A checkmark in the “Pass” field or in the appropriate box will be sufficient to indicate that a step has passed the test. When all steps in a specific test pass, a representative from Motorola Solutions and the State will sign the test procedure form to indicate the system has passed that test.

If a failure occurs, a check will be placed in the “Fail” field within the test procedure and an entry made on a Punchlist Form. Procedures that fail will be remedied and retested. The Punchlist Form includes the date and time the entry was opened, the date closed, the test number and step and a description of the failure.

	Field Functional Acceptance Testing Documentation and Results Following completion of functional acceptance testing, Motorola Solutions will document the results of the acceptance test plan and provide them to the State in a final system documentation package. The documentation will include: - Testing procedures utilized. - Test dates and locations. - Testing results.
9.	Offeror must acknowledge that: a. The successful Offeror shall provide all necessary technical personnel and test equipment to conduct staging tests. All deviations, anomalies and test failures shall be resolved at the Offeror's expense. b. Offeror shall use an approved SATP. It is expected that the SATP has been performed and all tests have been successful before the STATE witnesses the official SATP. The SATP shall be signed and dated by Offeror and STATE representatives following completion of all tests. All tests in the SATP shall be marked as either pass, fail, or pass qualify. c. Failed tests shall be documented, corrected and retested. All defective components shall be replaced and retested. Defective components that cannot be corrected shall be replaced at the expense of the Offeror. d. Retest of individual failed SATP tests or the entire plan shall be at the STATE'S discretion. e. The fully executed and completed SATP document shall be provided to the STATE.
	Offeror Response: Comply
	System Installation
10.	Offeror must acknowledge that installation shall include a complete, tested system to include placement of associated cabling, appropriate system layout and terminal connections. Offeror shall provide associated power supplies and any other hardware, adapters and/or connections to deliver a complete operable system to the STATE at the time of acceptance.
	Offeror Response: Comply Motorola Solutions will provide a complete tested system with cabling, appropriate system layout and terminal connections. Associated power supplies and other hardware, as defined per the Statement of Work, will be provided.
11.	Offeror must acknowledge that all installations shall be performed by factory-authorized or Offeror-affiliated service shops. Other shops or installers may be used

	upon mutual agreement between the STATE and Offeror. Qualified, adequately trained personnel familiar with this type of work shall perform all installations.
	Offeror Response: Comply
12.	Offeror must provide the names of the service shops, their qualifications, a description of their certified training on the proposed system, a summary of their experience and a list of three references (minimum) for each proposed shop.
	Offeror Response: Comply Subcontractor service shops, qualifications, training, experience, staff and certifications follow. **Midwest Steeplejacks, Inc.** www.midweststeeplejacks.com 133 West Main Ave, Suite 201 West Fargo, ND 58078 Phone: 701.241.7040 Midwest Steeplejacks is an industry leader in quality control for wireless communication. They provide a full range of wireless communication services for towers, antennas and co-location including: - Construction - Inspection - Maintenance Midwest Steeplejacks provide service for several major carriers and many independent customers. Their customers are spread through the upper Midwest and surrounding states including MN, WI, IL, MI, IA, NE, MO, ID, NY, OH, IN, and KS. For many customers, Midwest Steeplejacks functions as their sole quality control inspection team for their wireless sites. Their wireless technicians do a complete tower inspection, checking over 100 points on the tower, site and cabling. They work with a variety of companies including - Cellular Phone Companies - TV Broadcasters

- Radio Stations
- Digital Internet Providers
- Microwave broadcasters

Great Plains Tower
https://greatplainstowers.com/About-Us
126 Sixth Street West
West Fargo, ND 58708
Phone: 701.282.2236
Phone: 800.853.2236

Owner Ron Reski opened A-1 Radio and Television in Moorhead, MN under contract to RCA Service Company in the 1950s. Over the years the business evolved as Ron spent more and more time with the communication tower and antenna industries, eventually renaming the business Ron's Electronics. In 1974 Ron's son, Kevin, joined the family business and the company decided to focus entirely on tower maintenance and erection services. In those early years, Kevin and his father designed, fabricated, and modified many custom hoisting and rigging systems which manufacturers now use as standards of the tower erection industry.

In 1990 they changed the company name to Great Plains Towers (GPT), then in 1992 moved to its current headquarters location from Moorhead MN to West Fargo ND. They now providing services all over the upper Midwest and to projects as far away as Argentina and Antarctica. They expanded their operation with additional shop and tower crew in Bismarck North Dakota.

GPT is using its knowledge of towers through its years of experience to fabricate their own top-quality guyed towers and self-supporting towers plus a multitude of hinged poles used at US embassies around the world. The towers include standard safety features which include built-in personnel anchorages, built-in worker platforms and built-in safety climb cable systems. They also fabricate meteorological (MET) towers, fold-down hinged poles, ice canopies, and sector mounts. These items can be customized to fit each customer's requirements.

In support of the tower industry at a national level, Kevin has served two terms on the board of the National Association of Erectors (NATE). He continues to provide his support and commitment to NATE by working on various committees that focus on safety, environment, procedures, and OSHA compliance.

MidStates Wireless

http://www.midStateswireless.com/
55 North Third St.
Fargo, ND 58102
Phone: 701.293.9561
JonW@midStateswireless.com

Mid States Wireless, Inc., formerly known as Elder's Radio Communications was originally formed in 1946 to work on consumer electronics during and following WWII when replacement parts were difficult to find. Elder's Radio Communications installed its first commercial RF communications in a fleet of taxi cabs for Doyle Cab Company in Fargo, ND.

The company has remained in the same family for the past 75 years and has been handed from one generation to the next. Today the corporation deals primarily in public safety, interoperability solutions from the RF subscriber, to the dispatch center technology up to and including the construction and maintenance of the tower facilities.

Mid States Wireless has two primary locations the headquarters in Fargo, ND and a satellite shop in Minot, ND. They also employ two technicians that are permanently assigned to Minot Air Force Base (AFB) and one who is permanently assigned to Grand Forks Air Force Base (AFB), these technicians that are located on the AFB's are contracted by the federal government to maintain the Land Mobile Radio network for the respective facilities. In addition to the maintenance of these facilities, Mid States does a significant amount of work with Minot AFB on the upgrade and expansion of its current communications network.

Mid States works with a variety of technologies, including but not limited to, wireless broadband (point-to-point & multi-point), UHF & VHF solutions (both analog and digital), Digital Trunking, Complete Dispatch Center Solutions, Command and Control Consoles, Analog and Digital Video capture and storage, 911 integration, Turnkey tower installations, Squad car fit-up, In car digital, ALPR, to name a few.

Mid States Wireless is a family owned and operated corporation and prides itself on being community oriented and employee friendly, a majority of their approximately 20 employees have worked for them for more than 5 years and more than half of them for greater than 10.

Staff:

Tyler Wiser, Project Manager / Service Manager

Travis Mastin, Two-Way Radio Service Technician, Associate Degree Electronic Technologies

Lloyd Helgeson, Project Manager, Associate Degree Electronics, Minnesota Moorhead Technical College

Jon Wiser, Owner / Project Manager / Operations Manager / Sales Manager

Gordon Flemming, Technician, Mobile Communication Technology, Willmar Technical Institute

Clinton Demere, Project Manager / Technician, AAS Applied Science, Alexandria Technical College

Aaron Kangas, Technician

References:

City of Fargo, North Dakota

Deployed two Motorola Solutions PTP systems; a PTP 100 that served as the primary communications link with ambulances and EMTs during the flood and a PTP 600 solution. that was quickly deployed as an additional backup network in the event of flood damage to the underground wired system.

Moorhead Fire Department, Moorhead, MN

Contact: Jeffrey Wallin, CFO, EFO, Assistant Chief Moorhead Fire Department

Primary radio communications service provider. Replacement of VHF radio system and migration to the State of Minnesota's ARMER system, including: radio codeplug design, maintenance, repair and troubleshooting of the multi-site VHF radio infrastructure, interference mitigation and installation of base, mobile and portable radio components.

Ward County Fire Department, Minot, ND

Contact: Sheriff Robert Barnard

Radio system purchasing, construction, maintenance and modification.

Certifications:

- ETAS-R56 Communications Site Installer
- MN Registered Technician License
- ETAJ-WCM Wireless Communications
- MN Power Limited Technician License
- MCC7500 Dispatch Console
- ASTRO25 IV&D with M Core Systems
- Bridge the Knowledge Gap
- APX Quick Start
- CPS Programming and Template Building
- WAVE OnCloud SP Sales Professional
- FCC Narrowbanding Mandate Training

Stones Mobile Radio

https://www.stonesmobileradio.com/

1550 47th Ave S

Grand Forks, ND 58201

Phone: 701.772.6691

chris@stonesmobileradio.com

Neil E. Stone founded Stone's Mobile Radio in 1954, servicing radios in his garage in Thief River Falls, Minnesota. In 1956, Stone's became a Motorola Service Shop (MSS).

Today, Stones is a Full Line Authorized Dealer, a Manufacturers' Representative (MR), a Select System Dealer and a Federal Agent for Motorola Solutions. They are authorized to sell and service all Radius radios, all Motorola Branded radios and all ASTRO Digital equipment. Stone's is also authorized to service all Dispatch Centers and Federal Accounts requiring GSA pricing.

Most recently, Stone's has built a reputation as a leader in the sales, management and installation of GPS Fleet Services Systems. They are helping businesses manage their mobile workers, their vehicles and ultimately their entire operations with products from Network Fleet.

Staff:

Chris Ranisate, Owner / Master Technician / Service Manager, AAS Electronics, North Dakota State School of Science

Ryan Schmidt, Technician, AAS Electronic Technology, North Dakota State School of Science

Jim Poole, Shop Foreman, Associates Drafting and Design, Northwest Technical College and Associates Degree Broadband Engineering, Arapahoe College

Mike Nielsen, Technician, Bachelor Business Administration, American InterContinental University; AAS Electronics System Technology, Community College of the Air Force; AAS Instructor of Technology and Military Science, Community College of the Air Force

Michael Batholome, Technician

Kathy McDanal, Technician, United States Army School for 91B Wheeled Vehicles

David Evans, Technician, Community College of the Air Force

References:

Grand Forks County Public Safety

Installed and maintains a city-wide simulcast system with a 4-position Motorola Solutions Gold Elite console.

Contact: Becky Ault, 911 Director

Polk County Sheriff's Office

Installed and maintains a 4-position MCC7500 console with support infrastructure for the radio system. Installed a microwave link between the State and Polk County Law Enforcement Center.
Contact: Sheriff Barb Erdman
Pennington County Law Enforcement Center
Installed a 2-position MCC7500 console and maintains radio infrastructure.
Contact: Sheriff Ray Kuznia

Certifications:

- Certified Communications Technician, PCIA
- Electronic Technicians Association, ETA
- General Radio Telephone Operator License

Electronic Communications, Inc. (ECI)
http://www.ecisystems.com/
212 W Main Ave
Bismarck, ND 58501
(701) 258-7698
and
3739 38th Street South, #D
Fargo, ND 58104
(701) 492-6267
marshall@ecisystems.com
Established in 1979, ECI has offices in Bismarck, ND (corporate headquarters), Fargo, ND and North Sioux City, SD. They provide design, sales, installation and service and provide highly certified and capable staff with over a century of combined experience in the industry.

ECI's customer base is broad in spectrum, covering the simplest of solutions to the most complex in nature. They provide services to customers nationwide.

Staff:
Marshall Pudwill, President, Associate Degree Electronics
Arnie Leingang, Project Manager, AAS Electronics, Bismarck State College
Jack Lacher, Install Technician, AAS Electronics and Telecommunications, Bismarck State College
Jason Friedt, Install / Service Technician
Tracy Hoffman, Service Technician

References:
Morton County Sheriff

Installed Countywide P25 Digital Radio System.

Dakota Gasification Plant
Engineered and maintain RF Communication System.

North Dakota State Radio
Installed and maintain 11-position Zetron Max Dispatch system answering all radio channels in the State of North Dakota.

Certifications:

- Motorola RDS0004, Basic Radio
- Motorola RDS0003, Basic Networking
- Motorola RDS0002, Basic RF
- Motorola NRSTA0001, P25 Systems Technical Associate
- Motorola ASE0402, ASTRO25 Subscriber
- Motorola ACS715430, ASTRO25 IV&D with Core System
- Motorola ACS715400, ASTRO25 IV&D Conventional with K Core System
- Motorola ACS715200, ASTRO25 IV&D M Core System
- Motorola NST9252, Introduction to R56
- MCC7000 Series Console Workshop
- ETA Certified R56 Installer

Kohler Communications
http://www.kohlercomm.com
1429 Main Street
Dickinson, ND 58601
701.225.5554
dennis@kohlercomm.com
and
14012 West Front Street
Williston, ND 58801
701.774.8596
dkohler@midconetwork.com

In business for more than 55 years, Kohler Communications has been a long time provider of communications equipment in Southwestern and Northwestern North Dakota. Kohler Communications was founded by William Kohler Jr. and includes two office facilities and 6 employees.

Kohler Communications has supplied only Motorola Solutions two-way radios supplier for the past 55 years. They have provided equipment and service for Motorola Solutions, ESI Business Telephone Systems, Panduit, Microwave Data Systems and Wilson Electronics.

Kohler Communications has expanded through the years to include sales and service of Motorola Solutions two-way radios, Business Telephone systems, Cat 5, Cat 5e, Cat 6 and Cat 6e data and voice wiring, Oil well alarm systems and Scada radios as well as numerous other products and accessories.

Kohler Communications has a full staff of experienced and knowledgeable employees to provide sales and service, as well as a full line of inventory for all sales and repair needs. Kohler Communications has serviced many systems in Southwestern and Northwestern North Dakota since 1961.

Staff:

Doug W Kohler, Co-Owner / Manager / Technician, Associates Degree Radio Communications, North Dakota State College of Science

Dennis Kohler, Business Manager, Bismarck Junior College

References:

Trotter Construction

Trotter is a locally owned construction firm specializing in aggregate construction including: county roads, bridges, oilfield locations and general site building. Kohler communications provided Trotter Construction with (2) MOTOTRBO repeaters and over 150 mobile units and several portable units. Two-way radio communications is vital to their operation to cover a large area of Western North Dakota.

Whiting Oil & Gas

Whiting Oil & Gas is a major Oil Company operating in Western North Dakota and Northeast Montana. Kohler Communications provided Whiting with the largest digital two-way radio system of its kind in Western North Dakota. The system includes: (7) MOTOTRBO digital repeater Sites with Ethernet connection between them (MOTOTRBO Site Connect). The system also consists of over (60) digital portable radios and over (300) digital mobiles. This system allows mobile users to talk to one another anywhere in West-Northwest North Dakota & Northeastern Montana, thus allowing them to have a portable user in Dickinson talk to a mobile user North of Sidney Montana.

Dickinson Public School District

Kohler Communications provided The Dickinson Public Schools a MOTOTRBO Digital System including: (1) 2 slot digital repeater with over (50) portable units and (20) mobile units for use in the Dickinson area for bussing and security purposes. The school district consists of (5) Elementary Schools, (1) Middle School, (1) High School, (1) Head Start program and the Bus facility.

Certifications:

- MCC 5500 console
- MOTOTRBO Radio Management
- OTAP Technician

Pyramid Network Services

www.Pyramidnetworkservices.com
6615 Towpath Road, Suite 200
East Syracuse, NY 13057
315.701.1300
info@pyramidns.com

Pyramid Network Services has been a premier force in the development of wireless communications throughout North America since 1996. Headquartered in Syracuse, NY with 12 US office locations and one office in Toronto, Pyramid offers turnkey site development capabilities through real world knowledge, speed and predictability and reliability.

Pyramid Network Services has four core divisions: Commercial Wireless, Renewable Energy, Radio and Surveillance and Dispatch and E911 Centers. They provide:

- Site audits and physical site assessments
- File audits and lease reviews
- A&E, site design and value engineering
- Construction & project management
- Zoning, permitting and regulatory compliance
- Professional staffing & recruiting
- Electronic data conversion and consolidation
- Site and network decommissioning
- Turnkey telecommunications tower construction
- Site acquisition and RF guidance
- Renewable energy system design & installation

Staff:

Cy Weichert, President
Ron Brunozzi, Executive Vice President, COO
Scott McCabe, Vice President of Finance and Corporate Operations
Mark Zagger, Vice President Business Development
Brian Bohl, Vice President Construction Services
Matthew Donnelly, Director of Operations, South
Matthew Bell, Director of Operations, Great Plains
TJ Sauthoff, Director of Construction, West/Large Projects
Rod Prodonovich, Director of Operations, Great Lakes
Robert Sparrow, Director of Construction, Midwest/Mid-Atlantic
Ronald Thrall, Director of Safety and Quality Assurance
Steve Elsbree, Director of Construction and Operations, Northeast

	Ken MacMaster, Director of Special Projects, Wheelhouse **References:** Saab Sensis Contact: Matt Massiano, Director FAA Business Development, 315.445.5735, matt.massiano@saabsensis.com Design and Construction of 32 remote Wide Array Multi-Lateration (WAM) sites at United States Marine Corps Air Ground Combat Center; 29 Palms, CA. All sites consisted of a guyed tower, electronics cabinets and solar powered array. WAM system is used to track bomb accuracy during training. Additionally, constructed 15 WAM sites in Boulder and Colorado Springs, CO to supplement existing FAA radar. Albany County NY Sheriff's Department Contact: Ralph Mariani, Captain Communications Center, 518.652.7897, mariani@albanycounty.com Design and Construction of 12 Land Mobile Radio sites for Albany County Sheriff's Office Public Safety Radio System. Currently performing Feasibility Study for Integrated 911 Call and Dispatch Center for Albany County Sheriff and City of Albany Police Department. T-Mobile Contact: Alan Tantillo, Director National Siting Policy, 425.383.2413, alan.tantillo@t-mobile.com Over 10-year partnership (ongoing) with T-Mobile Corporate Headquarters working on a vast array of services, including: Site Acquisition, Site Audits of existing towers, Lease Renewals to secure additional time and more favorable terms and Decommissioning / deconstruction of sites across the United States. Verizon Contact: Randy Wilson, Real Estate Manager, 585.321.5461, randy.wilson@verizonwireless.com Site Candidate Information Packages (SCIPs), Site Selection, Leasing, Zoning and Permitting for over 350 macro sites and over 1500 upgrades sites. Also provide Program Management for current build out of over 300 Small Cell Sites.
13.	Offeror must acknowledge that prior to the start of the system installation, the Offeror shall participate in a mandatory project site survey with the STATE or STATE'S representative to confirm actual equipment location within each space. At that time, the exact equipment locations shall be determined and documented by the Offeror.
	Offeror Response: Comply
14.	Offeror must acknowledge that they will coordinate with others, as appropriate, to confirm that any preparation work that affects the installation of the base station

	equipment, such as tower work, coring, bracing, conduit, electrical, etc., is complete before final inspection.
	Offeror Response: Comply
15.	Offeror must acknowledge that they will provide and pay for all materials necessary for the execution and completion of all work. Unless otherwise specified, all materials incorporated into the permanent work shall be new and shall meet the requirements of this specifications document. All materials furnished and work completed shall be subject to inspection by the State or the State's representative.
	Offeror Response: Comply Materials will be provided for all work as proposed and defined per the agreed-upon Contract.
16.	Offerors must acknowledge that upon completion of the installation, all issues and/or functionality found must be resolved at the expense of the Offeror.
	Offeror Response: Comply with Clarification Upon completion of the installation, all issues and/or functionality issues associated with Motorola Solutions-supplied equipment and services will be resolved at our expense.
17.	Offeror must acknowledge that equipment supplied as spare equipment shall not be used for installation of the proposed system. All spare equipment shall be supplied in an unused condition.
	Offeror Response: Comply
18.	Offeror must acknowledge that all equipment and devices shall be cleaned internally and externally and all damaged finishes shall be repaired.
	Offeror Response: Comply
19.	Offeror must acknowledge that worksites shall be left neat and broom swept upon completion of work each day. All shelter floors will be thoroughly cleaned and all scuff marks and abrasions shall be removed prior to acceptance. All trash shall be removed weekly.

	Offeror Response: Comply
20.	**Inspection** Offeror must acknowledge that: a. The STATE shall conduct an inspection of the installations upon substantial completion. Any deficiencies shall be documented on a single punch list and provided to the Offeror for resolution. b. Final acceptance testing shall not commence until all punch-list items are resolved.
	Offeror Response: Comply
	Coverage Testing
21.	Offerors must acknowledge that they will thoroughly test the system prior to cutover. All issues found must be resolved at the expense of the Offeror. The STATE shall have access to all testing documentation and the documentation will become property of the STATE.
	Offeror Response: Comply with Clarification Motorola Solutions will conduct coverage testing as part of Phase 3 deliverables when all proposed sites for Phases 2 and 3 have been deployed. Prior to cutover, Motorola Solutions will complete the functional testing and the 60-Day Burn-in testing (Phase 3). Issues found that are associated with the Motorola equipment and services as defined in the contracted scope of work will be tracked and resolved at Motorola Solutions' cost.
22.	Offeror must acknowledge that they will submit a preliminary CATP with the proposal. The final CATP shall be submitted during the final design stage of the project.
	Offeror Response: Comply The CATP is included in Exhibit B: Phase 3, section 32.
23.	CATP Offeror must acknowledge that: a. The CATP shall be consistent with the procedures and guidelines outlined in TIA TSB-88, latest revision. b. Coverage testing shall commence only after the radio systems are fully tested and aligned. Significant changes to the system shall require retesting of coverage at the State's discretion.

	a. Automated objective mobile drive testing b. Non-automated subjective DAQ testing (intelligibility testing)
	Offeror Response: Comply The CATP is included in Exhibit B: Phase 3, section 32.
24.	The Offeror must describe in detail the proposed CATP. The CATP must include the procedures to be followed, the equipment to be used and the pass/fail criteria to be utilized to verify system performance. Upon notification of selection for contract negotiation, a final acceptance test plan shall be submitted for review and approval prior to execution of a contract.
	Offeror Response: Comply The CATP is included in Exhibit B: Phase 3, section 32.
25.	**60-Day Operational Test** Offeror must describe in detail their ability to perform a 60-calendar day operational test of the system to ensure that all hardware and software defects have been corrected prior to entering final proof-of-performance testing. The fully integrated operation of the system, including all individual subsystems, shall be demonstrated during these tests. The tests shall be designed to demonstrate the reliability, long-term stability and maintainability of the systems. A failure of any critical component of the system during this test will cause the test to restart after the repair is completed. Offeror must acknowledge that they and the STATE will agree on what constitutes a critical failure prior to commencing this test. Offeror must acknowledge that they will provide a 60-day operational test plan during the preliminary design phase.
	Offeror Response: Comply Motorola Solutions has included a 60-day Burn-in Test period as part of the Phase 3 system testing. We have successfully performed similar burn-in test periods for large customer systems similar to North Dakota's proposed system. Our rigorous processes and pre-testing that are completed prior to the burn-in period help ensure both Motorola and the Users of the system are prepared for this testing. In addition, Motorola provides customer training (as defined per Phase) in advance of burn-in to ensure system technicians and end-users are trained on the system and familiar with subscriber radio and dispatch end user operation. During this burn-in period Motorola

	allocates support resources who will be ready to quickly respond and resolve any issues which may arise during this initial customer usage of the system. Motorola Solutions will work with the State during the Preliminary Design phase to define the 60-day Burn-in plan which will include the definition of critical failures, as well as, defining additional test parameters.
26.	**Final Acceptance Testing** Offeror must acknowledge that: a. Prior to final acceptance testing, the successful Offeror shall verify and document that all equipment, hardware and software are upgraded to the latest factory revision. Multiple revision levels among similar equipment are not acceptable. The State shall be given two weeks written notice that the system is ready for final acceptance testing. b. FATP: a. Offeror will use the completed and approved FATP. It is expected that the FATP has been performed and all tests have been successful before the State witnesses the official FATP. The FATP shall be signed and dated by Vendor and STATE representatives following completion of all tests. All tests in the FATP will be marked as either pass, fail, or pass qualify. b. Offeror will provide all necessary technical personnel and test equipment to conduct FATP tests. All deviations, anomalies and test failures shall be resolved at the Offeror's expense. c. Failed tests shall be documented, corrected and retested. All defective components shall be replaced and retested. Defective components that cannot be corrected shall be replaced at the Offeror’s expense. d. Retest of individual failed FATP tests or the entire plan shall be at the STATE’S discretion. e. The fully executed and completed FATP document shall be provided to the STATE.
	Offeror Response: Comply
27.	**As-built Documentation** Offeror must acknowledge that at the completion of the installation phase, Offeror will provide complete as-built documentation as outlined below. As-built documentation shall be provided in both hardcopy and softcopy formats: a. Equipment provided b. Plan and elevation drawings of all equipment, including antennas on towers c. Cabling and terminations d. Block and system-level diagrams e. Fleet mapping and programming f. Setup and alignment information g. Successfully completed, signed and dated SATP

	Offeror Response: Comply Motorola Solutions will provide one hard copy and one soft copy of the defined documentation noted above as applicable to the equipment installed per each phase.
28.	**System Acceptance** Offeror must acknowledge that the State shall deem the system ready for final acceptance following successful completion and approval of the following: a. Final design submittals b. SATP c. System installation d. Final inspection and punch-list resolution. e. As-built documentation f. FATP, including CATP g. 60-day operational test completion h. Training
	Offeror Response: Comply The CATP will be conducted as part of Phase 3 final testing. The 60-day operational test will be conducted as part of Phase 3 final testing. The CATP is included in Exhibit B: Phase 3, section 32.
29.	Offerors must acknowledge that they will provide on-site expertise with the ability to correct any issues at each PSAP for the first 24 hours after cutover.
	Offeror Response: Comply Included in Phase 1, Motorola Solutions will provide a technical resource at the PSAP for the first 8 hours after cutover and, as required, for the resolution of critical issues.

c. Customer Service, Experience, Product Support

No.	Customer Service and Experience
1.	**Contract Representation** Offeror must provide a narrative of the dedicated contract representative and the support staff team. Information for the contract representative must include: a. name, b. phone number, c. e-mail address, d. mailing address and e. years of appropriate experience.

Offeror must provide information on dedicated support or back-up staff including:

a. names,
b. titles,
c. phone numbers,
d. e-mail addresses and
e. mailing addresses.

Offeror must provide the names and titles, phone numbers and e-mail and mailing addresses for the contract representative's chain of command within your company.

Offeror Response:

Comply

Our project team will provide the day-to-day subject-matter expertise, accountability, vision and experience needed for a successful project implementation for the State of North Dakota. This team brings a solid understanding of the complexities and challenges of implementing and maintaining public safety systems of this magnitude. Additionally, as the manufacturer of the proposed systems, Motorola Solutions provides unique advantages over the lifecycle of the system by offering enhanced system support and product and services support.

Strategic Contract Representative (Account Manager (AM))

Account Manager, Dave Eischens, will act as a liaison, responsible for addressing the State's needs that arise from day to day operations, as well as issues arising from the system implementation. The Account Manager's other tasks include:

- Assist in configuration and pricing of equipment quotes.
- Process and manage equipment orders.
- Perform a consultative role in applying Motorola's equipment solutions.
- Participate in the staging and support testing of the system.
- Represent and clarify the State contractual request for change orders.

Dave Eischens **Director & Area Sales Manager Strategic Project Team**	Motorola Solutions, Inc. 8125 Tierneys Woods Curve, Bloomington, MN 55438 Work Phone Number (612) 834-5800 Dave.eischens@motorolasolutions.com Years of Appropriate Experience: 35

Contract Representative (Account Manager (AM))

Account Manager, Mike Mihelich will act as a liaison, responsible for addressing the State's needs that arise from day to day operations, as well as issues arising from the system implementation. The Account Manager's other tasks include:

- Assist in configuration and pricing of equipment quotes.
- Process and manage equipment orders.
- Perform a consultative role in applying Motorola's equipment solutions.
- Participate in the staging and support testing of the system.
- Represent and clarify the State contractual request for change orders.

Mike Mihelich **Account Manager**	Motorola Solutions, Inc. 1440 Sophia Dr. Chaska, MN 55318 Phone: 612-357-0029 Email: mike.mihelich@motorolasolutions.com Years of Appropriate Experience: 20

Project Manager (PM)

The Project Managers (PM), Stuart Johnston and Jim Brockhaus will serve as the primary project liaisons to the State of North Dakota. In this role, Stuart and Jim will track the progress of the project and take proactive measures to ensure the project proceeds as planned. Our PMs will work with the State's Project Manager(s) to ensure contractual commitments are delivered and fulfilled. They will manage and allocate all required resources, personnel, budgets and materials to ensure the system is implemented to your satisfaction and that the system meets our standards on the specifications as agreed to during the Contract Design Review, while maintaining the highest standards of quality and customer satisfaction. The PM will be fully dedicated to all project related tasks to meet the scheduled completion.

Other responsibilities are:

- Implementing the project plan and monitor schedule adherence
- Conducting bi-weekly status meetings to include published agendas, meeting minutes, status reports, action item tracking and project schedule updates.
- Tracking delivery and installation progress to the master project plan and plan, recommend and order changes to the schedule or resources to ensure on time completion of critically sequenced deliverables.
- Directing technical individuals responsible for the installation, configuration and quality of the project.

- Monitoring and controlling the installation, integration, testing and acceptance of the proposed system.
- Coordinating the development and execution of technical and user training plans.
- Managing and directing all subcontracting activities.
- Mitigating risks in order to ensure that the system meets the design specifications and is delivered on time.
- Overseeing change management.
- Ensuring quality workmanship by all Motorola Solutions vendors and subcontractors.
- Ensuring that our team works collaboratively with State of North Dakota personnel throughout the project.

Lead Project Manager

Stuart Johnston **Regional Service Manager**	Motorola Solutions, Inc. 350 Worthington Road, Suite C Westerville, Ohio 43082 Work Phone Number (740) 953-0447 Email: stuart.johnston@motorolasolutions.com Years of Experience: 20

Supporting Project Manager

Jim Brockhaus **Support Project Manager**	Motorola Solutions, Inc. 7722 149 h Circle Savage, MN 55378 Work Phone Number (612) 849-6872 Email Address: jim.brockhaus@motorolasolutions.com Years of Appropriate Experience: 24

Systems Engineer (SE)

The Lead Systems Engineer will lead the engineering and design effort for State of North Dakota. In this role, The Lead SE will develop Design Review documentation and ensure the system design meets the State's requirements. The Lead SE is responsible for all phases of Performance Verification.

Other responsibilities handled by the Lead Systems Engineer are:

- Working with the subcontractor's engineers and reviewing their specifications and products.

- Providing technical direction for the staging and testing of the system at Motorola Solutions' Customer Center for Solutions Integration (CCSi).
- Managing the process of defining, documenting and acquiring North Dakota's approval of system programming and subscriber fleetmapping.
- Directing the integration of all the subsystems to ensure technical and engineering compliance of the system.
- Developing and executing system acceptance test plans to verify the technical and engineering compliance of the system.
- Managing system migration and cutover from existing systems.
- Developing primary system documentation, defining final system design and verifying the technical integrity of the system design.

Lead Systems Engineer

Dave Pieczynski **Field Systems Engineer – Principal Staff III**	Motorola Solutions, Inc. 15461 W. Sunrise Circle Eden Prairie, MN, 55347 Phone: (952)-240-9456 Email: david.pieczynski@motorolasolutions.com

Support Systems Engineer

Susan Weigele **Principal Staff Systems Engineer**	Motorola Solutions, Inc. 12715 Durham Way Apple Valley, MN 55124 Phone: (952) 240-8136 Email: susan.weigele@motorolasolutions.com Years of Appropriate Experience: 22 years

System Technologist (ST):

Lead System Technologist (ST)

The Lead ST is responsible for ensuring that the system is programmed, integrated, optimized and tested to perform as designed.

Other responsibilities handled by the Lead Systems Technologist are:

- Participating in the staging and testing of the system at Motorola Solutions' Customer Center for Solutions Integration (CCSi).
- Ensuring site link verification testing occurs to validate connectivity and adequate performance at the State's sites.

- Overseeing the integration and optimization of all system hardware and software, which includes:
- Equipment programming and configuration development.
- Optimization of RF equipment and the consoles.
- Acceptance Testing.
- Supporting cutover plan development and execution.

Lead Systems Technologist

Ed Kirsch **Systems Technologist**	Motorola Solutions, Inc. 9855 W. 78th Street. Suite 170 Eden Prairie, MN 55344 Phone: 612-865-6616 Email: ed.kirsch@motorolasolutions.com

Customer Support Manager (CSM)

The Customer Service Manager is responsible for development of the proposed service delivery plan and the Customer Support Plan for the warranty phase of the project. The CSM will work with State of North Dakota to customize the plan to best meet your needs. The CSM will be involved during multiple phases of the implementation and throughout the warranty and post-warranty lifecycle of the project.

Other responsibilities handled by the Customer Support Manager are:

- Presenting the proposed warranty and post-warranty scopes of work.
- Reviewing in-warranty scope of work and services and Motorola Solutions responsibilities in the delivery of said services.
- Initiating warranty coverage.
- Implementing remote system monitoring media (T1 circuits, firewall).
- Verifying customer and site profile information, including Customer Support Plan and Customer Handling Procedures.
- Testing site/environmental alarms with our Network Monitoring Office.
- Reviewing the progress and results of the warranty support program to date:
- Establishing regularly scheduled meetings to review case history, average time to respond, average time to resolution throughout warranty period.

- Reviewing customer satisfaction with services rendered, taking corrective action as necessary.
- Reviewing the scope of post-warranty support services and establishing post-warranty contract/budget process tailored to North Dakota.
- Hardware Maintenance services.
- Software Maintenance/Upgrade services.

Mike Rosonke **Customer Support Manager**	Motorola Solutions, Inc. 18586 148th NW Elk River, MN 55330 Phone: (612)-490-4453 Email: mike.rosonke@motorolasolutions.com Years of Appropriate Experience: 13 years

Civil and Site Design

Director of Operations -Central Region	Rod Prodonovich Pyramid Network Services, LLC 2531 Cadwallader-Sonk Road Cortland, OH 44410 330-531-5327 rprodonovich@pyramidns.com Years of Appropriate Experience: 10 years

2.

Offeror must describe in detail:

a. The process for placing orders,
b. The process for handling customer inquiries
c. Response time to inquiries,
d. The proposed sales support/account representation,
e. Billing procedures,
f. Reporting capabilities

Offeror Response:

Comply

Motorola Solutions' Account Managers are responsible for providing "offers for sale" that define pricing terms, contract terms and project scope detail for Motorola

	Solutions Radio System sales. To place an order a Customer provides the Account Manager with the applicable signed contract and/or purchase order referencing the "offer for sale" and the contract terms, along with applicable payment. Upon receipt of the contract/purchase order and applicable payment the Account Manager will ensure all documentation is countersigned if needed. The Account Manager will then, submit the order to the Motorola Solutions Order Management team for order placement. Process for handling Inquiries - Inquiries associated with purchase requests, orders or other sales related items are submitted to your local Motorola Solutions Account Manager. These inquiries can be made via phone call, emails or other. If your inquiry requires additional assistance the Account Manager will either solicit the information directly or refer you to the appropriate contact, as applicable. Response Time – A timely response is important for all inquiries. Our goal is to respond to your initial inquiry call on the same day as the request. If the Account Manager is out of the office the Area Sales Manager is also available to assist as needed. Once the inquiry and initial response is made the Account Manager will review the request and determine next steps, as needed. If additional team members are required to address the inquiry the Account Manager will set up meetings or calls as needed. For requests that require information gathering and/or work product the Account Manager will provide a response commitment date. Sales Support – Motorola's proposed sales support for the State of North Dakota is Account Manager, Mike Mihelich and Large Project Account Manager, Dave Eischens. Both Dave and Mike are available to response to inquiries and assist with supporting the State with any Sales support requests, as needed. In addition, Dave and Mike have a technical support team that is also available to support any Sales inquiries which require technical assistance. A credit analyst assigned to each customer that is responsible for billing the State. Once specific milestones are achieved during implementation, the State will sign a milestone acceptance certificate. Once signed, the Credit analyst will invoice the State for the completed milestone (according to the payment schedule outlined in Exhibit B). The State will have 45 days to pay the invoice. Subscribers and Accessories will be invoiced upon shipment. As this equipment ships, an invoice will be generated and the State will have 45 days to pay the invoice. As each deliverable is met, this process will repeat.
3.	Offeror must acknowledge that they will take the appropriate measures to ensure the safety of its employees, State employees, the public and property. Offeror must identify any additional risks associated with the project.
	Offeror Response: Comply **Safety Policies**

	Motorola Solutions' large sites and manufacturing facilities operate Environment, Health and Safety (EHS) management systems that have been certified to the international standards ISO14001 (Environment Management System) and OHSAS18001 (Occupational Health and Safety System). The management systems encompass products, processes, activities and services of Motorola that occur at our facilities and by both Motorola Solutions badged employees and contractors. Our Field Services Operations (FSO) include a wide variety of construction, installation, maintenance and repair activities and involve numerous Motorola Solutions' employees working as program managers, engineers, system technicians and other field service personnel. The safety and health of all employees are of prime importance to us. We hold the safety, welfare and health of employees and customers in the highest regard. It is our belief that accidents injuring persons and damaging equipment cause needless human suffering, inconvenience and expense. We provide our employees a work environment as free of recognized hazards as is possible and practical. Control of potential safety and health hazards and their elimination is the primary objective of our safety program. The Motorola Solutions Project Manager has primary responsibility for ensuring safety considerations addressed during the project implementation. This includes identifying any State-specific safety training and policies that apply to the work areas where the Project 25 (P25) equipment will be installed and or tested; assuring that all Motorola Solutions personnel and subcontractors receive the proper training prior to starting work and establishing a specific safety plan prior to beginning installation of the system equipment. The Project Manager will interface with the State and its consultants as required to support safety audits as required. If requested by State of North Dakota, Motorola Solutions will appoint a Safety Superintendent to monitor safety at all worksites. <u>General Safety Rules</u> 1. All accidents with or without injury shall be reported to the supervisor immediately. 2. Report unsafe conditions in the workplace, including defective tools or other equipment, to your supervisor immediately. It is the supervisor's responsibility to review and correct unsafe conditions. 3. Established safe job procedures shall be followed by all employees. 4. If unsure of how to operate machines/equipment or perform any assigned task, ask the supervisor before proceeding. Training shall be provided to individuals that are not proficient in the use of particular machines/equipment. 5. Do not alter machines or equipment. Mechanical safeguards shall be in place and kept in place at all times unless locked out and/or tagged out for maintenance or repair purposes.

6. Personal protective equipment, as directed by regulations, shall be worn or used to reduce the chance of injury.
7. Use only the proper tool for the job. Do not use defective tools or equipment if the proper tool is not available.
8. Get assistance in lifting any item too bulky, awkward, or heavy to lift safely. Employees should use material handling equipment, such as a cart or dolly before attempting to move any heavy item.
9. If a repetitive task causes discomfort, or is unsafe or unhealthy, report it to the supervisor immediately.
10. In case of emergency, know:
    a. Whom to call.
    b. What to do.
    c. Where to go.
11. Observe safe and healthy housekeeping practices.
12. Do not use chemicals without a full understanding of their toxic properties and without the knowledge required in safe use.

<u>Environmental Health and Safety Policy</u>

Our EHS policy commits us to operating our facilities to minimize environmental impact, to continuously improve our EHS processes and to prevent pollution. The policy supports our corporate responsibility business principles and code of business conduct.

We implement our policy through our EHS management system, which describes how we identify and manage potential risks to people and the environment, improve our performance and monitor compliance. The system has earned independent certification to the international standard ISO 14001 at our manufacturing sites and larger design centers.

<u>Safety Standards</u>

We have numerous safety standards. If potential safety issues are identified at a site, the safety standards call for corrective actions to control or eliminate the situation. Each site is also asked to implement a process for reporting accidents that result in injury/illness or damage to property. Accident investigations are conducted to identify the possible cause(s) of the accident and determine any necessary steps to prevent recurrence. We also ask our independent contractors to participate in the evaluation and monitoring of safety activities.

An effective safety program is built around good housekeeping. Accordingly, the safety standards instruct each site to address housekeeping issues, such as maintenance of work areas in a clean, dry and orderly condition, safe storage of materials, adequate spacing in aisles and stairways, proper lighting and maintenance of facilities in good repair. Each site also establishes minimum safety

	standards for walking and working surfaces to prevent accidents caused by trips and falls. By implementing and applying these EHS standards on a worldwide basis and by remaining committed to continuous improvement in all its activities, we are working to fulfill our vision of being a global corporate leader for progressive and best-in-class environmental, health and safety practices. Our culture is grounded in a respect for the dignity of people. It is a culture that respects our natural environment and strives to improve the surroundings in which we live and work. <u>Verifying Health and Safety Compliance</u> Our EHS audit program assesses how ISO 14001-certified sites are complying with the company's policy, management system and legal requirements. Our staggered audit schedule ensures each site is audited at least annually. - Corporate-level audits of the EHS management system–every three years. - Site-level audits of the EHS management system–every three years. - Site-level audits of EHS compliance with legal requirements–every three years by independent, third-party auditors. - ISO 14001 surveillance audits–every three years by independent, third-party auditors. We record all non-compliances identified by these audits and systematically track them to ensure that corrective actions are taken and the root causes corrected. Our senior leaders and board of directors review the audit results periodically. **Project Risks** Additional project risks are not known at this time. A Safety review will be completed during the CDR to review any additional items as applicable.
4.	**Professional Services** The STATE seeks the following professional services to achieve the objectives of this project. Offeror must describe in detail their ability to provide the following: a. Planning b. Gap analysis/design c. Application configuration d. Reports e. Data conversion f. Interface planning and implementation g. Installation h. System setup and configuration i. Testing j. Training

k. System Documentation
l. Implementation services
m. Post implementation services

Offeror Response:

Comply

Motorola Solutions is experienced with delivering the professional services noted above. Our Project Managers and Teams utilize a work breakdown structure which is broken into project phases. This phased approach is used for all projects both large and small. This ensures a consistent process approach to all projects.

Our Project Phases utilized are outlined below. Depending on the particular project, all or some of these phases may be required. Each phase follows a Work Breakdown Structure (WBS) that clearly identifies the work to be performed during the project.

The Motorola Solutions Project Phases and corresponding North Dakota professional services are shown below:

Motorola Project Phases	North Dakota – Professional Services
Contract/Project Initiation (Award) The implementation process will begin with the Contract/Project Initiation phase. During this phase, the project teams from Motorola and the County meet to begin the project. This phase is considered complete when the Project Kickoff Meeting has been held.	
Detailed Design Review After the Project Kickoff Meeting, Motorola Solutions and the State will meet to review the proposed system design. This review is not intended to redesign the system architecture or to re-evaluate any specifications previously reviewed and approved. The goal of this review is to achieve written agreement on the overall system design and detailed documentation. Various design documents will be presented for approval. These documents will form the basis of the system that will be built, assembled, staged and installed.	*Planning, gap analysis/design, application configuration, reports, data conversion, interface planning*
Order Processing The completion of the Detailed Design Review phase, resulting in an agreed upon system design and equipment list	*n/a*

		triggers the onset of the Order Processing phase. Within this phase, the Equipment List goes through a validation process. Motorola Solutions also confirms the shipping and storage location(s) for this equipment and creates Ship Views. Ship Views are the mailing labels that carry complete shipping information. They direct the timing, method of shipment and ship path each item will take to reach their ultimate destination. This makes tracking of the factory orders more manageable for the Project Manager and team. The final step within order processing is the creation of the orders for the equipment based on all the information gathered.		
		Manufacturing and Staging Manufacturing: Based on the equipment order, Motorola Solutions will manufacture and/or procure the items necessary for the system. For Motorola equipment, the manufacturing facility performs product testing during the manufacturing process up through the complete subsystem at factory staging. In addition, Motorola Solutions' Product Quality Engineering Department performs additional tests on periodic samples throughout the manufacturing process. Factory Staging: This system will undergo a Factory Acceptance Test Plan (FATP) at Motorola Solutions' Customer Center for System Integration (CCSi). Specialized technical teams work with factory and field Project Managers, project engineers and product group personnel to set up the system at CCSi. All cables with required connectors will be installed between the various system components to provide an operational system within the staging facility. CCSi staff builds the system from approved drawings, configuring equipment, as it will be at its final destination. CCSi staff will run factory test procedures to ensure that the system is working in accordance	*n/a*	

		with the design documentation. The intent of the FATP is to verify system functionality and to expedite the installation effort at the final installation location(s).		
		Installation During installation phase Motorola Solutions provides Civil Work as needed at the proposed sites, installs Fixed Network Equipment, Dispatch Equipment, Subscribers and Other equipment as applicable.	*Interface implementation, Installation*	
		System Optimization Upon completion of the installation process, the RF equipment will be powered up and then optimized by the Motorola Solutions System Technologist under the direction of the Project Manager. Motorola Solutions and its subcontractors will optimize each subsystem individually. Audio and data levels will be checked to verify factory settings. Radio equipment will have forward and reflected power checked after connection to the antenna systems to verify that they meet the FCC requirements and are within tolerances. Communication interfaces between devices will be verified for proper operation. Features and functionality will be tested to ensure that they are functioning according to the manufacturer's specifications and per the final configuration established during system staging.	*System set up and configuration*	
		Acceptance Testing Upon completion of the fixed-end equipment optimization functional Acceptance Testing of the fixed equipment at the sites will begin as per the Acceptance Test Plan (ATP) as agreed to in the Contract Design Review. The ATP specifies the standards and tests to which Motorola Solutions or its authorized subcontractors will adhere. Motorola Solutions will conduct a Functional Acceptance Test to verify the operational functionality and features of both the individual subsystems and of the system as a whole. In the event that any task fails in the initial test, that particular task will be retested when Motorola Solutions determines that corrective action has been taken. All issues that	*Testing*	

arise during the acceptance test are to be fully documented and resolved before the subsystem is considered ready for integration into the system. Motorola Solutions will document the results of this acceptance test and these results will be available for review. The Coverage Acceptance Test Plan (CATP) will determine acceptance of coverage and will be conducted during Phase 3. During acceptance testing, a 'punch-list' will be generated noting any corrections that may be required to be made prior to Final Project Acceptance.	
Subscriber Installation (as applicable)	*Installation*
Project Finalization Training will be provided for all agreed upon per the Training plan. Cutover is a logical, well-documented process designed to activate new communications systems while minimizing disruption to user groups. Cutover will be completed per the agreed upon cutover plan developed jointly with the State. System Acceptance - After the successful completion of the cutover and System Acceptance, the State will begin to use the system for its day-to-day operation Final Acceptance - After successful completion of system testing and acceptance of the system, Motorola Solutions will conduct acceptance meetings to verify with the State that all contract deliverables have been satisfied and also review the Customer Service Support Plan for transition to Service.	*Training, System documentation, Implementation Services, Post Implementation Services*

Quality Assurance:

The foundation for Motorola Solutions' Quality Assurance Program is our Project Management framework and System Integration-Gates (SI-Gates). SI-Gates is a disciplined approach, methodology and repository of Motorola Project Management and System Integration teams' activities and best practices. The Motorola Solutions

	project teams utilizing this SI-Gates approach to facilitate the incorporation of our quality management system through policy and procedure so that project quality remains at the forefront throughout the North Dakota project lifecycle. Motorola Solutions' Quality Assurance Plan is a set of physical guidelines and check-points created to demonstrate that the solution's design, integration and implementation are progressing according to your expectations and recognized industry standards such as IS0 9001, TL 9000 and our R56 guidelines.
5.	**Vendor/Manufacturer Relationship** Offerors must describe their relationship with the manufacturers on their partnership agreements (ex. Gold, Silver, Bronze). Offerors must describe their relationship with each equipment manufacturer for all equipment offered in their proposal, including levels of partnership agreements.
	Offeror Response: Comply As the worldwide provider of mission critical communications systems, Motorola Solutions only partners with vendors who are leading the market in innovative ideas and cyber-security. Motorola's extended system support commitment to our customers' demands that we work with vendors who offer extended production run lifecycles, extended support lifecycles (past the end of their production run) and quality process controls (e.g. no running changes during the production run). The following describes the agreements in place with our suppliers as part of our ASTRO25 system infrastructure: - HP Server, PC Clients and Switches - Motorola Solutions has a Corporate Supply Agreement with HP Inc. which was assigned to HPE (Servers / Switches) and HPI (PC Clients) since their split mid-2016. We have global rights to do business with all their entities. In regions where they do not have a facility, we work with resellers or distributors. - Fortinet - Corporate Supply Agreement that enables the distribution of hardware, software and services from Fortinet. - Microsoft - OEM agreement that enables the distribution of LTSB software from Microsoft. - RHEL - Software Distribution agreement that enables distribution of their subscriptions. - McAfee - Purchased through distribution. Motorola Solutions carefully selects vendors and develops and manages supply agreements to meet our lifecycle commitments. We continually assess vendor product and software lifecycles to ensure we can meet our commitments by evaluating new suppliers or doing last time buys if they can't meet their

	commitments. Motorola Solutions conducts product evaluations for all third-party vendors and has predefined escalation procedures in place to immediately address any issues that arise in the field with our vendors. Since Motorola's Customer Supply Agreements are proprietary, we are not able to divulge the specifics of the agreement. Motorola Solutions can only state that we either have a specific Corporate Supply Agreement or that we purchase through distribution.
6.	**Experience** The Offeror must provide the following information regarding its experience: a. Number of years in business. b. Number of years' experience with providing the types of goods and/or services sought by the RFP. c. The level of technical experience in providing the types of goods and/or services sought by the RFP. d. A list of all goods and/or services similar to those sought by this RFP that the Offeror has provided to other businesses or governmental entities. e. Offerors must describe the experience of their firm in completing similar projects.
	Offeror Response: Comply **Experience the State Can Trust** Motorola Solutions, Inc. (Motorola Solutions) is the global leader in providing mission-critical communications solutions, products and services for public safety and government customers (**Figure 37**). Motorola Solutions strives to enable our customers to be their best in the moments that matter through innovation, delivery of mission-critical communications technology and provide an elite technical staff to maintain the systems. With a strong balance sheet, disciplined financial policies and commitment to innovation, we are extremely well positioned to serve our customers for decades to come. Motorola Solutions has proudly served the public safety and government markets by providing reliable mission–critical, interoperable wireless communications systems, products and services for 89 years. Our 14,000 employees worldwide are focused exclusively on our public safety, government and enterprise customers worldwide. We have design centers around the globe that focus on human dynamics, functionality of products and systems, application development and the improvement of advanced Internet Protocol (IP) platforms. From the development of our first public safety two-way vehicular radio in 1931, to the advanced digital trunking networks deployed today, Motorola Solutions is very proud of our heritage and ability to provide mission-critical communications for our public safety customers. **The State of North Dakota can rest assured, that our**

industry leadership, experience and dedication will ensure a continued partnership that will exceed the State's vision and goals. Our unique history and our focus on our public safety customers have contributed to our position as the leading provider of mission-critical communications. We offer the State the following advantages, **unmatched** by any other company:

- Industry-leading experience with P25 standards–based technology.
- Proven, resilient trunked simulcast technology using Linear Simulcast Modulation (LSM).
- Unparalleled success with large, complex land mobile radio projects (more implementations than all of our competitors combined).
- Proven implementation knowledge, capability and long–term support.
- More resources dedicated to research and development than all our competitors combined.

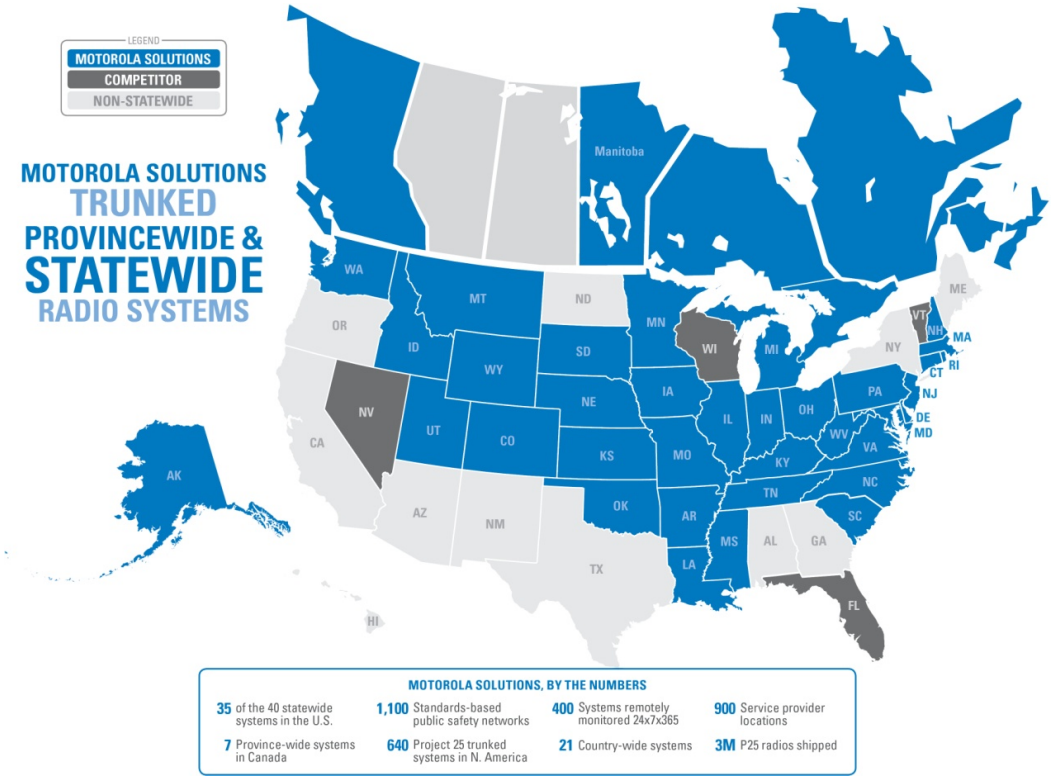


Figure 37: Motorola Solutions has been trusted to deploy the largest, most complex systems throughout the United States, including 36 Statewide networks (in blue)

Service, Support and Our Ability to Perform

The State of North Dakota's public safety project is a priority for Motorola Solutions. As such, the first responders, elected officials and citizens of the State will be assured that resources will not be a concern. Our team of specialized resources will be dedicated to the State and its agencies while having the ability to leverage

	additional personnel if needed. Our team of proven engineers, project managers and technicians provides resource dedication for this project implementation. Motorola Solutions maintains partnerships with four authorized service shops, with Motorola Solutions-certified technicians, to support our subscribers and infrastructure in the State of North Dakota. Serving public safety agencies in North Dakota for more than 40 years, Motorola Solutions and its partners are staffed with trained and qualified technicians to provide rapid service response on service requests. Motorola Solutions' and our partners are both highly experienced and skilled to fulfill requests for repairs, restoration, installations, removals and programming, maintaining network optimization and scheduled preventive maintenance tasks for site standards compliance and RF operability in a timely manner.
7.	Offerors must provide three/3 references for similar projects the Offeror has completed. The Offeror must include the following contact information for each reference: a. person's name, b. telephone number and c. e-mail address. The Offeror must verify the accuracy of all contact information. The STATE reserves the right to contact other State and local government agencies regarding engagements they may have had with the Offeror's company in the past, in addition to the references provided in the proposal. Reference checks shall be completed on Offerors who are determined to be reasonably susceptible for award. The STATE will factor information received during the reference checks into the evaluation scoring.
	Offeror Response: State of Nebraska - Statewide Radio System (SRS) Office of the Chief Information Officer Public Safety Communications Mike Jeffres, Systems Manager 501 S 14th Street Lincoln, Nebraska 68508-2711 Email: stateradioadministrator@nebraska.gov Phone: 402-471-3719 State of South Dakota Radio System Jeff Pierce jeff.pierce@state.sd.us

	605-773-4347 State of Missouri - Missouri Statewide Interoperability Network (MOSWIN) Bryan Courtney Director Missouri Interoperability Center 2413 E. McCarty Street Jefferson City, MO 65101 573-522-9584 office 573-645-1643 cell bryan.courtney@dps.mo.gov State of Minnesota ARMER System Tim Lee 651-234-7963 Tim.lee@state.mn.us KSICS - Kansas Statewide Interoperable Communication System Darren Miller darren.miller@ks.gov (785)296-5948 State of Michigan - Michigan Public Safety Communications system MPSCS Brad Stoddard stoddardb@michigan.gov (517) 336-6108 400 Collins Road PO Box 30631 Lansing, Michigan 48909-8131 State of Wyoming - Wyolink Nathan Smolinski, WyoLink Support manager Address Wyoming Department of Transportation 5300 Bishop Blvd. Cheyenne WY 82001 Phone (307) 777-4756
8.	The Offeror must provide resumes for **all** key personnel who will be involved in providing the goods and/or services contemplated by this RFP. The personnel listed must be the people that will perform/provide goods and services for the STATE. Any changes in personnel during the project must be approved by the STATE. Additionally, replacement personnel must have comparable training, experience and

ability as the person originally proposed for the job. The following information must be included in the resumes:

a. Full name.
b. Education including degrees, relevant certifications and the institution from which they were obtained.
c. Manufacturer training
d. Years of experience and employment history particularly as it relates to the requirements of the RFP.
e. Description of the type of work the individual shall perform
f. Specify the employment status of the personnel (e.g., subcontractor, employee of the Offeror)
g. Location from where the personnel will perform applicable services (e.g., STATE facility, remote Offeror facility, off shore facility)

Offeror Response:

Comply

Our project team will provide the day-to-day subject-matter expertise, accountability, vision and experience needed for a successful project implementation for the State of North Dakota. This team brings a solid understanding of the complexities and challenges of implementing and maintaining public safety systems of this magnitude. Additionally, as the manufacturer of the proposed systems, Motorola Solutions provides unique advantages over the lifecycle of the system by offering enhanced system support and product and services support.

Team organization and Qualifications

Director & Area Sales Manager, Strategic Projects

Dave Eischens **Area Sales Manager**	Motorola Solutions, Inc. 8125 Tierneys Woods Curve, Bloomington, MN 55438 Work Phone Number (612) 834-5800
Date of Hire	November 15., 1978
Motorola Professional Experience	Director & Area Sales Manager Strategic Project Team *Motorola Solutions 1997-2018* Directed Motorola Solutions presales team for the followin projects: State of Kansas System Upgrade 2016 State of Minnesota ARMER Upgrade 2015 Niagara Regional Police Service 2014 Montgomery County Ohio 2014 State of Michigan Upgrade Project 2010 City of Indianapolis/Marion County -2007 State of Kansas - Statewide Radio System - 2005

	State of Illinois - STARCOM System 2002 State of South Dakota -State Wide Public Safety Radio System 2001 State of Minnesota - ARMER System 1998
Other Professional Experience	Motorola Inc. District Sales Manager 1987-1996
Education	A.A.S. Degree Electronics Technology Hennepin Technical College, Eden Prairie, Minnesota 1976

Contract Representative (Account Manager (AM))

Mike Mihelich **Account Manager – MN/ND**	Motorola Solutions, Inc. 1440 Sophia Dr Chaska, MN 55318 (612) 357-0029
Date of Hire	June 2017
Motorola Solutions Professional Experience	Account Manager for State and Local Government customers throughout Northern Minnesota and all of North Dakota.
Other Professional Experience	*General Dynamics Information Technology / SRA, 2008 to 2017* **Senior Systems Administrator / Communications Manager Pentagon Force Protection Agency (PFPA)** - Managed Land Mobile Radio (LMR) for multiple law enforcement and emergency response directorates under PFPA in the Pentagon and throughout the National Capital Region (NCR). - Provided communications support for Mobile Comman Centers, Pentagon Dispatch Communications Center, Pentagon Police, Emergency Response Teams (SWA Chemical Biological Radiological Nuclear and Explosiv (CBRNE) (Bomb Squad), High Risk Protective Service Raven Rock Mountain Complex (RRMC), Secretary of Defense Communications (OSD), Pentagon Building Maintenance Office (PBMO), Washington Headquarter Services (WHS), National Military Command Center (NMCC), Military Security Force (MSF), Army CID, NC Air Force, DC National Guard and the FBI Emergency Response Team. - Assured communications interoperability with surrounding Public Safety agencies utilizing Analog an

Digital, Conventional and Trunking systems in the VHF, UHF and 700/800 MHz bands.

- I was instrumental in researching new technologies, working with manufacturers to resolve equipment bugs and identifying cost-effective solutions.

United States Department of Health and Human Services (HHS) / Office of the Secretary (OS), 2012-2017

Communications Officer / Telecommunications Specialist, National Disaster Medical System (NDMS)

- Incident Response Command Team (IRCT)
- Logistics Response Assistance Team (LRAT)
- Responded to federally declared disaster areas providing medical, communications and logistics support throughout the United States and its Territories.
- Setup and maintained mobile and fixed communications system used for disaster communications.

United States Department of Homeland Security / Federal Emergency Management Agency, 2004-2008

Telecommunications Specialist

- Mobile Emergency Response Support (MERS)
- National Disaster Medical System (NDMS) MN-1 Disaster Medical Assistance Team (DMAT)
- Programming, testing, installation, maintenance and repair of Motorola and EF Johnson portable radios, mobile radios and repeaters (VHF, UHF, 700/800 and HF).

North Memorial Medical Center / North Ambulance 1997-2007

Electronic Communications Technician / Emergency Medical Technician (EMT)

- North Memorial Medical Center is a Level 1 Trauma Center with more than 100 ambulance units and 7 helicopters serving Minnesota and Wisconsin transporting more than 50,000 patients annually. North Memorial Ambulance Service is one of the fewer than 100 medical transportation providers to be accredited by

		the Commission on Accreditation of Ambulance Services (CAAS) in the United States. - Administrator of all Emergency Medical Services Motorola Astro Project 25 digital subscriber units of the Minnesota Metro / Minnesota Allied Radio Matrix for Emergency Response (ARMER). Including fleetmap and codeplug creation for XTS2500, XTS5000, Astro Spectra Plus, XTL2500 and XTL5000 subscriber units. ARMER utilizes 700/800 MHz ASTRO Smartzone and conventional system configurations.

Project Manager (PM)

The Project Manager (PM) will serve as the primary project liaison to State of North Dakota. In this role, Jim will track the progress of the project and take proactive measures to ensure the project proceeds as planned. The PM will work with the State's Project Manager to ensure contractual commitments are delivered and fulfilled. He will manage and allocate all required resources, personnel, budgets and materials to ensure the system is implemented to your satisfaction and that the system meets our standards on the specifications as agreed to during the Contract Design Review, while maintaining the highest standards of quality and customer satisfaction. The PM will be fully dedicated to all project related tasks to meet the scheduled completion.

Other responsibilities are:

- Implementing the project plan and monitor schedule adherence
- Conducting bi-weekly status meetings to include published agendas, meeting minutes, status reports, action item tracking and project schedule updates.
- Tracking delivery and installation progress to the master project plan and plan, recommend and order changes to the schedule or resources to ensure on time completion of critically sequenced deliverables.
- Directing technical individuals responsible for the installation, configuration and quality of the project.
- Monitoring and controlling the installation, integration, testing and acceptance of the proposed system.
- Coordinating the development and execution of technical and user training plans.
- Managing and directing all subcontracting activities.
- Mitigating risks in order to ensure that the system meets the design specifications and is delivered on time.
- Overseeing change management.

- Ensuring quality workmanship by all Motorola Solutions vendors and subcontractors.
- Ensuring that our team works collaboratively with State of North Dakota personnel throughout the project.

Lead Project Manager

Stuart Johnston **Regional Service Manager**	Motorola Solutions, Inc. 350 Worthington Road, Suite C Westerville, Ohio 43082 Work Phone Number e.g. (740) 953-0447
Date of Hire	March 28th, 2011
Motorola Solutions Professional Experience	Insert narrative description of individual's professional experience at Motorola, qualifications and skills here. Can up to 5 lines long. *April 2016 - Present* **Regional Services Manager T5N** - Oversee all day to day operations including revenue forecasting, cost management/containment, customer satisfaction, Systems Integration and Lifecycle Service activities, in collaboration with the Sales team throughc the customer engagement. - Systems Integration responsibilities include ensuring th quality, profitability and timeliness of design, installatior and commissioning of Customer projects, through the coordination of department resources (Project Manage Field Systems Engineers, System Technologists) and external resources (third-party subcontractors). - Directly managed a team of Ten (10) Project Managers across Six (6) States handling numerous projects of various technologies and contract value. *July 2014 – April 2016* **System Manager State of Ohio MARCS** - Served as the primary point of contact to the State of C MARCS Customer and worked closely with Systems Support Center, Dispatch Operations, Product Groups, Factory, System Engineering and System Integration, t Field Service Organization, the Service Support Netwo third-party contractors, the local service provider and o vendors.

	- Directly Managed 3 Field Technicians that provided daily maintenance and support to achieve Best-in-Class performance and system utilizations. - Oversight to Nine (9) Motorola Service Providers to ensure contract compliance of response/restoration time of system issues. - Successful implementation of System upgrade for System version 7.13 to 7.15. Included management and coordination of Upgrade Operations, MSS providers, Motorola Engineers and Motorola Field Technicians. *March 2011 – June 2014* **Project Manager** - Implementation of the State of Ohio MARCS IP Large Project - $90M. Project implemented on time and under budget. - Implementation of the Greene County, Ohio Six (6) Site Ten (10) Channel Simulcast Site, Add on to the Ohio MARCS Statewide System. - Implementation of the Geauga County Ohio P25 Ten (10) Site Ten (10) Channel Simulcast Site Add on to the Ohio MARCS Statewide System. - Implementation of the Jefferson County Ohio P25 Six (6) Site Five (5) Channel Simulcast Site, Add on to the Ohio MARCS Statewide System - Implementation of various dispatch centers on both the State of Ohio MARCS System and the State of Michigan MPSCS Statewide System.
Other Professional Experience	Insert narrative description of individual's professional experience, qualifications and skills here. Can be up to 5 lines long. *WD Partners September 2002 – March 2011* **Site Civil Program Manager** - Client focused Project management that delivered complete permitting and design documentation that resulted in on time construction of new ground up developments. - Managed on average twenty-four (24) $1.5M-$2M projects per year. Key Customers include

- Longhorn Steakhouse, Bob Evans, BP, Mimi's Café and EatnPark Hospitality.
- Directly managed a four (4) person team which included planners, civil designer and landscape architects.
- Established effective working relationships with customers, jurisdictions, third-party consultants and internal disciplines including Engineer (Structural, MEP), Architects.
- Selected as Lead Civil Engineer for $10M Indoor/Outdoor Amphitheatre in the North Shore District in Downtown Pittsburgh. Open December 2010.
- Selected as Lead Civil Engineer for $12M-$15M Dining Hall located on the Campus of Bowling Green State University. Project designed per LEED Standards –Gold Certification. Open fall of 2011.
- Selected as Lead Civil Engineer for $2M EatnPark Restaurant in Pittsburgh, PA. Projected designed per LEED Standards –Platinum Certification. Open.

Tectonic Engineering May 1999 – September 2002

Staff Civil Engineer

- Prepared civil design and documentation of cellular tower locations including site plan, grade plan, utility coordination and local jurisdiction permitting.
- Coordinated civil designer project assignments and responsible for tracking geotechnical and environmental investigations, managed third-party consultant activities and reviewed construction, zoning and permit drawings.
- Field experience including developing geotechnical boring logs, conducting concrete testing and site inspections.

Black & Veatch June 1997 – May 1999

Staff Engineer

- Prepared civil design and documentation of cellular tower locations including site plan, grade plan, utility coordination and local jurisdiction permitting.
- Special assignment in the development of fiber optic route design including route layout, managing third-party survey teams and complete design documentation for L3 Communications in Kentucky, California and Michigan.

	Total of 3000 miles of fiber optic routes completed in eighteen (18) months.
Education	B.S. Civil Engineering - 1997 Ohio Northern University

Support Project Manager

Jim Brockhaus **Support Project Manager**	Motorola Solutions, Inc. Street Address 7722 149 h Circle State, State, Zip Savage, MN 55378 Work Phone Number e.g. (612) 849-6872
Date of Hire	August 2012
Motorola Solutions Professional Experience	Developed partnerships with customers in defining, assessing, securing requirements and deliverables, tracki technical issues and managing risk to ensure the appropri resources are involved with the development, design and deployment of the customer's systems. *06/16 to Present* **Project Manager, Waukesha County, Sheboygan Cour Portage County WI** - Establish project implementation schedules and manag the tasks for on time delivery of the system. - Manage subcontractors and Motorola resources to accomplish the - tasks of the project and insure a successful implementation. - Interface with customer and Motorola senior leaders to maintain solid relationships. *03/14 to 8/10/17* **Project Manager, State of South Dakota WAVE, 7.13 – 7.15 and 7.15 - 7.17 Statewide System Software Upgra Projects** - Establish project implementation schedules and manag the tasks for on time delivery of the system. - Manage subcontractors and Motorola resources to accomplish the tasks of the project and insure a succes implementation.

- Interface with customer and Motorola senior leaders to maintain solid relationships

06/16 to Present

Project Manager, Console Projects, MN

- Establish project implementation schedules and manage the tasks for on time delivery of the system.
- Manage subcontractors and Motorola resources to accomplish the
- tasks of the project and insure a successful implementation.
- Interface with customer and Motorola senior leaders to maintain solid relationships.

Completed P25 Console Projects for:

- Fillmore County, MN
- Hubbard County, MN
- Leech Lake Band of Ojibwe, Yellow Medicine County, MN
- Benton County, MN
- Wadena County, MN
- Stearns County, MN
- Pennington County, MN
- MN Met Council
- Koochiching County, MN
- Itasca County, MN
- Becker County, MN
- Crow Wing County, MN
- Ramsey County, MN
- Allina Health Emergency Medical Services
- Hennepin County Medical Center Emergency Medicine Services Regions Hospital
- State of Bloomington, MN
- State of Minneapolis, MN

	▪ State of St Louis Park, MN
Other Professional Experience	Telecommunications specialist with 24 years of experience in project management, systems and RF engineering, vendor relations, program management, training and technical sales. Exceptionally well organized with a track record that demonstrates self-motivation, initiative and a proven ability to interface with customers to ensure project solutions that meet customer's requirements.
Education	Electronics Technology Riverland Technical College, Austin, MN
Training, Certifications and Memberships	▪ Project Management Certificate, 2007 (Cardinal Stritch University) ▪ Technical Writing Course, 1984 (Mankato State University)

Lead Systems Engineer (SE)

The Lead Systems Engineer will lead the engineering and design effort for State of North Dakota. In this role, The Lead SE will develop Design Review documentation and ensure the system design meets the State's requirements. The Lead SE is responsible for all phases of Performance Verification.

Other responsibilities handled by the Lead Systems Engineer are:

- Working with the subcontractor's engineers and reviewing their specifications and products.
- Providing technical direction for the staging and testing of the system at Motorola Solutions' Customer Center for Solutions Integration (CCSi).
- Managing the process of defining, documenting and acquiring approval of system programming and subscriber fleetmapping.
- Directing the integration of all the subsystems to ensure technical and engineering compliance of the system.
- Developing and executing system acceptance test plans to verify the technical and engineering compliance of the system.
- Managing system migration and cutover from existing systems.
- Developing primary system documentation, defining final system design and verifying the technical integrity of the system design.

Dave Pieczynski **Field Systems Engineer – Principal Staff III**	Motorola Solutions, Inc. 15461 W. Sunrise Circle Eden Prairie, MN, 55347 952-240-9456

Date of Hire	June 1995
Motorola Solutions Professional Experience	*2016 - Present* Motorola Solutions Inc., Eden Prairie, MN Principal Staff Engineer, North American Government & Commercial Market - Focus on design, testing and implementation planning for State of Florida Statewide Law Enforcement Radio System (SLERS). Responsible for coverage, console and RF site design and overall equipment requirements for Statewide Project 25 mobile radio system. *2015 - 2016* Motorola Solutions Inc., Eden Prairie, MN Implementation Engineer, North American Government & Commercial Market - Focus on design, testing and implementation of the Iowa Statewide Interoperability Communications System (ISICS). Responsible for coverage design and frequency plan for 700 MHz Statewide Project 25 mobile radio system. *2012 - 2015* Motorola Solutions Inc., Eden Prairie, MN Systems Engineering Manager, North American Government & Commercial Market - Manage the engineering team responsible for Public Safety systems in the St. Louis, MO area. Responsible for the technical coordination and implementation of three large Public Safety communications systems. *2008 - 2012* Motorola Inc., Burnsville, MN Systems Engineering Manager, North American Government & Commercial Market - Manage the engineering team responsible for Public Safety systems in Midwest Territory (IL, IA, KS, MN, MO, NE, ND, SD, WI). Interface with high level customers and consultants, with extensive experience

	in negotiated sales and RFP responses for all levels of voice and data systems. *2003 - 2008* Motorola Inc., Eden Prairie, MN Engineering Group Leader - Led the engineering team responsible for Public Safety systems in Wisconsin, Minnesota, North and South Dakota. Also participated in design and proposal of New York State system proposal. *1997 - 2003* - Motorola Inc., Eden Prairie, MN Senior Electrical Engineer (Land Mobile Radios systems) Responsible for the design of two-way radio systems for Public Safety market. Interface with customers, perform needs analysis and develop analog and digital voice systems in VHF, UHF and 800 MHz frequency bands. Experience in all stages of engineering of Public Safety voice and data systems, including 911 and dispatch console designs, trunked and conventional radio systems. I led the pre-sale design effort of the State-wide VHF ASTRO SmartZone system for the State of South Dakota. Involved in the post-sale engineering and implementation tasks related to the Minnesota ARMER ASTRO25 SmartZone system. I planned, performed and managed the Coverage Acceptance Test for the Minnesota system, gaining customer acceptance and a major milestone. *1995-1997* - Motorola Inc., Arlington Heights, IL RF Hardware Engineer Developed cellular frequency base stations. Was responsible for design, testing and documentation of 800 MHz base stations in both analog and CDMA formats. Also worked on the board level design and development of transmitter/receiver circuits.
Other Professional Experience	*2013-2017*

	Firefighter, Eden Prairie, MN Firefighter, Fire Apparatus Operator, EMT. Part-time first responder for City of Eden Prairie, Minnesota. Registered with Minnesota Fire Service Certification Board.
Education	B.S., Electrical Engineering University of Illinois at Urbana/Champaign
Training, Certifications and Memberships	- Licensed Professional Engineer, Minnesota. - CompTIA Network+ Certified.

Support Systems Engineer

Susan Weigele **Principal Staff Systems Engineer**	Motorola Solutions, Inc. 12715 Durham Way Apple Valley, MN 55124 (952) 240-8136
Date of Hire	1/19/1988
Motorola Solutions Professional Experience	Use my technical and leadership skills to translate custom requirements into highly reliable public safety system designs and efficient implementations. Leverage my experience in systems engineering and technology development to meet public safety customer needs on performance, price and schedule. *04/99 to Present* **Principal Staff Systems Engineer - Motorola Solutions Inc. State and Local Government** - Design and implement large voice and data radio communication systems for public safety and State/loca government applications. - Key member of design/implementation team for the Minnesota Allied Radio Matrix for Emergency Respons (ARMER) system. - Designed, implemented and documented radio communications systems for numerous public safety ar government agencies in Minnesota, Wisconsin, Iowa, North and South Dakota. - Frequent interaction with City/County Boards, State/Local Law Enforcement, CIO/IT officials and Statewide Radio Boards.

	10/95 to 1/99 **Principal Staff Engineer - Motorola, Inc. Semiconductor Products Sector** - Led research team to develop and transfer new solder and polymer-based semiconductor packaging technologies. - Employed use of statistical process characterization techniques to develop Electroless Nickel-Gold/Solder Flip Chip Interconnect Technology. - Conducted reliability testing and analysis to identify failure modes in semiconductor packaging technologies under development. *10/93 to 10/95* **Senior Engineer – Motorola, Inc. Messaging, Information and Multimedia Sector** - Conducted statistical process capability studies and used statistical control for all critical electronic assembly processes in high volume printed circuit board manufacturing environments. - Directed the development and characterization of in-line measurement systems used to collect product and process quality data. - Member of inter-disciplinary team to develop and manufacture pioneering wireless Personal Digital Assistant, the Motorola Envoy.
Education	B. S. Electrical Engineering, 1989 University of Illinois at Urbana-Champaign M. S. Mechanical Engineering – Manufacturing Systems, 1992 University of Wisconsin-Madison
Training, Certifications and Memberships	- CompTIA Network+ Certified - Motorola Network Subject Matter Expert - Apprentice Level - Member of Motorola Staff Engineering Council – Developed and lead North America Engineering Mentoring Program - Numerous training courses taken in radio system design/implementation and backhaul network integration.

Lead System Technologist (ST)

The Lead Systems Technologist (ST) is responsible for ensuring that the system is programmed, integrated, optimized and tested to perform as designed.

Other responsibilities handled by the Lead Systems Technologist are:

- Participating in the staging and testing of the system at Motorola Solutions' Customer Center for Solutions Integration (CCSi).
- Ensuring site link verification testing occurs to validate connectivity and adequate performance at installed sites.
- Overseeing the integration and optimization of all system hardware and software, which includes:
    - Equipment programming and configuration development.
    - Optimization of RF equipment and the consoles.
- Acceptance Testing.
- Supporting cutover plan development and execution.

Ed Kirsch **Systems Technologist**	Motorola Solutions, Inc. 9855 W. 78th Street. Suite 170 Eden Prairie, MN 55344
Date of Hire:	June 6, 1988
Motorola Solutions Professional Experience:	29 years' experience installing, programming, troubleshooting and repairing Motorola radio communication equipment. Implementations include Astro 25, SmartNet and SmartZone systems including both analog and digital simulcast trunking and SmartX, as well as conventional simulcast and paging systems. Individual products include MCC7500 and Gold Elite consoles, mobile, portables and control stations. *2001 to Present* **System Technologist, State of South Dakota** - Implemented as a 4.1 SmartZone VHF system. Migrate to Release 7.9 and then upgraded to Releases 7.13, 7.15 and 7.17. Included migration of all Statewide Gold Elite consoles to MCC7500. *1999 to 2016* **System Technologist, Great River Energy- MN**

	▪ Implemented as a 3.5 SmartZone OmniLink UHF analog system. Upgrade to Astro 25 Release 7.11 and then upgraded Release 7.16 along with migration of Gold Elite consoles to MCC7500. **System Technologist, State of North Dakota** ▪ Implemented VHF conventional system with Astro capabilities and Gold elite consoles. **System Technologist, Northern States Power - WI** ▪ Implemented conventional Astro system with data and Gold Elite consoles. **System Technologist, Commonwealth Edison - IL** ▪ 6 nuclear plants: Implemented the first 900MHZ Trunked system in a nuclear plant with Gold Elite consoles
Education	Associate of Applied Science in Electronics DeVry Institute of Technology
Training, Certifications and Memberships	▪ WAVE Certified Integration Engineer ▪ Astro 25 System Configuration and Implementation ▪ CEN 101

Customer Support Manager (CSM)

The Customer Service Manager is responsible for development of the proposed service delivery plan and the Customer Support Plan for the warranty phase of the project. The CSM will work with the State of North Dakota to customize the plan to best meet your needs. The CSM will be involved during multiple phases of the implementation and throughout the warranty and post-warranty lifecycle of the project.

Other responsibilities handled by the Customer Support Manager are:

- Presenting the proposed warranty and post-warranty scopes of work.
- Reviewing in-warranty scope of work and services and Motorola Solutions responsibilities in the delivery of said services.
- Initiating warranty coverage.
- Implementing remote system monitoring media (T1 circuits, firewall).
- Verifying customer and site profile information, including Customer Support Plan and Customer Handling Procedures.

- Testing site/environmental alarms with our Network Monitoring Office.
- Reviewing the progress and results of the warranty support program to date:
- Establishing regularly scheduled meetings to review case history, average time to respond, average time to resolution throughout warranty period.
- Reviewing customer satisfaction with services rendered, taking corrective action as necessary.
- Reviewing the scope of post-warranty support services and establishing post-warranty contract/budget process tailored to the State of North Dakota.
- Hardware Maintenance services.
- Software Maintenance/Upgrade services.

Mike Rosonke **Customer Support Manager**	Motorola Solutions, Inc. Minneapolis, MN 612-490-4453
Date of Hire	11/22/2004
Motorola Solutions Professional Experience	Dedicated and results-oriented wireless professional with over twenty-two years of experience. My skills include working in teams or individually to influence events and achieve goals beyond requirements. The proven ability in developing and implementing exemplary project plans resulting in customer satisfaction. Skilled in managing rap change while maintaining effectiveness in varying environments involving tasks, responsibilities and people. *Motorola / Motorola Solutions | August 2017 - Present* **Customer Support Manager** - Manage assigned accounts (small, medium, large) with primary emphasis on supporting existing accounts/contracts in accordance with SLA's. - Pro-actively managing/assessing account issues and risks. - Consult with customers to understand issues and concerns, to offer solutions and to determine/advise bo the process and the timelines for resolving. - Work with Sales to procure new accounts and/or manage new opportunities in assigned region and/or to up-sell additional services to existing accounts.

- Build/cultivate and manages relationships with key stakeholders - both internal (Motorola) and external (customer, third-party service providers, other stakeholders).
- Accountable for adhering to contract budget (cost/margin performance).
- Help customers to define, plan and execute technology transformation programs - including defining business requirements, developing strategy, defining the architecture, identifying the operating model, determining the re-engineering process and the IT analytics required to enable customers to move towards a “best-in-class” IT organization.
- Collaborate with multiple stakeholders - from the customer, Motorola (internal teams) and external partners - to resolve complex customer issues.
- Lead cross-functional teams to both understand client issues and deliver critical solutions/ outcomes.
- Manage/provide oversight to third-party service providers while on-site.
- Facilitate client presentations and coherently articulates value add to the client.
- Discuss and demonstrate current industry knowledge, understanding of competitors as well as the network and infrastructure markets and future trends.

Motorola Solutions - Xcel Energy Account | *September 2012 - July 2016*

Services Customer Operations Manager

- Lead negotiations on complex deals which are primarily technical, financial or both.
- Responsible for revenue attainment, margins and personal expenses.
- Full financial responsibility for all Above Contract revenue.
- Manage above contract projects supporting the customer.
- Lead multiple small projects or portions of larger projects in the analysis of quality efficiencies and continuous

improvement. Direct and coordinate the work activities of project staff.

- Provide input to senior customer operations personnel toward the development of customer operational strategies.
- Provides resolutions to a diverse range of complex problems where analysis of data requires evaluation of a variety of factors.
- Contribute to the fulfillment of projects and organizational objectives.
- Builds productive working relationships internally and externally.

Motorola / Motorola Solutions - Xcel Energy Account | November 2004 - December 2012

Specialist Process Improvement Sr./ Technician Field Service III

- Full financial responsibility for all Above Contract revenue.
- Full billing responsibilities, assure bills are submitted and paid in a timely manner.
- Mentor Project Administrator in all Xcel Energy Region
- Provide Project Management support to Motorola Engineer.
- Works closely with Xcel Energy Management Team on all contractual commitments.
- Develop and implement medium-scale continuous improvement processes, procedures and/or programs across the business unit or organization.
- Analyze improvement processes, procedures and programs and its potential results.
- Monitor performance metrics to measure program success and reports to various stakeholders/clients.
- Coordinate project reviews, communications, training, etc.
- Work with other support and field teams to ensure revenue and cost functions are being reconciled accurately.

			▪ Provide quality performance drivers and identifies areas for improvement. ▪ Continuously seeks data capture improvement and works with systems experts to provide effective operational and business performance data. Initiate problem solving actions and follow through to resolution..
		Education	Associates in Electronic Technology DeVry University
		Training, Certifications and Memberships	▪ Personal Communication Industry Association (PCIA) Certification
9.	The STATE prefers that the proposed Project Manager have a project management certification. Offeror must specify any project management certification the proposed Project Manager has.		
	Offeror Response: Comply Stuart Johnson, the assigned lead project manager for the State of North Dakota's project, has been with Motorola Solutions since 2011. Jim has a Project Management Certificate from Cardinal Stritch University and more than 24 years of experience in project management, systems and RF engineering, vendor relations, program management and training and technical sales. *Lead Project Manager*		
		Stuart Johnston **Regional Service Manager**	Motorola Solutions, Inc. 350 Worthington Road, Suite C Westerville, Ohio 43082 Work Phone Number e.g. (740) 953-0447
		Date of Hire	March 28th, 2011
		Motorola Solutions Professional Experience	Insert narrative description of individual's professional experience at Motorola, qualifications and skills here. Can be up to 5 lines long. *April 2016 - Present* **Regional Services Manager T5N** ▪ Oversee all day to day operations including revenue forecasting, cost management/containment, customer satisfaction, Systems Integration and Lifecycle Service activities, in collaboration with the Sales team throughc the customer engagement.

- Systems Integration responsibilities include ensuring the quality, profitability and timeliness of design, installation and commissioning of Customer projects, through the coordination of department resources (Project Managers, Field Systems Engineers, System Technologists) and external resources (third-party subcontractors).
- Directly managed a team of Ten (10) Project Managers across Six (6) States handling numerous projects of various technologies and contract value.

July 2014 – April 2016

System Manager State of Ohio MARCS

- Served as the primary point of contact to the State of Ohio MARCS Customer and worked closely with Systems Support Center, Dispatch Operations, Product Groups, the Factory, System Engineering and System Integration, the Field Service Organization, the Service Support Network, third-party contractors, the local service provider and other vendors.
- Directly Managed 3 Field Technicians that provided daily maintenance and support to achieve Best-in-Class performance and system utilizations.
- Oversight to Nine (9) Motorola Service Providers to ensure contract compliance of response/restoration time of system issues.
- Successful implementation of System upgrade for System version 7.13 to 7.15. Included management and coordination of Upgrade Operations, MSS providers, Motorola Engineers and Motorola Field Technicians.

March 2011 – June 2014

Project Manager

- Implementation of the State of Ohio MARCS IP Large Project - $90M. Project implemented on time and under budget.
- Implementation of the Greene County, Ohio Six (6) Site Ten (10) Channel Simulcast Site, Add on to the Ohio MARCS Statewide System.

		- Implementation of the Geauga County Ohio P25 Ten (10) Site Ten (10) Channel Simulcast Site Add on to the Ohio MARCS Statewide System. - Implementation of the Jefferson County Ohio P25 Six (6) Site Five (5) Channel Simulcast Site, Add on to the Ohio MARCS Statewide System - Implementation of various dispatch centers on both the State of Ohio MARCS System and the State of Michigan MPSCS Statewide System.
	Other Professional Experience	*WD Partners September 2002 – March 2011* **Site Civil Program Manager** - Client focused Project management that delivered complete permitting and design documentation that resulted in on time construction of new ground up developments. - Managed on average twenty-four (24) $1.5M-$2M projects per year. Key Customers include - Longhorn Steakhouse, Bob Evans, BP, Mimi's Café and EatnPark Hospitality. - Directly managed a four (4) person team which included planners, civil designer and landscape architects. - Established effective working relationships with customers, jurisdictions, third-party consultants and internal disciplines including Engineer (Structural, MEP), Architects. - Selected as Lead Civil Engineer for $10M Indoor/Outdoor Amphitheatre in the North Shore District in Downtown Pittsburgh. Open December 2010. - Selected as Lead Civil Engineer for $12M-$15M Dining Hall located on the Campus of Bowling Green State University. Project designed per LEED Standards –Gold Certification. Open fall of 2011. - Selected as Lead Civil Engineer for $2M EatnPark Restaurant in Pittsburgh, PA. Projected designed per LEED Standards –Platinum Certification. Open. *Tectonic Engineering May 1999 – September 2002*

	Staff Civil Engineer - Prepared civil design and documentation of cellular tower locations including site plan, grade plan, utility coordination and local jurisdiction permitting. - Coordinated civil designer project assignments and responsible for tracking geotechnical and environmental investigations, managed third-party consultant activities and reviewed construction, zoning and permit drawings. - Field experience including developing geotechnical boring logs, conducting concrete testing and site inspections. *Black & Veatch June 1997 – May 1999* **Staff Engineer** - Prepared civil design and documentation of cellular tower locations including site plan, grade plan, utility coordination and local jurisdiction permitting. - Special assignment in the development of fiber optic route design including route layout, managing third-party survey teams and complete design documentation for L3 Communications in Kentucky, California and Michigan. Total of 3000 miles of fiber optic routes completed in eighteen (18) months.
Education	B.S. Civil Engineering - 1997 Ohio Northern University

James Brockhaus, the assigned support project manager for the State of North Dakota's project, has been with Motorola Solutions since 2012. Jim has a Project Management Certificate from Cardinal Stritch University and more than 24 years of experience in project management, systems and RF engineering, vendor relations, program management and training and technical sales.

Support Project Manager

Jim Brockhaus **Support Project Manager**	Motorola Solutions, Inc. Street Address 7722 149 h Circle State, State, Zip Savage, MN 55378 Work Phone Number e.g. (612) 849-6872
Date of Hire	August 2012

		Motorola Solutions Professional Experience	Developed partnerships with customers in defining, assessing, securing requirements and deliverables, tracking technical issues and managing risk to ensure the appropriate resources are involved with the development, design and deployment of the customer's systems. *06/16 to Present* **Project Manager, Waukesha County, Sheboygan County, Portage County WI** - Establish project implementation schedules and manage the tasks for on time delivery of the system. - Manage subcontractors and Motorola resources to accomplish the - tasks of the project and insure a successful implementation. - Interface with customer and Motorola senior leaders to maintain solid relationships. *03/14 to 8/10/17* **Project Manager, State of South Dakota WAVE, 7.13 – 7.15 and 7.15 - 7.17 Statewide System Software Upgrade Projects** Establish project implementation schedules and manage the tasks for on time delivery of the system. Manage subcontractors and Motorola resources to accomplish the tasks of the project and insure a successful implementation. Interface with customer and Motorola senior leaders to maintain solid relationships *06/16 to Present* **Project Manager, Console Projects, MN** Completed P25 Console Projects for: - Fillmore County, MN - Hubbard County, MN

	- Leech Lake Band of Ojibwe, Yellow Medicine County, MN - Benton County, MN - Wadena County, MN - Stearns County, MN - Pennington County, MN - MN Met Council - Koochiching County, MN - Itasca County, MN - Becker County, MN - Crow Wing County, MN - Ramsey County, MN - Allina Health Emergency Medical Services - Hennepin County Medical Center Emergency Medicine Services Regions Hospital - State of Bloomington, MN - State of Minneapolis, MN - State of St Louis Park, MN Establish project implementation schedules and manage the tasks for on time delivery of the system. Manage subcontractors and Motorola resources to accomplish the tasks of the project and insure a successful implementation. Interface with customer and Motorola senior leaders to maintain solid relationships
Other Professional Experience	Telecommunications specialist with 24 years of experience in project management, systems and RF engineering, vendor relations, program management, training and technical sales. Exceptionally well organized with a track record that demonstrates self-motivation, initiative and a

		proven ability to interface with customers to ensure project solutions that meet customer's requirements.
	Education	Electronics Technology Riverland Technical College, Austin, MN
	Training, Certifications and Memberships	- Project Management Certificate , 2007 (Cardinal Stritch University) - Technical Writing Course, 1984 (Mankato State University)
10.	The Offeror must provide a proposed organizational chart for this project indicating relationships and responsibilities of the Offeror's proposed team.	
	Offeror Response: Comply	
11.	Offerors must outline the name, contact information and qualifications of any subcontractors who will be involved with this project the Offeror proposes to use and the nature of the goods and/or services the subcontractor would perform.	

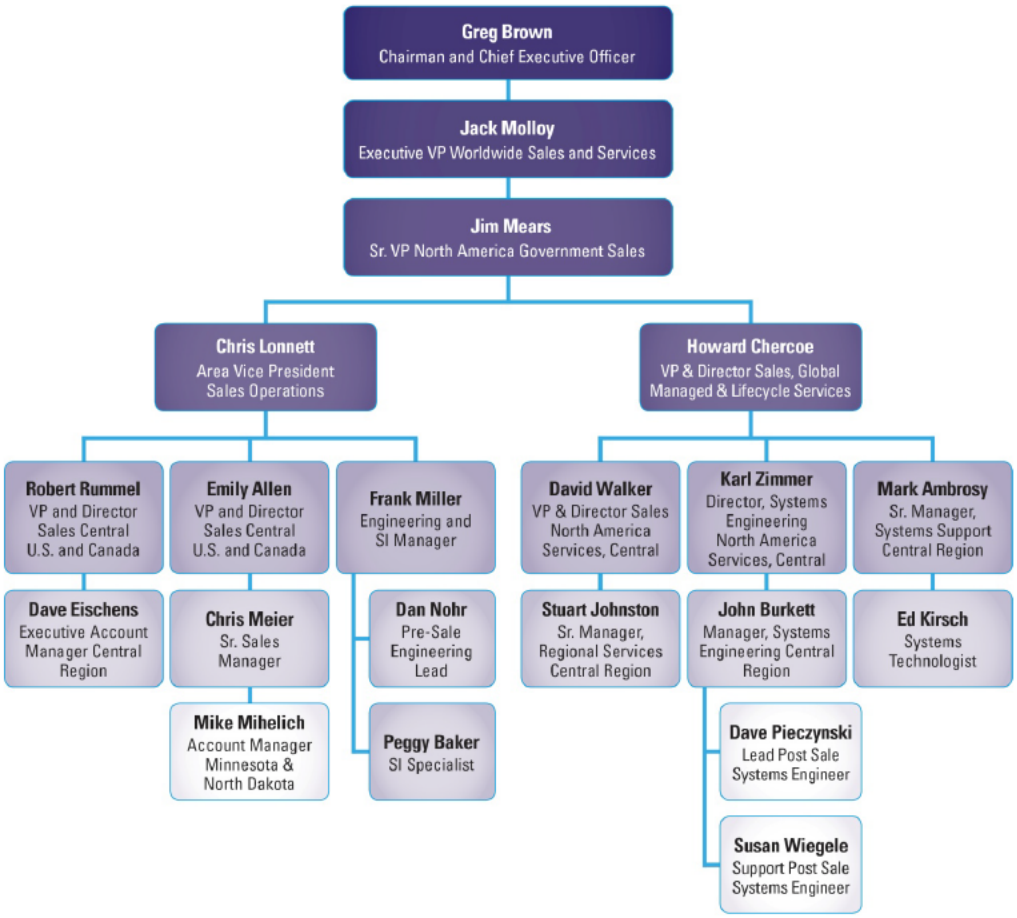


Figure 38: Motorola Solutions High Level Organization Chart

Offeror Response:
Comply

Subcontractor names, contact information and qualifications follow.

Midwest Steeplejacks, Inc.
www.midweststeeplejacks.com
133 West Main Ave, Suite 201
West Fargo, ND 58078
Phone: 701.241.7040

Midwest Steeplejacks is an industry leader in quality control for wireless communication. They provide a full range of wireless communication services for towers, antennas and co-location including:

- Construction
- Inspection
- Maintenance

Midwest Steeplejacks provide service for several major carriers and many independent customers. Their customers are spread through the upper Midwest and surrounding states including MN, WI, IL, MI, IA, NE, MO, ID, NY, OH, IN, and KS.

For many customers, Midwest Steeplejacks functions as their sole quality control inspection team for their wireless sites. Their wireless technicians do a complete tower inspection, checking over 100 points on the tower, site and cabling.

We work with a variety of companies including

- Cellular Phone Companies
- TV Broadcasters
- Radio Stations
- Digital Internet Providers
- Microwave broadcasters

Great Plains Tower

https://greatplainstowers.com/About-Us

126 Sixth Street West
West Fargo, ND 58708
Phone: 701 282 2236
Phone: 800 853 2236

Owner Ron Reski opened A-1 Radio and Television in Moorhead MN under contract to RCA Service Company in the 1950. Over the years the business evolved as Ron spent more and more time with the communication tower and antenna industries, eventually renaming the business Ron's Electronics. In 1974 Ron's son, Kevin, joined the family business and the company decided to focus entirely on tower maintenance and erection services. In those early years, Kevin and his father designed, fabricated, and modified many custom hoisting and rigging systems which manufacturers now use as standards of the tower erection industry.

In 1990 they changed the company name to Great Plains Towers (GPT), then in 1992 moved to its current headquarters location from Moorhead MN to West Fargo ND. They now providing services all over the upper Midwest and to projects as far away as Argentina and Antarctica. They expanded their operation with additional shop and tower crew in Bismarck North Dakota.

GPT is using its knowledge of towers through its years of experience to fabricate their own top-quality guyed towers and self-supporting towers plus a multitude of hinged poles used at US embassies around the world. The towers include standard safety features which include built-in personnel anchorages, built-in worker platforms and built-in safety climb cable systems. They also fabricate meteorological (MET) towers, fold-down hinged poles, ice canopies, and sector mounts. These items can be customized to fit each customer's requirements.

In support of the tower industry at a national level, Kevin has served two terms on the board of the National Association of Erectors (NATE). He continues to provide his support and commitment to NATE by working on various committees that focus on safety, environment, procedures, and OSHA compliance.

MidStates Wireless

http://www.midStateswireless.com/

55 North Third St.
Fargo, ND 58102
Phone: 701.293.9561
JonW@midStateswireless.com

	Mid States Wireless, Inc., formerly known as Elder's Radio Communications was originally formed in 1946 to work on consumer electronics during and following WWII when replacement parts were difficult to find. Elder's Radio Communications installed its first commercial RF communications in a fleet of taxi cabs for Doyle Cab Company in Fargo, ND. The company has remained in the same family for the past 75 years and has been handed from one generation to the next. Today the corporation deals primarily in public safety, interoperability solutions from the RF subscriber, to the dispatch center technology up to and including the construction and maintenance of the tower facilities. Mid States Wireless has 2 primary locations the headquarters in Fargo, ND and a satellite shop in Minot, ND. We also employ 2 technicians that are permanently assigned to Minot Air Force Base (AFB) and 1 that is permanently assigned to Grand Forks Air Force Base (AFB), these technicians that are located on the AFB's are contracted by the federal government to maintain the Land Mobile Radio network for the respective facilities. In addition to the maintenance of these facilities, Mid States does a significant amount of work with Minot AFB on the upgrade and expansion of its current communications network. Mid States works with a variety of technologies, including but not limited to, wireless broadband (point-to-point & multi-point), UHF & VHF solutions (both analog and digital), Digital Trunking, Complete Dispatch Center Solutions, Command and Control Consoles, Analog and Digital Video capture and storage, 911 integration, Turnkey tower installations, Squad car fit-up, In car digital, ALPR, to name a few. Mid States Wireless is a family owned and operated corporation and prides itself on being community oriented and employee friendly, a majority of their approximately 20 employees have worked for them for more than 5 years and more than half of them for greater than 10. **Staff:** Tyler Wiser, Project Manager / Service Manager Travis Mastin, Two-Way Radio Service Technician, Associate Degree Electronic Technologies Lloyd Helgeson, Project Manager, Associate Degree Electronics, Minnesota Moorhead Technical College Jon Wiser, Owner / Project Manager / Operations Manager / Sales Manager Gordon Flemming, Technician, Mobile Communication Technology, Willmar Technical Institute Clinton Demere, Project Manager / Technician, AAS Applied Science, Alexandria Technical College Aaron Kangas, Technician

References:

City of Fargo, North Dakota

Deployed two Motorola Solutions PTP systems; a PTP 100 that served as the primary communications link with ambulances and EMTs during the flood and a PTP 600 solution. that was quickly deployed as an additional backup network in the event of flood damage to the underground wired system.

Moorhead Fire Department, Moorhead, MN

Contact: Jeffrey Wallin, CFO, EFO, Assistant Chief Moorhead Fire Department

Primary radio communications service provider. Replacement of VHF radio system and migration to the State of Minnesota's ARMER system, including: radio codeplug design, maintenance, repair and troubleshooting of the multi-site VHF radio infrastructure, interference mitigation and installation of base, mobile and portable radio components.

Ward County Fire Department, Minot, ND

Contact: Sheriff Robert Barnard

Radio system purchasing, construction, maintenance and modification.

Certifications:

- ETAS-R56 Communications Site Installer
- MN Registered Technician License
- ETAJ-WCM Wireless Communications
- MN Power Limited Technician License
- MCC7500 Dispatch Console
- ASTRO25 IV&D with M Core Systems
- Bridge the Knowledge Gap
- APX Quick Start
- CPS Programming and Template Building
- WAVE OnCloud SP Sales Professional
- FCC Narrowbanding Mandate Training

STONE'S
Communication, Security & Fleet Management Systems

Stones Mobile Radio

https://www.stonesmobileradio.com/

1550 47th Ave S

Grand Forks, ND 58201

Phone: 701.772.6691

chris@stonesmobileradio.com

Neil E. Stone founded Stone's Mobile Radio in 1954, servicing radios in his garage in Thief River Falls, Minnesota. In 1956, Stone's became a Motorola Service Shop (MSS).

Today, Stones is a Full Line Authorized Dealer, a Manufacturers' Representative (MR), a Select System Dealer and a Federal Agent for Motorola Solutions. They are authorized to sell and service all Radius radios, all Motorola Branded radios and all ASTRO Digital equipment. Stone's is also authorized to service all Dispatch Centers and Federal Accounts requiring GSA pricing.

Most recently, Stone's has built a reputation as a leader in the sales, management and installation of GPS Fleet Services Systems. They are helping businesses manage their mobile workers, their vehicles and ultimately their entire operations with products from Network Fleet.

Staff:

Chris Ranisate, Owner / Master Technician / Service Manager, AAS Electronics, North Dakota State School of Science

Ryan Schmidt, Technician, AAS Electronic Technology, North Dakota State School of Science

Jim Poole, Shop Foreman, Associates Drafting and Design, Northwest Technical College and Associates Degree Broadband Engineering, Arapahoe College

Mike Nielsen, Technician, Bachelor Business Administration, American InterContinental University; AAS Electronics System Technology, Community College of the Air Force; AAS Instructor of Technology and Military Science, Community College of the Air Force

Michael Batholome, Technician

Kathy McDanal, Technician, United States Army School for 91B Wheeled Vehicles

David Evans, Technician, Community College of the Air Force

References:

Grand Forks County Public Safety

Installed and maintains a city-wide simulcast system with a 4-position Motorola Solutions Gold Elite console.

Contact: Becky Ault, 911 Director

Polk County Sheriff's Office

Installed and maintains a 4-position MCC7500 console with support infrastructure for the radio system. Installed a microwave link between the State and Polk County Law Enforcement Center.
Contact: Sheriff Barb Erdman

Pennington County Law Enforcement Center
Installed a 2-position MCC7500 console and maintains radio infrastructure.
Contact: Sheriff Ray Kuznia

Certifications:

- Certified Communications Technician, PCIA
- Electronic Technicians Association, ETA
- General Radio Telephone Operator License

Electronic Communications, Inc. (ECI)
http://www.ecisystems.com/
212 W Main Ave
Bismarck, ND 58501
(701) 258-7698
and
3739 38th Street South, #D
Fargo, ND 58104
(701) 492-6267
marshall@ecisystems.com

Established in 1979, ECI has offices in Bismarck, ND (corporate headquarters), Fargo, ND and North Sioux City, SD. They provide design, sales, installation and service and provide highly certified and capable staff with over a century of combined experience in the industry.

ECI's customer base is broad in spectrum, covering the simplest of solutions to the most complex in nature. They provide services to customers nationwide.

Staff:
Marshall Pudwill, President, Associate Degree Electronics
Arnie Leingang, Project Manager, AAS Electronics, Bismarck State College
Jack Lacher, Install Technician, AAS Electronics and Telecommunications, Bismarck State College
Jason Friedt, Install / Service Technician
Tracy Hoffman, Service Technician

References:

Morton County Sheriff

Installed Countywide P25 Digital Radio System.

Dakota Gasification Plant

Engineered and maintain RF Communication System.

North Dakota State Radio

Installed and maintain 11-position Zetron Max Dispatch system answering all radio channels in the State of North Dakota.

Certifications:

- Motorola RDS0004, Basic Radio
- Motorola RDS0003, Basic Networking
- Motorola RDS0002, Basic RF
- Motorola NRSTA0001, P25 Systems Technical Associate
- Motorola ASE0402, ASTRO25 Subscriber
- Motorola ACS715430, ASTRO25 IV&D with Core System
- Motorola ACS715400, ASTRO25 IV&D Conventional with K Core System
- Motorola ACS715200, ASTRO25 IV&D M Core System
- Motorola NST9252, Introduction to R56
- MCC7000 Series Console Workshop
- ETA Certified R56 Installer

Kohler Communications

http://www.kohlercomm.com

1429 Main Street

Dickinson, ND 58601

701.225.5554

dennis@kohlercomm.com

and

14012 West Front Street

Williston, ND 58801

701.774.8596

dkohler@midconetwork.com

In business for more than 55 years, Kohler Communications has been a long time provider of communications equipment in Southwestern and Northwestern North

Dakota. Kohler Communications was founded by William Kohler Jr. and includes two office facilities and 6 employees.

Kohler Communications has supplied only Motorola Solutions two-way radios supplier for the past 55 years. They have provided equipment and service for Motorola Solutions, ESI Business Telephone Systems, Panduit, Microwave Data Systems and Wilson Electronics.

Kohler Communications has expanded through the years to include sales and service of Motorola Solutions two-way radios, Business Telephone systems, Cat 5, Cat 5e, Cat 6 and Cat 6e data and voice wiring, Oil well alarm systems and Scada radios as well as numerous other products and accessories.

Kohler Communications has a full staff of experienced and knowledgeable employees to provide sales and service, as well as a full line of inventory for all sales and repair needs. Kohler Communications has serviced many systems in Southwestern and Northwestern North Dakota since 1961.

Staff:

Doug W Kohler, Co-Owner / Manager / Technician, Associates Degree Radio Communications, North Dakota State College of Science

Dennis Kohler, Business Manager, Bismarck Junior College

References:

Trotter Construction

Trotter is a locally owned construction firm specializing in aggregate construction including: county roads, bridges, oilfield locations and general site building. Kohler communications provided Trotter Construction with (2) MOTOTRBO repeaters and over 150 mobile units and several portable units. Two-way radio communications are vital to their operation to cover a large area of Western North Dakota.

Whiting Oil & Gas

Whiting Oil & Gas is a major Oil Company operating in Western North Dakota and Northeast Montana. Kohler Communications provided Whiting with the largest digital two-way radio system of its kind in Western North Dakota. The system includes: (7) MOTOTRBO digital repeater Sites with Ethernet connection between them (MOTOTRBO Site Connect). The system also consists of over (60) digital portable radios and over (300) digital mobiles. This system allows mobile users to talk to one another anywhere in West-Northwest North Dakota & Northeastern Montana, thus allowing them to have a portable user in Dickinson talk to a mobile user North of Sidney Montana.

Dickinson Public School District

Kohler Communications provided The Dickinson Public Schools a MOTOTRBO Digital System including: (1) 2 slot digital repeater with over (50) portable units and (20) mobile units for use in the Dickinson area for bussing and security purposes. The school district consists of (5) Elementary Schools, (1) Middle School, (1) High School, (1) Head Start program and the Bus facility.

Certifications:

- MCC 5500 console

Pyramid Network Services

www.Pyramidnetworkservices.com
6615 Towpath Road, Suite 200
East Syracuse, NY 13057
315.701.1300
info@pyramidns.com

Pyramid Network Services has been a premier force in the development of wireless communications throughout North America since 1996. Headquartered in Syracuse, NY with 12 US office locations and one office in Toronto, Pyramid offers turnkey site development capabilities through real world knowledge, speed and predictability and reliability.

Pyramid Network Services has four core divisions: Commercial Wireless, Renewable Energy, Radio and Surveillance and Dispatch and E911 Centers. They provide:

- Site audits and physical site assessments
- File audits and lease reviews
- A&E, site design and value engineering
- Construction & project management
- Zoning, permitting and regulatory compliance
- Professional staffing & recruiting
- Electronic data conversion and consolidation
- Site and network decommissioning
- Turnkey telecommunications tower construction
- Site acquisition and RF guidance
- Renewable energy system design & installation

Staff:

Cy Weichert, President
Ron Brunozzi, Executive Vice President, COO
Scott McCabe, Vice President of Finance and Corporate Operations
Mark Zagger, Vice President Business Development
Brian Bohl, Vice President Construction Services
Matthew Donnelly, Director of Operations, South
Matthew Bell, Director of Operations, Great Plains
TJ Sauthoff, Director of Construction, West/Large Projects
Rod Prodonovich, Director of Operations, Great Lakes
Robert Sparrow, Director of Construction, Midwest/Mid-Atlantic

	Ronald Thrall, Director of Safety and Quality Assurance Steve Elsbree, Director of Construction and Operations, Northeast Ken MacMaster, Director of Special Projects, Wheelhouse **References:** Saab Sensis Contact: Matt Massiano, Director FAA Business Development, 315.445.5735, matt.massiano@saabsensis.com Design and Construction of 32 remote Wide Array Multi-Lateration (WAM) sites at United States Marine Corps Air Ground Combat Center; 29 Palms, CA. All sites consisted of a guyed tower, electronics cabinets and solar powered array. WAM system is used to track bomb accuracy during training. Additionally, constructed 15 WAM sites in Boulder and Colorado Springs, CO to supplement existing FAA radar. Albany County NY Sheriff's Department Contact: Ralph Mariani, Captain Communications Center, 518.652.7897, mariani@albanycounty.com Design and Construction of 12 Land Mobile Radio sites for Albany County Sheriff's Office Public Safety Radio System. Currently performing Feasibility Study for Integrated 911 Call and Dispatch Center for Albany County Sheriff and City of Albany Police Department. T-Mobile Contact: Alan Tantillo, Director National Siting Policy, 425.383.2413, alan.tantillo@t-mobile.com Over 10-year partnership (ongoing) with T-Mobile Corporate Headquarters working on a vast array of services, including: Site Acquisition, Site Audits of existing towers, Lease Renewals to secure additional time and more favorable terms and Decommissioning / deconstruction of sites across the United States. Verizon Contact: Randy Wilson, Real Estate Manager, 585.321.5461, randy.wilson@verizonwireless.com Site Candidate Information Packages (SCIPs), Site Selection, Leasing, Zoning and Permitting for over 350 macro sites and over 1500 upgrades sites. Also provide Program Management for current build out of over 300 Small Cell Sites.
12.	The Offeror must provide resumes for **all** key subcontractor personnel who will be involved in providing the goods and/or services contemplated by this RFP. The personnel listed must be the people that will perform/provide goods and services for the STATE. Any changes in personnel during the project must be approved by the STATE. Additionally, replacement personnel must have comparable training, experience and ability as the person originally proposed for the job. The following information must be included in the resumes:

	a. Full name. b. Education including degrees, relevant certifications and the institution from which they were obtained. c. Manufacturer training d. Years of experience and employment history particularly as it relates to the requirements of the RFP. e. Description of the type of work the individual shall perform f. Specify the employment status of the personnel (e.g., subcontractor, employee of the Offeror) g. Location from where the personnel will perform applicable services (e.g., STATE facility, remote Offeror facility, off shore facility)
	Offeror Response: Comply **Midwest Steeplejacks, Inc.** www.midweststeeplejacks.com 133 West Main Ave, Suite 201 West Fargo, ND 58078 Phone: 701.241.7040 Midwest Steeplejacks is an industry leader in quality control for wireless communication. They provide a full range of wireless communication services for towers, antennas and co-location including: - Construction - Inspection - Maintenance Midwest Steeplejacks provide service for several major carriers and many independent customers. Their customers are spread through the upper Midwest and surrounding states including MN, WI, IL, MI, IA, NE, MO, ID, NY, OH, IN, and KS. For many customers, Midwest Steeplejacks functions as their sole quality control inspection team for their wireless sites. Their wireless technicians do a complete tower inspection, checking over 100 points on the tower, site and cabling. We work with a variety of companies including - Cellular Phone Companies - TV Broadcasters - Radio Stations

- Digital Internet Providers
- Microwave broadcasters

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https://greatplainstowers.com/About-Us
126 Sixth Street West
West Fargo, ND 58708
Phone: 701 282 2236
Phone: 800 853 2236

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In support of the tower industry at a national level, Kevin has served two terms on the board of the National Association of Erectors (NATE). He continues to provide his support and commitment to NATE by working on various committees that focus on safety, environment, procedures, and OSHA compliance.

Pyramid Network Services

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- Professional staffing & recruiting
- Electronic data conversion and consolidation
- Site and network decommissioning
- Turnkey telecommunications tower construction
- Site acquisition and RF guidance
- Renewable energy system design & installation

Rod Prodonovich **Director of Operations -Central Region**	Rod Prodonovich Pyramid Network Services, LLC 2531 Cadwallader-Sonk Road Cortland, OH 44410 330-531-5327 rprodonovich@pyramidns.com
Date of Hire	8/8/2008
Professional Experience **Pyramid Network Services, LLC – Syracuse, NY**	Experienced wireless industry professional. Areas expertise include; site analysis, candidate selection, leasir amendments, zoning/permitting and constructi management. Project experience includes new site build raw lands, rooftops, water tanks, stealth design, colocation antenna modifications, MW and backhaul, lease review a entitlements, zoning analysis, field audits, add land and tow modifications and upgrades, drop and swap and s decommissioning. *01/2017 to Present* **Director of Operations – Central Region** **Motorola and Government Programs**

		- Direct responsibility for all Pre-Sale and Post-sale operations and staff for Motorola projects in the Central U.S. (Motorola Region T5) - Responsible for turnkey project management (site selection, leasing/collocations, zoning/permitting and construction management) for city, county and State emergency services radio systems - Conduct site walks and field audits of potential sites with local authorities, landowners and AE vendors - Management of all construction activities in compliance with Motorola's R-56 standards and guidelines **Recent & Active Construction Projects**: - Iowa (State of Iowa, Mills County, Page County) - Michigan (City of Dearborn, City of Detroit, Jackson County, Kent County, Lenawee County, Macomb County, State of Michigan) - Missouri (Clay County, St. Charles, MO) - Ohio (Clermont County, Franklin County, COIRS (Central Ohio Interoperability Radio System), City of Cleveland) - Multi-State (IL to NJ) high-speed data transmission network *2010-2017* **Other Relevant Past Motorola Project Experience** - Arizona (State of Arizona) - Pennsylvania (State of Pennsylvania) - California (Bayweb Bay Area Multi-County) - Maryland (State of Maryland) - Missouri (State of Missouri)
	Other Professional Experience	*01/2013 to 12/2016* **Director of Operations – Great Lakes Region Commercial Wireless** Managed all Site Acquisition and Construction Management staff for Great Lakes Region. Responsible for operations,

	sales, customer service and profitability of multiple major markets. - Site Acquisition of 1,000+ new build and antenna modification sites for Verizon, T-Mobile and Sprint - Construction Management for raw land sites, rooftops, water tanks and collocations - Build Suit new tower sites in OH, PA, MI, IN, KY and WV for multiple tower companies and carriers - Candidate Analysis: site selection, SCIPS, feasibility analysis, search ring search and scrubs - Zoning & Permitting: presentations, applications, admin zoning, CUP, variances and appeals - Project tracking and reporting with customer and subcontractors *08/2008-12/20012* **Project Manager – Multiple Markets** Project Management/Construction Management/Site Acquisition - Motorola – multiple States (Project Management and Construction Management - detailed at top of page) - Verizon - OH/PA (Project Management) - Sprint/Clearwire - PA/NJ (Project Management) - T-Mobile - NY (Project Management) - AT&T – NY (Project Management)
Education	Bachelor of Science The Ohio State University
Training, Certifications and Memberships	OSHA 10 Hour Construction Certified Licensed New York State Realtor 2009 Ohio Wireless Association

MidStates Wireless

Mid States Wireless has 2 primary locations the headquarters in Fargo, ND and a satellite shop in Minot, ND. We also employ 2 technicians that are permanently assigned to Minot Air Force Base (AFB) and 1 that is permanently assigned to Grand Forks Air Force Base (AFB), these technicians that are located on the AFB's

are contracted by the federal government to maintain the Land Mobile Radio network for the respective facilities. In addition to the maintenance of these facilities, Mid States does a significant amount of work with Minot AFB on the upgrade and expansion of its current communications network.

Mid-States Wireless, an authorized Motorola Solutions Service Partner is located at: 55 North Third Street, Fargo, ND 58102.

John Wiser	Project Manager Operations Manager Sales Manager Owner
Date of Hire	5/1/78
Professional Experience	Public Safety Systems: - Red River Regional Dispatch center. - Fargo Police/Fire simulcast system. - Moorhead fire police seven-site voting system. - Minot Air Force Base six-site simulcast 7x P-25 trunked system. - Cass County Sheriff's Office P-25 system - Clay County Sheriff's Office P-25 System - Minot Police Department P-25 Upgrade - Barnes County E9-1-1 Dispatch Consoles - Barnes County P-25 system - Cass County Electric Connect Plus MOTOTRBO - County wide MnDOT ARMER systems: Becker, Ottertail, Wilkin, Hubbard, Mahnomen - Ward County Multicast
Training, Certifications and Memberships	- Motorola Solutions Project Management - Motorola Solutions ASTRO25 - Motorola Solutions QUANTAR - Motorola Solutions Simulcast Systems - R-56 Motorola

Tyler Wiser	Project Manager Service Manager
Date of Hire	6/1/08
Professional Experience	Public Safety Systems: - RRRDC, ND E9-1-1 CENTER - Minot, ND E9-1-1 CENTER - Clay, Norman, Becker, Hubbard, Cass, Mahnomen Counties Armer Upgrade. - Minot Air Force Base LMR contract - Minot Air Force Base Infrastructure contract - Grand Forks Air Force Base Infrastructure contract - Grand Forks Air Force BPA - Clay County Channel Expansion - Lake of the Woods Co Upgrade - United States Postal Service Upgrade Eagan, MN
Training, Certifications and Memberships	- Motorola Solutions Project Management - PCR Sales Associate - P-25 Sales Associate - US Fed Partner - WAVE OnCloud SP Sales Professional

Lloyd Helgeson	Project Manager
Date of Hire	1/31/90
Professional Experience	Public Safety Systems: - Red River Regional Dispatch center. - Fargo Police/Fire simulcast system. - Moorhead fire police seven-site voting system. - Minot Air Force Base six-site simulcast 7x P-25 trunked system. - Cass County Sheriff's Office P-25 system

	- Clay County Sheriff's Office P-25 System - Minot Police Department P-25 Upgrade - Barnes County E9-1-1 Dispatch Consoles - Barnes County P-25 system - Cass County Electric Connect Plus MOTOTRBO - County wide MNDoT ARMER systems: Becker, Ottertail, Wilkin, Hubbard, Mahnomen - Ward County Multicast
Education	Electronics Minnesota Moorhead Technical College
Training, Certifications and Memberships	- R56 Grounding Certified Technician - MCC5500 - MIP5000 - QUANTAR - ASTRO25 SYSTEMS - CENTRACOM GOLD - MCC7500

Travis Mastin	Two Way Radio Service Tech
Date of Hire	Sep 2006
Professional Experience	Public Safety Systems: - Red River Regional Dispatch center. - Fargo Police/Fire simulcast system maintenance and repair - Moorhead fire police seven-site voting system. - R56 Installation at Red River Regional Dispatch center - Cass County Sheriff's Office P-25 system - Clay County Sheriff's Office P-25 System - Minot Police secure flashing, maintenance and repair - Barnes County 911 Dispatch Consoles - Barnes County P-25 system

	- Cass County Electric Connect Plus MOTOTRBO - County wide MnDOT ARMER systems: Becker, Ottertail, Wilkin, Hubbard, Mahnomen - Ward County Multicast - Removal and installation of all ND State Radio Equipment - USPS Eagen infrastructure maintenance and repair - Minot air base installs and programming. - Installation and repair of Federal and Whelen outdoor warning systems in Fargo, Moorhead, Lamoure County, Casselton and Valley City. - Installation and repair of Canopy, Cambium and Ubiquity microwave systems
Education	Associate Degree, Electronic Technologies
Training, Certifications and Memberships	- Senior ETA R-56 Motorola installer - FCC Narrow banding Mandate Training

Gordon Flemming	Technician
Date of Hire	10/22/91
Professional Experience	Public Safety Systems: - Red River Regional Dispatch Center - Fargo/Cass County, ND RF and & microwave infrastructure - Mahnomen County, MN E9-1-1 Dispatch Center - Ottertail County, MN E9-1-1Dispatch Center
Education	Mobile Communication Technology Willmar Technical Institute
Training, Certifications and Memberships	CET Certified Technician NABER Certified Two-Way Radio Technician PCIA Certified Technician R56 Grounding Certified Technician Motorola Solutions Centracom Gold Motorola Solutions Quantar

Clinton Demere	Project Manager Technician
Date of Hire	5/15/12
Professional Experience	Public Safety Systems: - Red River Regional Dispatch Center, Fargo, ND - Fargo Police/Fire simulcast system, Fargo, ND - Moorhead Fire/Police seven-site voting system, Moorhead, MN - Cass County Sheriff's Office P-25 system, North Dakota - Clay County Sheriff's Office P-25 system, Minnesota - Minot Police Department P-25 Upgrade, Minot, ND - Barnes County P-25 system, Valley City, ND - Ward County Multicast, North Dakota - Norman County Multicast, Minnesota - MnDOT ARMER Systems, Becker, Wilkin, Hubbard, Mahnomen and Clay Counties, Minnesota US Government: - Minot AFB six-site simulcast 7x P-25 trunked system - USPS Minneapolis MotoTRBO system, Minneapolis, MN - USPS IT Facility MotoTRBO system, Eagan, MN Commercial Systems: - Cass County Electric Cooperative, Connect Plus, Cass County, ND - Sanford Health, Multisite Capacity Plus, Fargo, ND - City of Moorhead, Capacity Plus and TRBOnet, Moorhead, MN - MidStates Wireless Rental Capacity Plus, Fargo, ND Network Switching Systems Operator / Maintainer, MNARNG

		- Install, operate and maintain encrypted voice, video and data networking equipment - Install, operate and maintain associated transmission equipment including cable, UHF/VHF/SHF radios and satellite terminals - Cisco CM, Lucent, L3, Avaya Communications Platoon Sergeant, United States Army - Responsible for maintenance and installation of tactical voice and data systems - Transmission systems including point-to-point, point-to-multipoint, tropospheric scatter, MILSTAR, DKET and TACSAT - Responsible for the installation and maintenance of fixed battalion communications assets MidStates Wireless, Fargo, ND - Install/repair microwave equipment made by Motorola, Cambium, Aviat, Harris, eXalt, Ubiquiti and GE - Configure and install POE security camera systems - Install/repair bi-direction cellular amplifier systems and distributed antenna systems - Install AVL software on computers/servers and integrate with Motorola two-way radio equipment and Android devices - Install/repair 12-volt vehicle lighting and audible warning systems - Install/repair outdoor warning systems by Whelen and Federal Signal - Install IP networking devices which include HP, Cisco and Adtran
	Education	AAS Applied Science Alexandria Technical College Alexandria, MN Computer and Voice Networking - Rolm PBX, Cisco Networking, Novell/Microsoft Networking, Microsoft operating systems, A+, Unix, cabling, fiber termination

Training, Certifications and Memberships	- ETA - Power Limited - DEMS, EWB, MotoTRBO - A+, Certified Novel Network Administrator

Aaron Kangas	Technician
Date of Hire	2/06
Professional Experience	Public Safety Systems: - Red River Regional Dispatch center. - Fargo Police/Fire simulcast system. - Moorhead fire police seven-site voting system. - Cass County Sheriff's Office P-25 system - Clay County Sheriff's Office P-25 System - Cass County Electric Connect Plus MOTOTRBO - County wide MnDOT ARMER systems: Becker, Ottertail, Wilkin, Hubbard, Mahnomen - Wilkin County Sheriff's Office Dispatch - Becker County Sheriff's Office Dispatch - US Post Office radio upgrade. - ND State Radio upgrade.
Education	Bio-Medical Technology Detroit Lakes Technology
Training, Certifications and Memberships	- AVTEC - Motorola Solutions Senior R-56 Installer - Certified Electronics Tech - ETA

Stone's Mobile Radio

Stone's is a Full Line Authorized Dealer, a Manufacturers' Representative (MR), a Select System Dealer and a Federal Agent for Motorola Solutions. They are authorized to sell and service all Radius radios, all Motorola Branded radios and all ASTRO Digital equipment. Stone's is also authorized to service all Dispatch Centers and Federal Accounts requiring GSA pricing.

Most recently, Stone's has built a reputation as a leader in the sales, management and installation of GPS Fleet Services Systems. They are helping businesses manage their mobile workers, their vehicles and ultimately their entire operations with products from Network Fleet.

Chris Ranisate, President	Stones Mobile Radio Inc. 1550 47th Ave South Grand Forks, ND 58201 Work Phone Number e.g. (701) 772-6691
Date of Hire	5/9/1988
Professional Experience	I started working for Stones in 1988 as a bench and field technician. From the start I worked on Motorola Solutions subscriber equipment along with Motorola Solutions systems consoles and infrastructure equipment. *05/02 to Present* **Owner/Service Manager:** - Oversee day to day operation and manage service dept. *05/88 to 05/02* **Service Technician** - Attend several Motorola National training courses with certificate of completion. I have installed several Gold Elite and MCC consoles to include Grand Forks AFB, Grand Forks Police Department Thief River Falls law enforcement, Grafton law enforcemer Installation of several Privacy Plus trunked systems, Connect Plus etc. I have 29 years of Motorola service experience under Stones Mobile Radio Inc.
Education	Associate of Applied Science Degree in Electronics North Dakota State School of Science. Wahpeton, ND Power Limited Technician: License # PL006488 7/14/2003 to Present.
Training, Certifications and Memberships	- Trunked Central controller certificate - Centracom Console certificate - Troubleshooting microprocessor based products certificate. - Trunked Centracom certificate

	- Centracom "Elite" Console certificate - MCC 5500 Console certificate - RTW035- Networking certificate - RSS programming certificate - R56 Installation Standards certificate - Continuing education for Power Limited Technician license

Ryan J. Schmidt, Technician	Stone's Mobile Radio, Inc. 1550 47th Ave S Grand Forks, ND 58201 ryan@stonesmobileradio.com 701-741-6342
Date of Hire	January 2004
Professional Experience	*January 2004 to present* **Technician** - Program & bench test subscriber radios for end customer - Component level repair of various electronic devices - Install subscriber radios in cars, trucks, tractors and machines - Perform RF Coverage study & microwave path study - Program & align site equipment including: o Duplexers, combiners and filters o Program & align Analog, P25 and DMR repeaters o R56 site installation practices - Program, install and maintain radio console systems o Motorola Centracom Gold Elite o Motorola MCC5500 o Motorola MIP 5000 o Motorola MCC7500 o Avtec DSPatch o Zetron Max

	- Perform light-duty tower work o Antenna & feed line installation o Dish installation and alignment o Tower Light replacement - IT / Network administration o Design & configure multi-site IP network for radios o Cisco IOS, HP Comware and Procurve o Maintain company computers & users o Windows Server 2003 – 2012R2 o Linux, BSD o SIP based Asterisk PBX
Education	Associate of Applied Science in Electronic Technology North Dakota State College of Science, Wahpeton, ND
Training, Certifications and Memberships	- NRSTA0001 - P25 Systems Technical Associate - NRETA0021 - ASTRO® 25 IV&D K Core Install Technician - NRETA0022 - ASTRO® 25 IV&D L/M Core Install Technician - NRYSA0001 - Professional and Commercial Radio Sales Associate - NRYTA0001 - Professional and Commercial Radio Technical Associate - NACTP0001 - Digital Evidence Management Solution Technical Professional

James Poole, Shop Foreman	James Poole 1907 S. 17th St. Grand Forks, N. Dakota 58201 Phone 701-775-7713 Cell 701-330-1957 E-mail jpoole@stonesmobileradio.com
Date of Hire	2006

	Professional Experience	4/12/2006 – Present Stone's Mobile Radio Inc. Started as a security system installer for the first 2 years. Then moved into radio installer and building Emergency response vehicles which includes design and implementation of lights, sirens and any other vital equipment for their safety Shop foreman for the past 3 years Responsibilities to include Design, implementation, trouble shooting and procurement of all equipment. 1989 - 2/28/2003 TCI, AT&T, Midcontinent Comm. Grand Forks, N. Dakota Project Coordinator Grand Forks Rebuilt: - Completed on 11/31/2002. - Total project consisted of 218 miles of plant, of which 130 miles were aerial. - Certifications through NCTI as Installer, Installer Tech, Service Tech, System Tech and Advanced Tech. - Comletion of Fiber Optic course - Completion of Customer 1st training course 1989 - 1991 System/Lead Tech - Construction and system design - Electronics sweeps - Experience in head-end - Class A drivers license with airbrakes, taker and hazmat endorsements 1988 -1989 Minnko Steel Grand Forks, N. Dakota - Iron worker
	Education	Associates degree from Northwest Technical College in Drafting and Design. Associates degree from Arapahoe College in Broadband Engineering.

Training, Certifications and Memberships	- Member of SCTE since 1997 - Certified Master Technician In the broadband field with NCTI. - Member of Blue Knights Of North Dakota - Member of the Harley Owners Group - Member of the United States Air Force from 1976-1979 as a Law Enforcement/Security Forces

Michael Nielsen, Technician	Stone's Mobile Radio, Inc. 35914 300 h Street Fisher, MN 56723 Michael.nielsen@stonesmobileradio.com
Date of Hire	January 2004
Professional Experience	*2012 to present* Electronic Technician - Worldwide support in installation, programming and maintenance of numerous communications platforms including: o Command and Control o Air Traffic Control and Aeronautical System o Point to Point Communications o Long Haul Communications - Testing and acceptance to all platforms listed above as they were installed.
Education	Associate of Applied Science Electronics Systems Technology Community College of the Air Force, 2002 Associates of Applied Science Instructor of Technology an Military Science Community College of the Air Force, 2003 Bachelor of Business Administration American InterContinental University, 2006
Training, Certifications and Memberships	- Installed and Maintain MCC-7500, MCC-5500 and MIP-5000 consoles - Install, program and maintain RF infrastructure

	- Install, Program, Maintain and repair Subscriber hardware including portable radio, mobile radios and associated equipment - Maintain Non Motorola equipment as required - Install and maintain microwave T-1 circuits - Install Maintain and design RF antenna systems used with both Radio and WIFI systems - Install and maintain audio wirelines, demarks and termination - Lead in Project Management and on sight management

Michael Bartholome, Electronic Technician	Stones Mobile Radio Inc. 1006 6th Ave SE Devils Lake, ND 58301 (701)-662-4040
Date of Hire	10/31/2016
Professional Experience	Stan's Communications from March 15, 1981 till October 1 2016 as an Electronic Tech for communication equipment for Harris and Kenwood Equipment.
Education	Diploma Minnesota State Community and Technical College-Moorhead Minnesota for Electronics
Training, Certifications and Memberships	- Zetron Technical Training on Max Dispatch System. - General Radiotelephone Operator License from FCC - Certified Communications Technician from PCIA

Katherine McDanal, Service Technician	Motorola Solutions, Inc. 1550 47th Ave S. Grand Forks ND, 58201 Work Phone Number (701) 772-6691
Date of Hire	01/12/2016

Professional Experience	*01/16 to Present* Service Technician - Install radios into many different vehicles - Diagnose why a radio does not work - Fabricator of parts and brackets United States Army (Fort Riley, KS), Jan 2014 to March 2015 Wheel Vehicle Mechanic - Did full service repairs on vehicles of different types. - Quality inspection control. - Diagnosed what is wrong with equipment. United States Army (Fort Stewart, GA), Jan 2011 to Dec 2013 Wheel Vehicle Mechanic / Team Leader - Team leader on the Gun Truck. - Team leader over 10 personal. - Deployed and worked as a liaison between the Camp personal and the Commander of the Camp. - Did equipment inspections so that they could be turned in. - Worked as key control to maintain security. United States Army (Guantanamo Bay, Cuba), Dec 2009 to Dec 2010 Wheel Vehicle Mechanic / - Worked in the detention facilities. - Served as a contact between some of the contractors and the Unit. - Keep up vehicles for the External Security Forces.
Education	U.S. Army school for 91B Wheeled Vehicle Mechanic
Training, Certifications and Memberships	- Certifications: TMDE (Test, Measurement, & Diagnostic Equipment), Key control, Freon Recovery, Gunnery grader and Vehicle Commander Corse, Correction officer, FPCB2 (Blue Force Tracker)

	- Professional Training: Warrior leaders Course, Self-development courses over 700 hours. FBCB2 (Blue Force Tracker) Gun truck Operator/ Vehicle Commander - Memberships: VFW, American Legion

David Sean Evans, Radio Technician	Stone's Mobile Radio 1550 47th Ave S. Grand Forks, ND 58201 (701) 772-6691
Date of Hire	May 8, 2017
Professional Experience	Delivers clear communication, security and safety, asset control to businesses in Grand Forks and surrounding communities. Performs maintenance, installation of two-wa communications systems and associated electronic equipment supporting Public safety and emergency services. Plans, coordinates, installs, maintains and programs all brands of two-way communications systems. *May 2017 to Present* Radio Service Technician - Install, program and maintain two-way radio Subscriber hardware including portable radio, mobile radios and associated equipment and various accessories into publi safety vehicles. - Uses computer applications to program Motorola radios and various other brands of radios - Calibrates, aligns and modifies circuitry and components - Repaired and maintained transceivers, HF, VHF and UH radio equipment electronically using schematic diagrams multimeter and soldering iron. - Used sophisticated instruments of measure (e.g., spectru analyzer, oscilloscope, frequency meter and watt-meters to repair equipment. - Optimizes, maintains, trouble shoots and repairs analog and digital two-way Motorola Radios and other wireless equipment - Install, program and maintain RF infrastructure and antenna systems.

	319TH COMMUNICATIONS SQUADRON (USAF)- Grand Forks AFB, ND, Jul 2010 to Nov 2014 C4 Systems Planner, Project Manager - Managed LMR sys upgrade; built replacement plan with AMC functional manager--secured $1.8M for new system - Promoted LMR upgrade; critical link between GF/AFSPC--first in AMC/used existing infrastructure/saved AF $2.6M - Coordinated four T-1/$20K circuit installs; provided C2 radio link encryption/479 devices secured - Oversaw installation of WAC Astro 25 Trunk radio system, 12 MCC7500E Dispatch consoles distributed among 6 sites, one network management client and one OTAR client. 319TH COMMUNICATIONS SQUADRON (USAF) — Grand Forks AFB, ND, Dec 2002 to Jul 2005 Personal Wireless Communications Systems Manager, - Implemented Land Mobile Radio narrowband migration plan a full year ahead of schedule. Obtained $780K from HQ to purchase 260 critical LMRs. First in AMC to achieve 100% compliance. - Maintains trunked radio equipment valued over $4.8M supporting the 319th Air Refueling Wing and base Tenant units. Provided voice and data communications to 2k base personnel. - Directs Base Spectrum management for 123 frequencies & chairs C4 planning forum for Land Mobile Radio program requirements.
Education	Completed 54 credits Applied Associates degree in Electronic Systems Technology Community College of the Air Force.
Training, Certifications and Memberships	- ETA Certified Fiber Optic Technician (CFOT), Aug 2016 – Aug 2019 - CompTIA Security+ COMP001021040011, Jun 2016 – Jun 2019 - CompTIA Network+ COMP001020984145, Mar 2016 – Mar 2019 - AF Project Management, E3AZR3DX7X 00AA, Apr 2011

	- AF Communications-Electronics Career Advancement Course, E3ACR2EZ7X 002, Jul 2003 - AF Ground Radio Communications Apprentice, E3ABR2EZ7X 0022, Mar 1998 - Motorola Solutions XTS500 Radio Training, Oct 2008 - Motorola Solutions R56 Standards and Guidelines for Communications Sites, 2004 - Motorola Solutions Trunk Radio Management/Site Lens, 2004 - Motorola Solutions Gold Elite Consoles, 2004 - Motorola Solutions Communications Systems Concepts, 2004 - Motorola Solutions Quantar Repeater, 2004

ECI Systems

Established in 1979, ECI has offices in Bismarck, ND (corporate headquarters), Fargo, ND and North Sioux City, SD. They provide design, sales, installation and service and provide highly certified and capable staff with over a century of combined experience in the industry.

ECI's customer base is broad in spectrum, covering the simplest of solutions to the most complex in nature. They provide services to customers nationwide.

Arnie Leingang, Service Manager	
Date of Hire	Feb 1, 1985
Professional Experience	March 2017 Project Manager, Three Affiliated Tribes Project - Install MCC7500 Dispatch Console - Install APX 7500 Consolette Base Stations - Install Base antennas - Perform Acceptance Testing of System - Provided training for console usage March 2016

		Project Manager, Mountrail County Sheriff Project - Install MCC7500 Dispatch Console - Install APX 7500 Consolette Base Stations - Install Base antennas - Perform Acceptance Testing of System - Provided training for console usage November 2015 to present CENCOM Service Contract - Provide Emergency repairs on Gold Elite Console. - Provide normal repairs on console. 2007 to present Project Manager, State Radio Zetron Console - Install Zetron MAX Dispatch Radio Console. - Provide normal service on console. - Provide Emergency service on console. - Perform Preventative Maintenance on console. 2000 to present Project Manager, McLean County Zetron Console - Install Zetron MAX Dispatch Radio Console. - Provide normal service on console. - Provide Emergency service on console. - Perform Preventative Maintenance on console 2008 to present Project Manager, Stark County Zetron Console - Install Zetron MAX Dispatch Radio Console. - Provide normal service on console. - Provide Emergency service on console. - Perform Preventative Maintenance on console	
	Education	AAS Degree in Electronics	

	Bismarck State College
Training, Certifications and Memberships	- Motorola Solutions RDS0004 Basic Radio. - Motorola Solutions RDS0003 Basic Networking. - Motorola Solutions RDS0002 Basic RF. - Motorola Solutions NRSTA0001 P25 Systems Technical Associate. - Motorola Solutions ASE0402 Astro 25 Subscriber. - Motorola Solutions ACS715430 Astro 25 IV&D with Core System. - Motorola Solutions ACS715400 Astro 25 IV&D Conventional with K Core System. - Motorola Solutions ACS715200 Astro 25 IV&D M Core System. - Motorola Solutions NST9252 Introduction to R56

Jack Lacher, Technician	Electronic Communications Inc. 212 W Main Ave Bismarck ND 58501 (701) 258-7698
Date of Hire	February 2005
Professional Experience	March 2017 to May 2017 Install Technician, Three Affiliated Tribes Project - Install MCC7500 Dispatch Console - Install APX 7500 Consolettes - Install base antennas and coax cables - Perform acceptance testing of system December 2016 Install Technician, Mountrail County Project - Install MCC7500 Dispatch Console - Install APX 7500 Consolettes - Install base antennas and coax cables - Perform acceptance testing of system

	November 2015 to Present Install/Service Technician, Central Dakota Communications - Install additional console positions and APX Consolettes to existing Centracom Gold Elite - Perform routine maintenance of console and base stations - Provide emergency support for console and base stations March 2015 to June 2015 Install Technician, City of Dickinson Tait Simulcast Project - Install Tait repeaters and combining equipment - Install GPS time sync equipment - Install microwave network equipment November 2012 to February 2013 Project Manager, Dakota Gasification Company Project - Install Zetron 4020 console - Install Harris M7300 base stations - Install I/O server March 2011 to June 2011 Install Technician, Bismarck-Mandan-Burleigh Tait Simulcast Project - Install Tait repeaters and combining equipment - Install GPS time sync equipment - Install microwave network equipment
Education	Associate in Applied Science in Electronics and Telecommunications Bismarck State College
Training, Certifications and Memberships	ETA Certified R56 Installer MCC7000 Series Console Workshop

Jason Friedt, Installation Tech	Electronic Communications 212 West Main Ave Bismarck, ND 58501

	(701) 258-7698
Date of Hire	November, 2000
Professional Experience	Install, program & diagnose mobile & portable radios APX, XTL, CM & CP series. Installation & service of consoles 2000-Present Installation/Service Tech. of Public Safety radio systems - Installation of mobile radios into public safety vehicles Syntor, Spectra, XTL & most recently APX series - Diagnose & repair mobile radios. December 2016 Installation of MCC7500 dispatch consoles - Install antennas & coax - Install rack mounts - Assisted with radio installation - Assisted with equipment grounding 2017 Programming APX mobile & portable radios - Adding or removing channels - Cloning radios Install, program & service Tait & Vertex radio systems. Install & service Harris radio systems Electronic Communications November 2000 to present Coal Mine Installation/Service Tech. - Diagnose/repair Vertex mobile & portable radios - Install mobile radios - Program mobile Electronic Communications 2012-Present Installation/service of Tait trunked radio system - Install Tait mobile radios with AVL - Diagnose & repair hardware issues - Program Tait mobile radios

Kohler Communications

Kohler Communications has expanded through the years to include sales and service of Motorola Solutions two-way radios, Business Telephone systems, Cat 5, Cat 5e, Cat 6 and Cat 6e data and voice wiring, Oil well alarm systems and Scada radios as well as numerous other products and accessories.

Kohler Communications has a full staff of experienced and knowledgeable employees to provide sales and service, as well as a full line of inventory for all sales and repair needs. Kohler Communications has serviced many systems in Southwestern and Northwestern North Dakota since 1961.

Doug W Kohler	Kohler Communications of Williston Inc. Williston, ND 58801 701-774-8596
Date of Hire **Status of Employment**	1982-Present Co-Owner/Manager/Technician
Professional Experience	- Install and Maintain Motorola 2-Way Radio Base Stations and Mobiles. Antenna Site Maintenance - Install Cellular infrastructure Antenna's and Coax Cables on Communications Towers
Education	Associates Degree in Radio Communications, North Dakot State College of Science 1980-1982
Training, Certifications and Memberships	Accredited Certifications with MCC 5500 Console
Operation Area	North West North Dakota

13.	Offeror must acknowledge that the STATE may require contracted staff and subcontractors assigned by Offeror to perform work under this Contract to submit to a criminal history record check in accordance with N.D.C.C. § 54-59-20 and §12-60-24. STATE shall have the right to reject any individual assigned to perform work under the Contract if, in its sole discretion, it determines that the results of the criminal history record check make the individual unacceptable.
	Offeror Response: Comply
14.	Offeror must acknowledge that the STATE may require Offeror to conduct background investigations on all contracted staff and subcontractors assigned by Offeror to perform work under the Contract and shall furnish the results of such background investigations to STATE. STATE shall have the right to reject any individual assigned to perform work under this Contract if, in its sole discretion, it

	determines that the results of the background investigation make the individual unacceptable.
	Offeror Response: Comply
15.	Assigned contract representative may be required to meet with the STATE on a regular basis, or when deemed necessary. The STATE may also require other support staff or team members identified on Offeror's escalation lists to be available for these meetings. Please verify that your company can and will make these staff members available to meet with the STATE, given adequate notice.
	Offeror Response: Comply
16.	Provide a detailed breakdown of Offeror's expectations for STATE resources that will be needed for the project, including number of staff, qualifications, roles and responsibilities and the percentage of time for each resource for the various phases of the project.
	Offeror Response: Comply The information below includes initial estimates only. Resource requirements can vary based on final project scope decisions, individual experience and based upon State's desired level of participation.

RESOURCE TITLE	QUALIFICATION RECOMMENDATIONS	TIME REQUIRED TOT
Project Manager		
Lead Project Manager	Project Management Certification, Experienced 5+ years	100% All phases
Subscriber Project Manager	Project Management Certification, Experienced 5+ years	100% All phases
Site Project Manager	Project Management Certification, Experienced 5+ years	100% All phases
Technical Resource	Radio Communications Experience, Technical Training, 5+ years	100% All phases
Networking Resource	Experience with State Networking 5+ years	25-50% All phases
Dispatch Operator(s)	Dispatch Operator	0.5 days
Dispatch Operator/Administrator(s)	Dispatch Operator/Administrators	1 day
Senior Management	State Management as Applicable	10% Planning, Testin Final Acceptance
Outreach/User Group Lead	Radio Communications Experience, Technical Training, 5+ years	25% Planning, Configuration, Trainin 15% Other Phases
Users	Current Radio System Users	.5 day+60 Day Burn

A summary of resources and associated tasks are further detailed below.

RESOURCE TITLE	PROJECT RESPONSIBILITIES	PHASE
Project Manager	Customer Contact for all Project Related Items	All Phases
	Complete all required State Project Management requirements for Large Projects, Projects >$250,000, Other As applicable	All Phases
	Work with Motorola to develop Plans (per North Dakota State requirements)	All Phases
	Provide reviews of all Motorola completed deliverables	All Phases
	Provide decision making as needed	All Phases
	Assist with obtaining State approvals as needed (ie Executive Steering Committee	All Phases
	Provide administrative activities and coordination	All Phases
	Identify and assist with obtaining local entities approval and assistance throughout project	All Phases
	Work with 3rd party sub-contractors utilized by State, as applicable (ie DCN, others)	All Phases
	Attend site surveys	Planning
	Attend R56 Site Audits	Testing
	Participate at Motorola System Staging, if desired	Staging (Installation
	Attend proposed radio training courses (as needed)	Training
Technical Resource	Site Survey initial	Planning
	Fleetmapping Training and Configuration	Planning/Configuratio Training
	Work with Motorola to Develop Dispatch Console Configuration / Screen Layout Definition	Planning/Configuratio
	Participate in Technical Planning	Planning
	- coverage test plan, staging test plan, function test plan, system acceptance test plan development	
	Participate in Technical decision making as needed.	All Phases
	Participate in Technical Review during planning	All Phases
	Participate in Coverage Testing	Testing
	R56 Site Audit with Motorola	Testing
	Participate at Motorola System Staging, if desired	Staging (Installation
	Training – technical resource to attend technical system training/system administrator formal	Training
	Train the Trainers to provide training for State Subscriber Users (as applicable)	Training
	Subscribers - Project subscriber and paging unit templates, programming, alignment, installations as needed.	Installation
	Provide Tecnnical Review during testing	Testing
	Provide Onsite Support after Year 1 Warranty	Post Warranty
Networking Resource	Provide Technical Review during planning for Motorola and State 3rd party providers (ie backhaul)	Planning
	Availability for ongoing support/information during installation (as needed) for Motorola/State 3rd party providers	Installation
	Provide Technical Review during testing for Motorola and State 3rd party providers	Testing
Outreach/User Group Lead	Gather input from various user groups regardings Subscriber Requirements	Planning
	Gather input from various user groups regardings Dispatch Console Requirements	Planning
	Schedule and Coordinate Meetings to Communicate/Share Project Information	All Phases as Applica
Senior Management	Review and Approvals As Needed	Planning, Testing, Fi Acceptance
State Radio System Users	Receive Subscriber Training from State Trained Employee (Train the Trainer(s)) for Subscribers	60 Day Burn In
	Radio System usage (on the job) - Provide Testing input	60 Day Burn In
Other	Provide other support and management overview as applicable / desired by State	All Phases

17. **Value Added Services**

Offerors are invited to provide any other service that they feel is relevant to this RFP process.

	Add lines below as needed.
	Offeror Response: Comply In addition to Motorola Solutions' baseline offering, we have proposed optional services available after warranty. These services provide the State with ongoing maintenance and lifecycle support to protect your investment and ensure system longevity. The following value added services are as follows: *System Upgrade Agreement (SUA):* To ensure the highest level of operation, allow for system expansion, provide maximum lifespan and protect the initial investment, regular update and replacement of individual software and hardware components is required. The Motorola Solutions System Upgrade Agreement is a comprehensive approach to technology refreshment of the ASTRO25 system aligned with our lifecycle roadmap. Updates to OEM components ensure availability of repair services support and may also provide increased capacity and processing speed. Regular updates enable system expansion. Our professional implementation services guarantee live system upgrades are performed with minimal interruption to system operation with minimal reliance on owner resources. SUA ensures the ASTRO25 system functions at the highest level of operation, allows for expansion and feature enhancement and maximizes the lifespan of the investment. For owners that are committed to upgrading their system on a regular basis, SUA offers a consistent budgeting solution. that provides complete coverage. Extended Maintenance Services: ***Technical Support:*** Motorola Solutions' Technical Support service provides telephone consultation for technical issues that require a high level of ASTRO network expertise and troubleshooting capabilities. Remote Technical Support is delivered through the Motorola System Support Center by a staff of technical support specialists skilled in diagnosis and swift resolution. of infrastructure performance and operational issues. Technical Support provides access to a solutions database, as well as access to in house test labs and additional Motorola Solutions technical resources ***Dispatch and Case Management:*** Motorola Solutions will provide a toll-free, 7-day-per-week, 24-hour-per-day coordination point for all service requests. All requests are tracked and monitored from beginning to end through a call center operations case number. Automatic, time driven escalation of all open issues to management is an integral part of this process. Customer notification and escalation can also be accommodated. Dispatch Operations will receive all calls and dispatch or coordinate appropriate technical support. If on-site service is required, we will dispatch one of our Premier Service Partners to the site and track the call to closure.

	We will verify and advise the caller when that restoration is complete and verify that the System is functional. ***Infrastructure Board Repair***: This service provides for the repair of all Motorola Solutions -manufactured equipment, as well as equipment from third-party infrastructure vendors. All repair management is handled through a central location, eliminating the need to send equipment to multiple locations. Comprehensive test labs replicate your network in order to reproduce and analyze the issue. State-of-the-art, industry-standard repair tools enable our technicians to troubleshoot, analyze, test and repair the State's equipment. Our ISO9001 and TL9000-certified processes and methodologies ensure that the State's equipment is quickly returned maintaining the highest quality standards. ***Remote Network Monitoring:*** The State's system will be monitored 24 hours per day, 7 days per week and 365 days per year from the Motorola Solutions System Support Center. When the Network Monitoring Operations Team detects an event, trained technologists acknowledge the alarm, run remote diagnostic routines and initiate an appropriate response. The System Support Center technologist will forward an incident to the Dispatch Call Center and place the incident in 'high priority' status. The system is continuously monitored in 'high priority' status throughout the troubleshooting and repair process. Many system issues may be resolved remotely through advanced diagnostic services, eliminating the need to dispatch a local technician. In the event that field resources are required to troubleshoot an issue, they are alerted to specific elements of the problem and informed of the spares/FRUs necessary for replacement. This level of remote diagnostic capability allows Motorola to restore the system to normal operating condition quickly and efficiently. Event records are cleared and returned to 'normal' status when the field technician notifies the NOC that a resolution is in place. Wireless communications networks and IP networks are converging as innovative applications and services are developed and deployed. The move toward an IP-based infrastructure introduces the need for network security. To ensure maximum preparedness, maximum protection and rapid response, Motorola Solutions' network security monitoring service provides security assurance by proactively managing the security elements present on the system, enabling us to mitigate the risk associated with viruses, worms and other deliberate or inadvertent cyber-attacks. Motorola Solutions Security Operations Center (SOC) is a specialized, secured facility that will monitor the system day and night for attacks. ***Security Monitoring and Security Update Service:*** The security monitoring service is the 24x7x365 monitoring of specific elements for security events and incidents. Motorola understands the unique needs of public safety, as well as the risk and security concerns that are specific and unique to this environment. To safeguard the system from virus attacks, Motorola Solutions obtains the latest anti-virus definitions from commercial suppliers and pre-tests them on a dedicated system with the standard supported configurations prior to making updates to the State's system.

	We will perform periodic and, when necessary, immediate deployment of the latest release of anti-virus definitions to the anti-virus management server. We will also update firewall settings as necessary.
No.	**Product Support**
18.	Offeror must describe in detail how they will resolve all issues predicted during the intermodulation analysis and MPE studies. If an intermodulation problem is identified following implementation and within the equipment that was present at the time of implementation, the Offeror will resolve the issue without degrading system coverage or performance, for a period of up to 12 months after final acceptance at no cost to the STATE.
	Offeror Response: Comply with Clarification For intermodulation and MPE-related issues associated with Motorola Solutions equipment installed as part of Phase 2 and 3 deployments, Motorola Solutions will address these issues and resolve. We will ensure upon resolution that the coverage and performance as defined per the Contract is met.
19.	Offeror must describe in detail how they will handle any issues that arise after implementation.
	Offeror Response: Comply Following implementation and before final acceptance Motorola will address any system issues as part of the project punchlist items for resolution prior to Final Acceptance. System issues that arise following final acceptance will be managed by the Motorola Solutions Customer Service Manager during Warranty period. Motorola Solutions has included Onsite services during warranty to provide local, trained and qualified technicians who will arrive at the State's location upon a dispatch service call to diagnose and restore the communications network. This involves running diagnostics on the hardware or FRU (Field Replacement Unit) in order to identify defective elements and replacing those elements with functioning ones. The system technician will respond to the State's location in order to remedy equipment issues based on the impact of the issue to overall system function. Following the warranty period Motorola has proposed the extended years 2-5 maintenance services during which the trained State's technical resources will be dispatched by Motorola Solutions to support onsite services as needed.
20.	**Warranty** Offerors must describe in detail all warranties included for The proposed solution a. What is the warranty period and what is covered under the warranty? b. Describe any differences between warranty benefits and software maintenance benefits. c. Any extended warranties available.

Offeror Response:

Comply

a. The warranty period will be one year and start upon System Acceptance or Beneficial Use of the infrastructure equipment deployed. Warranty is included on infrastructure equipment provided by Motorola Solutions. The included one-year warranty provides the following:

    1. A suite of system support services designed to maximize network uptime (preventative maintenance, dispatch service and technical support).

    2. Additional remote network and security monitoring, system upgrade and security update services.

Additional manufacturer's warranties are as follows:

- Towers – 20 years
- Thermobond Lightweight Buildings – 2 years' interior / exterior
- Generators, ATS – 2 years
- HVAC – 2 years
- Unication E4/E5 Paging Unit – 12 months
- Charger, Programmer, G-Series LiIon Battery – 12 months

a. Motorola Solutions' proposed services during the one-year warranty period include software maintenance services as part of the System Upgrade Agreement (SUA) as described below. SUA is an optional service during the maintenance period following warranty that can be quoted upon request.

b. Any manufacturer extended warranty on equipment provided by Motorola Solutions will be passed through to the State and will be directly between the State and the manufacturer.

Services included during warranty:

Technical Support: Our Technical Support service provides telephone consultation for technical issues that require a high level of ASTRO network expertise and troubleshooting capabilities. Remote Technical Support is delivered through the Motorola Solutions System Support Center (SSC) by a staff of technical support specialists skilled in diagnosis and swift resolution of infrastructure performance and operational issues. Technical Support provides access to a solutions database, as well as access to in house test labs and additional Motorola Solutions technical resources

Dispatch and Case Management: Motorola Solutions will provide a toll-free, 7-day-per-week, 24-hour-per-day (7 x 24) coordination point for all service requests. All requests are tracked and monitored from beginning to end through a call center operations case number. Automatic, time driven escalation of all open issues to management is an integral part of this process. Customer notification and escalation can also be accommodated. Dispatch Operations will receive all calls and dispatch or coordinate appropriate technical support. If on-site service is required, we will dispatch one of our Authorized Service Providers to the site and track the call to closure. Motorola Solutions will verify and advise the caller when that restoration is complete and verify that the System is functional. Response times are defined as having an on-site technician, a remote systems technologist, or a remote network specialist having taken assignment of the issue and actively working on the system to resolve it. If the response time is delinquent, the customer support representative will initiate escalation procedures to achieve timely resolution. When next level support is required by the local service facility, the Customer Support Manager (CSM) will coordinate a response by the appropriate factory personnel. For issues significantly impacting system availability and requiring next level support, the CSM will escalate per Motorola Solutions' established protocol for next level support upon receiving notification from the local service facility of the need for assistance. The CSM will coordinate with the appropriate personnel to have a System Technologist respond on-site within 24 hours. Upon arriving on site, the System Technologist will evaluate the issue and, if necessary, work with the CSM to engage additional factory resources from the appropriate technology group(s).

OnSite and Network Preventative Maintenance: On-site repairs and network preventative maintenance will be provided by authorized local field services delivery personnel, who will be dispatched from and managed by the Solutions Support Center.

OnSite Support provides local, trained and qualified technicians who will arrive at the State's location upon a dispatch service call to diagnose and restore the communications network. This involves running diagnostics on the hardware or FRU (Field Replacement Unit) in order to identify defective elements and replacing those elements with functioning ones. The system technician will respond to the State's location in order to remedy equipment issues based on the impact of the issue to overall system function.

Annual Preventive Maintenance Service provides proactive, regularly scheduled operational testing and alignment of infrastructure and network components to ensure that they continually meet original manufacturer specifications. Certified field technicians perform hands-on examination and diagnostics of network equipment on a routine and prescribed basis.

Infrastructure Board Repair: This service provides for the repair of all Motorola Solutions-manufactured equipment, as well as equipment from third-party

	infrastructure vendors. All repair management is handled through a central location, eliminating the need to send equipment to multiple locations. Comprehensive test labs replicate your network in order to reproduce and analyze the issue. State-of-the-art, industry-standard repair tools enable our technicians to troubleshoot, analyze, test and repair the State's equipment. Our ISO9001 and TL9000-certified processes and methodologies ensure that the State's equipment is quickly returned maintaining the highest quality standards. ***Remote Network Monitoring:*** The State's system will be monitored 24 hours per day, 7 days per week and 365 days per year from the Motorola Solutions System Support Center. When the Network Monitoring Operations Team detects an event, trained technologists acknowledge the alarm, run remote diagnostic routines and initiate an appropriate response. The System Support Center technologist will forward an incident to the Dispatch Call Center and place the incident in 'high priority' status. The system is continuously monitored in 'high priority' status throughout the troubleshooting and repair process. Many system issues may be resolved remotely through advanced diagnostic services, eliminating the need to dispatch a local technician. In the event that field resources are required to troubleshoot an issue, they are alerted to specific elements of the problem and informed of the spares/FRUs necessary for replacement. This level of remote diagnostic capability allows Motorola Solutions to restore the system to normal operating condition quickly and efficiently. Event records are cleared and returned to 'normal' status when the field technician notifies the NOC that a resolution is in place. Wireless communications networks and IP networks are converging as innovative applications and services are developed and deployed. The move toward an IP-based infrastructure introduces the need for network security. To ensure maximum preparedness, maximum protection and rapid response, Motorola Solutions' network security monitoring service provides security assurance by proactively managing the security elements present on the system, enabling Motorola Solutions to mitigate the risk associated with viruses, worms and other deliberate or inadvertent cyber-attacks. Our Security Operations Center (SOC) is a specialized, secured facility that will monitor the system day and night for attacks. ***Security Monitoring and Security Update Service:*** The security monitoring service is the 24x7x365 monitoring of specific elements for security events and incidents. Motorola Solutions understands the unique needs of public safety, as well as the risk and security concerns that are specific and unique to this environment. To safeguard the system from virus attacks, Motorola Solutions obtains the latest anti-virus definitions from commercial suppliers and pre-tests them on a dedicated system with the standard supported configurations prior to making updates to the State's system. We will perform periodic and, when necessary, immediate deployment of the latest release of anti-virus definitions to the anti-virus management server. We will also update firewall settings as necessary.

	System Upgrade Agreement (SUA): Modern technology LMR systems are specialized Information Technology (IT) networks that are a hybrid composition of commercial off-the-shelf (COTS) IT components, specialized Radio Frequency (RF) components and software designed to comply with standards-based specifications. To ensure the highest level of operation, allow for system expansion, provide maximum lifespan and protect the initial investment, regular update and replacement of individual software and hardware components is required. The Motorola Solutions System Upgrade Agreement is a comprehensive approach to technology refreshment of the ASTRO25 system aligned with the lifecycle roadmap. Updates to OEM components ensure availability of repair services support and may also provide increased capacity and processing speed. Regular updates enable system expansion (i.e. expansion of RF sites, dispatch positions, data sub-systems, network management positions, etc.). Professional implementation services guarantee live system upgrades are performed with minimal interruption to system operation with minimal reliance on owner resources. SUA ensures the ASTRO25 system functions at the highest level of operation, allows for expansion and feature enhancement and maximizes the lifespan of the investment. For owners that are committed to upgrading their system on a regular basis, SUA offers a consistent budgeting solution. that provides complete coverage. ***Motorola Online Support:*** The State will have Web-based, direct access to the call-tracking database. As a registered user of Motorola Solutions On-Line (MOL), the STATE will be able to open work tickets, track repair status, order parts and view repair history. This affords the STATE another level of control and awareness of the response and repair process. **Services After Year 1 Warranty per Contract** (including Transition of Services to the STATE): The proposed support plan during warranty is a comprehensive set of services. However, as Stated in the SIRN report, the State has resources that can be leveraged for operations and support. As a result, Motorola Solutions has proposed the State will assume responsibility for On-Site, Preventative Maintenance, and security update service (SUS) installation, for the proposed equipment at dispatch, tower sites and the core. To supplement these State provided services during the post warranty period, Motorola Solutions will continue to be responsible for dispatch, case management, technical support, remote monitoring, security update service, security monitoring and infrastructure repair parts for the duration of the contracted post warranty service period. Motorola Solutions will transition the On-Site post-warranty services to the State with all associated support information, passwords, administrative procedures, etc. The proposed solution includes Technician training and when the service transition occurs, Motorola Solutions will take the extra step to ensure the State is prepared to support the system.

d. Maintenance and Management

No.	
	At minimum, Offerors must describe in detail: a. Their ability to provide a full five-year support agreement for the overall system to include software and hardware support; inclusive of fixes, patches, upgrades and enhancements for the platform proposed. b. Describe in detail their proposed five-year maintenance plan outlining the support being offered. c. Describe the process for replacement of hardware d. Provide any specific requirements, constraints, terms or conditions that would in any way affect the Offeror's ability to provide these services.
1.	Offeror Response: Comply Motorola Solutions is able to provide a comprehensive support agreement throughout the warranty and maintenance period. The proposed warranty and maintenance plans build upon the current ecosystem of radio service suppliers Motorola Solutions has in North Dakota, as well as, various State agencies, such as DES, DOT and ITD which already have the resources and operational expertise in providing PSAP, IT and maintenance services to the State Radio system. We have included On-site response and Preventative Maintenance for the warranty year and will leverage State resources for on-site and preventative maintenance during post warranty in the initial contract term as Stated in the SIRN study. Motorola Solutions will train the State's technical resources to assume responsibility for first echelon support of the system following warranty. a) Upon system acceptance, State will be provided with a Project Transition Certificate, which officially transitions the project from implementation to warranty. At the same time, Motorola Solutions will provide a Customer Support Plan (CSP) that has been discussed and agreed upon regarding the State's specific requests and responsibilities throughout the subsequent warranty and maintenance periods. All of the service products described below will be outlined and the CSP will be the State's "directory" of services during warranty. Also included will be specifics on escalations in the event of special problems and, any pertinent information required specifically to the State. Some of these details will include items such as access to sites, response time requirements, severity level definitions and parts department access information. Services included during maintenance:

Technical Support: Motorola Solutions' Technical Support service provides telephone consultation for technical issues that require a high level of ASTRO network expertise and troubleshooting capabilities. Remote Technical Support is delivered through the Motorola Solutions System Support Center (SSC) by a staff of technical support specialists skilled in diagnosis and swift resolution of infrastructure performance and operational issues. Technical Support provides access to a solutions database, as well as access to in house test labs and additional Motorola Solutions technical resources

Dispatch and Case Management: Motorola Solutions will provide a toll-free, 7-day-per-week, 24-hour-per-day (7 x 24) coordination point for all service requests. All requests are tracked and monitored from beginning to end through a call center operations case number. Automatic, time driven escalation of all open issues to management is an integral part of this process. Customer notification and escalation can also be accommodated. Dispatch Operations will receive all calls and dispatch or coordinate appropriate technical support. If on-site service is required, Motorola Solutions will dispatch one of our Premier Service Partners to the site and track the call to closure. Motorola Solutions will verify and advise the caller when that restoration is complete and verify that the System is functional. Response times are defined as having an on-site technician, a remote systems technologist, or a remote network specialist having taken assignment of the issue and actively working on the system to resolve it. If the response time is delinquent, the customer support representative will initiate escalation procedures to achieve timely resolution. When next level support is required by the local service facility, the Customer Support Manager (CSM) will coordinate a response by the appropriate factory personnel. For issues significantly impacting system availability and requiring next level support, the CSM will escalate per Motorola Solutions' established protocol for next level support upon receiving notification from the local service facility of the need for assistance. The CSM will coordinate with the appropriate personnel to have a System Technologist respond on-site within 24 hours. Upon arriving on site, the System Technologist will evaluate the issue and, if necessary, work with the CSM to engage additional factory resources from the appropriate technology group(s).

Infrastructure Board Repair: This service provides for the repair of all Motorola Solutions -manufactured equipment, as well as equipment from third-party infrastructure vendors. All repair management is handled through a central location, eliminating the need to send equipment to multiple locations. Comprehensive test labs replicate your network in order to reproduce and analyze the issue. State-of-the-art, industry-standard repair tools enable our technicians to troubleshoot, analyze, test and repair the State's equipment. Our ISO9001 and TL9000-certified processes and methodologies ensure that the State's equipment is quickly returned maintaining the highest quality standards.

Remote Network Monitoring: The State's system will be monitored 24 hours per day, 7 days per week and 365 days per year from the Motorola Solutions System Support Center. When the Network Monitoring Operations Team detects an event, trained technologists acknowledge the alarm, run remote diagnostic routines and initiate an appropriate response. The System Support Center technologist will forward an incident to the Dispatch Call Center and place the incident in 'high priority' status. The system is continuously monitored in 'high priority' status throughout the troubleshooting and repair process. Many system issues may be resolved remotely through advanced diagnostic services, eliminating the need to dispatch a local technician. In the event that field resources are required to troubleshoot an issue, they are alerted to specific elements of the problem and informed of the spares/FRUs necessary for replacement. This level of remote diagnostic capability allows Motorola Solutions to restore the system to normal operating condition quickly and efficiently. Event records are cleared and returned to 'normal' status when the field technician notifies the NOC that a resolution is in place. Wireless communications networks and IP networks are converging as innovative applications and services are developed and deployed. The move toward an IP-based infrastructure introduces the need for network security. To ensure maximum preparedness, maximum protection and rapid response, Motorola Solutions' network security monitoring service provides security assurance by proactively managing the security elements present on the system, enabling Motorola Solutions to mitigate the risk associated with viruses, worms and other deliberate or inadvertent cyber-attacks. Motorola Solutions' Security Operations Center (SOC) is a specialized, secured facility that will monitor the system day and night for attacks.

Security Monitoring and Security Update Service: The security monitoring service is the 24x7x365 monitoring of specific elements for security events and incidents. Motorola Solutions understands the unique needs of public safety, as well as the risk and security concerns that are specific and unique to this environment. To safeguard the system from virus attacks, Motorola Solutions obtains the latest anti-virus definitions from commercial suppliers and pre-tests them on a dedicated system with the standard supported configurations prior to making updates to the State's system. Motorola Solutions will perform periodic and, when necessary, immediate deployment of the latest release of anti-virus definitions to the anti-virus management server. Motorola Solutions will also update firewall settings as necessary.

Motorola Online Support: The State will have Web-based, direct access to the call-tracking database. As a registered user of Motorola Solutions On-Line (MOL), the STATE will be able to open work tickets, track repair status, order

parts and view repair history. This affords the State another level of control and awareness of the response and repair process.

Services After Year 1 Warranty per Contract (including Transition of Services to the STATE):

The proposed support plan during warranty is a comprehensive set of services. However, as stated in the SIRN report, the State has resources that can be leveraged for operations and support. As a result, Motorola Solutions has proposed the State will assume responsibility for On-Site, Preventative Maintenance, and security update service (SUS) installation, for the proposed equipment at dispatch, tower sites and the core. To supplement these State-provided services during the post warranty period, Motorola Solutions will continue to be responsible for dispatch, case management, technical support, remote monitoring, security update service, security monitoring and infrastructure repair parts for the duration of the contracted post warranty service period.

b) Motorola Solutions has included all of the services described above during the maintenance period. Following warranty and completion of the State's technician training, Motorola Solutions will transition first echelon support of the system to the State's technical staff who will assume responsibility for On-Site, Preventative Maintenance, and security update service (SUS) installation services following warranty.

c) Motorola Solutions' authorized Repair Depot will repair the infrastructure equipment provided by Motorola Solutions, as well as select third-party infrastructure equipment supplied as part of The proposed solution. In the event Motorola Solutions (or the State's technicians) finds a malfunctioning board/unit at the site location, they will contact the Motorola Solutions' System Support Center's Call Center to request a return authorization (RA) number. We will remove the malfunctioning board/unit and ship to the Infrastructure Depot Operations Center (IDO) in Elgin, IL for repair. Upon receipt of malfunctioning equipment, the IDO will fully system test and repair malfunctioning Motorola Solutions manufactured boards/units down to the component level utilizing automated test equipment. A system test is performed to ensure that all software and hardware is set to current customer configuration. If the unit is not manufactured by Motorola Solutions, the unit may be returned to the Original Equipment Manufacturer (OEM) for repair or other third-party vendor for repair. Motorola Solutions will coordinate and track third-party equipment (as applicable) sent to the original equipment manufacturer or third-party vendor for service. Once the equipment is received from the IDO, Motorola Solutions will either re-install the equipment or return to the customer's spare inventory. The Infrastructure Repair Statement of Work is included with this response.

d) Motorola Solutions is fully capable of delivering all of the support services as described above and can customize a support plan to add or subtract services as the State desires.

	OPTIONAL (see Pricing in Exhibit C-4): System Upgrade Agreement (SUA): Modern technology LMR systems are specialized Information Technology (IT) networks that are a hybrid composition of commercial off-the-shelf (COTS) IT components, specialized Radio Frequency (RF) components and software designed to comply with standards-based specifications. To ensure the highest level of operation, allow for system expansion, provide maximum lifespan and protect the initial investment, regular update and replacement of individual software and hardware components is required. The Motorola Solutions System Upgrade Agreement is a comprehensive approach to technology refreshment of the ASTRO25 system aligned with the Motorola Solutions' lifecycle roadmap. Updates to OEM components ensure availability of repair services support and may also provide increased capacity and processing speed. Regular updates enable system expansion (i.e. expansion of RF sites, dispatch positions, data sub-systems, network management positions, etc.). Professional implementation services guarantee live system upgrades are performed with minimal interruption to system operation with minimal reliance on owner resources. SUA ensures the ASTRO25 system functions at the highest level of operation, allows for expansion and feature enhancement and maximizes the lifespan of the investment. For owners that are committed to upgrading their system on a regular basis, SUA offers a consistent budgeting solution. that provides complete coverage.
2.	Offeror must describe in detail their approach to the preventative maintenance of the proposed system. *Offeror Response:* Comply Motorola Solutions has included preventative maintenance services during the warranty year and will utilize our Authorized Service providers to perform preventative maintenance for the State's new equipment on a schedule to be developed jointly by Motorola Solutions and the State. Preventative maintenance will provide an operational test and alignment on the State's infrastructure equipment to monitor the infrastructure's conformance to original specifications. Preventative maintenance provides a scheduled operational test and alignment of the communications system equipment. The purpose of preventative maintenance testing is to ensure that all equipment meets original manufacturer specifications and to confirm that all critical subsystems in the network are fully operational. Preventative maintenance testing can prevent major site outages caused by intermittent or malfunctioning backhaul equipment and identify faulty components in the site power system. Network preventative maintenance testing should be performed annually on the system. A recommended plan for preventative maintenance for infrastructure and dispatch consoles is included in the Preventative Maintenance Statement of Work for Level 1 services.

	OPTIONAL - Subscriber Preventative Maintenance If Motorola subscribers are purchased, the following services can optionally be provided as Subscriber Preventative Maintenance services: - Physically inspect the Equipment - Remove any dust, and/or foreign substances internally from the Equipment - Measure, record, align and adjust the following applicable Equipment parameters outlined by the Manufacturer o Receive frequency o Transmit frequency o Deviation o Transmitter power o Reflected power in antenna line (mobile antennas only as applicable) o Receive sensitivity o Audit output levels If unit fails the above tests, the customer will be contacted to approve repair charge unless the unit is still in warranty, the customer has purchased Service from the Start (SfS) or Essential Services, or the customer has a separate service agreement. As stated in the SIRN report, the State has resources that can be leveraged to perform first echelon service, On-Site, preventative maintenance, and security update service (SUS) installation following warranty. Motorola Solutions has taken the approach that the State will assume responsibility for these services following the one-year warranty period. Motorola Solutions has included pricing for first echelon technician training in our proposed solution that will prepare the State's staff to perform regular preventative maintenance on the system. In addition, the State's staff can work with our service team during the warranty year to better prepare for the transition of system service responsibilities to the State after warranty.
3.	Offerors must describe in detail their ability to provide system optimization and adjustment following the cutover. *Offeror Response:* Comply Motorola Solutions will provide system optimization for the State's system. The optimization activities include: - Verification that all equipment is operating properly and that all electrical and signal levels are set accurately. – all Phases - Verification that all audio and data levels are at factory settings. – all Phases - Checking of forward and reflected power for all radio equipment, after connection to the antenna systems, to verify that power is within tolerances. – Phases 2 and 3 - Verification of communication interfaces between devices for proper operation. – all Phases

	▪ Testing of features and functionality to confirm they are in accordance with manufacturers' specifications and that they comply with the final configuration established during the CDR/system staging. – all Phases ▪ Testing and optimization of the simulcast system. – Phase 3 ▪ Install and integrate the RF sites with the system, then optimize and activate the SmartZone controller. – Phases 2 and 3 ▪ Integrate the consoles into the system to ensure proper operation and setting up of the consoles on the radio system to perform the dispatching operation. – Phase 1
4.	Offerors must acknowledge that all replacement parts shall be equal in quality and ratings to the original parts.
	Offeror Response: Comply Replacement parts shall be equal or better in quality and ratings to the original parts.
5.	Offerors must acknowledge that all equipment shall be maintained in clean condition. Oil, dust and other foreign substances shall be removed on a routine basis.
	Offeror Response: Comply Motorola Solutions will maintain all equipment provided as part of this proposal in clean condition to the extent that Motorola Solutions has responsibility for maintenance services purchased by the State as part of the initial contract term.
6.	Offerors must acknowledge that the equipment and system performance shall be maintained at the level initially described in these equipment and systems specifications. Offeror must acknowledge that they will maintain records to confirm that this has been performed. Records shall be available for STATE'S inspection upon request. Records shall be maintained by the Offeror throughout the initial maintenance and warranty periods (and any subsequent maintenance contract period) and shall revert to the STATE upon termination of the warranty (or maintenance contract).
	Offeror Response: Comply Motorola Solutions will maintain the equipment and system performance as described in this proposal to the extent that Motorola Solutions has responsibility for maintenance services purchased by the State as part of the initial contract term.

7.	Offeror must acknowledge that routine maintenance procedures recommended by the equipment manufacturer shall be followed. *Offeror Response:* Comply Motorola Solutions will follow recommended routine maintenance procedures to the extent that Motorola Solutions has responsibility for maintenance services purchased by the State as part of the initial contract term.
8.	Offeror must acknowledge that they will provide only factory trained and authorized maintenance personnel. *Offeror Response:* Comply Motorola Solutions will provide trained and authorized maintenance personnel to the extent that Motorola Solutions has responsibility for maintenance services purchased by the State as part of the initial contract term.
9.	Offeror must acknowledge that they will maintain comprehensive as-built and instruction manuals for all system equipment. Offeror must acknowledge that the manuals are the property of the STATE. *Offeror Response:* Comply Motorola Solutions will provide comprehensive as-built and instruction manuals for all equipment purchased as part of our proposed solution to the extent that Motorola Solutions has responsibility for maintenance services purchased by the State as part of the initial contract term.
10	Offerors must describe in detail their process to dispatch the proper personnel during any event that requires on-site service. *Offeror Response:* Comply Motorola Solutions will provide a toll-free, 7-day-per- week, 24-hour-per-day (7 x 24) coordination point for all service requests. All requests are tracked and monitored from beginning to end through a call center operations case number. Automatic, time driven escalation of all open issues to management is an integral part of this process. Customer notification and escalation can also be accommodated. Dispatch Operations

	will receive all calls and dispatch or coordinate appropriate State technical support. If on-site service is required, we will dispatch a State technician to the site and track the call to closure. Motorola Solutions will verify and advise the caller when that restoration is complete and verify that the System is functional. Response times are defined as having an on-site technician, a remote systems technologist, or a remote network specialist having taken assignment of the issue and actively working on the system to resolve it. During the warranty year, Motorola Solutions will provide OnSite Support services to the State. On-site maintenance and repair of the State's system will be provided by Motorola's local team of service personnel. Motorola Solutions will provide the State with a Customer Support Plan (CSP) that outlines the details of each service, provides escalation paths for special issues and any other information specific to the agreed upon service agreement. Some of these details will include items such as access to sites, response time requirements, severity level definitions and parts department access information.
11	Offerors must describe in detail how the proposed system is engineered to perform self-diagnostics and automatically report problems through selectable audible and visible alarms at the central equipment location as well as to client workstations. Additionally, the system must provide the ability to auto-report conditions via email, text, paging or other messaging system to pre-determined system support personnel.
	Offeror Response: Comply The proposed system by Motorola Solutions is engineered to perform self-diagnostics and automatically report problems through selectable audio and visible alarms with a Unified Event Manager (UEM) SNMP based fault management system. The system monitoring is holistic where devices send alarms from internally generated alarms, as well as externally monitored. As an example, if a site link router should fail, the site link will automatically switch to the redundant path and there were be many alarms generated from equipment along the path with an alarm generated by the companion router and controller. The system provides for automated notification via email and/or SMTP text messages direct from the UEM located locally in North Dakota to predetermined system support personnel and additionally, the State's technical staff can be notified from Motorola's System Support Center remote monitoring as determined by the State and Motorola Solutions in the agreed-upon Customer Support Plan.

The Unified Event Manager (UEM) is an application that provides a fault management solution. for ASTRO25 Private Radio Systems. The UEM operates at zone level providing centralized, secure, reliable functionalities to fault manage.

The UEM has the capabilities to fault manage devices securely via a fully secure interface using the SNMPv3 protocol. This secure interface includes both South (i.e., site device) and North Bound Interfaces (i.e., Motorola Systems Support Center (SSC)). The UEM application is accessed using a standard web browser from Network Management client workstations residing within the radio system network. Users launch and use the application directly within the browser. A UEM is present in each Zone and is used to fault manage the devices within that Zone.

The UEM is a client server application. UEM server resides in zone core and UEM clients can be accessed from any Network Management client workstation.

The Primary functions of UEM are:

- Fault Management of devices (SNMP traps or informs)
- Maintaining inventory of managed devices
- Detecting and reporting loss of communication with managed devices (Supervision)
- Ensuring the status reported is current (Synchronization)
- Basic Troubleshooting Capability
- Ability to manage/Unmanage a device or delete a subnet/device
- Device Command Operation
- Alarm Generation/Annotation/Ownership Assignment/Clearing / Acknowledgment
- Alarm Summary
- Zone Health Map
- Capability to use secure protocol (i.e., SNMPv3) configuration
- User access management
- Data access management
- Redundancy Management (i.e., router, Site Controller).

<u>UEM Alarms</u>

An alarm results from an event in a managed resource. It occurs as a result of a pre-determined significant State (a failure or a fault) that may require user attention. Alarms are raised within UEM based on notifications from the network element, or by UEM to report failures associated with fault management functions.

UEM Alarms can fall into the following general categories:

- Communication alarms
- Equipment alarms
- Quality-of-service alarms

Alarms across a network are commonly related to:

- Resources that have failed
- Connectivity issues
- Devices malfunctioning
- Threat assessment reports
- SNMPv3 or Web Service credentials failure

UEM Alarms Summary

Alarm summary is used to display the count of the total number of alarms organized by device categories and/or severities. It is positioned just below the navigation tree in the main window. Each severity is represented in a single cell or graph, depending on the presentation that is selected. The view is updated automatically and the counts can be seen at all times, irrespective of the view that is currently open.

The presentation of the alarm summary can be modified by clicking the buttons at the top of the summary panel. Three different presentations are available:

- Table view
- Bar graph view
- Pie chart view

Clicking a particular severity symbol opens an alarms window with the corresponding alarm type filtered.

	UEM Alarms Window The Alarms window is opened from the Navigation View by clicking the Alarms node under the Fault Management node. In the window, only active alarms of devices are displayed, that is the latest failure or an event clearing a failure. A detailed view of an alarm can be opened by double-clicking an entry in the window. By default, 25 alarms can be viewed on a single page. The number of alarms displayed on the page is customizable. The maximum number of alarms on a page is 1,000. The Alarm Details window allows the Unified Event Manager user to perform the following functions: - Assign/Unassign an alarm - Acknowledge/Unacknowledge an alarm - Annotate an alarm - View the history of the selected alarm The default sorting criterion in the Alarms window is the Date/Time column. You can sort the events by any attribute by clicking the associated column heading. To toggle between ascending and descending sort orders, click the column again. UEM Severity Definitions Alarms and events are assigned with severity levels, indicated by a severity color and an alarm or event message. The action required depends on the severity of the alarm.
12	Offerors must acknowledge that they are capable of providing support services on a 24x7x365 basis. *Offeror Response:* Comply Motorola will provide support services 24x7x365 for the proposed system which includes the proposed Core infrastructure, P25 infrastructure at the tower sites and the proposed dispatch consoles per the proposed contractual agreement terms. Motorola has included Onsite Support services in year 1 warranty period. For the remaining years, Motorola has assumed the State will provide first echelon onsite support.

13	Offeror must describe in detail their proposed technical helpdesk with a single toll-free telephone number that answers 24 hours a day, 7 days a week, 365 days a year (24 x 7 x 365), for all service requests and warranty claims.
	Offeror Response: Comply Technical Support provides telephone consultation for technical issues that require a high level of ASTRO25 network experience and troubleshooting capabilities. Technical Support is delivered through the Motorola Solution Support Center (SSC) by a staff of technical support specialists skilled in diagnosis and swift resolution of infrastructure performance and operational issues. Technical Support is available Monday - Friday 8:00am - 5:00pm local site time and 24 hours a day, 7 days a week for Severity 1 Incidents. Technical Support availability for severity 2, 3 and 4 incidents is outlined in the Severity Level Response Goals. Calls requiring incidents or service requests will be logged in Motorola's Customer Relationship Management (CRM) system. This helps ensure that technical issues are prioritized, updated, tracked and escalated as necessary, until resolution. Technical Support Operations assigns the impact level in accordance with the agreed Severity Level Definitions Stated in this document. Motorola Solutions will track the progress of each case from initial capture to resolution. Motorola Solutions will advise and inform the customer of the case progress and tasks that require further investigation and assistance from the State's technical resources. This service requires the State to provide a suitably trained technical resource that delivers maintenance and support to the State's system and who is familiar with the operation of that system. Motorola Solutions provides technical consultants to support the local resource in the timely closure of infrastructure, performance and operational issues.

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of failure: • 33% of call processing resources impaired • Site Environment alarms: o Smoke, o Unauthorized access o Temperature o Power failure
Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services consist of: Voice, data or network management). The following are examples of this kind of failure: ☐ Less than 33% of call processing resources impaired ☐ Failure of a single redundant component
Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: ☐ Intermittent faults that are infrequent and minor impact to core services ☐ Statistical reporting problems
Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: ☐ Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. ☐ Faults that have no impact in how the user perceives the system to work. ☐ Cosmetic issues. ☐ Requests for information.

Figure 39: Security Level Definitions

The following response times are based on the defined severity levels as follows:

Severity Level Technical Support Response Goals

- Severity Level 1 response = 1 hour
- Severity Level 2 response = 4 hour
- Severity Level 3 response = 1 business day

- Severity Level 4 response = 1 business day

Severity Level	Response Time
Severity 1	A Motorola SSC Technician will make contact with the customer technical representative within one hour of the request for support being logged in the issue management system. Continual effort will be maintained to restore the system or provide a workaround resolution. Response provided 24 x 7.
Severity 2	A Motorola SSC Technician will make contact with the customer technical representative within four hours of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 3	A Motorola SSC Technician will make contact with the customer technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 4	A Motorola SSC Technician will make contact with the customer technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

Figure 40: Severity Level Technical Support Response Goals

14	Offeror must describe in detail their proposed plan to maintain and repair all systems, equipment, hardware and software throughout the implementation, migration and warranty periods. Offeror must acknowledge that the State reserves the right to have staff onsite to witness and if desired, assist in the maintenance and troubleshooting procedures. This does not relieve the Offeror from its warranty and maintenance responsibilities as defined in this specifications document.
	Offeror Response: Comply Throughout the installation and maintenance of the system, the Motorola Solutions Technical Support Operations team provides centralized remote telephone support via the System Support Center for technical issues that require a high level of expertise or troubleshooting. The technical support operations team is staffed with experienced and

	degreed factory technologists who have attained industry-standard networking certifications and technology specialization. They have an average of 10 to 15 years of experience working with complex mission critical communications systems. The factory technologists work closely with the field service support team, the State's technical staff, or both to ensure rapid resolution and closure of system issues. Technical Support is available 24 hours per day, 7 days per week and 365 days per year. Using the Case Management system, a case is created and tracked for each issue, followed to resolution and documented every step of the way. The factory technologists can remotely access the State's system and, when necessary, replicate the problem in the system laboratory to get the system back up and running as quickly and efficiently as possible. The Technical Support personnel are in close proximity to the Motorola factory engineers, who provide the highest level of technical support needed. Upon system acceptance, the STATE will be provided with a Project Transition Certificate, which officially transitions the project from implementation to warranty. At the same time, Motorola Solutions will provide a Customer Support Plan (CSP) that has been discussed and agreed upon regarding the State's specific requests and responsibilities throughout the subsequent warranty and maintenance periods. All of the service products described in this proposal will be outlined and the CSP will be the State's "directory" of services during warranty. Also included will be specifics on escalations in the event of special problems and, any pertinent information required specifically to the State. Some of these details will include items such as access to sites, response time requirements, severity level definitions and parts department access information. While Motorola Solutions encourages the State's technical staff to be on-site to witness and assist, as qualified, during troubleshooting and maintenance procedures so they may be better prepared for the transition from warranty to first echelon support, this does not relieve Motorola Solutions of its' warranty and maintenance responsibilities as agreed upon.
15	Offeror must describe in detail their ability to provide reports on problems, enhancements, service requests and system performance. *Offeror Response:* Comply The following reports are available with Motorola's Private Radio Network Management suite of applications: Provided with Phase 1 Equipment:

	System Historical Reports (Accounting, Performance) – Application allows to generate reports for system-wide activity. Zone Historical Reports (Accounting, Performance) - Application that allows to generate reports for individual zones. License Manager (Accounting) - An application for loading licenses, checking license status and managing licensed application session. Unified Event Manager (Fault) - A tool that provides reliable fault management services, such as service discovery, fault management, supervision and synchronization. Unified Network Configurator (Configuration) - An advanced network configuration tool that provides controlled and validated configuration management of system devices. It includes Voyence Control and Unified Network Configurator Wizards (UNCW). Provisioning Manager (Configuration) - A management application used to enter and maintain configuration information for the User Configuration Server (UCS). The Provisioning Manager configures Consoles, CCGWs, AuC, System, Subscribers, Security and applications (such as ZoneWatch provided in Phase 2). Provided with Phase 2 Equipment: Affiliation Display (Performance) - Application that displays the association of a radio with a talkgroup and a site and information about conventional channels, console sites and consoles. Air Traffic Information Access (ATIA) Log Viewer (Performance) - Application that displays log files generated by the Air Traffic Router server application (ATR) and ZoneWatch. These log files contain records of all recent zone activity, such as site registrations and calls processed. Dynamic Reports (Accounting, Performance) - Application that provides predefined report templates you can use to display statistics for a zone, site, or a console site in near real time. ZoneWatch (Fault, Performance) - Application that allows monitor radio call traffic for an individual zone in real time. This application uses different Watch Windows that allow displaying only the required information. Radio Control Manager (Configuration, Security) - The Radio Control Manager (RCM) is an application used primarily by dispatchers to monitor and manage radio events, issues; to monitor commands and make informational queries of the system database. It also enables to present and analyze data showing RCM activity in the system.
	Offerors must describe in detail the following: a. Personnel

	a. Telephone number b. email b. Procedures for replacement and/or repair of equipment and/or facilities c. Maintenance organizational chart (showing supervision and key personnel) d. Escalation procedures All listed personnel contact information shall include telephone numbers and email addresses, as well as a 24 hour reach number in case of emergency.
16	*Offeror Response:* Comply Prior to transition to warranty, a Customer Support Plan (CSP) will be finalized and approved by the STATE working with Motorola's Customer Support Manager (CSM) that includes personnel, contact information, case initiation and specific STATE escalation procedures. Your Motorola Solutions Customer Support Manager (CSM) provides coordination of support resources to enhance the quality of service delivery and to ensure your satisfaction. The CSM is responsible to oversee the execution of your support contract (maintenance or warranty) by serving in the role of customer advocate. They serve as a point of contact for issue resolution and escalation, monitoring of our contractual performance, providing review and analysis of process metrics and fostering a relationship for continuous improvement with customers. a) Motorola Solutions Customer Support Manager; Mike Rosonke a. 612-490-4453 b. mikerosonke@motorolasolutions.com c. 24-hour emergency dispatch number: 800-228-4500; this will be customized for the State based on the agreed upon Customer Support Plan (CSP). b) Procedure to Obtain Infrastructure Repair ***Action:*** **Retrieval of Equipment** The procedures for Dispatch Services will be followed and Motorola Solutions will retrieve the malfunctioning equipment.

Ship to Infrastructure Depot Operations Center (IDO)

Motorola Solutions (during warranty) or the STATE will obtain a Return Authorization (RA) number and ship the equipment to the IDO for repair.

Repair of Equipment

The IDO will receive the equipment, system test and repair malfunctioning Motorola Solutions manufactured boards/units down to the component level utilizing automated test equipment. If the equipment is not manufactured by Motorola, the unit may be returned to the Original Equipment Manufacturer (OEM) or third-party vendor for repair.

Return of Equipment

IDO will return repaired equipment via FedEx or UPS' 2-day delivery service. Return delivery is paid by Motorola Solutions.

Re-install of Equipment

Motorola Solutions will either re-install the serviced unit or return the equipment to your spare inventory.

c) Organizational Chart (Motorola Solutions)

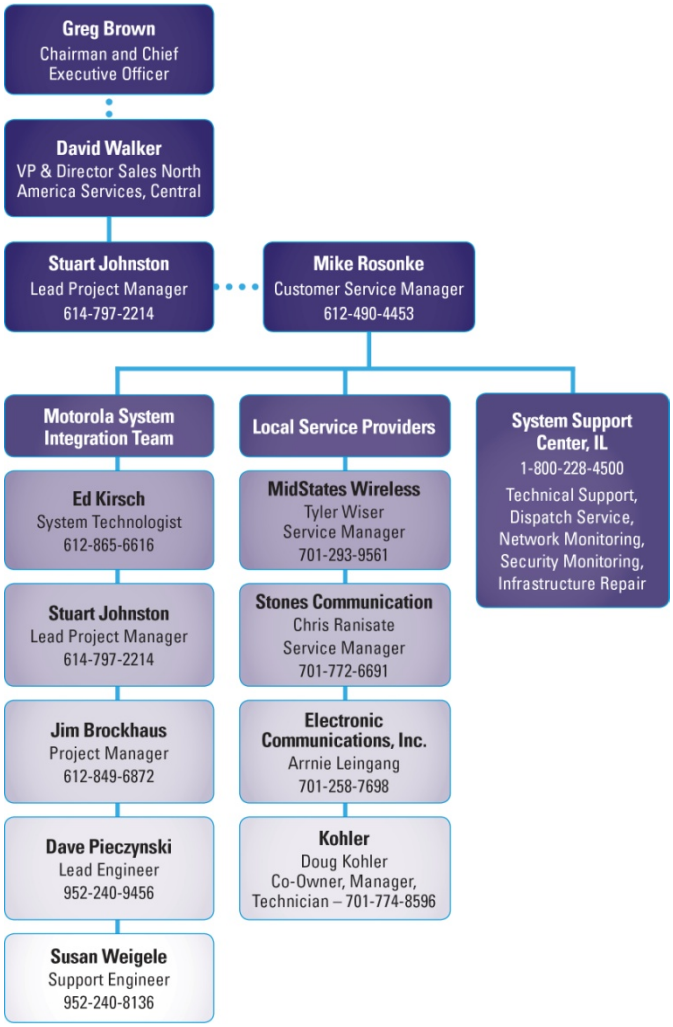

Figure 41: Motorola Solutions Organizational Chart

Email: Mike.Rosonke@motorolasolutions.com

Email: Stuart.Johnston@motorolasolutions.com

Email: Ed.Kirsch@motorolasolutions.com

Email: Jim.Brockhaus@motorolasolutions.com

Email: Dave.Pieczynski@motorolasolutions.com

Email: Susan.Weigele@motorolasolutions.com

Email: TylerW@MidStatesWireless.com

Email: Arnie@ECISystems.com

Email: chris@stonesmobileradio.com

Email: dkohler@midconetwork.com

	Email: info@greatplainstowers.com d) Automatic, time driven escalation of all open issues to management is an integral part of Motorola Solutions' Dispatch process. Customer notification and escalation can also be accommodated. Motorola Solutions will provide a toll-free, 7-day-per- week, 24-hour-per-day (7 x 24) coordination point for all service requests. All requests are tracked and monitored from beginning to end through a call center operations case number. Dispatch Operations will receive all calls and dispatch or coordinate appropriate technical support. If on- site service is required (during warranty), Motorola Solutions will dispatch a technician to the site and track the call to closure. Motorola Solutions will verify and advise the State when that restoration is complete and verify that the system is functional. Response times are defined as having an on-site technician, a remote systems technologist, or a remote network specialist having taken assignment of the issue and actively working on the system to resolve it. If the response time is delinquent, the customer support representative will initiate escalation procedures to achieve timely resolution.
17	Offerors must describe in detail their ability to provide and maintain a 1-hour response for the most critical system issues. Offerors must provide a response schedule for various system issues ranging from critical failures to general minor performance issues not affecting work processes.
	Offeror Response: Comply Motorola Solutions will respond to all critical system issues (Severity Level 1) within one hour and will dispatch State resources in that time. We will provide Technical Support for Severity Level 1 issues. Often, through Motorola Solutions' Network Monitoring Service, we can identify a system issue and begin to address it before the State sees the issue. With a call to Motorola Solutions' Dispatch Service, system response and the restoration process begins immediately. Dispatch ensures that the appropriate technician is dispatched to the site to diagnose and restore the State's system. An automated escalation process ensures case assignment. Motorola Solutions' Technical Support provides the State with immediate access available 24x7x365 to specialized technologists who have in-depth experience troubleshooting, remote analysis and a response and restoration methodology that ensures the State's issue is resolved quickly and effectively. Once the issue has been addressed, Motorola Solutions' System Support Center

verifies resolution and, only with the State's approval, closes the case.

The following severity level definitions will be used to determine the maximum response times:

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of severity: • 33% of call processing resources impaired • Site Environment alarms: o Smoke o Unauthorized access o Temperature o Power failure
Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services are voice, data or network management). The following are examples of this kind of severity: • Less than 33% of call processing resources impaired • Failure of a single redundant component
Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: • Intermittent faults that are infrequent and minor impact to core services • Statistical reporting problems
Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: • Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. • Faults that have no impact in how the user perceives the system to work. • Cosmetic issues. • Requests for information. • Preventive Maintenance

Figure 42: Security Level Definitions

The following response times are based on the defined severity levels as follows:

Severity Level Technical Support Response Goals

- Severity Level 1 response = 1 hour
- Severity Level 2 response = 4 hour

- Severity Level 3 response = 1 business day
- Severity Level 4 response = 1 business day

Severity Level	Response Time
Severity 1	A Motorola SSC Technician will make contact with the customer technical representative within one hour of the request for support being logged in the issue management system. Continual effort will be maintained to restore the system or provide a workaround resolution. Response provided 24 x 7.
Severity 2	A Motorola SSC Technician will make contact with the customer technical representative within four hours of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 3	A Motorola SSC Technician will make contact with the customer technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 4	A Motorola SSC Technician will make contact with the customer technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

Figure 43: Severity Level Technical Support Response Goals

Offeror must describe in detail the maintenance plans available. Plans should be based on the quantities of equipment included in the proposed system.

Offeror Response:

Comply

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Motorola has proposed consistent maintenance services for the proposed P25 Core infrastructure equipment (Phase 1), the P25 infrastructure equipment located at the tower sites (Phases 2 and 3) and the Motorola P25 proposed dispatch console equipment (Phase 1).

Maintenance Services After Year 1 Warranty:

The proposed support plan during warranty is a comprehensive set of services. However, as Stated in the SIRN report, the State has resources that can be leveraged for operations and support. As a result, Motorola Solutions has proposed the State will

	assume responsibility for On-Site, Preventative Maintenance and security update service installation for the proposed equipment at dispatch, tower sites and the core after year 1 warranty. To supplement these State provided services during the post warranty period, Motorola Solutions will continue to be responsible for dispatch, case management, technical support, remote monitoring, security update service, security monitoring and infrastructure repair parts for the duration of the contracted post warranty service period. Statements of Work for the Motorola provided services are included with this response. Throughout the installation and maintenance of the system, the Motorola Solutions Technical Support Operations team provides centralized remote telephone support via the System Support Center for technical issues that require a high level of expertise or troubleshooting. The technical support operations team is staffed with experienced and degreed factory technologists who have attained industry-standard networking certifications and technology specialization. They have an average of 10 to 15 years of experience working with complex mission critical communications systems. The factory technologists work closely with the field service support team, the State's technical staff, or both to ensure rapid resolution and closure of system issues. Technical Support is available 24 hours per day, 7 days per week and 365 days per year. Using the Case Management system, a case is created and tracked for each issue, followed to resolution and documented every step of the way. The factory technologists can remotely access the State's system and, when necessary, replicate the problem in the system laboratory to get the system back up and running as quickly and efficiently as possible. The Technical Support personnel are in close proximity to the Motorola factory engineers, who provide the highest level of technical support needed. Upon system acceptance, the STATE will be provided with a Project Transition Certificate, which officially transitions the project from implementation to warranty. At the same time, Motorola Solutions will provide a Customer Support Plan (CSP) that has been discussed and agreed upon regarding the State's specific requests and responsibilities throughout the subsequent warranty and maintenance periods. All of the service products described in this proposal will be outlined and the CSP will be the State's "directory" of services during warranty. Also included will be specifics on escalations in the event of special problems and, any pertinent information required specifically to the State. Some of these details will include items such as access to sites, response time requirements, severity level definitions and parts department access information. While Motorola Solutions encourages the State's technical staff to be on-site to witness and assist, as qualified, during troubleshooting and maintenance procedures so they may be better prepared for the transition from warranty to first echelon support, this does not relieve Motorola Solutions of its' warranty and maintenance responsibilities as agreed upon.
	Offeror must describe in detail if any of the proposed maintenance plans include a yearly retune of all components.

19	*Offeror Response:* Comply Motorola Solutions has included Preventative Maintenance for the infrastructure during the warranty year. Motorola assumes the State's technical staff will perform Preventative Maintenance following the warranty year.
20	Offerors must describe in detail their ability to provide and maintain a secure web-based customer support portal for access to product documentation, training, issue discussion and general administrative information.
	Offeror Response: Comply As a registered user of Motorola Solutions On-Line (MOL), the STATE will be able to open work tickets, track repair status, order parts and view repair history. MOL also includes access to product manuals, software downloads and Knowledge Base with FAQs.
21	Offerors must acknowledge that all back-up media and revised software manuals must be provided to the STATE at no extra cost at the time of any software revisions. If deemed necessary by the STATE, the Offeror shall perform software upgrades at a mutually agreed upon maintenance window at no expense to the STATE.
	Offeror Response: Comply Our compliance is based on the State's purchase of an on-going SUA during the 15-year period.
22	Offerors must acknowledge that any notices either generated and circulated internally by the Offeror or received by the Offeror from the Original Equipment Manufacturer or Software Provider, alerting the Offeror to software problems that impact the State's system, shall be passed on to the STATE within 30 days of receipt of such material.
	Offeror Response: Comply By registering with Motorola Solutions' Technical Notification Service, critical issue communications will be sent to the State.
	Offeror must describe in detail any licensing required and licensing options for The proposed solution, including what is covered under each licensing option and advantages of the various options.

23	*Offeror Response:* Comply with Clarification Motorola Solutions licenses software per Motorola Solutions' Software License Agreement. As part of Motorola Solutions' ASTRO25 radio systems, licenses provide permissions and authorization for usage of features and functions within a deployed ASTRO25 system. Based on the desired features and functions selected by the customer, licenses are then appropriately issued, installed and managed within the ASTRO25 System Core by a License Manager. The customer license entitlements are generated upon an order submittal which applies to a specific ASTRO25 System and Core combined via a portal. One License Manager is deployed per Core within the ASTRO25 System to manage and serve licenses for that Core. The License Manager that resides in the Core where the User Configuration Server (UCS) is located contains the Core level licenses for that zone and the system level licenses. New systems ship with the licenses pre-installed based on the ordered configuration; expansion licenses for new features, functions and capacity are available through the portal. License entitlement keys can be emailed for convenience to be manually loaded on the License Manager for the matching ASTRO25 System and Core to enable the feature, function, or capacity expansion.
24	**Software Maintenance** For any product being proposed: a. Describe in detail how software maintenance is handled. b. Does the proposal contemplate that STATE will be required to pay for maintenance prior to first production use? Describe the maintenance payment process. c. Does proposal contemplate that STATE will need to pay maintenance during the warranty period? Please describe. d. Does maintenance include all upgrades and technical support? e. Describe any software maintenance requirements. f. Describe the process for issuing maintenance releases and patches. g. Describe your major and minor release cycles. h. What is the frequency for major and minor upgrades? i. What is the typical down time required for major and minor upgrades? j. What is the estimated level-of-effort required to perform an upgrade? k. Explain the process for upgrading and applying patches to your solution. l. If database schema extension is required to meet the business need, how does this impact the upgrade/patch process? m. How are the customizations or configurations maintained during an upgrade?

	Offeror Response: Comply Software Maintenance Handling (a) Our approach to software maintenance is based on protecting the integrity and availability of your system. Our release structure is comprised of both major and minor releases. Major releases, also known as Platform Upgrades, address technology refreshes such as OS version changes such as Microsoft Windows, application software platform changes and any required equipment changes needed to run the new software. Minor releases include security patches, antivirus updates and defect resolutions. Maintenance Cost (b, c, d) Prior to production use and during the initial contract term, Motorola Solutions has included Security Update Service and System Enhancement Releases. These services will ensure the availability of required support services for the initial five-year support period to the State. Following the one-year warranty and completion of the State's technician training, Motorola will transition responsibility of SUS and SER installations to the State's technical staff. Software Maintenance Requirements (e) The required software maintenance is included in the initial contract term. Response to f-m Above Minor releases are designed to have a relatively easy installation process, which can be accomplished by technician-level personnel in a matter of 1-3 days, depending on the size of the system. SER implementations are localized to individual elements, minimizing any system level impact to between no impact and a matter of seconds during a redundancy switch-over. Minor releases may contain software bug fixes and new features. Bug fixes are released to affected customers as soon as available. General distribution of SERs are provided annually as needed. Incremental feature releases will be made available dependent on customer need and the development cycle for the particular features. Currently incremental feature releases have been averaging two per year. Major release (platform upgrades) tend to be more complex and require the services of our dedicated Upgrade Operations team. While the procedures tend to be complex, our engineered upgrade paths minimize the impact to your operations. Any changes to the database schema will be accomplished as part of the new platform upgrade software release. Your system's databases will be locked down just prior to the upgrade and migrated to the new format so that when it is reloaded with the new release software, all customizations and configurations are maintained. Using our redundant core technology and engineered upgrade procedures, our UO engineers insure that typical cut-over to the new software release is measured in seconds of site trunking. Other impacts are usually localized to individual box level such as one dispatch position and can be customized to meet your loading needs during the upgrade procedure.

	Major releases primarily address technology refresh. Motorola synchronizes required refreshes to a single release approximately once every two years. At a minimum, the IT components need to be refreshed every four years to maintain support services availability. Motorola Solutions provides the following services to address major and minor software releases, ensuring that your system will be secure and available at all times. ▪ SECURITY UPDATE SERVICE (SUS). – We perform pretesting of security patches associated with the ASTRO25 network. Distribution of these security updates follows the release schedule from the Software OEMs. The typical release schedule is currently monthly and quarterly for OS security patches and weekly for Antivirus definitions and Intrusion Detection signatures. ▪ SYSTEM ENHANCEMENT RELEASES (SER) – SERs address software defects by providing a periodic bundle of software defect resolutions discovered after the initial ship of the software release. Motorola will provide SER bundles at approximately one and two years after initial availability of the latest system release. At the request of the State, Motorola Solutions will install the SER at no cost during the warranty period. After the warranty period, it will be the responsibility of the State to deploy the SER. The SERs are designed to have a relatively easy installation process, which can be accomplished by technician-level personnel in a matter of 1-3 days, depending on the size of the system. SER implementations are localized to individual elements, minimizing any system level impact to between no impact and a matter of seconds during a redundancy switch-over. ▪ SYSTEM UPGRADE AGREEMENT (SUA) – Modern Land Mobile Radio (LMR) systems are specialized Information Technology (IT) networks that are a hybrid composition of commercial off-the-shelf (COTS) IT components, specialized Radio Frequency (RF) components and software designed to comply with standards-based specifications. Regular upgrade and replacement of individual software and hardware components within your system is critical to ensure the highest levels of Cybersecurity, operational effectiveness. Other benefits of upgrades include the ability to expand your system as needed, maximize the operational lifespan and protect the initial investment from obsolescence.
25	**Manufacturer Support** The Offeror must describe in detail, the manufacturer's end-of- production and support schedules.
	Offeror Response: Comply The proposed State components are in current production with no pending announcements for termination. The lifecycle of the individual components within the ASTRO25 platform varies based on the type of technology and manufacturer of the component. The lifecycle for components within the ASTRO25 platform can be considered in the following categories:

	Infrastructure FNE Components: ▪ Motorola Solutions manufactured hardware components are planned for eight to twelve year cycles between refreshes, to support existing features and functionality. However, as technology advances, newer hardware designs may become available to support new features and functionality. Where possible, we make every effort to implement new features and functionality through software version refreshes. An example of a Motorola Solutions manufactured component would be a RF base station. ▪ Motorola Solutions manufactured software components are refreshed approximately once a year. These annual refreshes may include items such as defect repair, feature enhancements, support for new features and support for next generation hardware components (both Motorola Solutions and third-party manufactured). ▪ Third-party manufactured hardware components within the ASTRO25 platform consist of IT equipment such as client workstations, servers, routers and switches. These types of hardware components typically have three to six-year refresh cycles, as this is the nature of the IT industry. Motorola Solutions works closely with our third-party OEM partners to incorporate new product versions and ensure compatibility with the ASTRO25 platform. Through last-buys of equipment, in many cases we are able to extend the availability and support dates for discontinued third-party hardware products beyond what is available in the commercial market place. ▪ Third-party manufactured software components such as anti-virus definitions and operating system security patches have refresh cycles that range from weekly to quarterly. Other third-party software components such as applications and operating systems may have refresh cycles ranging from 6 months to several years. Just as with our third-party hardware providers, Motorola Solutions works closely with our third-party software providers to incorporate new product versions and ensure compatibility with the ASTRO25 platform. By regression testing newer software versions with older hardware versions, in many cases we are able to extend the availability and support dates for discontinued products beyond what is available in the commercial market place.
	Service Level Agreements Offerors must describe in detail their service level agreements.

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Offeror Response:

Comply

Severity Level Definitions

The following severity level definitions will be used to determine the maximum response times:

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of failure: • 33% of call processing resources impaired • Site Environment alarms: o Smoke, o Unauthorized access o Temperature o Power failure
Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services consist of: Voice, data or network management). The following are examples of this kind of failure: ☐ Less than 33% of call processing resources impaired ☐ Failure of a single redundant component
Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: ☐ Intermittent faults that are infrequent and minor impact to core services ☐ Statistical reporting problems
Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: ☐ Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. ☐ Faults that have no impact in how the user perceives the system to work. ☐ Cosmetic issues. ☐ Requests for information.

Response Goals for Technical Support Services. This is included during warranty year and during the maintenance period.

	Our Technical Support service provides telephone consultation for technical issues that require a high level of ASTRO25 network knowledge and troubleshooting capabilities. Remote Technical Support is delivered through the Motorola Support Center (SSC) by a staff of technical support specialists skilled in diagnosis and swift resolution of infrastructure performance and operational issues. We apply leading industry standards in recording, monitoring, escalating and reporting for Technical Support calls from its contracted customers, reflecting the importance of maintaining mission critical systems. Our Solution Support Center's (SSC) primary goal is Customer Issue Resolution (CIR); providing Incident Restoration and Service Request Fulfillment on our currently supported infrastructure. This team of highly skilled, knowledgeable and experienced specialists is available to the customer as an integrated part of the support and technical issue resolution process. The SSC remotely supports the State and works with but not limited to fault diagnostics tools, simulation networks and fault database search engines. Technical Support is available Monday - Friday 8:00am - 5:00pm local site time and 24 hours a day, 7 days a week for Severity 1 Incidents. Technical Support availability for severity 2, 3 and 4 incidents is outlined in the Severity Level Response Goals. Calls requiring incidents or service requests will be logged in Motorola's Customer Relationship Management (CRM) system. This helps ensure that technical issues are prioritized, updated, tracked and escalated as necessary, until resolution. Technical Support Operations assigns the impact level in accordance with the agreed Severity Level Definitions Stated in this document. Motorola will track the progress of each case from initial capture to resolution. We will advise and inform the State of the case progress and tasks that require further investigation and assistance from the State's technical resources. This service requires the State to provide a suitably trained technical resource that delivers maintenance and support to the State's system and who is familiar with the operation of that system. We provide technical consultants to support the local resource in the timely closure of infrastructure, performance and operational issues. **Severity Level Technical Support Response Goals** - Severity Level 1 response = 1 hour - Severity Level 2 response = 4 hour - Severity Level 3 response = 1 business day - Severity Level 4 response = 1 business day

Severity Level	Response Time
Severity 1	A Motorola SSC Technician will make contact with the customer technical representative within one hour of the request for support being logged in the issue management system. Continual effort will be maintained to restore the system or provide a workaround resolution. Response provided 24 x 7.
Severity 2	A Motorola SSC Technician will make contact with the customer technical representative within four hours of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 3	A Motorola SSC Technician will make contact with the customer technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 4	A Motorola SSC Technician will make contact with the customer technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

Response Goals for OnSite Support Services. This is included during warranty year only.

Motorola Solutions' OnSite Support service provides case management and escalation for onsite technical service requests. The service is delivered by the Motorola's Solution Support Center (SSC) in conjunction with a local service provider. The SSC is responsible for opening a case for onsite support and monitoring the status of that case to maintain response time conformance.

The Motorola Solutions SSC will receive the State's request for OnSite service and dispatch a servicer. The servicer will respond to the State's location based on predefined Severity Levels set forth in Severity Level Definitions table and Response times set forth in Severity Level Response Time Goals for OnSite Support Service table in order to restore the system.

We will provide case management as set forth herein. The SSC will maintain contact with the on-site Motorola Service Shop until system restoral and case closure. The SSC will continuously track and manage cases from creation to close through an automated case tracking process. We will provide continuous effort until system resolution.

Severity Level Response Goals for OnSite Support Services

The response times are based on the defined severity levels as follows:

Severity Level	Standard Response Time
Severity 1*	Within 4 hours from receipt of notification continuously
Severity 2	Within 4 hours from receipt of notification Standard Business Day
Severity 3	Within 8 hours from receipt of notification Standard Business Day
Severity 4	Within 12 hours from receipt of notification Standard Business Day

27	Offeror must describe in detail their plan to maintain replacement parts for all delivered equipment.
	Offeror Response: Comply Motorola Solutions will use commercially reasonable efforts to provide replacement parts for Motorola Solutions'-manufactured subscriber equipment for five (5) years and for Motorola Solutions'-manufactured fixed infrastructure equipment exclusive of third party IT equipment (e.g. servers, pc's) for seven (7) years, both from the date of last manufacture. Motorola Solutions reserves the right to supply either assemblies or piece parts. Applicable 3rd party equipment is subject to separate manufacturers support policies. To sustain the ASTRO 25 Platform lifespan, Motorola Solutions makes on-going investments to regularly refresh the underlying IT components to address normal technology obsolescence and apply security safeguards. Both software and hardware updates are incorporated into major system releases. By making regular updates to

	their system, the State can extend supportability well beyond the above stated timelines
28	Offeror must acknowledge that they will notify the STATE if they plan to discontinue stocking any part required for maintenance, the Offeror will send written notice to the STATE 24 months prior to the date of discontinuance, to allow for last-time buys and replenishment.
	Offeror Response: Comply Motorola Solutions will provide notification of discontinuation of stocking parts via Motorola OnLine (MOL) as they are known. Advance notification time frames vary based on type of product.
29	Offeror must describe in detail their plan to provide year round, 24-hour ordering facilities via telephone, Internet, email and fax service.
	Offeror Response: Comply Motorola Solutions offers multiple ways for the State to order equipment and parts including a toll-free customer support line, fax, email, or by registering at Motorola Solutions Online (MOL) for web-access to ordering based on the State's contract.
30	**Spare Equipment** Offeror must describe in detail a list of recommended spare parts for the system, subsystems and individual equipment. The list of spare parts shall include, but is not limited to: a. Any Manufactures-identified field-replaceable units (FRUs). b. Any infrastructure component that does not have FRUs that can cause a critical system failure if it were to fail. Examples could include base station antennas and other non-modular components. c. Power supplies. d. Spares for less-critical items. e. Other recommended equipment The list must include items that will rapidly and completely restore all critical system functionality with the least amount of effort, e.g., board replacement instead of troubleshooting to the component level when a critical unit has failed.
	Offeror Response:

	Comply
	
	Motorola Solutions recommends the following list of spare equipment:
	Phase 1: The proposed MCC7500E dispatch console spare equipment includes:
	- Seven (7) MCC Series Desktop Speakers
	- Seven (7) MCC Series Desktop Gooseneck Microphones
	- Seven (7) MCC Series Headset Jacks
	- Seven (7) MCC7500E Workstations
	- Seven (7) MCC7500E Voice Processor Module FRUs
	  o ADD: DES-OFB Algorithm (based on options purchased)
	  o ADD: MCC7500E Secure Operation (based on options purchased)
	  o ADD: AES Algorithm (based on options purchased)
	  o ADD: ADP Algorithm (based on options purchased)
	- Seven (7) GR500 AC Power Cords
	- Seven (7) Power Supplies 108W AC INP 12VDC OUT W18
	- Seven (7) DC CABLE ASSY
	- Seven (7) GCP 8000/GCM 8000/GPB 8000 FRU's
	- Seven (7) Power Supply FRU's
	- Seven (7) Fan Module FRU's
	
	Phase 2: The proposed MCC7500E dispatch console spare equipment includes:
	- Thirteen (13) MCC Series Desktop Speakers
	- Thirteen (13) MCC Series Desktop Gooseneck Microphones
	- Thirteen (13) MCC Series Headset Jacks
	- Thirteen (13) MCC7500E Workstations
	- Thirteen (13) MCC7500E Voice Processor Module FRUs
	  o ADD: DES-OFB Algorithm (based on options purchased)
	  o ADD: MCC7500E Secure Operation (based on options purchased)
	  o ADD: AES Algorithm (based on options purchased)

	○ ADD: ADP Algorithm (based on options purchased) - Thirteen (13) GR500 AC Power Cords - Thirteen (13) Power Supplies 108W AC INP 12VDC OUT W18 - Thirteen (13) DC CABLE ASSY - Thirteen (13) GCP 8000/GCM 8000/GPB 8000 FRU's - Thirteen (13) Power Supply FRU's - Thirteen (13) Fan Module FRU's Phase 2: Base Station Spares (Rural Sites) 800 MHz - Twenty-One (21) Configuration/Service Software - Twenty-One (21) Power Supply FRU's - Twenty-One (21) PA 7/800 MHz FRU's - Twenty-One (21) Transceiver 7/800 MHZ V2 FRU's - Twenty-One (21) Fan Module FRU's - Twenty-One (21) 700/800 MHZ Site LNA FRU's - Twenty-One (21) 700/800 MHZ Cabinet RMC Module FRU's Phase 3: Total IP Simulcast Spares and Base Station Spares 800 MHz - Fourteen (14) Four Port DDM's - Seven (7) 2620-48 Ethernet switches - Seven (7) GCP 8000/GCM 8000/GPB 8000 FRU's - Fourteen (14) Configuration/Service Software - Seven (7) Power Supply FRU's - Seven (7) PA 7/800 MHz FRU's - Seven (7) Transceiver 7/800 MHZ V2 FRU's - Seven (7) Fan Module FRU's - Seven (7) 700/800 MHZ Site LNA FRU'. - Seven (7) 700/800 MHZ Cabinet RMC Module FRU's - Seven (7) G-SERIES XHUB FRU's

	▪ Twenty-Three (23) Configuration/Service Software ▪ Twenty- Three (23) Power Supply FRU's ▪ Twenty- Three (23) PA 7/800 MHz FRU's ▪ Twenty- Three (23) Transceiver 7/800 MHZ V2 FRU's ▪ Twenty- Three (23) Fan Module FRU's ▪ Twenty- Three (23) 700/800 MHZ Site LNA FRU's ▪ Twenty- Three (23) 700/800 MHZ Cabinet RMC Module FRU's Four (4) spare antennas (one per four regions in the STATE) are recommended.
31	Offeror must describe in detail their ability to provide system management support staff.
	Offeror Response: Comply Motorola Solutions stands behind its commitment to provide a highly-available system to the State. A key component to that commitment is our ability to provide a customized service support program that will fully meet the State's needs, delivered by expert technicians and system support staff who are intimately knowledgeable about the State's system. Our approach to supporting and servicing a system the size and complexity of the State's leads to a customer service team comprised of three complementary elements: ▪ Badged Motorolans, including engineers, customer support managers, account managers and system technologists, who will provide in-depth focus on supporting the State's. ▪ Motorola's Technical Support and Monitoring Centers, based in Illinois, who will provide ongoing network fault monitoring, dispatch and case management and wide-ranging technical support with knowledge gained from the hundreds of systems maintained by Motorola Solutions. ▪ Authorized Service Providers based throughout the State of North Dakota, who will provide onsite repair and preventative maintenance during the warranty period and as needed to support the State's technical staff after warranty.
	Offeror must describe in detail their proposed system management plan for The proposed solution

32	*Offeror Response:* Comply Motorola Solutions' service and support delivery team is the heart of our support operations. Motorola continues to invest a significant amount of time and resources to develop new procedures and tools designed to enhance the service delivery process. Our skilled and experienced team supporting the State's system includes the following: **Customer Support Manager–Mike Rosonke** Mike Rosonke, the State of North Dakota's Customer Support Manager (CSM), has extensive support and technical experience working with customers to ensure system availability and he has worked closely with Motorola's commercial and public safety customers for over 17 years. Your CSM provides coordination of support resources to enhance the quality of service delivery and to ensure your satisfaction. The Customer Support Manager is responsible for overseeing the execution of the Warranty and Service Agreement and ensuring that we meet our response and restoration cycle time commitments. The CSM will supervise and manage the Motorola Authorized Servicer's functions. Your CSM will have monthly review meetings with the STATE to ensure your satisfaction and a Motorola System Technologist will participate in the monthly review. **Motorola Solutions System Technologist–Ed Kirsch** Our System Technologists (ST) are highly skilled, factory trained, technical individuals who optimize and configure networks. They are available to assist Motorola's Authorized Service Providers with network health and operations when needed. In addition, a Motorola System Technologist will participate in monthly review meetings with the STATE. **Local Service Partners** Motorola Solutions' authorized service providers are staffed with trained and qualified technicians. They provide rapid response, repair, restoration, installation, removal, programming and scheduled preventive maintenance tasks for site standards compliance and RF operability. Our authorized service centers are assessed annually for technical and administrative competency. Servicing the State's system will be four service companies, which together have six locations throughout the State of North Dakota and into South Dakota. Each servicing organization is expected to own and maintain service monitors and test equipment

necessary to maintain the State's P25 infrastructure for the State of North Dakota. The technicians employed by these authorized centers will be able to respond within hours of an initial phone call from the State and will restore system functionality during warranty support. We anticipate the following Authorized Service Providers to provide support for the State of North Dakota:

- Great Plains Towers
- Midwest Steeplejacks
- Mid States Wireless
- Stones Mobile Radio
- ECI Systems Inc.
- Kohler Communications

Motorola's Factory Organization

The service support proposed to the State includes the customer support manager, local field service technicians, our system technologists and Technical Support Operations team based in Illinois that includes the System Support Center, factory technologists and factory engineering teams.

Motorola Solutions' System Support Center (SSC)

The SSC is the heart of our central support operations. We continue to invest a significant amount of time and resources to develop new procedures and tools designed to enhance the service delivery process. The toll free call center, located at the SSC, will handle your incoming service requests and manage each case from beginning to end keeping you informed every step of the way. Our Dispatch and Case Management team works hand-in-hand with our Network Operations Center (NOC) and Technical Support Teams to continuously monitor case activity and ensure rapid resolution of system issues. If a system alarm is detected at the NOC, the team will evaluate the issue and notify our Dispatch Operations Team that an alarm is active on the State's system. The NOC technician will continue to monitor and evaluate the alarm condition until the issue is resolved. Our diagnostic tools allow us to detect whether the alarm condition is a result of a P25 equipment malfunction or a status change within one of the system sites. This level of integration allows us to pinpoint the problem and quickly restore the system to normal operation.

Ongoing Level of Factory Engineering and Service Support

Throughout the installation and maintenance of the system, our Technical Support Operations team provides centralized remote telephone support via the System Support Center for technical issues that require a high level of expertise or troubleshooting. The technical support operations team is staffed with experienced and

	degreed factory technologists who have attained industry-standard networking certifications and technology specialization. They have an average of 10 to 15 years of experience working with complex mission critical communications systems. The factory technologists work closely with the field service support team, the State's technical staff, or both to ensure rapid resolution and closure of system issues. Technical Support is available 24 hours per day, 7 days per week and 365 days per year. Using the Case Management system, a case is created and tracked for each issue, followed to resolution and documented every step of the way. The factory technologists can remotely access the State's system and, when necessary, replicate the problem in the system laboratory to get the system back up and running as quickly and efficiently as possible. The Technical Support personnel are in close proximity to the Motorola factory engineers, who provide the highest level of technical support needed.

e. Training

The Offeror, prior to cutover and final acceptance of the system, shall provide a comprehensive training program for the identified audiences and the required knowledge areas as defined in this section. Such training shall include, at a minimum, sessions to familiarize dispatch center personnel with the operation of The proposed solution, alarm systems and with the system management equipment. Field personnel will be trained in the operation of mobile and portable equipment.

No.	
1.	Offeror must describe in detail how they will provide complete and comprehensive operational training covering features, operation and special care associated with the equipment supplied.
	Offeror Response: Comply Delivering training is the core business of Motorola Solutions' training organization. Classes delivered at the State of North Dakota sites are tailored to the State's system design and incorporate standard operating procedures. Participants are taught only what applies to them. Tailoring classes and materials optimizes classroom time and gives participants the opportunity to work on their own equipment. Instructor-led is the most effective means of training when supervised, hands-on training is required. Our instructional staff possesses a dynamic blend of cutting edge technical knowledge, practical hands-on experience and interactive presentation skills. Instructor-led classes combine foundational theory and extensive hands-on learning.

Table 9: System Administrator Training Plan – Included in Phase 2

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 Systems Fleetmapping RDS1017 (Instructor-led)	System Administrators	1	4.5 days	ND	Early in Planning Stage	Up to 12

Course Synopsis: This workshop addresses topics necessary for the effective planning and mapping of an ASTRO25 IV&D radio system. During this course, the participants will learn about ASTRO25 features, capabilities and restrictions in order to effectively plan for a new or upgraded ASTRO25 system.						
ASTRO25 IV&D System Overview AST1038 (Self-paced; On-Line) Prerequisite	System Administrators	1	2.5 hours	On-Line; Self-paced	Prior to Workshops	Up to 12
Course Synopsis: The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered and an introduction to applications available in the ASTRO®25 system will be provided.						
ASTRO25 IV&D Radio System Administrator Workshop ACS7171102 (Instructor-led)	System Administrators	1	4.5 days	ND	Prior to managing the system	Up to 12
Course Synopsis: This workshop covers administrator functions for an ASTRO25 Integrated Voice and Data (IV&D) System. Learning activities in this course focus on how to use the different ASTRO25 IV&D System Management applications. Participants will be provided with an opportunity to discuss how to structure their organization and personnel for optimal ASTRO25 IV&D system use.						
ASTRO25 Domain Controller Administrator AST2015 (Instructor-led)	System Administrators	1	3 days	ND	Prior to managing the system	Up to 12
Course Synopsis: This workshop covers the administrator and management functions in the ASTRO25 Domain Controller and how these functions affect both users and computers in the ASTRO25 system. Learning activities in this course focus on how to use the Domain Controllers to authenticate, administer and authorize users and devices in the ASTRO25 System. Group Policies and Organizational Units, RADIUS and DNS structure will be addressed during this course.						
ISSI 8000 / CSSI 8000 Feature Overview AST2005 (On-line; Self-paced)	System Administrators	1	4 hours	On-line; Self-paced	TBD	Up to 12
Course Synopsis: The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios and an overview of the installation process.						

Table 10: 1st Echelon Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 IV&D System Applied Networking NWT003 (Instructor-led)	1st Echelon	1	4.5 days	ND	Prior to remaining classes	Up to 12
Course Synopsis: This course provides the participant with the necessary networking information required for understanding the Network Transport subsystem components installed in an ASTRO25 IV&D communications system. The course includes familiarization with basic networking concepts and the networking components deployed throughout the system.						
ASTRO25 IV&D System Overview AST1038 (Self-paced; On-Line) Prerequisite	1st Echelon	1	2.5 hours	On-Line; Self-paced	Prior to Workshops	Up to 12
Course Synopsis: The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered and an introduction to applications available in the ASTRO®25 system will be provided.						
1st Echelon Technical Training Specially Tailored (Instructor-led)	1st Echelon	1	10 days	ND	Prior to cutover	Up to 12
Course Synopsis: This is a specially tailored class to take the 1st echelon technicians through basic system troubleshooting. This class will enable the 1st echelon technicians to recognize issues, do basic, repairs and intelligently relay the issues to the 2nd level support team.						
APX CPS Programming and Template Building with Radio Management and OTAP APX7001 & RDS2017 (Instructor-led)	Radio Programmers	1	4 days	ND	Prior to programming radios	Up to 12

CPS Course Synopsis:

The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX portable/mobile subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and APX mobile.

Radio Management Course Synopsis:

Participants will learn the capabilities, features and functions of the APX Radio Management Suite. This course will cover an APX CPS overview, APX Radio Management Overview, Basic Networking Primer, ASTRO25/CEN Networking and UNS Overview and APX Radio Management Installation, Configuration and Operations. In addition, the course will contain labs that will focus on installation, configuration and operation using both wired and POP25 updates to APX Subscriber radios in both a LAN and WAN environment.

ISSI 8000 / CSSI 8000 Feature Overview AST2005 (On-line; Self-paced)	1st Echelon	1	4 hours	On-line; Self-paced	TBD	Up to 12

Course Synopsis:

The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios and an overview of the installation process.

ASTRO25 IV&D M /L Core Workshop ACS7171103 (Instructor-led)	Technicians	1	4.5 days	ND	Prior to maintaining	Up to 12

Course Synopsis:

The ASTRO25 IV&D with M/L Core course teaches advanced troubleshooting skills and best practices for the Trunked Large Systems. The course also focuses on gathering and analyzing system information to implement appropriate action(s) that return a system to full operational status.

ASTRO25 GTR8000 Repeater Site and IP Digital Simulcast Workshop ACS717208 & ACS717217 (Instructor-led)	Technicians	1	5 days	ND	Prior to maintaining	Up to 12

GTR 8000 Course Synopsis:

This workshop describes the components in the ASTRO25 IV&D System Repeater Site with GTR 8000 expandable site subsystem. This course also presents how the GTR 8000 expandable site subsystem operates and explains the tools and methods available for troubleshooting components within the subsystem.

IP Digital Simulcast Course Synopsis:

The ASTRO® 25 IV&D IP Based Digital Simulcast workshop provides an understanding of the components that comprise the ASTRO® 25 IV&D IP Simulcast subsystem and how they operate in conjunction with each other. The workshop also explains the tools and methods available for troubleshooting components within the IP Based Simulcast subsystem.

Table 11: Optional Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 IV&D Secure Communication Workshop (OTAR) to include KMF ACS7171207 (Instructor-led)	System Administrators	1	4.5 days	ND	Prior to maintaining	Up to 12
Course Synopsis: This workshop describes planning, installation, configuration, operations and troubleshooting of Secure Communications within the ASTRO25 Integrated Voice and Data (IV&D) System.						
Dynamic System Resilience (DSR) Overview (Optional) ACS 715023 (On-line; Self-paced)	1st Echelon	1	2 hours	On-line; Self-paced	TBD	Up to 12
Course Synopsis: The ASTRO25 IV&D Dynamic System Resilience (DSR) Overview is a self-study training course intended to provide a technical overview of DSR. The course describes how DSR adds a geographically separate backup for the Master Site to protect against a catastrophic failure.						
ASTRO25 IV&D NICE Logger Integration (Optional) AST1002 (Instructor-led)	1st Echelon	1	5 days	ND	Prior to cutover	Up to 12
Course Synopsis: This workshop covers the tasks and knowledge to implement a NICE logging solution. in an ASTRO25 system. Learning activities in this course focus on both initial installation and configuration and operation and troubleshooting the components after installation. Participants will be provided with an opportunity to demonstrate with available lab equipment tasks required to install and maintain the related subsystem components.						
APX Technical Subscriber Academy APX010 (Instructor-led)	Radio Technicians	1	4.5 days	ND	Prior to maintaining	Up to 12
Course Synopsis: This course focuses on the knowledge required for a 2-way Radio Technician working in a communication environment or using the family of APX radios in the field. The course is specifically designed to provide significant amounts of hands-on, scenario based labs around configuration and troubleshooting. Key Loading and Management, Encryption, Over-The Air Programming and Mobile Radio Installation are some of the topics that will be covered in detail for both mobile and portable radios.						

Offeror must describe in detail how they will provide training to the different groups and how they will assist the STATE with Train-the-Trainer to train others.

Offeror Response:

Comply

The Motorola Solutions training team conducts train-the-trainer classes for State personnel on operations and subscriber equipment. Professional instructors work with the State's trainers developing their facilitation skills and product/system knowledge. We provide the State qualified trainers and users with tailored course materials.

Table 12: Radio User – Train-the-Trainer - OPTIONAL

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
APX6000 Portable (3 Models) and **APX6000 Mobile** (1 Model) **Train-the-Trainer Utilizing the Interactive End User Tool Kit** (Instructor-led)	User Trainers	1 (8 hour session)	1	ND	Prior to training users	15

Course Synopsis:

This course provides APX radio trainers with an introduction to their radio, its basic operation and tailored job aids available for assistance in operation. The learning experience is a mix of facilitation and hands-on activities to help users perform common tasks associated with their radio operation. Segmentation between user groups (i.e. Police, Fire/EMS and Public Service) is encouraged to help focus instruction on the specific operational issues of the individual user group. This course is geared for customers who have an experienced dedicated training staff in their organization. It provides the customer's identified training personnel with the knowledge and practice applying training techniques that will enable them to successfully train their students. Trainers will use audio visual (Interactive End User Toolkits – iEUTK), facilitation and "hands-on" activities to facilitate learning events supported by tailored or customized training materials and job aides. They will become proficient in discussing common tasks associated with the operation of the customer's radios.

NOTE: The first half of the class is the operator training. The second half of the class teaches customer trainers how to manipulate the Interactive End User Tool Kit as well as how to redeliver this training for users.

2.

iEUTK

	The Interactive End User Tool Kit (iEUTK) is a revolutionary knowledge transfer tool designed to accelerate learning. Using the iEUTK allows trainers to customize operator training to match unique button, feature programming and displays provided in the system. Each iEUTK is user friendly and menu driven. The home page in every iEUTK provides excellent navigation to the multiple areas of interest for the specific communication device. Operators select "Getting Started" to view a highly informative video overview that helps build solid foundational knowledge and quickly brings users up to speed on the operational theory of their specific device. The tailored materials are developed on-site using tool kits that allow users to modify training materials when radio or console features change. Personnel are taught how to maneuver through and tailor the iEUTK screens. The tailored selections are saved to an electronic file that the Motorola Solutions training team sends to the printer to develop the training materials. The trainers use the iEUTK to generate their instructor guides, incorporating standard operating procedures, notes and reminders. This dynamic tool allows the customer to generate training materials on an as-needed basis depicting current features and functionality.  *We use our iEUTK to produce PowerPoint™ presentations s that students can have self-paced training on any PC with Microsoft Office™.*
3.	Offeror must describe in detail all proposed training programs detailing how Offeror intends to provide training. The training description must include, but not limited to the following: a. A list of all subjects with a description of each b. Class material to be provided by Offeror c. Number of classes d. Class duration e. Need for recurring training f. Class size
	Offeror Response: Comply Delivering training is the core business of Motorola Solutions' training organization. Classes delivered at the State of North Dakota sites are tailored to the State's system design and incorporate standard operating procedures. Participants are taught only what applies to them. Tailoring classes and materials optimizes classroom time and gives participants the opportunity to work on their own equipment. Instructor-led is the most effective means of training when supervised, hands-on training is required. Our instructional staff possesses a dynamic blend of cutting edge technical knowledge, practical hands-on experience and interactive presentation skills. Instructor-led classes combine foundational theory and extensive hands-on learning.

Table 13: System Administrator Training Plan – Included in Phase 2

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 Systems Fleetmapping RDS1017 (Instructor-led)	System Administrators	1	4.5 days	ND	Early in Planning Stage	Up to 12
Course Synopsis: This workshop addresses topics necessary for the effective planning and mapping of an ASTRO25 IV&D radio system. During this course, the participants will learn about ASTRO25 features, capabilities and restrictions in order to effectively plan for a new or upgraded ASTRO25 system.						
ASTRO25 IV&D System Overview AST1038 (Self-paced; On-Line) Prerequisite	System Administrators	1	2.5 hours	On-Line; Self-paced	Prior to Workshops	Up to 12
Course Synopsis: The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered and an introduction to applications available in the ASTRO®25 system will be provided.						
ASTRO25 IV&D Radio System Administrator Workshop ACS7171102 (Instructor-led)	System Administrators	1	4.5 days	ND	Prior to managing the system	Up to 12
Course Synopsis: This workshop covers administrator functions for an ASTRO25 Integrated Voice and Data (IV&D) System. Learning activities in this course focus on how to use the different ASTRO25 IV&D System Management applications. Participants will be provided with an opportunity to discuss how to structure their organization and personnel for optimal ASTRO25 IV&D system use.						
ASTRO25 Domain Controller Administrator AST2015 (Instructor-led)	System Administrators	1	3 days	ND	Prior to managing the system	Up to 12
Course Synopsis: This workshop covers the administrator and management functions in the ASTRO25 Domain Controller and how these functions affect both users and computers in the ASTRO25 system. Learning activities in this course focus on how to use the Domain Controllers to authenticate, administer and authorize users and devices in the ASTRO25 System. Group Policies and Organizational Units, RADIUS and DNS structure will be addressed during this course.						
ISSI 8000 / CSSI 8000 Feature Overview AST2005 (On-line; Self-paced)	System Administrators	1	4 hours	On-line; Self-paced	TBD	Up to 12

Course Synopsis:
The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios and an overview of the installation process.

Table 14: 1st Echelon Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 IV&D System Applied Networking NWT003 (Instructor-led)	1st Echelon	1	4.5 days	ND	Prior to remaining classes	Up to 12
Course Synopsis: This course provides the participant with the necessary networking information required for understanding the Network Transport subsystem components installed in an ASTRO25 IV&D communications system. The course includes familiarization with basic networking concepts and the networking components deployed throughout the system.						
ASTRO25 IV&D System Overview AST1038 (Self-paced; On-Line) Prerequisite	1st Echelon	1	2.5 hours	On-Line; Self-paced	Prior to Workshops	Up to 12
Course Synopsis: The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered and an introduction to applications available in the ASTRO®25 system will be provided.						
1st Echelon Technical Training Specially Tailored (Instructor-led)	1st Echelon	1	10 days	ND	Prior to cutover	Up to 12
Course Synopsis: This is a specially tailored class to take the 1st echelon technicians through basic system troubleshooting. This class will enable the 1st echelon technicians to recognize issues, do basic, repairs and intelligently relay the issues to the 2nd level support team.						
APX CPS Programming and Template Building with Radio Management and OTAP APX7001 & RDS2017 (Instructor-led)	Radio Programmers	1	4 days	ND	Prior to programming radios	Up to 12

CPS Course Synopsis:

The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX portable/mobile subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and APX mobile.

Radio Management Course Synopsis:

Participants will learn the capabilities, features and functions of the APX Radio Management Suite. This course will cover an APX CPS overview, APX Radio Management Overview, Basic Networking Primer, ASTRO25/CEN Networking and UNS Overview and APX Radio Management Installation, Configuration and Operations. In addition, the course will contain labs that will focus on installation, configuration and operation using both wired and POP25 updates to APX Subscriber radios in both a LAN and WAN environment.

ISSI 8000 / CSSI 8000 Feature Overview AST2005 (On-line; Self-paced)	1st Echelon	1	4 hours	On-line; Self-paced	TBD	Up to 12

Course Synopsis:

The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios and an overview of the installation process.

ASTRO25 IV&D M /L Core Workshop ACS7171103 (Instructor-led)	Technicians	1	4.5 days	ND	Prior to maintaining	Up to 12

Course Synopsis:

The ASTRO25 IV&D with M/L Core course teaches advanced troubleshooting skills and best practices for the Trunked Large Systems. The course also focuses on gathering and analyzing system information to implement appropriate action(s) that return a system to full operational status.

ASTRO25 GTR8000 Repeater Site and IP Digital Simulcast Workshop ACS717208 & ACS717217 (Instructor-led)	Technicians	1	5 days	ND	Prior to maintaining	Up to 12

GTR 8000 Course Synopsis:

This workshop describes the components in the ASTRO25 IV&D System Repeater Site with GTR 8000 expandable site subsystem. This course also presents how the GTR 8000 expandable site subsystem operates and explains the tools and methods available for troubleshooting components within the subsystem.

IP Digital Simulcast Course Synopsis:

The ASTRO® 25 IV&D IP Based Digital Simulcast workshop provides an understanding of the components that comprise the ASTRO® 25 IV&D IP Simulcast subsystem and how they operate in conjunction with each other. The workshop also explains the tools and methods available for troubleshooting components within the IP Based Simulcast subsystem.

Table 15: Optional Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 IV&D Secure Communication Workshop (OTAR) to include KMF ACS7171207 (Instructor-led)	System Administrators	1	4.5 days	ND	Prior to maintaining	Up to 12
Course Synopsis: This workshop describes planning, installation, configuration, operations and troubleshooting of Secure Communications within the ASTRO25 Integrated Voice and Data (IV&D) System.						
Dynamic System Resilience (DSR) Overview (Optional) ACS 715023 (On-line; Self-paced)	1st Echelon	1	2 hours	On-line; Self-paced	TBD	Up to 12
Course Synopsis: The ASTRO25 IV&D Dynamic System Resilience (DSR) Overview is a self-study training course intended to provide a technical overview of DSR. The course describes how DSR adds a geographically separate backup for the Master Site to protect against a catastrophic failure.						
ASTRO25 IV&D NICE Logger Integration (Optional) AST1002 (Instructor-led)	1st Echelon	1	5 days	ND	Prior to cutover	Up to 12
Course Synopsis: This workshop covers the tasks and knowledge to implement a NICE logging solution. in an ASTRO25 system. Learning activities in this course focus on both initial installation and configuration and operation and troubleshooting the components after installation. Participants will be provided with an opportunity to demonstrate with available lab equipment tasks required to install and maintain the related subsystem components.						
APX Technical Subscriber Academy APX010 (Instructor-led)	Radio Technicians	1	4.5 days	ND	Prior to maintaining	Up to 12

	Course Synopsis: This course focuses on the knowledge required for a 2-way Radio Technician working in a communication environment or using the family of APX radios in the field. The course is specifically designed to provide significant amounts of hands-on, scenario based labs around configuration and troubleshooting. Key Loading and Management, Encryption, Over-The Air Programming and Mobile Radio Installation are some of the topics that will be covered in detail for both mobile and portable radios.
4.	Offeror must describe in detail their plan to provide training to the operators that use subscriber units. The operator may be a daily user or a user only during emergencies and exercises. User courses will include, at a minimum, the following topics: a. The System Overview Course b. Area of operation; coverage provided c. Operation of all subscriber features d. Operation and control of mobile and portable radios e. Operation and control of control stations f. Hands-on familiarization of all equipment functions g. Proper use of all associated accessories h. Proper radio procedures i. System failure and backup modes j. Basic troubleshooting techniques k. Proper handling and care of radio equipment, batteries and accessories
	Offeror Response: Comply The Motorola Solutions training team provides the State's trainers with all the tools they need to deliver training to the State's user population. Product videos depicting features and functionalities are used both to support initial training and as refresher training. The interactive end user tool kit is used to incorporate notes, the State's operating procedures and reminders when to use other classroom aids into the instructor guides. Student materials that are tailored to show only the State's features and functionality are developed using the interactive end user tool kit. Tailoring student materials to only display the State's chosen features and functionality rather than all possible product features, limits user questions as to why certain features were chosen by the State.

Table 16: Radio User – Train-the-Trainer - OPTIONAL

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
APX6000 Portable (3 Models) and **APX6000 Mobile** (1 Model) **Train-the-Trainer Utilizing the Interactive End User Tool Kit** **(All Optional)** (Instructor-led)	User Trainers	1 (8 hour session)	1	ND	Prior to training users	15

Course Synopsis:

This course provides APX radio trainers with an introduction to their radio, its basic operation and tailored job aids available for assistance in operation. The learning experience is a mix of facilitation and hands-on activities to help users perform common tasks associated with their radio operation. Segmentation between user groups (i.e. Police, Fire/EMS and Public Service) is encouraged to help focus instruction on the specific operational issues of the individual user group. This course is geared for customers who have an experienced dedicated training staff in their organization. It provides the customer's identified training personnel with the knowledge and practice applying training techniques that will enable them to successfully train their students. Trainers will use audio visual (Interactive End User Toolkits – iEUTK), facilitation and "hands-on" activities to facilitate learning events supported by tailored or customized training materials and job aides. They will become proficient in discussing common tasks associated with the operation of the customer's radios.

NOTE: The first half of the class is the operator training. The second half of the class teaches customer trainers how to manipulate the Interactive End User Tool Kit as well as how to redeliver this training for users.

iEUTK

	The Interactive End User Tool Kit (iEUTK) is a revolutionary knowledge transfer tool designed to accelerate learning. Using the iEUTK allows trainers to customize operator training to match unique button, feature programming and displays provided in the system. Each iEUTK is user friendly and menu driven. The home page in every iEUTK provides excellent navigation to the multiple areas of interest for the specific communication device. Operators select "Getting Started" to view a highly informative video overview that helps build solid foundational knowledge and quickly brings users up to speed on the operational theory of their specific device. The tailored materials are developed on-site using tool kits that allow users to modify training materials when radio or console features change. Personnel are taught how to maneuver through and tailor the iEUTK screens. The tailored selections are saved to an electronic file that the Motorola Solutions training team sends to the printer to develop the training materials. The trainers use the iEUTK to generate their instructor guides, incorporating standard operating procedures, notes and reminders. This dynamic tool allows the customer to generate training materials on an as-needed basis depicting current features and functionality.  *We use our iEUTK to produce PowerPoint™ presentations s that students can have self-paced training on any PC with Microsoft Office™.*
5.	**Dispatcher/Console Operator** Offeror must describe in detail their plan to provide training to the Dispatch/Console Operators to ensure a detailed understanding of operating the console system as it pertains to its own agency's operations. a. Examples of personnel that fall into this category level include: a. Dispatcher/Console Operators b. Dispatch Supervisors b. Dispatch Console Operator courses will include, at a minimum, the following topics: a. Dispatch Console System Overview Course b. Hands-on familiarization of all console position functions c. Proper use of all associated accessories d. Proper radio procedures e. System failure and backup modes f. Alarms that show on the console screen c. Any console functionality features such as door controls d. Basic troubleshooting techniques e. Proper handling and care of radio equipment, batteries and accessories

Offeror Response:

Comply

The Motorola Solutions training team provides the State's Console Dispatch Operators and Supervisors with tailored training at each PSAP. Product videos depicting features and functionalities are used both to support initial training and as refresher training. The console training materials are tailored to show only the State's features and functionality. Tailoring student materials to only display the State's chosen features and functionality rather than all possible product features, limits user questions as to why certain features were chosen by the State.

Table 17: PSAPs – Hillsboro, Grafton, Cavalier, Rugby, Rolla, Bottineau, Stanley, Stanton, Washburn, Valley City and Langdon: Console Operator and Supervisor - INCLUDED IN PHASE 1

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500 Dispatch Console Operator and Admin Supervisors 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	6 (2 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500 Dispatch Console Operator Dispatchers 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	6 (2 per session) To cover shifts

Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

Table 18: PSAPs – Devil's Lake, Grand Forks, Dickinson, Minot, New Town, Jamestown, Wahpeton: Console Operator and Supervisor - INCLUDED IN PHASE 1

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500 Dispatch Console Operator and Admin Supervisors 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	12 (4 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500 Dispatch Console Operator Dispatchers 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	12 (4 per session) To cover shifts

Operator Course Synopsis:
This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

Table 19: PSAP –Fargo: Console Operator and Supervisor - INCLUDED IN PHASE 1

Course Title	Target Audience	Sessions	Duration	Location	Date	Participant
MCC7500 Dispatch Console Operator and Admin Supervisors 4 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	24 (8 per sessio To cover shif
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aid which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500 Dispatch Console Operator Dispatchers 4 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	24 (8 per sessio To cover shif

Operator Course Synopsis:
This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

Table 20: PSAP-Bismarck: Console Operator and Supervisor - INCLUDED IN PHASE 1

Course Title	Target Audience	Sessions	Duration	Location	Date	Participant
MCC7500 Dispatch Console Operator and Admin Supervisors 6 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	36 (12 per session) To cover shif
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aid which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500 Dispatch Console Operator Dispatchers 6 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	36 (12 per session) To cover shif

Operator Course Synopsis:
This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

Table 21: PSAP – Bismarck State Radio: Console Operator and Supervisor - INCLUDED IN PHASE 1

Course Title	Target Audience	Sessions	Duration	Location	Date	Participant
MCC7500 Dispatch Console Operator and Admin Supervisors 8 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	48 (16 per session) To cover shif
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aid which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500 Dispatch Console Operator Dispatchers 8 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	48 (16 per session) To cover shif

Operator Course Synopsis:
This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

Table 22: PSAP – Williston, Prime: Console Operator and Supervisor - INCLUDED IN PHASE 1

Course Title	Target Audience	Sessions	Duration	Location	Date	Participant
MCC7500 Dispatch Console Operator and Admin Supervisors 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	12 (4per session To cover shif
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aid which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500 Dispatch Console Operator Dispatchers 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	4 (12 per session) To cover shif

Operator Course Synopsis:
This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

Table 23: PSAP – Williston, Sheriff's Office and Emergency Management: Console Operator and Supervisor - INCLUDED IN PHASE 1

Course Title	Target Audience	Sessions	Duration	Location	Date	Participant
MCC7500 Dispatch Console Operator and Admin Supervisors 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	6 (2 per sessio To cover shif
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aid which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500 Dispatch Console Operator Dispatchers 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	6 (2 per sessio To cover shif

Operator Course Synopsis:
This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

6. Along with the operator training requested above, Offeror must provide a full list of training available to the STATE and must also provide the recommended minimum technical and administrator training for subsystems within the entire proposed solution design.

For example:

a. Trunking System Administration
b. Infrastructure
c. Network Management Terminal
d. Dispatch Console Administration
e. System Management
f. Other

Offeror Response:

Comply

A list of all training along with roadmaps for system administrators and technicians can be found on our training web site http://motorolasolutions.com/amlearn.

Table 24: System Administrator Training Plan - INCLUDED IN PHASE 2

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 Systems Fleetmapping RDS1017 (Instructor-led)	System Administrators	1	4.5 days	ND	Early in Planning Stage	Up to 12
Course Synopsis: This workshop addresses topics necessary for the effective planning and mapping of an ASTRO25 IV&D radio system. During this course, the participants will learn about ASTRO25 features, capabilities and restrictions in order to effectively plan for a new or upgraded ASTRO25 system.						
ASTRO25 IV&D System Overview AST1038 (Self-paced; On-Line) Prerequisite	System Administrators	1	2.5 hours	On-Line; Self-paced	Prior to Workshops	Up to 12
Course Synopsis: The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered and an introduction to applications available in the ASTRO®25 system will be provided.						

ASTRO25 IV&D Radio System Administrator Workshop ACS7171102 (Instructor-led)	System Administrators	1	4.5 days	ND	Prior to managing the system	Up to 12
Course Synopsis: This workshop covers administrator functions for an ASTRO25 Integrated Voice and Data (IV&D) System. Learning activities in this course focus on how to use the different ASTRO25 IV&D System Management applications. Participants will be provided with an opportunity to discuss how to structure their organization and personnel for optimal ASTRO25 IV&D system use.						
ASTRO25 Domain Controller Administrator AST2015 (Instructor-led)	System Administrators	1	3 days	ND	Prior to managing the system	Up to 12
Course Synopsis: This workshop covers the administrator and management functions in the ASTRO25 Domain Controller and how these functions affect both users and computers in the ASTRO25 system. Learning activities in this course focus on how to use the Domain Controllers to authenticate, administer and authorize users and devices in the ASTRO25 System. Group Policies and Organizational Units, RADIUS and DNS structure will be addressed during this course.						
ISSI 8000 / CSSI 8000 Feature Overview AST2005 (On-line; Self-paced)	System Administrators	1	4 hours	On-line; Self-paced	TBD	Up to 12
Course Synopsis: The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios and an overview of the installation process.						

Table 25: 1st Echelon Training Plan – INCLUDED IN PHASE 2

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 IV&D System Applied Networking NWT003 (Instructor-led)	1st Echelon	1	4.5 days	ND	Prior to remaining classes	Up to 12
Course Synopsis: This course provides the participant with the necessary networking information required for understanding the Network Transport subsystem components installed in an ASTRO25 IV&D communications system. The course includes familiarization with basic networking concepts and the networking components deployed throughout the system.						
ASTRO25 IV&D System Overview AST1038 (Self-paced; On-Line) Prerequisite	1st Echelon	1	2.5 hours	On-Line; Self-paced	Prior to Workshops	Up to 12

Course Synopsis: The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered and an introduction to applications available in the ASTRO®25 system will be provided.						
1st Echelon Technical Training Specially Tailored (Instructor-led)	1st Echelon	1	10 days	ND	Prior to cutover	Up to 12
Course Synopsis: This is a specially tailored class to take the 1st echelon technicians through basic system troubleshooting. This class will enable the 1st echelon technicians to recognize issues, do basic, repairs and intelligently relay the issues to the 2nd level support team.						
APX CPS Programming and Template Building with Radio Management and OTAP APX7001 & RDS2017 (Instructor-led)	Radio Programmers	1	4 days	ND	Prior to programming radios	Up to 12
CPS Course Synopsis: The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX portable/mobile subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and APX mobile. **Radio Management Course Synopsis:** Participants will learn the capabilities, features and functions of the APX Radio Management Suite. This course will cover an APX CPS overview, APX Radio Management Overview, Basic Networking Primer, ASTRO25/CEN Networking and UNS Overview and APX Radio Management Installation, Configuration and Operations. In addition, the course will contain labs that will focus on installation, configuration and operation using both wired and POP25 updates to APX Subscriber radios in both a LAN and WAN environment.						
ISSI 8000 / CSSI 8000 Feature Overview AST2005 (On-line; Self-paced)	1st Echelon	1	4 hours	On-line; Self-paced	TBD	Up to 12
Course Synopsis: The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios and an overview of the installation process.						
ASTRO25 IV&D M /L Core Workshop ACS7171103 (Instructor-led)	Technicians	1	4.5 days	ND	Prior to maintaining	Up to 12

Course Synopsis: The ASTRO25 IV&D with M/L Core course teaches advanced troubleshooting skills and best practices for the Trunked Large Systems. The course also focuses on gathering and analyzing system information to implement appropriate action(s) that return a system to full operational status.						
ASTRO25 GTR8000 Repeater Site and IP Digital Simulcast Workshop ACS717208 & ACS717217 (Instructor-led)	Technicians	1	5 days	ND	Prior to maintaining	Up to 12
GTR 8000 Course Synopsis: This workshop describes the components in the ASTRO25 IV&D System Repeater Site with GTR 8000 expandable site subsystem. This course also presents how the GTR 8000 expandable site subsystem operates and explains the tools and methods available for troubleshooting components within the subsystem. **IP Digital Simulcast Course Synopsis:** The ASTRO® 25 IV&D IP Based Digital Simulcast workshop provides an understanding of the components that comprise the ASTRO® 25 IV&D IP Simulcast subsystem and how they operate in conjunction with each other. The workshop also explains the tools and methods available for troubleshooting components within the IP Based Simulcast subsystem.						

Table 26: Optional Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO25 IV&D Secure Communication Workshop (OTAR) to include KMF ACS7171207 (Instructor-led)	System Administrators	1	4.5 days	ND	Prior to maintaining	Up to 12
Course Synopsis: This workshop describes planning, installation, configuration, operations and troubleshooting of Secure Communications within the ASTRO25 Integrated Voice and Data (IV&D) System.						
Dynamic System Resilience (DSR) Overview (Optional) ACS 715023 (On-line; Self-paced)	1st Echelon	1	2 hours	On-line; Self-paced	TBD	Up to 12
Course Synopsis: The ASTRO25 IV&D Dynamic System Resilience (DSR) Overview is a self-study training course intended to provide a technical overview of DSR. The course describes how DSR adds a geographically separate backup for the Master Site to protect against a catastrophic failure.						

	ASTRO25 IV&D NICE Logger Integration (Optional) AST1002 (Instructor-led)	1st Echelon	1	5 days	ND	Prior to cutover	Up to 12
	Course Synopsis: This workshop covers the tasks and knowledge to implement a NICE logging solution. in an ASTRO25 system. Learning activities in this course focus on both initial installation and configuration and operation and troubleshooting the components after installation. Participants will be provided with an opportunity to demonstrate with available lab equipment tasks required to install and maintain the related subsystem components.						
	APX Technical Subscriber Academy APX010 (Instructor-led)	Radio Technicians	1	4.5 days	ND	Prior to maintaining	Up to 12
	Course Synopsis: This course focuses on the knowledge required for a 2-way Radio Technician working in a communication environment or using the family of APX radios in the field. The course is specifically designed to provide significant amounts of hands-on, scenario based labs around configuration and troubleshooting. Key Loading and Management, Encryption, Over-The Air Programming and Mobile Radio Installation are some of the topics that will be covered in detail for both mobile and portable radios.						

7.	**On-going Training** Offeror must describe in detail their ability to provide on-going training (i.e. classroom, on-line) to the STATE on The proposed solution for the duration of the Contract.
	Offeror Response: Comply Ongoing training takes many forms. As technology evolves, there are opportunities for the State and Motorola to assess the need for refresher training. As upgrades are installed on the State's system, system administrators, network operators and users are trained on the changes to system features and functionality impacted. Upgrade training classes are delivered during the installation of the upgrade. Full course descriptions are located at the link referenced in Exhibit F.
8.	Offeror must describe in detail the materials they will provide instructional materials, including printed manuals, audio, video, interactive self-paced personal computer programs and complete equipment operating instructions for all technical and operational training classes.
	Offeror Response: Comply Self-study web-based classes are used as pre-work for the instructor-led technical classes. We have learned from delivering these classes that to be successful, the system administrators, 1st echelon and users require as much supervised, hands-on training as possible. To meet this need, we have moved the theory portion of the classes to the self-study web-based prerequisites. Participants receive supporting

	system documentation on a CD or a thumb drive along with participant guides to follow the instructor's presentation and take notes. Console and radio classes are 90% hands-on labs allowing students practice on their live system. The interactive end user tool kit is a departure from paper-based training materials. The tailored materials are developed using software that allows the user to modify training materials when radio or console features change. Console and radio users receive tailored participant guides based on the State's features and functionality. The State receives Master Tool Kits as well as tailored files that can be loaded on the State's intranet for refresher training. Full course descriptions are located in at the link referenced in Exhibit F.
9.	Offeror must acknowledge that actual and/or exact model and series of equipment being delivered shall be made available for hands-on use and operation during training.
	Offeror Response: Comply Dispatch Supervisor and Operator Training is conducted on the State's installed and operational system prior to cutover. System Administrator and 1st Echelon Training will be conducted on the State's installed and operational system as part of Phase 2 and prior to managing and maintaining the system.
10	Offeror must acknowledge that all instructional materials shall be subject to the approval of the State and shall become property of the State.
	Offeror Response: Comply
11	Offeror must describe in detail their plan to schedule the classes as near to system cutover as possible.
	Offeror Response: Comply The Motorola Solutions training team works with the State to develop a training plan that meets the State's needs. Once the State approves the training as defined per Phase and the equipment is installed, our team delivers training prior to cutover, as applicable.
12	Offeror must describe in detail their plan to work with the STATE to develop the schedule.
	Offeror Response: Comply The training schedule is mutually agreed upon by the State and our training team and is integrated with the design and implementation build-out schedule. We work with the

	State to accommodate shift operations and other site-specific requirements. Evening classes are delivered as necessary.

EXHIBIT B – Statements of Work

The following sub-exhibits are included in this exhibit:

Exhibit B-1 – Phase 1 Statement of Work

Exhibit B-1A – Phase 1 Draft Schedule

Exhibit B-1B – Payment Schedule

Exhibit B-2 – Phase 2 Statement of Work

Exhibit B-2A – Phase 2 Draft Schedule

Exhibit B-2B – Payment Schedule

Exhibit B-3 – Phase 3 Statement of Work

Exhibit B-3A – Phase 3 Draft Schedule

Exhibit B-3B – Payment Schedule

Items noted as Optional in the Statements of Work may be purchased separately and are not included in the Phase 1, 2, 3 Pricing Summary Totals.

EXHIBIT B-1 – Phase 1 Statement of Work

1. PHASE 1 SYSTEM OVERVIEW:

This Initial Phase 1 will provide dispatch operation and a master site core with applicable dispatch licenses. This is a stand-alone, operational system that includes the equipment, staging, installation, implementation services, dispatch testing and dispatch training needed.

a. Primary Fully Redundant Network Core Master Site
   1) [redacted]
   2) Includes P25 TDMA Phase II technology
   3) Core Dispatch Licenses.

b. Network Management Client at Core (1).

c. Dispatch equipment at 21 locations

d. Dispatch Spares: 7 sets

e. ADD: CADI for 13 Dispatch Centers.

f. ADD: Backup State Radio Dispatch Site with 5 operator positions

g. OPTION: Optional DSR Core with P25 TDMA Phase II technology and Network Management Client (1).

h. Dispatch Training: Included

i. Warranty: One Year

j. CONTRACTOR will ensure CONTRACTOR provided equipment and installations (electronic and civil) are per the R56 site standards and an audit will be completed after installation at each site. If existing sites require additional R56 site upgrades these can be separately quoted as needed.

a. <u>Radio System Equipment Included:</u>

1) Primary Fully Redundant Network Core Master Site
   a) Redundant Zone Controllers.
   b) Redundant Core LAN Switches.
   c) Redundant GGM8000 Core Routers.
   d) Redundant GGM8000 Gateway Routers.
   e) Terminal Server.
   f) One Network Manager Client Computer.
      i. [redacted]
      ii. Each network management terminal consists of the network management application installed on a certified CPU, a 24” LCD monitor (non-touch screen), keyboard and mouse.
   g) Customer Network Interface (CNI).
      i. 1 Firewall.
      ii. GGM8000 Border Router.

iii. 1 DMZ Switch.

h) GPS TRAK9100 for NTP.

i) CORE LICENSES

License	Description of License	Qty
ASTRO 25 TDMA Trunking	License for Project 25 Phase 2 compliant trunking. This license supports P25 Phase 2 CAI voice operation	1
MCC7500E Console License	License for the MCC7500E operator positions in the system. One license is required for up to 5 MCC7500E operator positions.	17
ASTRO 25 Radio Users	License for ASTRO 25 Voice radio users (i.e. subscribers). One license is required for up to 500 radio users	1
Unified Network Configurator (UNC) License	Provides the capability for a user to enter configuration information for all infrastructure and transport objects. One is required. Up to 7 concurrent user licenses are available per the system.	2
Provisioning Manager License	Provides the capability for a user to enter configuration information for all radio users, console users and some security. One is required. Up to 16 concurrent user licenses are available per the system.	2
Unified Event Manager (UEM) License	Network Fault Management tool. One is required. Up to 6 concurrent user licenses are available per the zone.	2
Zone Historical Reports	Provides the capability for users to manually or automatically generate historical performance reports through the use of standard templates. One is required. Up to 3 concurrent user licenses are available per M2 Core.	2

2) Network Management Client License and Workstation with Monitor at Core (1).

3) Dispatch equipment at 21 locations including the two additional Grand Forks operator positions.

It should be noted that each of the dispatch centers outlined below can backup each other in case of an emergency.

a) Stutsman County Communications Center

The proposed Stutsman County Communications Center's equipment located at [redacted], Jamestown includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Three (3) MCC 7500E Secure console operator positions.
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).

- Three (3) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

b) Barnes County Dispatch

The proposed Barnes County Dispatch's equipment located at [redacted], Valley City includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) MCC 7500E Secure console operator positions.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

c) Richland County Communications/911

The proposed Richland County Communications/911 equipment located [redacted], Wahpeton includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Three (3) MCC 7500E Secure console operator positions.
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).
- Three (3) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

d) Traill/Steele 911

The proposed Traill/Steele 911 equipment located at [redacted], Hillsboro includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).

- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) MCC 7500E Secure console operator positions.
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

e) Grand Forks Public Safety Answering Point including the additional 2 operator positions

The proposed Grand Forks Public Safety Answering Point's equipment located at [redacted], Grand Forks includes (additional 2 operator positions.):

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- Two (2) GGM 8000 Gateways with Encryption.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Six (6) 7500E Secure console operator positions.
- Four (4) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 32 analog conventional channels (4-wire Tone Remote Control).
- Six (6) APX 7500 Backup Consolettes, an Eight (8) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).

f) Walsh County Communications

The proposed Walsh County Communications' equipment located at [redacted], Grafton includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) MCC 7500E Secure console operator positions.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.

- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

g) Pembina County 911

The proposed Pembina County 911 equipment located at [redacted], Cavalier includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) MCC 7500E Secure console operator positions.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

h) Cavalier County 911

The proposed Cavalier County 911 equipment located at [redacted], Langdon includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) MCC 7500E Secure console operator positions.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

i) Lake Region 911 Center

The proposed Lake Region 911 Center's equipment located at [redacted], Devils Lake includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.

- Three (3) MCC 7500E Secure console operator positions.
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control).
- Three (3) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

j) Pierce County 911

The proposed Pierce County 911 equipment located at [redacted], Rugby includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) MCC 7500E Secure console operator positions.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run. One (1) Aux I/Os.
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.

k) Rolette County 911

The proposed Rolette County 911 equipment located at [redacted], Rolla includes:

- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) MCC 7500E Secure console operator positions.
- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) Aux I/Os.

l) Bottineau/Renville 911

The proposed Bottineau/Renville 911 equipment located at [redacted], Bottineau includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) MCC 7500E Secure console operator positions.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os
- Two (2) GGM 8000 Gateways with Encryption.

m) Minot Central Dispatch

The proposed Minot Central Dispatch equipment located at [redacted], Minot includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- Five (5) MCC 7500E Secure console operator positions.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) GGM 8000 Gateways with Encryption.
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).
- Five (5) APX 7500 Backup Consolettes, an Eight (8) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- One (1) MCD 5000 Deskset and Two (2) MCD 5000 Radio Gateway Units (RGU's).

n) Mountrail County Sheriff's Office

The proposed Mountrail County Sheriff's Office equipment located at [redacted], Stanley includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- Upgrade Existing Two (2) MCC 7500E VPM console operator positions.
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU). Two (2) GGM 8000 Gateways with Encryption
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- One (1) Conventional Channel Controller.

- One (1) Aux I/Os.

o) Williston/Williams County 911

The proposed Williston/Williams County 911 equipment located at [redacted], Williston includes:

- Four (4) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- Three (3) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 24 analog conventional channels (4-wire Tone Remote Control).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Four (4) MCC 7500E Secure console operator positions.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.
- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) Conventional Channel Controller.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).

p) Stark/Dickinson Dispatch

The proposed Stark/Dickinson Dispatch equipment located at [redacted], Dickinson includes:

- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU). I/Os.
- Four (4) MCC 7500E Secure console operator positions.
- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Four (4) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- One (1) Aux I/O

q) MHA Communications Center

The proposed MHA Communications Center's equipment located at [redacted], New Town includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.

- Upgrade Existing Four (4) MCC 7500E VPM console operator positions.
- Four (4) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.

r) Mercer/Oliver 911

The proposed Mercer/Oliver 911 equipment located at [redacted], Stanton includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit (RGU).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Three (3) New MCC 7500E Secure console operator positions.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).
- Three (3) APX 7500 Backup Consolettes, a Four (4) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.

s) McLean County 911

The proposed McLean County 911 equipment located at [redacted], Washburn-includes:

- One (1) Aux I/Os.
- Two (2) GGM 8000 Gateways with Encryption.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Two (2) New MCC 7500E Secure console operator positions.
- One (1) MCD 5000 Deskset and One (1) MCD 5000 Radio Gateway Unit
- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- Two (2) APX 7500 Backup Consolettes, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- One (1) Conventional Channel Controller.
- One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control). (RGU).

t) Central Dakota Communications Center

The proposed Central Dakota Communications Center's equipment located at [redacted], Bismarck includes:

- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).

- One (1) MCD 5000 Deskset and Two (2) MCD 5000 Radio Gateway Units (RGU's).
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Eight (8) New MCC 7500E Secure console operator positions.
- Five (5) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 40 analog conventional channels (4-wire Tone Remote Control).
- Eight (8) APX 7500 Backup Consolettes, and One (1) Aux I/Os.
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways with Encryption.

u) State Radio

The proposed State Radio equipment located at [redacted], Bismarck includes:

- Ten (10) APX 7500 Backup Consolettes, a Twelve (12) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control) in order to facilitate transition.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Ten (10) New MCC 7500E Secure console operator positions.
- One (1) MCD 5000 Deskset, Three (3) MCD 5000 Radio Gateway Units (RGU's) and a 24 Port Ethernet Switch with Encryption.
- Two (2) Key Variable Loader 4000 (KVL 4000), with AES, DES-OFB Encryption Algorithms and Cables.
- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways
- One (1) Aux I/Os.

v) All New Operator Positions:

Each new MCC 7500E operator position is equipped with the following:

- One (1) HP Z2 Mini Workstation Computer CPU with 24" Non-Touch Screen (Full HD, 1920 x 1080 HD at 60 Hz, 16:9 Standard Ratio), with Monitor/keyboard/Trackerball.
- One (1) Software Enhanced Instant Recall Recorder (IRR), second sound card and a pair of computer speakers.
- Optional Secure Operation. AES, DES-OFB Encryption Algorithms and Advanced Digital Privacy (ADP) Software Encryption.
- One (1) Audio Interface Module (AIM).
- Two (2) Desktop Speakers.
- One (1) Desktop Gooseneck Microphone.
- Two (2) Headset Jacks.
- Two (2) Headset Module Bases with PPT and 15′ Cables.

- Two (2) Plantronics SupraPlus Monaural (single ear headband style) with Noise Cancelling Microphone.
- One (1) Dual Pedal Footswitch.
- The proposed MCC 7500E shared spare equipment include:
- Eight (8) MCC Series Desktop Speakers.
- Eight (8) MCC Series Desktop Gooseneck Microphones.
- Eight (8) MCC Series Headset Jacks
- Eight (8) MCC 7500E Workstations.
- Eight (8) MCC 7500E Voice Processor Module FRUs.
- ADD: DES-OFB Algorithm.
- ADD: MCC 7500E Secure Operation.
- ADD: AES Algorithm.
- ADD: ADP Algorithm.
- Eight (8) GR500 AC Power Cords.
- Eight (8) Power Supplies 108W AC INP 12VDC OUT W18.
- Eight (8) DC CABLE ASSY.
- Eight (8) GCP 8000/GCM 8000/GPB 8000 FRU's.
- Eight (8) Power Supply FRU's.
- Eight (8) Fan Module FRU's.

Note: New equipment backup power is the responsibility of each Communications Center.

w) Equipment Summary

Table 27: Site Equipment Summary (Dispatch)

Site Name	Site Type	Operator Position Migration	8 Port Conventional Gateways	Backup Consolette	Control Station Combiner
Stutsman State Communications Center	Dispatch	3OP – New	2	3	1
Barnes State Dispatch	Dispatch with CADI	2OP - New	1	2	0
Richland State Communications/911	Dispatch with CADI	3OP - New	3	3	1
Trail/Steele 911	Dispatch	2OP - New	2	2	0
Grand Forks Public Safety Answering Point	Dispatch with CADI	6OP	3	6	1
Walsh State Communications	Dispatch with CADI	2OP - New	1	2	0
Pembina State 911	Dispatch with CADI	2OP - New	1	2	0
Cavalier State 911	Dispatch	2OP - New	1	2	0
Lake Region 911 Center	Dispatch	3OP - New	2	3	1
Pierce State 911	Dispatch	2OP - New	1	2	0

Rolette State 911	Dispatch	2OP - New	1	2	0
Bottineau/Renville 911	Dispatch	2OP - New	1	2	0
Minot Central Dispatch	Dispatch with CADI	5OP - New	3	5	1
Mountrail State Sheriff's Office	Dispatch with CADI	2OP - Upgrade	0	2	0
Williston/Williams State 911	Dispatch with CADI	4OP - New	3	4	1
Stark/Dickinson Dispatch	Dispatch with CADI	4OP - New	1	4	1
MHA Communications Center	Dispatch with CADI	4OP - Upgrade	0	4	1
Mercer/Oliver 911	Dispatch	3OP - New	1	3	1
McLean State 911	Dispatch with CADI	2OP - New	1	2	0
Central Dakota Communications Center	Dispatch with CADI	8OP - New	5	8	1
State Radio	Dispatch with CADI	10OP - New	2	10	1

4) CORE SPARES AND 7 SETS OF DISPATCH SPARES

SPARE TYPE	LOCATION	QTY	NOMENCLATURE	DESCRIPTION
CORE	BISMARCK	1	DLN6865	600 GB HARD DRIVE
CORE	BISMARCK	1	DLN7010	FRE: DL380 G9 HC NO DISK WD2
CORE	BISMARCK	1	DLN6977	FRE: DL380 G9 LC 600 GB DISK
CORE	BISMARCK	1	CKN6975	CABLE, DATA,CABLE, MINI-SAS HD TO MINI-SAS HD CABLE, AWG30, LENGTH 1M"
CORE	BISMARCK	1	CLN1857	HP X311 REDUNDANT POWER SUPPLY
CORE	BISMARCK	1	CLN1858	3800-48 ETHERNET SWITCH
CORE	BISMARCK	1	CLN1856	2620-24 ETHERNET SWITCH
CORE	BISMARCK	1	DKN6144A	ASSY,CBL,3 FT,RELAY PNL,CWR,S6000
CORE	BISMARCK	1	DKN6129B	ASSY,CBL,6 FT,RELAY PNL,CWR,S6000
CORE	BISMARCK	1	CKN6906A	FRU: FIBER CABLE
CORE	BISMARCK	1	CLN8490A	FRU: MINI GBIC (J4858B)
CORE	BISMARCK	1	CLN8489	48 PORT TERMINAL SERVER
CORE	BISMARCK	1	T8126	FORTINET FIREWALL APPLIANCE
CORE	BISMARCK	1	TYN4008	FRU: FIPS 140-2 LEVEL 2 ENCRYPTION CERT LABELS
DISPATCH	VARI REGIONS	7	TT3225	Z2 MINI WORKSTATION 258G 8G NON RET

DISPATCH	VARI REGIONS	7	SQM01SUM0205	GGM 8000 GATEWAY
DISPATCH	VARI REGIONS	7	CA01616AA	ADD: AC POWER
DISPATCH	VARI REGIONS	7	CA02086AA	ADD: HIGH DENSITY ENH CONV GATEWAY
DISPATCH	VARI REGIONS	7	CLN1856	2620-24 ETHERNET SWITCH
DISPATCH	VARI REGIONS	7	B1912	MCC SERIES DESKTOP SPEAKER
DISPATCH	VARI REGIONS	7	B1914	MCC SERIES DESKTOP GOOSENECK MICROP
DISPATCH	VARI REGIONS	7	B1913	MCC SERIES HEADSET JACK
DISPATCH	VARI REGIONS	7	TT3106	Z440 WORKSTATION WINDOWS 10 IOT ENT
DISPATCH	VARI REGIONS	7	B1934	MCC 7500 VOICE PROCESSOR MODULE FRU
DISPATCH	VARI REGIONS	7	CA00143AC	ADD: DES-OFB ALGORITHM
DISPATCH	VARI REGIONS	7	CA00147AF	ADD: MCC 7500 SECURE OPERATION
DISPATCH	VARI REGIONS	7	CA00182AB	ADD: AES ALGORITHM
DISPATCH	VARI REGIONS	7	CA00245AA	ADD: ADP ALGORITHM
DISPATCH	VARI REGIONS	7	3082933N08	GR500 AC POWER CORD
DISPATCH	VARI REGIONS	7	01009513001	PWR SPLY 108W AC INP 12VDC OUT W18
DISPATCH	VARI REGIONS	7	30009351001	DC CABLE ASSY
DISPATCH	VARI REGIONS	7	DLN6966	FRU: GCP 8000/GCM 8000/GPB 8000
DISPATCH	VARI REGIONS	7	DLN6781	FRU: POWER SUPPLY
DISPATCH	VARI REGIONS	7	DLN6898	FRU: FAN MODULE

5) GRAND FORKS PUBLIC SAFETY DISPATCH POSITIONS: Adds two additional operator positions, adds 2 consolettes to the originally proposed 4 positions and 4 consolettes.

   The positions added to the previously proposed Grand Forks PSAP Console Site equipment include:

   - Two (2) MCC7500E Secure console operator positions.
   - One (1) Zone Core MCC7500 Licenses (5 Pack).

- Two (2) APX 7500 Backup Consolettes, connecting into 2 open ports of the previously quoted 8 Channel Control Station Combiner.

Applicable installation services for the additional 2 operator positions at the Grand Forks Dispatch Center are as defined in DELIVERABLE 1-9.1 through 1-9.23 SYSTEM CONFIGURATION – FNE INSTALLATION. It is assumed that the additional positions and control stations will be installed in the same room as the existing dispatch positions and control stations. Existing furniture will be provided by the State.

Additional civil work is not included. A separate quote can be provided upon request if needed. Year 1 warranty is included. Post Warranty Maintenance services are separately quoted.

6) BACKUP STATE RADIO DISPATCH SITE

The proposed State Radio equipment located at Backup Dispatch Location includes:

- Five (5) APX 7500 Backup Consolettes, an Eight (8) channel Control Station Combiner, Antenna Network with two (2) Antennas, plus Maximum line length of 150′ for each run.
- Two (2) GGM 8000 High Density Conventional Channel Gateways (CCGW's) for support of up to 16 analog conventional channels (4-wire Tone Remote Control) in order to facilitate transition.
- Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.
- Five (5) New MCC 7500E Secure console operator positions.
- Two (2) 7.5′ Open Racks and Power Distribution Units (PDU's).
- One (1) Conventional Channel Controller.
- Two (2) GGM 8000 Gateways.
- One (1) Aux I/O.
- One (1) Firewall to support CADI interface.

Applicable installation services for the additional dispatch site are as defined in DELIVERABLE 1-9.1 through 1-9.23 SYSTEM CONFIGURATION – FNE INSTALLATION. Existing furniture will be provided by the State. Additional civil work is not included. A separate quote can be provided upon request if needed. Year 1 warranty is included. Post Warranty Maintenance services are separately quoted.

7) CADI - 13 DISPATCH CENTERS

To meet the request to interface the proposed system to the existing CAD system at each of the 13 dispatch centers the following is proposed:

- One (1) firewall for each dispatch center with CAD, used to interface networks with any preferred CAD vendor.
- 13 Locations Include the following Dispatch Centers: Barnes, Richland, Grand Forks, Walsh, Pembina, Minot, Mountrail, Williston, Stark, MHA, McLean, Central Dakota and State Radio Dispatch Centers.

Three APIs (Table 28) are available for use by third parties who wish to integrate their application with the MCC 7500 dispatch console. Each of these APIs performs a different function in the console/CAD interface, allowing for control of the console through the CAD system and information transfer between the console and the CAD system.

Table 28: APIs supported by the MCC 7500 Dispatch Console

API	Functionality
Console Dispatch Interface API	• Used for the overall management and maintenance of the connections between a software application and the dispatch system. • Authenticates the dispatch console user's login account and associates it with the security groups defined in the radio system's network manager. • Allows a CAD application to interface to the MCC 7500 console system. • Delivers API messages either directly to the CAD application or enables retrieval of API messages upon request by the CAD application.
Resource Configuration API	• Retrieves configuration information such as lists of radio resources, capabilities/features available on each radio resource, and lists of accessible auxiliary input/output signals. • Retrieves aliasing information such as the end user radio unit IDs (e.g., Unit 4352 = "Division ABCD") and end user radio unit status (e.g., Status 7 = "En Route").
Console Features API	• Monitors and controls subscriber and console activity on the radio system. • Initiates voice communications with a subscriber unit; and controls access to external equipment.

a) Software Developer Kit for the APIs

To aid in the integration of the dispatch console system with the CAD system, CONTRACTOR can provide a Software Developer Kit (SDK) that contains all information necessary to be able to access and use the APIs described above.

The SDK's manuals document the supported CONTRACTOR MCC 7500 dispatch APIs, including access to various dispatch features, configuration information, and aliasing information. The SDK also includes various files needed by software developers as they create applications that use the APIs. These files include source code header/include (.h) files, library (.LIB) files, and dynamic link libraries (DLLs).

All SDK licensing fees and software development costs associated with CAD integration with the MCC 7500 dispatch console through APIs are the responsibility of your selected CAD vendor.

b) CAD System Interface Services:

Applicable installation services for the CAD interface include installation of the firewall at each dispatch site location. The CAD vendor is responsible for the separate purchase of licensing and the Application Programmers Interface Software Developers Kit. Configuration and 3rd party development of the CAD is the responsibility of the State and applicable 3rd party

provider.

Additional dispatch services applicable to the firewall installation are as defined within DELIVERABLE 1-9.1 through 1-9.23: SYSTEM CONFIGURATION – FLEETMAPPING within this document.

Year 1 warranty is included. Post Warranty Maintenance services are separately quoted.

b. OPTION: Dynamic System Resilience (DSR)

To meet the requested fully redundant and geo-diverse core radio infrastructure requirement, CONTRACTOR has proposed the optional Dynamic System Resilience (DSR) to maintain critical radio system communications in the event one core is lost by switching immediately to a second core. In addition to have a second core, having the cores in different locations further enhances system resilience.

Applicable installation services for the DSR will include the FNE services as defined in DELIVERABLE 1-9.1 through 1-9.23: SYSTEM CONFIGURATION – FLEETMAPPING. The assumed location of the DSR core is at the DCN Fargo location. Civil work requirements are limited to electrical circuit expansion only. Due to this site being owned by DCN, a site visit was not performed by the Contractor initially. If additional civil work is required based upon the final selected location and site audit, this can be quoted separately. As an example, there may be requirements for backup power, electrical circuits, and cable raceways.

Spares for the optional DSR are as follows:

SPARE TYPE	LOCATION	QTY	NOMENCLATURE	DESCRIPTION
Dynamic System Resilience (DSR) Option Spares				
DSR-CORE	FARGO	1	T8126	FORTINET FIREWALL APPLIANCE
DSR-CORE	FARGO	1	DLN6865	600 GB HARD DRIVE
DSR-CORE	FARGO	1	DLN7010	FRE: DL380 G9 HC NO DISK WD2
DSR-CORE	FARGO	1	DLN6977	FRE: DL380 G9 LC 600 GB DISK
DSR-CORE	FARGO	1	CKN6975	CABLE, DATA,CABLE, MINI-SAS HD TO MINI-SAS HD CABLE, AWG30, LENGTH 1M"
DSR-CORE	FARGO	1	CLN1857	HP X311 REDUNDANT POWER SUPPLY
DSR-CORE	FARGO	1	CLN1858	3800-48 ETHERNET SWITCH
DSR-CORE	FARGO	1	CLN1856	2620-24 ETHERNET SWITCH
DSR-CORE	FARGO	1	DKN6144A	ASSY,CBL,3 FT,RELAY PNL,CWR,S6000
DSR-CORE	FARGO	1	DKN6129B	ASSY,CBL,6 FT,RELAY PNL,CWR,S6000
DSR-CORE	FARGO	1	CKN6906A	FRU: FIBER CABLE
DSR-CORE	FARGO	1	CLN8490A	FRU: MINI GBIC (J4858B)
DSR-CORE	FARGO	1	CLN8489	48 PORT TERMINAL SERVER
DSR-CORE	FARGO	1	T8126	FORTINET FIREWALL APPLIANCE
DSR-CORE	FARGO	1	TYN4008	FRU: FIPS 140-2 LEVEL 2 ENCRYPTION CERT LABELS

Year 1 warranty is included. Post Warranty Maintenance services are separately quoted.

2. PROJECT PLAN AND SCOPE OF WORK

a. Scope of Work Overview

Project Manager (PM)- CONTRACTOR has included a Project Manager (PM) will serve as the primary project liaison to State of North Dakota. The PM will track the progress of the project and take proactive measures to ensure the project proceeds as planned. The PM will work with the State's Project Manager to ensure contractual commitments are delivered and fulfilled. The PM will manage and allocate all required resources, personnel, budgets and materials to ensure the system is implemented to your satisfaction and that the system meets our standards on the specifications as agreed to during the Contract Design Review, while maintaining the highest standards of quality and STATE satisfaction. The PM will ensure all project related tasks are performed to meet the scheduled completion.

1) Other responsibilities are:
    a) Implementing the project plan and monitor schedule adherence.
    b) Conducting regular (as agreed upon with the State/bi-weekly) status meetings to include published agendas, meeting minutes, status reports, action item tracking and project schedule updates.
    c) Tracking delivery and installation progress to the master project plan and plan, recommend and order changes to the schedule or resources to ensure on time completion of critically sequenced deliverables.
    d) Directing technical individuals responsible for the installation, configuration and quality of the project.
    e) Monitoring and controlling the installation, integration, testing and acceptance of the proposed system.
    f) Coordinating the development and execution of technical and user training plans.
    g) Managing and directing all subcontracting activities
    h) Mitigating risks in order to ensure that the system meets the design specifications and is delivered on time.
    i) Overseeing change management.
    j) Ensuring quality workmanship by all CONTRACTOR vendors and subcontractors.
    k) Ensuring that our team works collaboratively with State of North Dakota personnel throughout the project.

3. CONTRACT ADMINISTRATION

a. Expectations of CONTRACTOR:

1) Assign a Project Manager, as the single point of contact throughout the duration of the project life-cycle, with authority to make project decisions.
2) Assign Project Engineer to be assigned throughout the duration of the project life-cycle.
3) Assign other required resources necessary for project implementation.

4) Schedule the project kickoff meeting with STATE prior to start of the project.

b. Expectations of STATE:

1) Assign a Project Manager, as the single point of contact responsible for STATE - signed approvals.
2) Assign other resources necessary to ensure completion of project tasks for which STATE is responsible.

c. Completion Criteria:

1) CONTRACTOR internal processes are set up for project management.
2) Both CONTRACTOR and STATE assign all required resources.
3) Project kickoff meeting is scheduled.

4. DELIVERABLE 1-1: PROJECT KICKOFF MEETING

a. Description:

CONTRACTOR shall coordinate with STATE to schedule a Kickoff Meeting in Bismarck, ND, with the core project and planning team. CONTRACTOR' Project Manager shall lead the meeting. The Kickoff Meeting must facilitate the introduction of CONTRACTOR and STATE core project team members and level-set understanding and awareness of project objectives, scope, governance, schedule and project risks and issues.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide content to STATE for a detailed agenda in advance of the meeting.
2) CONTRACTOR and STATE shall facilitate the meeting and discuss and further define, at a minimum, the following:
   a) Management plans to control cost, schedule, scope, and quality
   b) Effective project communication
   c) Project vision, background, purpose and objectives
   d) Project governance structure and project roles and responsibilities
   e) Approach to creating the Project Plan
   f) Initial risk assessment
   g) CONTRACTOR Project Manager shares CONTRACTOR' Safety Plan.

c. Expectations of STATE:

1) STATE shall finalize agenda and send agenda to invitees.
2) STATE shall coordinate the logistics and co-facilitate the Kickoff Meeting.
3) STATE's Project Sponsor and project team members shall participate in the Kickoff Meeting.
4) STATE shall provide schedule / availability for any required site surveys.
5) STATE shall provide site access, permissions and escort, as required.

6) STATE shall provide safety rules to be followed during the integration phase of this project.

d. Completion Date:

CONTRACTOR shall start work with STATE within five (5) working days after the commencement of the STATE providing written authorization directing the initiation of work.

e. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Kickoff Meeting results in:

1) Facilitation of Kickoff Meeting using a clearly defined agenda
2) An introduction of critical CONTRACTOR and STATE resources assigned to the project
3) Review of Project Charter to include project governance structure, roles and responsibilities, project purpose, objectives and scope
4) Discussion of communications approach and structure
5) Discussion of known project risks and issues

5. DELIVERABLE 1-2 PROJECT PLAN (INCLUDES DELIVERABLE 1-SCHED: PROJECT PLAN BASELINE SCHEDULE)

a. Description:

CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to develop a baseline Project Plan. The Project Plan will include the project schedule.

1) Project Deliverable Overview by Dispatch Site:

Following the installation and testing of the Redundant Core, the dispatch sites will be each installed, optimized and separately tested per the agreed upon project schedule as defined during the Contract Design Review. Upon successful completion of each dispatch site deliverable tasks which are defined below, a dispatch system acceptance test (see section 25 Acceptance Test Plan, sub-section a) will be completed for the site and upon successful completion the cutover for that site will take place. The dispatch site will then be available for beneficial use on the system.

Below is a summary of Tasks (see Statement of Work deliverables for task responsibility detail) which will be completed at a Dispatch Project Level and then, following shipment of equipment, the tasks applicable per dispatch site prior to the cutover of each site.

SIRN Deliverable	Technology Contract – SIRN Exhibit B-SOW	CONTRACTOR Solutions Radio Network SOW Overview	Task
1-1	Project Kick Off Meeting	DISPATCH PROJECT LEVEL: STATE/ CONTRACTOR Phase 1 Dispatch Kick Off Meeting	√

SIRN Deliverable	Technology Contract – SIRN Exhibit B-SOW	CONTRACTOR Solutions Radio Network SOW Overview	Task
1-2	Project Plan	DISPATCH PROJECT LEVEL: P25 Radio Network Project Plan	√
1-3	Data Conversion Plan	DISPATCH PROJECT LEVEL: Dispatch Backhaul Plan, Equipment List, Install Plan, Power, Alarm, Civil Work Plan	√
1-4	Data Conversion Design	DISPATCH PROJECT LEVEL: -Backhaul Design Specifications -Install Layout Drawings, -Power Requirements -Alarm Requirements	√
1-6	Interface Design	DISPATCH PROJECT LEVEL: CCGW Design, CEN Design, as applicable	√
1-8	Gap Analysis	DISPATCH PROJECT LEVEL: Review of System Design	√
1-10	Test Management Plan	DISPATCH PROJECT LEVEL: System Acceptance Test Plan (including Staging Test Plan, Backhaul Test Plan)	√
1-12	Training Management Plan	DISPATCH PROJECT LEVEL: Develop Dispatch Training Plans	√
1-15	Implementation & Transition Plan	DISPATCH PROJECT; Develop Cutover Plan, Service Plan	√
1-CDR	Contract Design Review (CDR)	DISPATCH PROJECT: CDR Review and Approval of Design	√
1-SHIP	Order, Manufacture, Stage, Ship	DISPATCH PROJECT: Order, Manufacture equipment, Stage, Ship	√
1-9.1 through 23	System Configuration	Per Dispatch Site (master as applicable for core license): Fleetmap, Site Development, Installation & Optimize: -Dispatch Equipment -Core Licenses - Backhaul	√
1-7.1 through 23	Interface Development and Release	Per Dispatch Site (master as applicable): - Install CCGW per Site - CEN interface install	√

SIRN Deliverable	Technology Contract – SIRN Exhibit B-SOW	CONTRACTOR Solutions Radio Network SOW Overview	Task
1-11.1 through 23	Acceptance Test	Per Dispatch Site (master as applicable); Complete Acceptance Test	√
1-13.2,3 and 5 through 23	Training	Per Dispatch Site: Dispatch Training	√
1-14.2,3 and 5 through 23	Training	Per Dispatch Site; Dispatch Training	√
1-5.1 through 23	Data Conversion Validation	Per Dispatch Site (master as applicable): -Programming/Configuration validation/test. -Backhaul Link Test -R56 Site Audit	√
1-16.1 through 23	Implementation	Per Dispatch Site (master as applicable): Cutover, Punchlist Resolution	√
1-17.1 through 23	Post Implementation Report	Per Dispatch Site (master as applicable); Project Documentation, Service Warranty Transition	√
1-18.1 through 23	Phase 1 Project Close Out Meeting	Final Review - System Documentation, Reports, Service Warranty Transition	√
1-19.1 through 23	Phase 1 Final Acceptance	Final Radio Network Acceptance - Phase 1	√

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall participate, contribute and collaborate with STATE to provide content that includes, at a minimum, the following:
   a) Management plans to control cost, schedule, scope and quality
   b) Governance structure for the project
   c) Roles and responsibilities of the project team
   d) Integrated change control process
   e) Communication management plan
   f) Risk management plan
   g) Issue management plan
   h) Human resources management plan
   i) Procurement management plan
2) CONTRACTOR shall provide CONTRACTOR tasks and participate and collaborate with STATE on a detailed project schedule created in Microsoft Project. The Microsoft Project format and settings will be mutually agreed-upon and the project schedule will follow STATE best practices, including:

a) Project has appropriate start date

b) Project has appropriate Work Breakdown Structure

c) All project tasks have appropriate predecessors and successors, with the exception of summary tasks

d) All project tasks are auto-scheduled using predecessors to drive the task dates (dates are not manually entered)

e) Minimal use of constraints

f) Both STATE and CONTRACTOR tasks are included

g) Project tasks are broken down into timeframes that can be reasonably managed – STATE encourages a maximum task length of approximately 80 hours/two (2) weeks

h) Project tasks have appropriate resources assigned with appropriate and reasonable allocation

i) Schedule has appropriate working times and incorporates STATE and CONTRACTOR holidays and nonworking times

3) CONTRACTOR shall provide written confirmation from an authorized individual confirming contents of the Project Plan.

c. <u>Expectations of STATE:</u>

1) STATE shall lead the project planning effort.

2) STATE'S Project Manager shall be responsible for the Project Plan.

3) The Project Plan shall follow STATE template.

4) STATE's Project Manager shall incorporate STATE tasks into the project schedule.

5) STATE shall obtain written confirmation from an authorized individual at CONTRACTOR for the contents of the Project Plan.

d. <u>Completion Date:</u>

CONTRACTOR shall start work with STATE within five (5) working days after the commencement of the STATE providing written authorization directing the initiation of work.

e. <u>Acceptance Criteria:</u>

1) For the acceptance of this deliverable to occur, CONTRACTOR shall provide content to STATE for the Project Plan regarding all services, tasks and products delivered by CONTRACTOR:

a) Mutually agreed-upon detailed baseline scope and schedule for the project

b) Management plans to control scope, schedule, cost and quality, including the variance

c) Governance structure for the project

d) Roles and responsibilities of the project team

e) Quality assurance and quality control plans

f) Integrated change control process

g) Communication management plan

h) Risk management plan

i) Issue management plan

j) Human resources management plan

k) Procurement management plan

l) Baseline Project Schedule – DELIVERABLE 1-SCHED

2) The Project Plan shall adhere to the Project Management Body of Knowledge

3) For the acceptance of this deliverable to occur, approval must be obtained from STATE's Executive Steering Committee (ESC).

6. CONTRACT DESIGN REVIEW: CDR SITE SURVEYS

a. Description:

CONTRACTOR shall visit and review each proposed site to determine viability and applicable information as needed for the radio system planning and implementation.

b. Expectations of CONTRACTOR:

1) Visit each site.

2) Gather / record site information.

3) Document and provide site summary.

c. Expectations of STATE

1) Provide site access and escort.

2) Participate as needed during site surveys.

3) Review site summary.

d. Acceptance Criteria:

1) Site visits complete

2) Site summaries documented and provided to STATE.

7. (CDR) DELIVERABLE 1-3: DATA/RADIO NETWORK CONVERSION PLAN

a. Description:

CONTRACTOR shall participate, contribute and collaborate with STATE to create a Data/ Radio Network Conversion Plan. The plan is intended to address the overall approach that will be followed for the data/proposed radio network conversion effort and will be a subordinate plan to the Implementation (Project) Plan deliverable. The plan will define methodology, strategies, required competencies, tools, templates, quality standards, data cleansing and data discrepancy resolution strategies, as applicable.

Specific to the radio system this Plan includes the following sub-items: Backhaul, Equipment List, Installation – Site layout, Power requirement, Site alarming requirement planning. NOTE: The term data in this deliverable and associated deliverables does not refer to any feature on the proposed system.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the data conversion planning effort.
2) CONTRACTOR shall create a Data /Radio Network Conversion Plan that will outline the approach to convert the agreed-upon data by collaborating with and gathering input from STATE. Specific to this offering the key data conversion items for the proposed radio system include:
    a) Backhaul Requirements Definition
    b) Installation
    c) Power Requirement
    d) Site Alarming Requirement
3) CONTRACTOR shall be responsible for the final product.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.
2) STATE shall provide support and make any necessary decisions in a timely manner per the project schedule.
3) STATE shall review and provide feedback to CONTRACTOR in a timely manner per the project schedule.
4) STATE shall work with CONTRACTOR to develop approaches planned for STATE's data cleansing efforts.
5) STATE shall provide existing system, site information and documentation available.
6) STATE shall provide backhaul/connectivity to all sites as required, per CONTRACTOR specification.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Data/ Radio Network Conversion Plan must include:

1) Data/ Radio Network conversion methodologies and strategies to be used including a repeatable extract, transform and load (ETL) process
2) Details regarding the tools and templates to be used
3) Outline of strategies and actions planned to resolve data discrepancies and mapping issues, which may include customizations and data cleansing
4) Outline of the testing approach and methodology, including defined success criteria and quality standards
5) Executive summary

8. (CDR) DELIVERABLE 1-4: DATA/RADIO NETWORK CONVERSION DESIGN

a. Description:

CONTRACTOR shall design the overall data/radio network conversion approach to convert data/radio network from the legacy radio system(s).

Radio specific conversion design includes:

1) System Description with final equipment list
2) Backhaul Design specifications
3) Installation Layout – floor and rack diagrams
4) Power Requirement
5) Site Alarming Requirement

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the data conversion design effort.
2) CONTRACTOR shall provide all necessary data conversion documentation to STATE.
3) CONTRACTOR shall provide example conversion files to STATE to assist STATE in generating successful data conversion files. As applicable to the proposed radio network specific requirements this includes establishing a baseline for the system design including: System description, final backhaul specifications, final RF equipment list, installation layout, frequency / channels, power calculations per site, defined alarming per site and confirm demarcation points, as applicable.

c. Expectations of STATE:

1) STATE shall assist CONTRACTOR' review and design of data elements applicable to data conversion.
2) STATE shall provide necessary and relevant resources to make design decisions.
3) STATE shall provide support and make any necessary decisions in a timely manner per the project schedule.
4) STATE shall review and provide feedback to CONTRACTOR in a timely manner per the project schedule.
5) STATE shall provide backhaul design plan information as required.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Data Conversion Design must include:

1) Proposed system context and workflow to be accomplished with the customizations
2) Documentation of development and how the development meets the requirements outlined in the Gap Analysis deliverable

NOTE: DELIVERABLE 1-5: DATA CONVERSION VALIDATION - Specific to the proposed Motorola Solutions Radio Network the "validation" task will be completed during testing which is prior to Phase 1 Final Acceptance.

9. (CDR) DELIVERABLE 1-6: INTERFACE DESIGN

a. Description:

CONTRACTOR shall design the interface from the system to STATE's XXX application, including any configurations or customizations required to support the integration of the interface with the system. Specific to the CONTRACTOR Radio Network the interface design work will be completed as applicable (i.e. CEN/Phase 1). NOTE: At the time the

State defines the XXX application the CONTRACTOR will review the request and provide a separate quote, as applicable.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the interface design effort.
2) CONTRACTOR shall develop a high-level conceptual design for the interfaces, as applicable.
3) CONTRACTOR shall collaborate with STATE to finalize design.

c. Expectations of STATE:

1) STATE shall review conceptual designs and provide feedback and clarification as requested.
2) STATE shall provide technical resources and subject matter experts who will assist and collaborate with CONTRACTOR during the design process.
3) STATE shall provide technical resources for talkgroup and other configuration planning and decision making for the optional ISSI operation as applicable per ISSI interface.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Interface Design must include:

1) Design documentation for the interface
2) Document detailing any customizations to support the integration between the systems

NOTE: DELIVERABLE 1-7: INTERFACE DEVELOPMENT and RELEASE - Specific to the proposed Motorola Solutions Radio Network the “Interface Development and Release” task will be completed during testing which is prior to Phase 1 Final Acceptance.

10. (CDR) DELIVERABLE 1-8: GAP ANALYSIS

a. Description:

CONTRACTOR to review, analyze and confirm understanding of system functionality, business practices, interfaces, configurations and customizations. Specific to the proposed CONTRACTOR Radio Network offering CONTRACTOR will review the State’s existing system and the State’s requirements and customizations which may require design changes.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the analysis effort.
2) CONTRACTOR shall demonstrate how system’s core functionality meets the requirements as defined in the Request for Proposal.
3) CONTRACTOR shall identify and document gaps between the system’s out-of-the-box functionality and STATE’s requirements and business processes and practices.
4) CONTRACTOR shall identify any gaps that require system configuration or customization changes.

5) CONTRACTOR shall identify any gaps that require system customization beyond the Request for Proposal response.

6) CONTRACTOR shall collaborate with STATE to document agreed-upon changes to the system that may be needed as a result of the review and confirmed understanding.

c. Expectations of STATE:

1) STATE staff shall actively participate in work and analysis sessions.

2) STATE shall collaborate with CONTRACTOR to confirm requirements and gap analysis.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Gap analysis to be presented in a matrix that lists requirements and identifies which requirements can be met out-of-the-box, which need configuration and which need customizations in accordance with CONTRACTOR' Request for Proposal response.

2) Gap analysis matrix includes a descriptive statement on how CONTRACTOR will meet each requirement.

3) Gap analysis matrix identifies which requirements that, through understanding and analysis, cannot be accomplished without additional efforts, including a recommended approach to resolve the gap and CONTRACTOR' level of effort.

NOTE: DELIVERABLE 1-9: SYSTEM CONFIGURATION – Specific to the proposed CONTRACTOR Radio Network, the "System Configuration" task will be completed following the Order, Manufacturing, Staging task below.

11. (CDR) DELIVERABLE 1-10: TESTING MANAGEMENT PLAN

a. Description:

CONTRACTOR shall create a Testing Management Plan that outlines the overall testing approach for CONTRACTOR and STATE testing. The proposed radio system testing plan includes the Acceptance Test Plan which also includes the CONTRACTOR proposed:

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the test planning effort.

2) CONTRACTOR shall create a Testing Management Plan with STATE support.

3) CONTRACTOR shall conduct working session(s) with STATE to review and finalize the Test Management Plan prior to start of testing.

4) CONTRACTOR shall coordinate with STATE to schedule all testing activities.

5) CONTRACTOR shall provide tools, existing test cases, user acceptance test case templates and reporting formats for testing.

6) CONTRACTOR shall train STATE to conduct user acceptance tests and report results.

7) CONTRACTOR shall participate, contribute and collaborate with STATE in development of user acceptance test cases.

8) CONTRACTOR shall complete the Acceptance Test Plan.

c. <u>Expectations of STATE:</u>

1) STATE shall actively participate in planning sessions.
2) STATE shall provide support and make any necessary decisions.
3) STATE shall review and provide feedback to CONTRACTOR.
4) STATE shall be responsible for approving the list of test scripts for performance and user acceptance testing, with support and guidance of CONTRACTOR. NOTE: The proposed radio network test scripts/plans will be written by CONTRACTOR. Input will be solicited by the STATE as applicable. The final test scripts/plan will be approved by the STATE.
5) STATE shall conduct application performance testing on STATE server(s). NOTE: Per project scope proposed it is not expected that the STATE will require any testing on STATE provided servers for the proposed radio system.
6) STATE shall conduct user acceptance testing.
7) STATE shall assign a resource as a testing coordinator to facilitate STATE's testing activities.

d. <u>Acceptance Criteria:</u>

For the acceptance of this deliverable to occur, the Testing Management Plan must include:

1) Testing strategy containing:
    a) Agreed-upon high-level testing schedule in accordance with the project schedule
    b) Testing assignments and responsibilities
    c) Test script creation practices including detail regarding system environments used during testing
    d) Method for reporting testing issues and tracking of remediation
    e) Statistical reporting strategy for issues and fixes
    f) CONTRACTOR support
2) Outline of the approaches and strategies for testing the requirements, federal and state reporting, interfaces, data conversion and performance
3) User acceptance test case template
4) Testing issues reporting approach containing:
    a) Template for reporting issues
    b) Prioritization and severity methodology, including a Service Level Agreement for CONTRACTOR support and fixes
    c) Resolution approach
5) Documentation of what priority and severity issues must be fixed before the system moves into production
6) Description of resources for testing, including numbers of testers and necessary skill-sets

7) Executive summary

12. (CDR) DELIVERABLE 1-12: TRAINING MANAGEMENT PLAN

a. Description:

CONTRACTOR shall create a Training Management Plan. The plan will address training approaches, courses to be delivered, course instructors, overall objectives and competencies, training schedule, evaluation and required resources.

Specific to the proposed radio system the Training Plan with proposed courses is included this document.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the training planning effort.
2) CONTRACTOR shall create a Training Management Plan with STATE support.
3) CONTRACTOR shall conduct working session(s) with STATE to review and finalize the Training Management Plan prior to start of training.
4) CONTRACTOR shall coordinate with STATE to schedule all training activities.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.
2) STATE shall provide support and make any necessary decisions.
3) STATE shall review and provide feedback to CONTRACTOR.
4) STATE will define training effectiveness criteria.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Training Management Plan must include:

1) Description of training session(s)
2) Identification of roles and responsibilities, intended audience, training objectives and evaluation methods
3) Identification of agreed-upon high-level timing and approach for training
4) Executive summary

13. (CDR) DELIVERABLE 1-15: RADIO NETWORK IMPLEMENTATION AND TRANSITION PLAN

a. Description:

CONTRACTOR shall collaborate with STATE to create an Implementation and Transition Plan to manage the implementation of the product and also transition the product and work from the project structure to maintenance. For the proposed Radio network, this deliverable is the Business Migration/Cutover Plan and the Service Plan.

1) Preliminary High Level Dispatch Site Cutover Plan:
    a) Install Core Dispatch Licenses

b) Install and Optimize Dispatch Site with Conventional Channel Gateway (CCGW) and /or Consolette(s), as applicable per dispatch site.

c) Test the Core, Dispatch Site and the interface to Legacy System

d) Complete Dispatch Function Testing

e) Complete Cutover

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the planning effort.

2) CONTRACTOR shall create an Implementation and Transition plan with STATE support including the following:

a) Cutover Plan (Business Migration)

b) Service Plan

3) CONTRACTOR shall conduct working session(s) with STATE to review and finalize the Implementation and Transition Plan prior to any implementation or transition work.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.

2) STATE shall provide support and make any necessary decisions.

3) STATE shall review and provide feedback to CONTRACTOR.

4) STATE shall Approve Plans

d. Acceptance Criteria:

For acceptance of this deliverable to occur, the Implementation and Transition Plan must include:

1) Implementation strategy

2) Implementation resources and tasks

3) Implementation entry and exit criteria and go/no go decision requirements

4) Implementation contingency plan

5) Business migration (Cutover) strategy

6) Transition resources and tasks

7) CONTRACTOR processes for moving product into maintenance and ensuring ongoing support (Service Plan)

8) Executive summary

NOTE: DELIVERABLE 1-15: IMPLEMENTATION AND TRANSITION PLAN - Specific to the proposed

Motorola Solutions Radio Network the “implementation and transition plan” task will be completed during the CDR phase. Detailed tasks and expectations for this deliverable are noted above in section 2 Project Plan and Scope of Work in this document.

14. DELIVERABLE 1-CDR: DETAILED CONTRACT DESIGN REVIEW (CDR)

a. Expectations of CONTRACTOR

1) Prepare change order to reflect updated system design and documentation.
2) System design is finalized in preparation for subsequent project phases.

b. Expectations of STATE

1) Review all CDR deliverables and documents.
2) Approve design review.

c. Acceptance Criteria:

1) Design deliverables and documentation approved by State.

15. DELIVERABLE 1-SHIP: ORDER, MANUFACTURING AND STAGING, SHIP EQUIPMENT

a. Expectations of CONTRACTOR:

1) Enter order into CONTRACTOR' Customer Order Fulfillment (COF) system.
2) Create equipment orders.
3) Reconcile the equipment list(s) to the Contract.
4) Procure third-party equipment if applicable.
5) Manufacture the Equipment necessary for the system based on equipment order.
6) Staging:
    a) Set up and rack the system equipment on a site-by-site basis, as it will be configured in the field at each of the transmitter/receiver sites.
    b) Cut and label cables according to the approved CDR documentation.
    c) Complete the cabling/connecting of the subsystems to each other ("connectorization" of the subsystems).
    d) Assemble required subsystems to assure system functionality.
    e) Power up, program and test all staged equipment.
    f) Confirm system configuration and software compatibility to the existing system.
    g) Load application parameters on all equipment according to input from Systems Engineering.
    h) Complete programming of the Fixed Network Equipment.
    i) Inventory the equipment with serial numbers and installation references.
    j) Complete system documentation.
    k) Third party subsystems may be staged at the manufacturer's facilities and integrated in the field.
    l) Provide a Staging Acceptance Test Plan.
7) Staging Acceptance Test Procedures
    a) Test and validate system software and features.
    b) Functional testing of standard system features.

c) Conduct site and system level testing.

d) Power-up site equipment and perform standardized functionality tests.

e) Perform STATE -witnessed tests (if requested) based upon Staging Acceptance Test Plan.

8) Ship Equipment to Field

a) Pack system for shipment to final destination.

b) Arrange for shipment to the field

b. <u>Expectations of STATE:</u>

1) Approve shipping location(s).

2) Staging:

a) Provide information on existing system interfaces as may be required.

b) Provide information on room layouts or other information necessary for the assembly to meet field conditions, as applicable.

c) Review and approve proposed Staging Acceptance Test Plan.

3) Staging Acceptance Test Procedures

a) Attend Staging Acceptance Testing (if attendance is desired).

b) Pay for travel, lodging, meals and all incidental expenses for STATE personnel and representatives to witness the Staging Acceptance Testing.

c) Witness, participate and approve SATP.

4) Ship Equipment to Field

c. <u>Acceptance Criteria:</u>

1) Verify that the Equipment List contains the correct model numbers, version, options and delivery data.

2) Trial validation completed.

3) Bridge the equipment order to the manufacturing facility.

4) Equipment shipped to either the field or the CCSi staging facility.

5) Staging- System staging completed and ready for testing.

6) Staging Acceptance Test Procedures Performed.

7) Approval of Staging Acceptance Testing.

8) Equipment shipped to Field

16. DELIVERABLE 1-9.1 THROUGH 1-9.23: SYSTEM CONFIGURATION – FLEETMAPPING

a. <u>Description:</u>

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Fleetmapping.

Fleetmapping is the process of configuring the features and programming parameters of a system to function according to the unique operational requirements of each

participating agency. Programming decisions for system infrastructure, dispatch consoles and radios are inherent to tailoring system performance. Fleetmapping determines how the radio communications for each user group of an organization is controlled and includes:

1) Assigning talkgroups to the radios issued to personnel
2) Assigning talkgroups to the dispatcher control positions
3) Defining the feature subsets available to the personnel using the radios and dispatcher control positions

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort for system and console fleetmapping. CONTRACTOR'S major deliverables are to provide and configure the system's database parameters and console screens.
2) Develop customized Fleetmap Development Best Practice for STATE.
3) ASTRO 25 Systems Fleetmapping
    a) Provide technical consultation on talkgroup, radio user and dispatch console programming features to the fleetmap committee.
    b) Deliver final fleetmap documentation.
    c) Introduce the "MCC7500E Console Programming" documentation forms for each unique radio purchased by STATE. Provide technical consultation to STATE on console programming features and options.
    d) Deliver final MCC7500E console programming documentation forms to CONTRACTOR system technologists for final programming.
    e) Demonstrate MCC7500E console programming choices to STATE. Execute final STATE requested changes to console programming.
    f) Schedule required meeting(s) with the appropriate STATE representative(s) and agencies.
4) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.
5) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.
6) Provide programmed test radios to STATE representatives, as needed, for live testing on STATE system.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions including the following:
    a) Appoint a representative who will become the fleetmap committee chairperson with signature responsibilities for all fleetmapping decisions.
    b) Identify agency champions that will become members of the fleetmapping committee.
    c) Set Standard Operating Procedure that will apply to all end users.

d) Define and verify user groups and corresponding radio allocations.

e) Develop talkgroup naming convention plan for each user group.

f) Develop Radio ID distribution plan for each user group.

g) Develop list of other jurisdictions' trunking systems with system ID numbers to include in radio programming.

h) Develop Memorandum of Understanding (MOU) for each trunking system jurisdiction that STATE plans to interoperate. The MOU should include talkgroups, radio identification range and alias authorizations and system key provisions.

i) Complete the Radio Subscriber Template requirements for each unique radio purchased.

j) Provide template information to CONTRACTOR for use during the Staging and System Testing, as needed.

k) Complete and sign memorandum of understandings for other jurisdictional trunking systems.

l) Develop conventional channel list.

m) Obtain approval letters and access allowing CONTRACTOR authority to program other jurisdiction talkgroups into STATE'S radios.

n) Develop and approve zone/channel layouts for each user group.

o) Develop list of talkgroups/conventional channels to display on the dispatch console and log.

p) Determine emergency configuration plan (to include radios and consoles).

q) Determine feature configurations to include but not limited to Call Alert, Private Call, Telephone Interconnect, Scan, Status/Message, Secure, Failsoft and Site Preferences for both radios and consoles.

r) Complete the staging fleetmap prior to staging of the system.

2) STATE shall provide requested information and documentation as needed to configure the system.

3) The STATE is responsible for all subscriber radio templates, as needed. Services not contained in this SOW can be provided via the change order process upon request.

d. <u>Acceptance Criteria:</u>

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE. NOTE: Fleetmap Configuration definition will be completed but, actual configuration will be completed during the System Configuration Deliverable.

2) State completes and approves Fleetmapping requirements.

3) Successful demonstration of the configuration and reporting capabilities NOTE: Fleetmap Configuration definition will be completed but, actual configuration will be completed during the System Configuration Deliverable.

17. DELIVERABLE 1-9.1 THROUGH 1-9.23: SYSTEM CONFIGURATION – SITE DEVELOPMENT

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Civil Work/Site Development.

Site Development and Construction for the 800 MHz Only Solution:

Master and Dispatch Sites are limited to the addition of electrical circuits added to an existing panel at the site, as needed, to support proposed equipment. If additional civil work is needed this can be separately quoted.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.
2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.
3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.
4) Restrictions:
    a) CONTRACTOR assumes no liability or responsibility for inadequate frequency availability or frequency licensing issues.
    b) CONTRACTOR is not responsible for issues outside of its immediate control. Such issues include, but are not restricted to, improper frequency coordination by others and non-compliant operation of other radios.
    c) CONTRACTOR is not responsible for co-channel interference due to errors in frequency coordination by APCO or any other unlisted frequencies, or the improper design, installation or operation of systems installed or operated by others.
    d) CONTRACTOR will provide the addition of electrical circuits added to an existing panel at the site, as needed, to support proposed equipment. Upon completion of the site surveys, prior to Contract Design Review, if additional civil work is needed this can be separately quoted.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.
2) STATE shall provide requested information and documentation as needed to configure the system.
3) The STATE to provide adequate space at the site, and other site compliance requirements as needed to meet R56 Communication Site Standards, except as provided by CONTRACTOR.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the proposed Civil Work specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE. NOTE: If additional requirements beyond the proposed Civil Work scope definition are needed a separate quote can be provided.

2) Successful demonstration of the completed configuration ~~and reporting capabilities~~/completed Civil Work as proposed.

18. DELIVERABLE 1-9.1 THROUGH 1-9.23 SYSTEM CONFIGURATION – FNE INSTALLATION (INCLUDES DELIVERABLE 1-FNE INSTALL.1-23 AND DELIVERABLE 1-DLVR)

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Install of proposed fixed network equipment for the radio sites and dispatch centers. Note below that “reporting capabilities” is not applicable to equipment installations.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.

2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.

3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.

4) CONTRACTOR shall deliver equipment to STATE provided warehouse/storage locations, as needed. (DELIVERABLE 1-DLVR).

5) CONTRACTOR shall install the following per the proposed equipment list:

   a) Install FNE

      i. Inspect and inventory all racks, cables, computers and other CONTRACTOR provided equipment.

      ii. Deliver equipment to proposed sites from warehouse/storage locations.

      iii. Install proposed equipment per Final Design approved floor and rack drawings, cable matrix and other final design documents.

      iv. Properly install proposed equipment per R56 installation guidelines.

      v. See Civil Work deliverable in section 17 for additional site responsibilities, as applicable.

      vi. Properly ground all racks, cabinets and equipment to protect against ground faults, electrical surges and lightning.

      vii. Install and connect all necessary cables (i.e. power, data) within each rack / cabinet and between racks / cabinets for system interconnection

         a. Cables will be run in the overhead cable trays per R56 guidelines

         b. Verify that all cables are properly labeled

viii. Power-up and test equipment.

ix. Removal of existing equipment is not proposed, but, if desired, can be quoted upon request.

b) Install Dispatch Equipment

i. Inspect and inventory all racks, cables, computers and other CONTRACTOR provided equipment.

ii. Deliver equipment to proposed dispatch sites from warehouse locations.

iii. Install the proposed console equipment per final design documents.

iv. Install and configure proposed MCC7500E console positions and backroom equipment at each site location as defined per the proposed System Description and Equipment List.

v. Connect STATE -supplied, previously-identified circuits into the console and/or proposed circuits, to a STATE demarcation point located within 25 feet of the console interface.

vi. Connect the appropriate equipment to existing or upgraded ground system in accordance with Motorola's R56 Site Installation standards.

vii. Perform the console programming, based on the console template designed during the fleet mapping process.

viii. Install consolettes, antenna and line utilizing existing cable runway, access/cable entry and mounting location for antenna. (It is assumed a steeplejack is not required for installations. If required, this can be quoted separately).

ix. CONTRACTOR shall reconnect all existing radio systems to the new console

x. CONTRACTOR will provide on-site expertise with the ability to correct any issues at each PSAP for the first 8 hours after cutover. CONTRACTOR shall stay on-site until all outstanding issues have been corrected.

xi. Remove existing dispatch equipment after cutover and deliver to designated central STATE location.

c. <u>Expectations of STATE:</u>

1) STATE shall make necessary configuration decisions.

2) STATE shall provide requested information and documentation as needed to configure the system.

3) STATE shall contract directly and provide required Backhaul (fiber, microwave) per CONTRACTOR defined radio system specifications via DCN or other provider, as applicable.

4) STATE Shall provide the following for proposed FNE and Dispatch equipment installation items:

a) Provide warehouse for all proposed equipment

i. Temperature controlled

ii. Secure

iii. 24-hour access

iv. Receipt of equipment

v. All movement within warehouse as needed

vi. In/Out loading and unloading

vii. 3 separate locations with proximity to local installer up to 15 months, or as needed

viii. Insurance coverage

5) Provide project management office space, as needed.

6) Provide designated contact to assist with both the coordination of the receipt of the proposed equipment and inventory all equipment.

7) Provide secure location for the CONTRACTOR -provided equipment at existing sites.

8) Provide or coordinate access to the site, as necessary.

9) Provide existing furniture for dispatch equipment at all sites, as needed.

10) Provide adequate floor space for installation of equipment in parallel with the existing system for cutover purposes.

11) Provide all conventional resource interfaces (as applicable) within the dispatch equipment room which are 4 wire or tone control / E&M signaling to ensure interface can be supported at the proposed sites.

12) Provide existing pre-wire auxiliary input/outputs for interface to the SDM 3000 at RF and Dispatch sites, as applicable.

13) Provide removals and designated location, within the respective County, for dispatch equipment removals, as applicable, per site.

14) Provide for 3rd party equipment, configuration, software/services which are not proposed as part of this contract.

d. <u>Acceptance Criteria:</u>

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE

2) Successful demonstration of the configuration and reporting capabilities; Specific to the proposed radio system this includes completion of FNE and Dispatch hardware installations for the proposed equipment. Reporting capabilities is not applicable to this install of radio equipment deliverable.

19. DELIVERABLE 1-9.1 THROUGH 1-9.23: SYSTEM CONFIGURATION – OPTIMIZATION

a. <u>Description:</u>

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Optimization of the proposed radio equipment.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.
2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.
3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE. Specific to the proposed radio system, Optimization Tasks below will be completed.
    a) CONTRACTOR and its subcontractors optimize each subsystem.
    b) Verify that all equipment is operating properly and that all electrical and signal levels are set accurately.
    c) Verify that all audio and data levels are at factory settings.
    d) Check forward and reflected power for all radio equipment, after connection to the antenna systems, to verify that power is within tolerances.
    e) Check audio and data levels to verify factory settings.
    f) Verify communication interfaces between devices for proper operation.
    g) Test features and functionality are in accordance with manufacturers' specifications and that they comply with the final configuration established during the CDR/system staging.
    h) Integrate the consoles into the system to ensure proper operation.
    i) Set up the consoles on the radio system to perform the dispatching operation.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.
2) STATE shall provide requested information and documentation as needed to configure the system.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured and optimized according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE
2) Successful demonstration of the configuration and reporting capabilities.

20. DELIVERABLE 1-9.1 THROUGH 1-9.23: SYSTEM CONFIGURATION – SUBSCRIBERS

NOTE: Subscribers are not proposed. The responsibilities in this section for subscribers are the State's pending separate purchase.

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes subscriber services (templates, programming, alignment, configuration, installation, as needed).

b. Expectations of CONTRACTOR:

Not Applicable – subscriber services have not been proposed.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.
2) STATE shall provide requested information and documentation as needed to configure the system.
3) STATE shall provide all subscriber related services for new and / or existing subscribers including but, not limited to: receive and inventory, storage, programming, template building, alignment, installation.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE
2) Successful demonstration of the configuration and reporting capabilities.

NOTE: DELIVERABLE 1-12: TRAINING MANAGEMENT PLAN - Specific to the proposed Motorola Solutions Radio Network the "training management plan" task will be completed during the CDR phase. Detailed tasks and expectations for this deliverable are noted above in the Project Plan and Scope of Work above in Section 2

21. DELIVERABLE 1-13.2,3,5 THROUGH 23: TRAINING

a. Description:

CONTRACTOR to conduct end user and administrator system training.

See proposed Phase 1 dispatch console training courses below specific to the proposed dispatch sites. Dispatch training included is per each individual PSAP site defined below and will allow for shift changes.

1) Course Descriptions and Syllabi for proposed dispatch training.

Table 29: PSAPs – Hillsboro, Grafton, Cavalier, Rugby, Rolla, Bottineau, Stanley, Stanton, Washburn, Valley City, Langdon, Williston, Emergency Management, and Sheriff's Office: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin **Supervisors** 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	6 (2 per session) To cover shifts
Operator Course Synopsis:						

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator **Dispatchers** 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	6 (2 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 30: PSAPs – Devil's Lake, Grand Forks, Dickinson, Minot, New Town, Jamestown, Wahpeton: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	12 (4 per session) To cover shifts

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	12 (4 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 31: PSAP – Fargo: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 4 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	24 (8 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator Dispatchers 4 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	24 (8 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 32: PSAP-Bismarck: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 6 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	36 (12 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 6 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	36 (12 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 33: PSAP – Bismarck State Radio: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 8 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	48 (16 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 8 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	48 (16 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 34: PSAP – Williston, Prime: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (8 hour sessions)	3 days	ND	Prior to cutover	12 (4per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	4 (12 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

b. <u>Expectations of CONTRACTOR:</u>

1) CONTRACTOR shall provide up-to-date and accurate user manuals and any other training materials that can be given to training participants and future STATE staff.
2) CONTRACTOR shall provide a training syllabus to STATE for review and feedback in advance of the training.
3) CONTRACTOR shall provide qualified instructors.
4) CONTRACTOR shall conduct training sessions at a location and time mutually agreed-upon with STATE.

c. <u>Expectations of STATE:</u>

1) STATE shall review and provide feedback on the training syllabus to verify that desired areas are part of the training.
2) STATE shall make assigned trainees available for the scheduled training sessions.

3) STATE shall provide training facilities and equipment.
4) STATE shall develop and conduct survey of training participants to verify training was effective.
5) STATE shall provide 30-day notice for any request to reschedule training.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Delivery of user manuals and training materials
2) Delivery of training in accordance with the syllabus
3) STATE survey concludes that CONTRACTOR training was effective.
4) Training approach and execution is in alignment with the Training Management Plan

22. DELIVERABLE 1-14.2,3,5 THROUGH 1-14.23: TRAINING

a. Description:

CONTRACTOR to conduct train-the-trainer and administrator system training. The train-the- trainer training will focus on persons that will ultimately perform training for end users. The administrator training will focus on persons that will act as system administrators. Dispatch training included is per each individual PSAP site as defined and will allow for shift changes.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide up-to-date and accurate user manuals and any other training materials that STATE trainers can give to training participants and future STATE staff.
2) CONTRACTOR shall provide a training syllabus to STATE for review and feedback in advance of the training.
3) CONTRACTOR shall provide qualified instructors.
4) CONTRACTOR shall conduct training sessions at a location and time mutually agreed-upon with STATE.

c. Expectations of STATE:

1) STATE shall review and provide feedback on the training syllabus to verify that desired areas are part of the training.
2) STATE shall make assigned trainees available for the scheduled training sessions.
3) STATE shall provide training facilities and equipment.
4) STATE shall provide 30-day notice for any request to reschedule training.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Delivery of user manuals and training materials
2) Delivery of train-the-trainer and administrator training in accordance with the syllabus
3) STATE survey concludes that CONTRACTOR training was effective

23. DELIVERABLE 1-5.1 THROUGH 1-5.23: DATA CONVERSION VALIDATION

a. Description:

CONTRACTOR and STATE shall validate the data conversion effort by reviewing the data loaded into the user acceptance testing environment and making any fixes to the system or data conversion process to ensure data transfers accurately and completely.

Specific to the proposed CONTRACTOR Radio Network validation items for this deliverable will be completed for the following items as defined during the CDR:

1) Programming/Configuration validation, as applicable.
2) Backhaul Link Test
3) Installation – R56 Communication Site Audits

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall initially validate the data conversion into the user acceptance testing environment and resolve any issues prior to STATE data conversion validation efforts.
2) CONTRACTOR shall support STATE's effort to identify and resolve any issues with the data conversion prior to Go Live.
3) Backhaul Test
    a) Perform test to verify site link performance meet CONTRACTOR specification for the proposed radio system.
4) Test alarming requirements as defined per CDR.
5) R56 Site Audit
    a) Perform R56 site-installation quality audits, verifying proper physical installation and operational configurations.
    b) Create site evaluation report to verify site meets or exceeds requirements, as defined in Motorola's Standards and Guidelines for Communication Sites (R56).

c. Expectations of STATE:

1) STATE shall test the data conversion into the user acceptance testing environment.
2) STATE shall identify, document, trouble-shoot and work with CONTRACTOR to resolve any data conversion issues.
3) Backhaul Test
    a) STATE shall make available the required links which meet the specifications defined by CONTRACTOR
    b) Provide preliminary test result information per CONTRACTOR specifications.
4) R56 Site Audit
    a) Provide access/escort to the sites.
    b) Witness tests if desired.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Successful upload of accurate and complete data extract from the legacy system to the user acceptance testing environment.
2) CONTRACTOR review of STATE-documented user acceptance testing issues and recommendations for file extract changes to remediate issues
3) Subsequent load(s) of STATE-provided revised data extracts to confirm resolution of issues, or documented alternatives to resolution.
4) R56 Site Audit successfully completed.
5) Backhaul Test/Link verification successfully completed.

24. DELIVERABLE 1-7.1 THROUGH 1-7.23: INTERFACE DEVELOPMENT AND RELEASE

a. Description:

CONTRACTOR shall build and release the interface with STATE's XXX application, per the requirements defined during analysis and the Interface Design deliverable. NOTE: At the time the State defines the XXX application the CONTRACTOR will review the request and provide a separate quote, as applicable.

Specific to the proposed CONTRACTOR Radio Network "interface development and release" the following items will be tested as applicable per phase (i.e. STATE Enterprise Network (CEN) interface). Installation tasks for these items will be performed during the previously completed System Configuration – Installation Deliverable.

b. Expectations of CONTRACTOR for proposed infrastructure equipment:

1) CONTRACTOR shall complete development of the interface.
2) CONTRACTOR shall conduct thorough technical testing of the interface as identified in the Testing Management Plan.
3) CONTRACTOR shall resolve issues identified with the interface.
4) CONTRACTOR shall provide configuration for the proposed CEN requirements.
5) CONTRACTOR shall install and validate the interface in preparation for user acceptance testing.

c. Expectations of STATE:

1) STATE shall provide technical resources and an environment for testing of the interface.
2) STATE shall collaborate with CONTRACTOR to validate CONTRACTOR installed interface correctly.
3) STATE shall validate interface is ready for user acceptance testing.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Release of the interface to STATE's user acceptance testing environment

2) Completion of CONTRACTOR'S testing effort and remediation of any testing failures.

e. Acceptance Process

1) Upon completion of a deliverable, the parties shall follow the acceptance process in accordance with this Contract.

25. DELIVERABLE 1-11.1 THROUGH 1-11.23: PHASE 1 ACCEPTANCE TESTING

a. Description:

CONTRACTOR shall support STATE testing efforts, make fixes and remediate testing issues during STATE's user acceptance testing and performance testing efforts.

The Dispatch console checklist will be competed per site is included on the following pages:

MCC7100/7500 Features

Console Conventional Instant Transmit

1. DESCRIPTION

The instant transmit switch provides immediate operator access to a channel, independent of its select status (selected or unselected).

SETUP

RADIO-1 - CONVCH1

RADIO-1 - CONVSITE 1

VERSION #1.01

SPS #7.6

2. TEST

Step 1. Click the mouse anywhere in the CONVCH1 resource window.

Step 2. Depress the Instant Transmit button on the CONVCH1 resource window.

Step 3. Verify that the Transmit indicator is lit.

Step 4. Verify that outbound audio is heard on RADIO-1.

Pass____ Fail____

Conventional Radio Resource

1. DESCRIPTION

A Radio Resource is selected on the MCC 7500 consoles by placing the cursor over the Radio Resource (Channel Control Window), choosing an area and selecting. The Radio Resource choice area is the region where the name of the Radio Resource is located (Top alphanumeric line of the Radio Resource). When selected, the background of the Radio Resource will turn white and the border will turn green. Choosing the PTT button will send keying commands to the station.

SETUP

RADIO-1 - CONVCH1
RADIO-1 - SITE - CONVSITE 1
CONSOLE-1 - CONVCH1
CONSOLE-1 - SITE - CONSITE 1

VERSION #1.01

SPS #7.6

2. TEST

Step 1. Select the CONVCH1 Radio Resource by moving the cursor over the Radio Resource's name and selecting.

Step 2. Begin an outbound console transmission using the PTT Button on the newly selected Radio Resource, in clear mode.

Step 3. Verify that console's outbound audio can be monitored by RADIO-1.

Step 4. Respond to the console outbound transmission from RADIO-1. Verify that RADIO-1 audio can be monitored at the console Select speaker.

Step 5. Depress any of the other available Radio Resources to "deselect" the present Radio Resource.

Step 6. Respond to the console outbound transmission from RADIO-1. Verify that RADIO-1's audio can be monitored at the unselect speaker.

Step 7. Repeat steps 1-6 for a sample of the remaining channels as needed.

Step 8. Repeat steps 1-7 for a sample of the remaining OPs as needed.

Pass____ Fail____

Frequency Selectable Digital Conventional Resource

1. DESCRIPTION

A Radio Resource is selected on the MCC 7500 consoles by placing the cursor over the Radio Resource (Channel Control Window), choosing an area and selecting. The Radio Resource choice area is the region where the name of the Radio Resource is located (Top alphanumeric line of the Radio Resource). When selected, the background of the Radio Resource will turn white and the border will turn green. Choosing the PTT button will send keying commands to the station.

There is also a drop down arrow button that shows the hidden available functions of that particular Channel Control Window (ID Display, Coded/Clear Switch, Volume Control, Frequency Select, etc.). There are also receive / transmit mode indications that will appear in the Radio Resource area.

The Frequency Select gives the option to choose 14 separate frequencies.

SETUP

RADIO-1 - CONVCH1

RADIO-1 - SITE - CONVSITE 1

CONSOLE-1 - CONVCH1

CONSOLE-1 - SITE - CONSITE 1

VERSION #1.01

SPS #7.6

2. TEST

Step 1. Select the CONVCH1 Radio Resource by moving the cursor over the Radio Resource's name and clicking the left mouse button.

Step 2. Use the pull down list to select the first frequency in the list.

Step 3. Select the corresponding frequency on RADIO-1.

Step 4. Verify communications between the console and RADIO-1.

Step 5. Repeat steps 1-4 for the remaining frequencies in the drop down list as needed.

Step 6. Repeat steps 1-3 for a sample of the remaining OPs as needed.

Pass____ Fail____

Patch Operation Conventional

1. DESCRIPTION

The Patch feature allows more than one Radio Resource to be grouped simultaneously. This can be used for temporarily merging two or more channels/frequencies together to act as one larger group. Telephones and radio resources can be patched together. In a patch group, the members can receive messages from the console and they can transmit to all other members of the patch group.

SETUP

RADIO-1 - CONVCH1
RADIO-2 - CONVCH2
CONSOLE-1 - CONVCH1 and CONVCH2

VERSION

1.02

2. TEST

Step 1. Select the tab for patch 1, 2 or 3. Verify that the patch edit button and patch transmit button appear.

Step 2. Select the "Patch Edit" icon. The selected patch will turn blue.

Step 3. Select the CONVCH1 and CONVCH2 Radio Resource by moving the cursor over the Radio Resources' names and selecting them.

Step 4. Verify that the selected Radio Resources display a "Patch Edit" icon.

Step 5. Press and hold the "Patch Transmit" icon to initiate the patch transmission.

Step 6. Verify that the RADIO-1 and RADIO-2 monitor the console outbound audio.

Step 7. Verify that RADIO-1 can communicate with RADIO-2 even though they are on separate channels.

Step 8. To knock down the patch, select the Radio Resources by moving the mouse cursor over the resource window and clicking over the patch icon. Repeat this process until all the resources have been removed from the Patch window.

Step 9. Select the Patch Edit icon and idle the current patch

Pass____ Fail____

Alert Tones – Conventional Channel

1. DESCRIPTION

Pre-defined alert tones can be transmitted on the selected Radio Resource to subscribers which can alert members of a channel / talkgroup to a particular event or signify to radio users' special instructions are to follow. The Console has the ability to send an Alert-Tone signal on selected conventional or talkgroup resources.

SETUP

RADIO-1 - CONVCH1
RADIO-2 - CONVCH1
CONSOLE-1 - CONVCH1

VERSION #

1.03

2. TEST

Step 1. Set the tracking generator to 0 dB signal.

Step 2. Set the spectrum analyzer to a center frequency of 815 MHz and 10 dB per division on the vertical scale. Set the the level to 0 and the span to 5 MHz per division.

Step 3. Turn the marker on to read signal level at the marker.

Step 4. Connect the tracking generator output to a multicoupler test port.

Step 5. Connect the spectrum analyzer RF input to any unused multicoupler output port.

Step 6. Measure the RF signal level on the spectrum analyzer. Record the spectrum analyzer signal level in the previously created table.

Step 7. Record the front panel current meter reading of the multicoupler on the previously created table.

Step 8. Restore all connections when completed.

Step 9. There is no pass/fail critera for this test. The purpose of this test is to keep a baseline record of the Receiver Preamplifier Gain for future reference and maintenance. This test does not need to be repeated for the remaining base stations.

Pass____ Fail____

Alarm Input / Outputs (Aux I/O Option)

1. DESCRIPTION

The alarm inputs of the Aux I/O can be connected to almost any device that requires or can detect a relay closure. These signals can be simulated and monitored in the factory.

SETUP

Connect a multi-meter capable of monitoring closures to the proper pins of the punch block cabled to the Aux I/O. One momentary input and one momentary output should be configured on at least one MCC 7100/7500 console.
CONSOLE-1 - TG1
CONSOLE-1 - SITE - CONSITE1
Aux I/O punch block pinout:

Aux I/O 1 - pins 26,1
Aux I/O 2 - pins 27,2
Aux I/O 3 - pins 28,3
Aux I/O 4 - pins 29,4

VERSION

1.01

2. TEST

Step 1. Using a shorting wire, simulate a relay closure on an input via the punch block.

Step 2. Verify that CONSOLE-1 momentary input displays the icon designated for an ON_STATE.

Step 3. Remove the shorting wire and verify that CONSOLE-1 displays the icon designated for an OFF_STATE.

Step 4. Connect the meter to the pins to monitor a relay output.

Step 5. Verify that the meter reads an open circuit.

Step 6. Press the output button on the console to initiate a relay closure.

Step 7. Verify that the meter displays a closed circuit

Pass____ Fail____

Unified Event Manager (UEM) – Base Views

1. DESCRIPTION

The Unified Event Manager (UEM) in its base configuration provides a number of views. The purpose of this test is to demonstrate the key views available from the UEM.

The Physical Summary and Detail View (Physical Map) and Service Summary and Detail View (Service Map) in previous releases are deprecated and are replaced by the Zone Map. Custom views can be saved and retrieved by other NM Client users.

SETUP

NMclient01 - UEM session up and running.

VERSION

1.01

2. TEST

Step 1. Alarms View: In the navigation pane expand Fault Management and select Alarms. The view displays active alarms for managed resources, displaying impacted managed resources and specific objects on the managed resource along with selected alarm properties.

Step 2. Alarm View Search: Customize the Active Alarms display by selecting the View option from the menu bar, then select Search. Perform a Managed Resource search for channels, site controllers and routers by entering "Contains" and ch, sc, and z00 respectively in the search fields to perform the three separate searches. For each of the three searches a filtered alarm view is displayed that contains alarms for the appropriate device in the search.

Step 3. Network Events View: In the navigation pane expand Fault Management and select Network Events. The view displays recent events reported for managed resources, displaying impacted managed resources and specific object on the managed resource along with selected event properties. Alarming events are base for creating alarm objects.

Step 4. Physical Summary View: In the navigation pane expand Zone Views and Physical, then select Physical Summary View. The Physical Summary View provides an aggregated alarm severity status of the devices located at all subnets in the Zone.

Step 5. Service Summary View: In the navigation pane expand Zone Views and Service, then select Service Summary View. The Service Summary View provides a quick summary of the service status of sites in a Zone, including access to Channel status.

Step 6. Zone Map: In the navigation pane, expand Zone Views and select Zone Map. The Zone Map view provides an aggregated alarm severity status of the devices located at discovered sites in the Zone.

Step 7. Network Database: In the navigation pane select Network Database. The Network Database displays a list of all discovered Managed Resources and Sites. The display includes properties of each resource as well as overall severity of all objects and/or sub resources

Pass____ Fail____

Alarm Processing – Acknowledged/Un-acknowledge alarm

1. DESCRIPTION

The Unified Event Manager (UEM) provides the user the ability to acknowledge alarms raised against managed resources and their objects. The operation is available for users with appropriate permissions and audited. This is the base UEM alarm acknowledgement functionality available in all UEM deployments. It is further enhanced if Enhanced Navigation is enabled.

SETUP

No prior setup is required.

VERSION

1.03

2. TEST

Step 1. Login to UEM Client as user with permissions to perform alarm acknowledge operation.

Step 2. Create an alarm condition by simulating an alarm on a managed device in the system.

Step 3. Navigate to Alarms View and sort by clicking on the header of Ack Status column.

Step 4. Review all not acknowledged alarms and locate test alarm that has been generated.

Step 5. Double-Click on the alarm to open Alarm details window.

Step 6. Ack status value should be set to Not acknowledged.

Step 7. Click Acknowledge button to acknowledge this alarm and verify that Acknowledge status has changed to include information on the current user and timestamp of the operation. The Alarms view should show alarm status as Acknowledged.

Step 8. Click Unacknowledged button and verify that Acknowledge status has changed to Unacknowledged and includes information on the current user and timestamp of the operation

Pass____ Fail____

Report Generation

Historical Reports

1. DESCRIPTION

Performance reports can be created automatically for dynamic statistical information about the air traffic activity on the system. These reports provide assistance with system management, resource planning, usage allocation, and monitoring. All reports are preformatted and summarize air traffic activity for a configured time span.

Note: Depending on the time span selected smaller time intervals may not be available.

SETUP

No prior setup is required for this test.

VERSION

1.01

2. TEST

Step 1. From the PC Application Launcher, select a zone.

Step 2. From that zone's menu, choose Zone Historical Reports.

Step 3. From the Historical Reports Player window that opens, select a report.

Step 4. Using the left mouse button, click on the view button.

Step 5. Observe a window opens allowing a user to enter report parameters.

Step 6. Enter all desired data for the report and Generate Report.

Step 7. Observe a window appears showing the requested report.

Step 8. Close the report window.

Step 9. Run the following reports during testing: Talkgroup at Zone Summary; User at Zone Summary; Site Summary

Pass____ Fail____

System Reliability Features

Link Failure between MCC7100/MCC7500 site and Zone Controller

1. DESCRIPTION

This test will demonstrate that the two communication paths between the MCC 7100/7500 Console Site and Zone Controller are redundant and the system will continue uninterrupted if the main path fails. To accomplish this test one of the two NIC connections is removed at the Zone Controller.

SETUP

RADIO-1 - TALKGROUP 1
RADIO-1 - SITE - SITE 1
RADIO-2 - TALKGROUP 1
RADIO-2 - SITE - SITE 1
RADIO-3 - TALKGROUP 2
RADIO-3 - SITE - SITE 1
RADIO-4 - TALKGROUP 2
RADIO-4 - SITE - SITE 2
CONSOLE-1 and CONSOLE-2 at the MCC 7100/7500 Console site are affiliated to the TALKGROUP 1 and TALKGROUP 2 talkgroups.

VERSION #1.010

2. TEST

Step 1. Initiate a Talkgroup Call with RADIO-1 in TALKGROUP 1.

Step 2. Observe that only RADIO-2, CONSOLE-1 and CONSOLE-2 are able to monitor and respond to the call

Step 3. Initiate a Talkgroup call with RADIO-3 in TALKGROUP 2.

Step 4. Observe that only RADIO-4, CONSOLE-1 and CONSOLE-2 are able to monitor and respond to the call.

Step 5. Remove the Ethernet cable from the NIC on the Dispatch Site Gateway 1, this will simulate a Zone Controller to Console Site Link failure.

Step 6. Observe that the calls on TALKGROUP 1 and TALKGROUP 2 can continue.

Step 7. Repeat steps 1-6 for the other Dispatch Site Gateway.

Step 8. Connect the Ethernet cables to normalize the system.

Pass____ Fail____

Signoff Certificate

By their signatures below, the following witnesses certify they have observed the system Acceptance Test Procedures.

Signatures

WITNESS: _____Date: _____

Please Print Name: _____ _____

Initials:

Please Print Title: _____

WITNESS: _____Date: _____

Please Print Name: _____ _____

Initials:

Please Print Title: _____

Functional Acceptance Test:

Successful completion of functional acceptance testing requires the system to be operational and the necessary parties to be available to participate in the testing. During testing, all measurements or outcomes will be recorded within the test script, as indicated in the test. The result of a test procedure will be “Pass”, “Fail”, or a measured value. A checkmark in the “Pass” field or in the appropriate box will be sufficient to indicate that a step has passed the test. When all steps in a specific test pass, a representative from the Contractor and the State will sign the test procedure form to indicate the system has passed that test.

If a failure occurs, a check will be placed in the “Fail” field within the test procedure and an entry made on a Punchlist Form. Procedures that fail will be remedied and retested. The Punchlist Form includes the date and time the entry was opened, the date closed, the test number and step and a description of the failure.

Field Functional Acceptance Testing Documentation and Results

Following completion of functional acceptance testing, CONTRACTOR shall document the results of the acceptance test plan and provide them to the State in a final system documentation package. The documentation will include:

- Testing procedures utilized.
- Test dates and locations.
- Testing results.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall test 80% of code against product specifications and agreed-upon requirements. NOTE: The proposed radio system does not include the customized writing of code. As such, any testing of software will be part of the System Acceptance Testing this includes:
   a) Functional Acceptance Test (field)
2) CONTRACTOR shall demonstrate system functionality prior to commencement of acceptance testing by STATE.
3) CONTRACTOR shall review and consult on STATE’s test scripts to ensure scripts are accurate and thorough.
4) CONTRACTOR shall provide template to document testing results.
5) CONTRACTOR shall provide testing support to identify, troubleshoot and resolve issues.
6) CONTRACTOR shall provide technical assistance with testing, verification and classification of issues.
7) CONTRACTOR shall correct validated issues based on priorities and severities defined by STATE.
8) CONTRACTOR shall work with STATE to ensure the development environment is correctly copied into the testing environment and all users have appropriate access.
9) CONTRACTOR Functional Acceptance Testing:

a) Verify the operational functionality and features of the individual subsystems and the system supplied by CONTRACTOR, as contracted.

b) If any major task as contractually described fails, repeat that particular task after CONTRACTOR determines that corrective action has been taken.

c) Document all issues that arise during the acceptance tests.

i. Document the results of the acceptance tests and present to the STATE for review.

ii. Resolve any minor task failures before Final System Acceptance

c. <u>Expectations of STATE:</u>

1) STATE shall provide the testing environment.

2) STATE shall lead the testing effort and issue resolution process.

3) STATE shall ensure STATE testing occurs according to the project schedule and test results and resolutions are documented.

4) STATE shall create test scripts according to STATE-defined workflows and processes.

5) STATE shall provide adequate and knowledgeable system users to participate in testing.

6) STATE shall perform user acceptance testing.

7) STATE shall perform application performance testing.

8) STATE shall document any identified issues, assign priority and severity and provide results to CONTRACTOR for trouble-shooting.

9) STATE shall provide programmed subscriber units for use in testing of the proposed system.

10) STATE shall provide the following to support the Functional Acceptance Testing:

a) Witness the functional testing.

b) Approval of the functional testing.

d. <u>Acceptance Criteria:</u>

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Completion of system testing and system functionality demonstration by CONTRACTOR

2) Completion of user acceptance testing and performance testing support by CONTRACTOR

3) Testing issues are resolved

4) Testing approach and execution is in alignment with the Testing Management Plan

5) STATE approves the Functional Acceptance Test.

26. DELIVERABLE 1-16.1 THROUGH 1-16.23: IMPLEMENTATION

a. Description:

CONTRACTOR shall support implementation of the final system. Implementation includes the Cutover / Business migration and Punchlist Resolution.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall participate, contribute and collaborate with STATE for implementation preparations.
2) CONTRACTOR shall make any fixes required in a timely manner to implement the system as approved in the Acceptance Testing deliverable.
3) CONTRACTOR shall provide technical support to STATE as needed for implementation efforts.
4) Cutover/Business Migration
    a) During cutover, follow the written plan (defined during the CDR) and implement the defined contingencies, as required, with little or no impact on the existing system and/or STATE operations
    b) Complete all required/proposed training plans prior to cutover
    c) Coordinate with the STATE to ensure all subscribers planned for cutover are activated in the system.
5) CONTRACTOR shall work with the STATE to resolve punchlist items, documented during the Acceptance Testing phase, in order to meet all the criteria for final system acceptance

c. Expectations of STATE:

1) STATE shall participate, contribute and collaborate with CONTRACTOR for implementation preparations.
2) STATE shall provide the production environment.
3) STATE shall monitor the implementation and notify CONTRACTOR of any issues.
4) STATE Cutover
    a) Notify the user group(s) affected by the cutover (date and time).
    b) Conduct a roll call of all users working during the cutover, in an organized and methodical manner.
    c) Ensure that all subscriber users are trained.
    d) Program, Distribute and install all subscriber devices prior to cutover.
    e) STATE shall Assist CONTRACTOR with resolution of identified punchlist items by providing support, such as access to the sites, equipment and system and approval of the resolved punchlist item(s).

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) CONTRACTOR support during implementation

2) System go live with no unresolved issues

3) Successful migration from the old to new system.

4) All punchlist items resolved and approved by the STATE

27. DELIVERABLE 1-17.1 THROUGH 1-17.23: POST-IMPLEMENTATION REPORT

a. Description:

CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to provide content for the Post-Implementation Report. Additionally, the proposed radio network project will include applicable project documentation as noted below including project warranty and post warranty documentation, as applicable.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall have project team members participate in the Post-Implementation Survey.

2) CONTRACTOR shall provide the following as applicable:

NOTE: The following will be provided in Phase I.

PHASE 1: Core and Dispatch documentation will be provided as defined below.

a) Functional Acceptance Test Plan test sheets and results

b) Equipment Inventory List

c) Console Programming Templates

d) ATP Test Checklists

e) System Block Diagram

f) Site Floor Plan

g) Site Rack Face

h) Site Block Diagrams

i) System Diagram

3) CONTRACTOR shall review the items necessary for transitioning the project to warranty support and service

4) CONTRACTOR shall provide a STATE Support Plan detailing the warranty and post warranty support, if applicable, associated with the Contract equipment.

5) CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to develop a Post-Implementation Report that provides, at a minimum, the following:

a) Key project metrics related to schedule, cost, scope and quality

b) Business metrics related to project objectives and measurements as defined in the Project Charter

c) Comprehensive lessons learned valuable to future projects

d) Success stories from the project

e) Results of the Post-Implementation Survey

c. Expectations of STATE:

1) STATE's Project Manager shall be responsible for the final product.
2) STATE's Project Manager shall design and conduct the Post-Implementation Survey.
3) The Post-Implementation Report shall follow STATE template.
4) Receive and approve Project Documentation provided by CONTRACTOR.
5) Participate in the Transition Service process.

d. Acceptance Criteria:

1) Applicable per Full Project: For the acceptance of this deliverable to occur, CONTRACTOR shall participate in the Post- Implementation Survey and provide content to STATE for the Post-Implementation Report regarding all services, tasks and products delivered by CONTRACTOR:
   a) Key project metrics related to schedule, cost, scope and quality
   b) Business metrics related to project objectives and measurements as defined in the Project Charter
   c) Lessons learned from the project
   d) Success stories from the project
2) Project Documentation provided by CONTRACTOR and received, approved by the STATE.
3) STATE Support Plan provided by CONTRACTOR and approved by STATE.
4) Applicable to Full Project: For the acceptance of this deliverable to occur, approval must be obtained from STATE's Executive Steering Committee (ESC).
5) Applicable per Dispatch Site:
   a) Completion of this deliverable per dispatch site will signify Final Acceptance per Dispatch Site (Final Acceptance for project is separate).

28. DELIVERABLE 1-18.1 THROUGH 23: PHASE 1 PROJECT CLOSEOUT MEETING

a. Description:

CONTRACTOR shall coordinate with STATE to schedule a Phase 1 Closeout Meeting in Bismarck, ND with the core project team and interested stakeholders. STATE's Project Manager shall lead the meeting, though CONTRACTOR may be asked to present on certain agenda items. The Closeout Meeting must present a completed Post-Implementation Report and facilitate discussion of the project closeout.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide content to STATE for detailed agenda in advance of the meeting.
2) CONTRACTOR shall provide STATE any required information for STATE's Project Manager to present the Post-Implementation Report.

3) CONTRACTOR shall expand upon the success stories and lessons learned captured from the Post-Implementation Survey and discuss details related to the lessons learned to provide comprehensive information to future projects.

c. Expectations of STATE:

1) STATE shall finalize and send agenda to invitees.
2) STATE shall coordinate logistics and facilitate the Closeout Meeting.
3) STATE shall expand upon the success stories and lessons learned captured from the Post- Implementation Survey and discuss and further document details related to the lessons learned to provide comprehensive information to future projects.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Closeout Meeting results in:

1) Completion and confirmation of the Post-Implementation Report deliverable
2) Comprehensive lessons learned and success stories valuable to future projects

29. DELIVERABLE 1-19.1 THROUGH 23: PHASE 1 FINAL ACCEPTANCE

a. Description:

Upon completion of all deliverables and upon mutual agreement of STATE and CONTRACTOR, the project work will be considered complete and retainage paid to contractor.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall address any outstanding issues or completion of deliverables.

c. Expectations of STATE:

1) STATE shall alert CONTRACTOR to any outstanding issues.

d. Acceptance Criteria:

Final Phase 1 System Acceptance Received from the STATE.

For the acceptance of this deliverable to occur, the following criteria must be met:

1) No outstanding or unfinished deliverables
2) No outstanding project or system issues

e. Project Administration

1) Progress Milestone Submittal
    a) CONTRACTOR Responsibilities:
        i. Submit progress (non-payment) milestone completion certificate/documentation.
    b) STATE Responsibilities:
        i. Approve milestone, which will signify confirmation of completion of the work associated with the scheduled task.
    c) Completion Criteria:

i. The STATE approval of the Milestone Completion document(s).

30. SCHEDULE

a. 800 MHz Only Solution Preliminary Schedule

The preliminary schedule below is based on the proposed main offering and assumes all deliverables are completed per schedule. This preliminary schedule will be jointly reviewed with the State prior to the Contract Design Review to accommodate any additionally purchased options, requested changes and the final Contract start date. Items such as permitting, as applicable, are estimates only and are not under CONTRACTOR'S control. A final schedule will be jointly agreed upon by the STATE and CONTRACTOR and included as a Contract Design Review deliverable.

EXHIBIT B-1A – Phase 1 Draft Schedule

Reference PDF file named 20190116 DRAFT ND Schedule Phase One.

EXHIBIT B-1B – Phase 1 Payment Schedule

As Deliverable acceptance is given in conjunction with the Phase 1 Statement of Work, STATE will make payments to CONTRACTOR within thirty (30) days after the date of each invoice. STATE will make payments when due in the form of a check, cashier's check, or wire transfer drawn on a U.S. financial institution and in accordance with the following milestones.

Total Phase 1 Value ($7,454,271)	
Contract Design Review (CDR)	
Project Kickoff Complete - Deliverable 1-1	$291,099
Project Plan (Schedule Baselined) – Deliverable 1-SCHED	$145,550
Project Plan Complete – Deliverable 1-2	$145,550
CDR Complete - Deliverable 1-CDR	$759,031
Total CDR Milestone	$1,341,229
Less 15% Retainage	*$201,184*
Net CDR Milestone Payments	$1,140,045
Delivery of Equipment (from Staging, as applicable)	
Delivery of Equipment – Deliverable 1-DLVR	$7,768,626
Less Applicable Contract Incentives	*$4,360,167*
Total Equipment Delivery Milestone	$3,408,459
Less 15% Retainage	*$511,269*
Net Equipment Delivery Milestone Payments	$2,897,190
FNE Install Complete by Site	
Installation Complete by site – Deliverable FNEINSTALL.1-23 (see breakdown by site on Exhibit D)	$2,543,876
Less 15% Retainage	*$381,581*
Net Installation Milestone Payments	$2,162,295
PSAP Training Complete by Site	
Training Complete by site – Deliverable 1-13.2-23(see breakdown by site on Exhibit D)	$160,707
Less 15% Retainage	*$24,106*
Net Training Milestone Payments	$136,601
Final Acceptance by site (Payment of Retainage)	
Final Acceptance Milestone by site – Deliverable 1-19.1-23 (see breakdown by site on Exhibit D)	$1,118,141

CONTRACTOR shall make partial shipments of equipment and will request payment upon delivery of such equipment as reflected on a per site basis within the referenced exhibit. In addition, CONTRACTOR shall invoice for installations completed on a site-by-site basis or when professional services are completed, when applicable, as per the referenced exhibit. For invoicing purposes only, contract incentives will be applied to payments as explicitly reflected within the Phase 1 payment milestones herein. Overdue invoices will bear simple interest at the maximum allowable rate by state law.

For Lifecycle Support Plan and Subscription Based Services

CONTRACTOR will invoice STATE annually in advance of each year of the plan.

EXHIBIT B-2 – Phase 2 Statement of Work

1. PHASE 2 SYSTEM OVERVIEW

This second phase will provide mobile coverage with portable in-building coverage within proximity of the proposed 45 ASR sites. Phase 2 utilizes the separately provided Phase 1 Master site/core and dispatch console equipment. Phase 2 includes the 45 site RF equipment, installation, implementation services, and functional testing. This Phase shall provide when implemented 95% coverage reliability throughout 85% of the geographic region of the State.

1) Mobile coverage, portable on-street and in-building coverage within proximity of all towers
2) Core Network system licenses.
3) OPTION: LTE PTT Broadband Gateway and concurrent per year user licenses.
4) Dispatch Spares - 13 sets additional
5) 45 800 MHz ASR RF sites with 3 channels, twenty-one sets of RF Site Spares and 4 Spare Antennas
    a) Each proposed ASTRO 25 Repeater Site (ASR) is equipped with three (3) channels (total of four (4) talkpaths). NOTE: One GTR 8000 Expandable Sub Subsystem (ESS) rack supports up to six (6) channels. Therefore, three (3) additional channels (six talkpaths) can be added without adding another ESS rack.
6) OPTION: Encryption – AES and DES-OFB – Infrastructure and consoles, KVL.
7) OPTION: Integrated Voice and Data, Enhanced Data for up to 25,000 users.
8) OPTION: BAFO Civil 45 Sites (tower maintenance not included)
    a) Add Supply 10 new shelters at existing sites and removal of existing shelter.
    b) Add Increased tower loading capability (foundation/steel) for proposed 34 new towers.
    c) Add Tower decommissioning and removal at 34 sites.
9) OPTION: Replace the proposed transmit antenna line and associated accessories, which is currently 7/8” with 1 5/8” line.
10) OPTION: Replace guyed tower with like-height self-supported tower, including applicable like-civil installation services.
11) OPTION: SDM 3000 removal from the proposed RF site offering.
12) OPTION: The STATE reserves the right to increase mobile coverage to meet each region (as defined in Attachment 2) with 95% mobile coverage throughout the geographically bounded area of the region at 95% reliability. This option includes adding 31 ASR sites, which are planned for Phase 3, to Phase 2.
13) Training: Dispatch Console Refresh and 1st Echelon System and Maintenance training.
14) Connectivity through DCN: Quoted but to be paid directly by STATE
15) Warranty: One Year is included for the proposed infrastructure equipment

16) Complete Implementation as detailed in the Statement of Work below including:

a) Installation & Optimization.

b) Civil Work as detailed in section 31 CIVIL SCOPE OF WORK

c) Coverage Verification.

d) Acceptance Testing.

a. Radio System Equipment Included:

1) Phase 2 Core Network system licenses.

License	Description of License	Qty
ASTRO 25 TDMA Site	License for the ASTRO 25 TDMA sites in the system. One license is required for every ASR and simulcast remote site.	45
ASTRO 25 TDMA Base Radio	License for the ASTRO 25 TDMA Base Radios in the system. One license is required for every TDMA Base Radio.	135
ASTRO 25 Radio Users	License for ASTRO 25 Voice radio users (i.e. subscribers). One license is required for up to 500 radio users	43
Email Alarm Notification	Sends notifications for system alarms in the UEM application through the customer enterprise network (CNI) to a specified email address. Alarms can also be forwarded to a mobile device, such as a cellular phone or PDA	1
Zone Watch	Provides a graphical display of channel activity for an entire zone by channel. Up to 5 concurrent user licenses are available per M2 Core.	2
Affiliation User Reports	Allows a user to observe selected real time affiliations in the zone for sites, talk groups, or individual radio users. Also provides graphing capabilities. Up to 3 concurrent user licenses are available per M2 Core.	2
Radio Control Manager	Provides the capability for users to perform selective radio inhibits, dynamic regrouping and issue storm plans. Up to 10 concurrent licenses are available per M2 Core.	24
Dynamic Reports	Provides the capability for users to generate near real-time graphical reports showing the total system utilization for talkgroup, private and interconnect calls. Up to 5 concurrent user licenses are available per zone.	2

2) OPTION: LTE PTT Broadband Gateway Equipment.

The Critical Connect Platform is focused on providing interoperable PTT communication between SIRN ASTRO®25 land mobile radio network and between and carrier-integrated broadband PTT.

A Broadband Gateway and Firewall which provides an interoperability radio network interface to support broadband LTE devices is included.

3) Spares Equipment: 21 Sets of RF Spares & 13 Sets of Dispatch Spares

SPARE TYPE	LOCATION	QTY	NOMENCLATURE	DESCRIPTION
DISPATCH	VARI REGION	13	TT3225	Z2 MINI WORKSTATION 258G 8G NON RET
DISPATCH	VARI REGION	13	SQM01SUM0205	GGM 8000 GATEWAY
DISPATCH	VARI REGION	13	CA01616AA	ADD: AC POWER
DISPATCH	VARI REGION	13	CA02086AA	ADD: HIGH DENSITY ENH CONV GATEWAY
DISPATCH	VARI REGION	13	CLN1856	2620-24 ETHERNET SWITCH
DISPATCH	VARI REGION	13	B1912	MCC SERIES DESKTOP SPEAKER
DISPATCH	VARI REGION	13	B1914	MCC SERIES DESKTOP GOOSENECK MICROP
DISPATCH	VARI REGION	13	B1913	MCC SERIES HEADSET JACK
DISPATCH	VARI REGION	13	TT3106	Z440 WORKSTATION WINDOWS 10 IOT ENT
DISPATCH	VARI REGION	13	B1934	MCC 7500 VOICE PROCESSOR MODULE FRU
DISPATCH	VARI REGION	13	CA00143AC	ADD: DES-OFB ALGORITHM
DISPATCH	VARI REGION	13	CA00147AF	ADD: MCC 7500 SECURE OPERATION
DISPATCH	VARI REGION	13	CA00182AB	ADD: AES ALGORITHM
DISPATCH	VARI REGION	13	CA00245AA	ADD: ADP ALGORITHM
DISPATCH	VARI REGION	13	3082933N08	GR500 AC POWER CORD
DISPATCH	VARI REGION	13	01009513001	PWR SPLY 108W AC INP 12VDC OUT W18
DISPATCH	VARI REGION	13	30009351001	DC CABLE ASSY
DISPATCH	VARI REGION	13	DLN6966	FRU: GCP 8000/GCM 8000/GPB 8000
DISPATCH	VARI REGION	13	DLN6781	FRU: POWER SUPPLY
DISPATCH	VARI REGION	13	DLN6898	FRU: FAN MODULE
CORE	BISMARCK	1	T8126	FORTINET FIREWALL APPLIANCE
CORE	BISMARCK	1	DLN6692	HP LASERJET PRINTER CP3525DN 110V
CORE	BISMARCK	1	DSK3R64AA	HP 9.5MM SLIM SUPERMULTI DVD WRITER
CORE	BISMARCK	1	CVN6565	SPARE CABINET ASTRO 7.9 & BEYOND
ASR	RF SITES	21	DLN6455	CONFIGURATION/SERVICE SOFTWARE
ASR	RF SITES	21	DLN6781	FRU: POWER SUPPLY
ASR	RF SITES	21	DLN6895	FRU: PA 7/800 MHz
ASR	RF SITES	21	DLN6885	FRU: XCVR 7/800 MHZ V2
ASR	RF SITES	21	DLN6898	FRU: FAN MODULE

SPARE TYPE	LOCATION	QTY	NOMENCLATURE	DESCRIPTION
ASR	RF SITES	21	DLN6634	FRU: 700/800 MHZ SITE LNA
ASR	RF SITES	21	DLN1306	FRU: 700/800 MHZ CABINET RMC MODULE
ASR	VARI REGION	4	DSCC80711T1	OMNI, CORP COLLINEAR, 10.5DB, 746-870MHZ, 1DEG DT, PIM, 25KW PIP RATED

4) 45 ASR 800 MHz RF Sites Equipment per Site includes (see Exhibit D: Pricing for full site list):

a) RF Equipment per ASR site:

i. One (1) 7.5′ Open Rack GTR 8000 Expanded Site System (ESS), AC or DC Power Distribution.

ii. Three (3) 7/800 MHz GTR 8000 ASTRO 25 TDMA Repeaters.

iii. One (1) Primary 6 Port Cavity Combiner.

iv. One (1) Cabinet Receiver Multicoupler.

v. One (1) Transmit Filters, 800 MHz only.

vi. Two (2) Site Controllers.

vii. Two (2) GGM 8000 Gateways with Encryption and Common Criteria (AC Power).

viii. One (1) 7.5′ Open Rack and Rackmount AC Power Strips.

ix. One (1) SDM 3000 RTU (AC Only) for site's Auxiliary Digital Inputs forwarding to UEM.

x. One (1) TXRX 428 E Control Monitoring Unit (CMU, AC Only).

xi. One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

xii. Two (2) UPS, SEPS Inc 9PX, 2700W, 120V, Softwired, 23 Min Runtime Rack Mounted.

b) Antenna Network Equipment per ASR site:

i. Two (2) RFI CC807-11T1 Antennas (one Transmit and one Receive Antenna).

ii. One (1) second receive antenna and line to be mounted at the same level as the new receive antenna

iii. One (1) TXRX 428 E Tower Top Amplifier (TTA).

iv. 7/8″ Coaxial transmit line plus connectors and jumpers. OPTION: Any tower 300' or higher optionally can add 1 5/8" coaxial transmit line plus connectors and jumpers.

v. 7/8″ Coaxial receive line plus connectors and jumpers.

vi. ½″ Coaxial test line plus connectors and jumpers.

c) Civil Work for each of the State Owned ASR sites (Towers, Shelters, Power as needed):

i. Supplying 33 + 1 (Mylo) new guyed towers.

ii. Utilize 11 existing towers.

iii. Utilize 45 existing shelters (unless Civil Option is purchased).

iv. Detailed Civil content for the 45 sites is in section 31 and Exhibit D: Pricing.

b. <u>OPTION BAFO Civil Work at 45 Sites</u>

1) OPTIONAL: Supply 10 new shelters at existing sites and removal of existing shelter. (Tower Maintenance Not Included)

CONTRACTOR will replace the existing older 14'x25' corrugated metal shelters with new Thermo Bond 12'x32' lightweight shelters at the following State sites: Arnegard, Tioga, Williston, Dickinson, Denhoff, Linton, Devils Lake, Milton, Grand Forks, Valley City. This option, if selected, will provide HVAC and generator replacements. The proposed new shelters are the same lightweight Thermo Bond shelters the State has currently deployed.

CONTRACTOR will demolish and dispose of the existing 14'x25' corrugated metal equipment buildings and remove the foundation materials to 12-inches below grade and backfill. The State will be responsible for the removal of all electronic equipment prior to demolition including DC power and batteries. Any asbestos removal has not been included.

CONTRACTOR will properly dispose of any remaining generator fuel and remove the decommissioned generator and ATS equipment including the fuel tank to an agreed-upon State- owned property within 50 miles of the site for disposal by the State.

Shelters, generators / ATS, and fuel tanks will be removed from the following 10 State sites where CONTRACTOR will replace the shelters:

1) Arnegard.
2) Denhoff.
3) Devils Lake.
4) Dickinson.
5) Grand Forks.
6) Linton.
7) Milton.
8) Tioga.
9) Valley City.
10) Williston.

c. <u>OPTION Add Increased tower loading capability (foundation/steel) for proposed 34 new guyed towers (Tower Maintenance Not Included)</u>

CONTRACTOR originally had provided for tower loading for the three (3) proposed new system antennas plus 100% growth. Per the State's request, this optional offering, if purchased, provides a guyed tower design to be less than 50%- loaded

with the proposed new system antennas, as well as, the State-requested antenna equipment as follows:

1) (5) DB 224 antennas or similar with side arms mounts.
2) 3' parabolic antenna.
3) Safety climb system.
4) Required tower lighting with mounts.
5) Lightning rod.
6) Anchors: Caisson type preferred. If dead-man anchors used, anchor shafts must be entirely incased in concrete below grade. Concrete shall extend a minimum of 6" above grade.
7) Designs based on TIA-222-G
8) Structural class III, Exposure category C, Topographic category 1.

The updated guyed tower design includes standard caisson anchor arms (updated from dead-man anchors) and is in accordance with ANSI/TIA-222-G to meet the following parameters:

a) Structural Class III

   Structures used primarily for essential communications such as: civil or national defense, emergency, rescue or other disaster operations, military and navigation facilities.

b) Exposure Category C

   Open terrain with scattered obstructions having heights generally less than 30 feet. This category includes flat, open country, grasslands and shorelines in hurricane prone regions. Exposure C is the standard default for exposure categories.

c) Topographic Category 2

   Structures located at or near the crest of an escarpment. Wind speed up shall be considered to occur in all directions. Structures located on the lower half of an escarpment or beyond 8 times the height of the escarpment from its crest, shall be permitted to be considered at Topographic Category I.

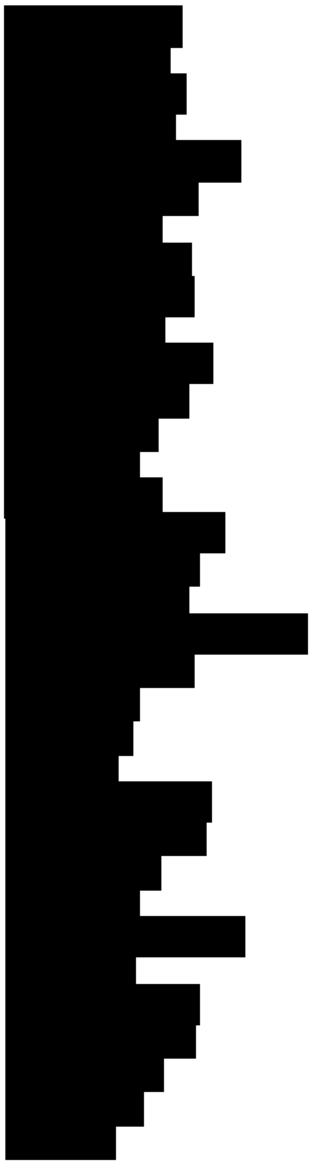
d. <u>OPTION Add Tower decommissioning and Tower removal at 34 sites.</u>

CONTRACTOR will be responsible for the decommissioning and demolition of the existing State- owned towers defined below. CONTRACTOR and the State will work together to develop an agreed-upon schedule and timeline for the decommissioning of this site infrastructure as it is related to final project scope and phases.

NOTE: The removal of the legacy antennas and lines is included in the CONTRACTOR Final Deployment pricing/Phase 3; However, the re-installation or replacement of the legacy antenna equipment for the optional 34 towers which will be decommissioned (if purchased) has not been included in CONTRACTOR pricing and can be quoted separately upon the State's request. Legacy equipment shall be reinstalled during Phase 2 and removed after completion of Phase 3 if requested by the STATE.

1) Existing State Towers:

CONTRACTOR will remove the tower steel to an agreed-upon State-owned property within 50 miles of the site for disposal by the State. The tower foundation will be removed to 12-inches below grade and backfilled. Towers will be removed from the following 34 State sites where CONTRACTOR has proposed replacement towers:



and DES-OFB – Infrastructure and consoles, KVL

The proposed ASTRO 25 radio system infrastructure (including base stations) is transparent to secure encryption algorithms. The proposed MCC7500E radio dispatch console operator positions will optionally be equipped with AES and DES-OFB encryption algorithms.

1) Advanced Encryption Standard (AES)

   The Advanced Encryption Standard (AES) is an improvement over DES algorithms, using keys of 128, 192 bits, or 256 bits to encrypt blocks of 128-bit traffic. The CONTRACTOR secure voice solution uses a 256-bit key. AES uses the Rijndael algorithm with symmetric block cipher. Between 3.4 x 10E38 and 1.1x 10E77

possible unique keys can be used with this algorithm, depending on the size of the key used. This enhances communication security by providing a range of at least 10E21 more unique keys than DES. The Advanced Encryption Standard is defined in FIPS publication 197. AES allows interoperability, like DES-OFB.

2) Data Encryption Standard (DES/DES-XL/DES-OFB)

The Data Encryption Standard (DES) was developed by IBM for the federal government and is approved to provide security for sensitive, unclassified radio communication. This standard uses 56-bit keys, with each byte of the key having odd parity (odd number of binary 1s). 7.2 x 10E16 unique keys can be used with this algorithm.

While several varieties of DES exist, the ASTRO 25 system supports DES-XL and DES-OFB. The DES-OFB algorithm has been selected as the APCO 25 digital encryption standard. DES-OFB utilizes the output feedback (OFB) method of encryption synchronization and is only compatible with systems using the APCO 25 specified Advanced Multi-Band Excitation (AMBE) vocoder. For DES-OFB, data is divided into blocks of bits and encrypted output from one block of data is used as an additional input for encrypting the next block of data. DES-OFB is not self-synchronizing.

f. <u>OPTION Integrated Voice and Data, Enhanced Data for up to 25,000 users (infrastructure only)</u>

The Project 25–compliant optional Integrated Voice and Data (IV&D) operation allows data traffic to seamlessly utilize your existing ASTRO 25 stations, improving in-field efficiency. Voice is prioritized, allowing Mission-Critical traffic to always take precedence over data transmissions. The IV&D service creates a data transport layer capable of supporting both industry-standard IP and customer-developed applications, including:

- Advanced Messaging
- Outdoor Location
- Over the Air Programming (POP25)
- Over the Air Rekeying (OTAR)

Users can achieve a number of important benefits, including:

- Conservation of valuable airtime
- Increased communications accuracy
- Allows users in the field to perform queries without dispatch
- Better return on investment—same assets for multiple functions
- Utilizes common radio units for both voice and data applications
- Advanced Messaging Service—Similar to text messaging on a cell phone, the Advanced Messaging Service provides a convenient means of communication between all network users. A user can send a text message of up to 200 characters to another radio or dispatcher. Dispatchers and radio users may be a part of a named text-messaging group, allowing point-multipoint service. Advanced Messaging Service makes use of the IV&D transport layer and provides a store and forward function, ensuring message delivery.

1) Packet Data Gateway

viii. One (1) 7.5′ Open Rack and Rackmount AC Power Strips.

ix. One (1) SDM 3000 RTU (AC Only) for site's Auxiliary Digital Inputs forwarding to UEM.

x. One (1) TXRX 428 E Control Monitoring Unit (CMU, AC Only).

xi. One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

xii. Two (2) UPS, SEPS Inc 9PX, 2700W, 120V, Softwired, 23 Min Runtime Rack Mounted.

b) Antenna Network Equipment per ASR site:

i. Two (2) RFI CC807-11T1 Antennas (one Transmit and one Receive Antenna).

ii. One (1) second receive antenna and line to be mounted at the same level as the new receive antenna

iii. One (1) TXRX 428 E Tower Top Amplifier (TTA).

iv. 7/8″ Coaxial transmit line plus connectors and jumpers. OPTION: Any tower 300' or higher optionally can add 1 5/8" coaxial transmit line plus connectors and jumpers.

v. 7/8″ Coaxial receive line plus connectors and jumpers.

vi. ½″ Coaxial test line plus connectors and jumpers.

c) Civil Work for each ASR sites:

i. Supplying 4 new guyed towers.

ii. Utilize 27 existing towers.

iii. Supply 31 new shelters.

iv. Detailed Civil content for the 31 Phase 3 sites, which optionally can be moved to Phase 2, is detailed in Exhibit D: Pricing.

h. Connectivity through DCN: Quoted but to be paid directly by STATE.

2. PROJECT PLAN AND SCOPE OF WORK

a. Scope of Work Overview

Project Manager (PM)- CONTRACTOR has included a Project Manager (PM) will serve as the primary project liaison to State of North Dakota. The PM will track the progress of the project and take proactive measures to ensure the project proceeds as planned. The PM will work with the State's Project Manager to ensure contractual commitments are delivered and fulfilled. The PM will manage and allocate all required resources, personnel, budgets and materials to ensure the system is implemented to your satisfaction and that the system meets our standards on the specifications as agreed to during the Contract Design Review, while maintaining the highest standards of quality and STATE satisfaction. The PM will ensure all project related tasks are performed to meet the scheduled completion.

1) Other responsibilities are:

a) Implementing the project plan and monitor schedule adherence.

b) Conducting regular (as agreed upon with the State/bi-weekly) status meetings to include published agendas, meeting minutes, status reports, action item tracking and project schedule updates.

c) Tracking delivery and installation progress to the master project plan and plan, recommend and order changes to the schedule or resources to ensure on time completion of critically sequenced deliverables.

d) Directing technical individuals responsible for the installation, configuration and quality of the project.

e) Monitoring and controlling the installation, integration, testing and acceptance of the proposed system.

f) Coordinating the development and execution of technical and user training plans.

g) Managing and directing all subcontracting activities.

h) Mitigating risks in order to ensure that the system meets the design specifications and is delivered on time.

i) Overseeing change management.

j) Ensuring quality workmanship by all CONTRACTOR vendors and subcontractors.

k) Ensuring that our team works collaboratively with State of North Dakota personnel throughout the project.

3. CONTRACT ADMINISTRATION

a. Expectations of CONTRACTOR:

1) Assign a Project Manager, as the single point of contact throughout the duration of the project life-cycle, with authority to make project decisions.

2) Assign Project Engineer to be assigned throughout the duration of the project life-cycle.

3) Assign other required resources necessary for project implementation.

4) Schedule the project kickoff meeting with STATE prior to start of the project.

b. Expectations of STATE:

1) Assign a Project Manager, as the single point of contact responsible for STATE - signed approvals.

2) Assign other resources necessary to ensure completion of project tasks for which STATE is responsible.

c. Completion Criteria:

1) CONTRACTOR internal processes are set up for project management.

2) Both CONTRACTOR and STATE assign all required resources.

3) Project kickoff meeting is scheduled.

4. DELIVERABLE 2-1: PROJECT KICKOFF MEETING

a. Description:

CONTRACTOR shall coordinate with STATE to schedule a Kickoff Meeting in Bismarck, ND, with the core project and planning team. CONTRACTOR'S Project Manager shall lead the meeting. The Kickoff Meeting must facilitate the introduction of CONTRACTOR and STATE core project team members and level-set understanding and awareness of project objectives, scope, governance, schedule and project risks and issues.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide content to STATE for a detailed agenda in advance of the meeting.
2) CONTRACTOR and STATE shall facilitate the meeting and discuss and further define, at a minimum, the following:
    a) Effective project communication
    b) Project vision, background, purpose and objectives
    c) Project governance structure and project roles and responsibilities
    d) Approach to creating the Project Plan
    e) Initial risk assessment
    f) The CONTRACTOR Project Manager shares CONTRACTOR'S Safety Plan.

c. Expectations of STATE:

1) STATE shall finalize agenda and send agenda to invitees.
2) STATE shall coordinate the logistics and co-facilitate the Kickoff Meeting.
3) STATE's Project Sponsor and project team members shall participate in the Kickoff Meeting.
4) STATE shall provide schedule / availability for any required site surveys.
5) STATE shall provide site access, permissions and escort, as required.
6) STATE shall provide safety rules to be followed during the integration phase of this project.

d. Completion Date:

CONTRACTOR shall start work with STATE within five (5) working days after the commencement of the STATE providing written authorization directing the initiation of work.

e. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Kickoff Meeting results in:

1) Facilitation of Kickoff Meeting using a clearly defined agenda
2) An introduction of critical CONTRACTOR and STATE resources assigned to the project
3) Review of Project Charter to include project governance structure, roles and responsibilities, project purpose, objectives and scope

4) Discussion of communications approach and structure

5) Discussion of known project risks and issues

5. (CDR) DELIVERABLE 2-2 PROJECT PLAN (INCLUDES 2-SCHED: PROJECT PLAN/BASELINE SCHEDULE)

a. Description:

CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to develop a baseline Project Plan. The Project Plan will include the project schedule.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall participate, contribute and collaborate with STATE to provide content that includes, at a minimum, the following:

   a) Management plans to control cost, schedule, scope and quality

   b) Governance structure for the project

   c) Roles and responsibilities of the project team

   d) Integrated change control process

   e) Communication management plan

   f) Risk management plan

   g) Issue management plan

   h) Human resources management plan

   i) Procurement management plan

2) CONTRACTOR shall provide CONTRACTOR tasks and participate and collaborate with STATE on a detailed project schedule created in Microsoft Project. The Microsoft Project format and settings will be mutually agreed-upon and the project schedule will follow STATE best practices, including:

   a) Project has appropriate start date

   b) Project has appropriate Work Breakdown Structure

   c) All project tasks have appropriate predecessors and successors, with the exception of summary tasks

   d) All project tasks are auto-scheduled using predecessors to drive the task dates (dates are not manually entered)

   e) Minimal use of constraints

   f) Both STATE and CONTRACTOR tasks are included

   g) Project tasks are broken down into timeframes that can be reasonably managed – STATE encourages a maximum task length of approximately 80 hours/two (2) weeks

   h) Project tasks have appropriate resources assigned with appropriate and reasonable allocation

i) Schedule has appropriate working times and incorporates STATE and CONTRACTOR holidays and nonworking times

3) CONTRACTOR shall provide written confirmation from an authorized individual confirming contents of the Project Plan.

c. Expectations of STATE:

1) STATE shall lead the project planning effort.
2) STATE'S Project Manager shall be responsible for the Project Plan.
3) The Project Plan shall follow STATE template.
4) STATE's Project Manager shall incorporate STATE tasks into the project schedule.
5) STATE shall obtain written confirmation from an authorized individual at CONTRACTOR for the contents of the Project Plan.

d. Completion Date:

CONTRACTOR shall start work with STATE within five (5) working days after the commencement of the STATE providing written authorization directing the initiation of work.

e. Acceptance Criteria:

1) For the acceptance of this deliverable to occur, CONTRACTOR shall provide content to STATE for the Project Plan regarding all services, tasks and products delivered by CONTRACTOR:
   a) Mutually agreed-upon detailed baseline scope and schedule for the project
   b) Management plans to control scope, schedule, cost and quality, including the variance
   c) Governance structure for the project
   d) Roles and responsibilities of the project team
   e) Quality assurance and quality control plans
   f) Integrated change control process
   g) Communication management plan
   h) Risk management plan
   i) Issue management plan
   j) Human resources management plan
   k) Procurement management plan
2) The Project Plan shall adhere to the Project Management Body of Knowledge
3) For the acceptance of this deliverable to occur, approval must be obtained from STATE's Executive Steering Committee (ESC).

6. CONTRACT DESIGN REVIEW: (CDR) SITE SURVEYS

a. Description:

CONTRACTOR shall visit and review each proposed site to determine viability and applicable information as needed for the radio system planning and implementation.

b. Expectations of CONTRACTOR:

1) Visit each site.
2) Gather / record site information.
3) Document and provide site summary.

c. Expectations of STATE

1) Provide site access and escort.
2) Participate as needed during site surveys.
3) Review site summary.

d. Acceptance Criteria:

1) Site visits complete
2) Site summaries documented and provided to STATE.

7. (CDR) DELIVERABLE 2-3: DATA/RADIO NETWORK CONVERSION PLAN

a. Description:

CONTRACTOR shall participate, contribute and collaborate with STATE to create a Data / Radio Network Conversion Plan. The plan is intended to address the overall approach that will be followed for the data/proposed radio network conversion effort and will be a subordinate plan to the Implementation (Project) Plan deliverable. The plan will define methodology, strategies, required competencies, tools, templates, quality standards, data cleansing and data discrepancy resolution strategies, as applicable.

Specific to the proposed radio system this Data/Radio Network Conversion Plan includes the following sub-items: Backhaul, Equipment List, Installation – Site layout, Power requirement, Site alarming requirement planning. NOTE: The term data in this deliverable and associated deliverables does not refer to any feature on the proposed system.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the data conversion planning effort.
2) CONTRACTOR shall create a Data Radio Network Conversion Plan that will outline the approach to convert the agreed-upon data by collaborating with and gathering input from STATE. Specific to this offering the key data conversion items for the proposed radio system include:
    a) Backhaul Requirements Definition
    b) Installation
    c) Power Requirement
    d) Site Alarming Requirement

3) CONTRACTOR shall be responsible for the final product.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.
2) STATE shall provide support and make any necessary decisions in a timely manner per the project schedule.
3) STATE shall review and provide feedback to CONTRACTOR in a timely manner per the project schedule.
4) STATE shall work with CONTRACTOR to develop approaches planned for STATE's data cleansing efforts.
5) STATE shall provide existing system, site information and documentation available.
6) STATE shall provide backhaul/connectivity to all sites as required, per CONTRACTOR specification.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Data/ Radio Network Conversion Plan must include:

1) Data/ Radio Network conversion methodologies and strategies to be used including a repeatable extract, transform and load (ETL) process
2) Details regarding the tools and templates to be used
3) Outline of strategies and actions planned to resolve data discrepancies and mapping issues, which may include customizations and data cleansing
4) Outline of the testing approach and methodology, including defined success criteria and quality standards
5) Executive summary

8. (CDR) DELIVERABLE 2-4: DATA/RADIO NETWORK CONVERSION DESIGN

a. Description:

CONTRACTOR shall design the overall data/radio network conversion approach to convert data/radio network from the legacy radio system(s).

Radio specific conversion design includes:

1) System Description with final equipment list
2) Backhaul Design specifications
3) Installation Layout – floor and rack diagrams
4) Power Requirement
5) Site Alarming Requirement

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the data conversion design effort.
2) CONTRACTOR shall provide all necessary data conversion documentation to STATE.

3) CONTRACTOR shall provide example conversion files to STATE to assist STATE in generating successful data conversion files. As applicable to the proposed radio network specific requirements this includes establishing a baseline for the system design including: System description, final backhaul specifications, final RF equipment list, installation layout, frequency / channels, power calculations per site, defined alarming per site and confirm demarcation points, as applicable.

c. Expectations of STATE:

1) STATE shall assist CONTRACTOR's review and design of data elements applicable to data conversion.
2) STATE shall provide necessary and relevant resources to make design decisions.
3) STATE shall provide support and make any necessary decisions in a timely manner per the project schedule.
4) STATE shall review and provide feedback to CONTRACTOR in a timely manner per the project schedule.
5) STATE shall provide backhaul design plan information as required.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Data Conversion Design must include:

1) Proposed system context and workflow to be accomplished with the customizations
2) Documentation of development and how the development meets the requirements outlined in the Gap Analysis deliverable

NOTE: DELIVERABLE 2-5: DATA / RADIO NETWORK CONVERSION VALIDATION - Specific to the proposed Motorola Solutions Radio Network the "validation" task will be completed during testing which is prior to Phase 2 Final Acceptance.

9. (CDR) DELIVERABLE 2-6: INTERFACE DESIGN

a. Description:

CONTRACTOR shall design the interface from the system to STATE's XXX application, including any configurations or customizations required to support the integration of the interface with the system. Specific to the CONTRACTOR Radio Network the interface design work will be completed as applicable (i.e. Broadband Gateway/Phase 2, Option ISSI Gateway if purchased/Phase 2 and Conventional Channel Gateways at RF sites/Phase 2). NOTE: Upon State definition of XXX application, the CONTRACTOR will provide a separate quote as applicable for any additional scope and work which is required.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the interface design effort.
2) CONTRACTOR shall develop a high-level conceptual design for the interfaces, as applicable.
3) CONTRACTOR shall collaborate with STATE to finalize design.

c. Expectations of STATE:

1) STATE shall review conceptual designs and provide feedback and clarification as requested.
2) STATE shall provide technical resources and subject matter experts who will assist and collaborate with CONTRACTOR during the design process.
3) STATE shall provide technical resources for talkgroup and other configuration planning and decision making for the optional ISSI operation as applicable per ISSI interface.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Interface Design must include:

1) Design documentation for the interface
2) Document detailing any customizations to support the integration between the systems

NOTE: DELIVERABLE 2-7: INTERFACE DEVELOPMENT and RELEASE - Specific to the proposed Motorola Solutions Radio Network the "Interface Development and Release" task will be completed during testing which is prior to Phase 2 Final Acceptance.

10. (CDR) DELIVERABLE 2-8: GAP ANALYSIS

a. Description:

CONTRACTOR to review, analyze and confirm understanding of system functionality, business practices, interfaces, configurations and customizations. Specific to the proposed CONTRACTOR Radio Network offering CONTRACTOR will review the State's existing system and the State's requirements and customizations which may require design changes.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the analysis effort.
2) CONTRACTOR shall demonstrate how system's core functionality meets the requirements as defined in the Request for Proposal.
3) CONTRACTOR shall identify and document gaps between the system's out-of-the-box functionality and STATE's requirements and business processes and practices.
4) CONTRACTOR shall identify any gaps that require system configuration or customization changes.
5) CONTRACTOR shall identify any gaps that require system customization (i.e. findings from site audits, testing such as soil conditions, foundation design) beyond the Request for Proposal response.
6) CONTRACTOR shall collaborate with STATE to document agreed-upon changes to the system that may be needed as a result of the review and confirmed understanding.

c. Expectations of STATE:

1) STATE staff shall actively participate in work and analysis sessions.

2) STATE shall collaborate with CONTRACTOR to confirm requirements and gap analysis.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Gap analysis to be presented in a matrix that lists requirements and identifies which requirements can be met out-of-the-box, which need configuration and which need customizations in accordance with CONTRACTOR'S proposed offering.
2) Gap analysis matrix includes a descriptive statement on how CONTRACTOR will meet each requirement.
3) Gap analysis matrix identifies which requirements that, through understanding and analysis, cannot be accomplished without additional efforts, including a recommended approach to resolve the gap and CONTRACTOR'S level of effort.

NOTE: DELIVERABLE 2-9: SYSTEM CONFIGURATION – Specific to the proposed Motorola Solutions Radio Network, the "System Configuration" task will be completed following the FCC Licensing task below.

11. (CDR) DELIVERABLE 2-10: TESTING MANAGEMENT PLAN

a. Description:

CONTRACTOR shall create a Testing Management Plan that outlines the overall testing approach for CONTRACTOR and STATE testing. The proposed radio system testing plan includes the Acceptance Test Plan which also includes the CONTRACTOR proposed:

Phase 2: Coverage Verification Plan, Functional Test Plan, System Acceptance Test Plan

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the test planning effort.
2) CONTRACTOR shall create a Testing Management Plan with STATE support.
3) CONTRACTOR shall conduct working session(s) with STATE to review and finalize the Test Management Plan prior to start of testing.
4) CONTRACTOR shall coordinate with STATE to schedule all testing activities.
5) CONTRACTOR shall provide tools, existing test cases, user acceptance test case templates and reporting formats for testing.
6) CONTRACTOR shall train STATE to conduct user acceptance tests and report results.
7) CONTRACTOR shall participate, contribute and collaborate with STATE in development of user acceptance test cases.
8) CONTRACTOR shall complete the Acceptance Test Plan.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.
2) STATE shall provide support and make any necessary decisions.

3) STATE shall review and provide feedback to CONTRACTOR.
4) STATE shall be responsible for approving the list of test scripts for performance and user acceptance testing, with support and guidance of CONTRACTOR. NOTE: The proposed radio network test scripts/plans will be written by CONTRACTOR. Input will be solicited by the STATE as applicable. The final test scripts/plan will be approved by the STATE.
5) STATE shall conduct application performance testing on STATE server(s). NOTE: Per project scope proposed it is not expected that the STATE will require any testing on STATE provided servers for the proposed radio system.
6) STATE shall conduct user acceptance testing.
7) STATE shall assign a resource as a testing coordinator to facilitate STATE's testing activities.

d. <u>Acceptance Criteria:</u>

For the acceptance of this deliverable to occur, the Testing Management Plan must include:

1) Testing strategy containing:
   a) Agreed-upon high-level testing schedule in accordance with the project schedule
   b) Testing assignments and responsibilities
   c) Test script creation practices including detail regarding system environments used during testing
   d) Method for reporting testing issues and tracking of remediation
   e) Statistical reporting strategy for issues and fixes
   f) CONTRACTOR support
2) Outline of the approaches and strategies for testing the requirements, federal and state reporting, interfaces, data conversion and performance
3) User acceptance test case template
4) Testing issues reporting approach containing:
   a) Template for reporting issues
   b) Prioritization and severity methodology, including a Service Level Agreement for CONTRACTOR support and fixes
   c) Resolution approach
5) Documentation of what priority and severity issues must be fixed before the system moves into production
6) Description of resources for testing, including numbers of testers and necessary skill-sets
7) Executive summary

NOTE: DELIVERABLE 2-11: ACCEPTANCE TESTING – Specific to the proposed Motorola Solutions Radio Network, the "ACCEPTANCE TESTING" task will be completed in the Audit and Acceptance Testing section below.

12. (CDR) DELIVERABLE 2-12: TRAINING MANAGEMENT PLAN

a. Description:

CONTRACTOR shall create a Training Management Plan. The plan will address training approaches, courses to be delivered, course instructors, overall objectives and competencies, training schedule, evaluation and required resources.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the training planning effort.
2) CONTRACTOR shall create a Training Management Plan with STATE support.
3) CONTRACTOR shall conduct working session(s) with STATE to review and finalize the Training Management Plan prior to start of training.
4) CONTRACTOR shall coordinate with STATE to schedule all training activities.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.
2) STATE shall provide support and make any necessary decisions.
3) STATE shall review and provide feedback to CONTRACTOR.
4) STATE will define training effectiveness criteria.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Training Management Plan must include:

1) Description of training session(s)
2) Identification of roles and responsibilities, intended audience, training objectives and evaluation methods
3) Identification of agreed-upon high-level timing and approach for training
4) Executive summary

13. (CDR) DELIVERABLE 2-15: RADIO NETWORK IMPLEMENTATION AND TRANSITION PLAN

a. Description:

CONTRACTOR shall collaborate with STATE to create an Implementation and Transition Plan to manage the implementation of the product and also transition the product and work from the project structure to maintenance. For the proposed Radio network, this deliverable is the Business Migration/Cutover Plan and the Service Plan.

Cutover for the RF sites will include the following steps beginning with installation. The proposed RF site equipment will be installed. At any existing VHF sites which are being used, the legacy equipment will remain in place and the new P25 equipment will be installed in parallel. Upon completion of equipment optimization and testing the site will be ready for cutover.

1) Install, optimization and Testing at RF Sites
2) Test and Cutover 800 MHz State and Local Subscribers (State provides

subscribers/services)

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the planning effort.
2) CONTRACTOR shall create an Implementation and Transition plan with STATE support including the following:
   a) Cutover Plan (Business Migration)
   b) Service Plan
3) CONTRACTOR shall conduct working session(s) with STATE to review and finalize the Implementation and Transition Plan prior to any implementation or transition work.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.
2) STATE shall provide support and make any necessary decisions.
3) STATE shall review and provide feedback to CONTRACTOR.
4) STATE shall Approve Plans

d. Acceptance Criteria:

For acceptance of this deliverable to occur, the Implementation and Transition Plan must include:

1) Implementation strategy
2) Implementation resources and tasks
3) Implementation entry and exit criteria and go/no go decision requirements
4) Implementation contingency plan
5) Business migration (Cutover) strategy
6) Transition resources and tasks
7) CONTRACTOR processes for moving product into maintenance and ensuring ongoing support (Service Plan)
8) Executive summary

NOTE: DELIVERABLE 2-15: IMPLEMENTATION AND TRANSITION PLAN - Specific to the proposed Motorola Solutions Radio Network the “implementation and transition plan” task will be completed during the CDR phase.

14. DELIVERABLE 2-CDR: DETAILED CONTRACT DESIGN REVIEW (CDR)

a. Expectations of CONTRACTOR

1) Prepare change order to reflect updated system design and documentation.
2) System design is finalized in preparation for subsequent project phases.

b. Expectations of STATE

1) Review all CDR deliverables and documents.

2) Approve design review.

c. Acceptance Criteria:

1) Design deliverables and documentation approved by State.

15. DELIVERABLE 2-FREQ: FCC LICENSING AND COORDINATION

a. Expectations of CONTRACTOR:

1) CONTRACTOR will assist the State with frequency coordination/modification and licensing by providing any required technical details and parameters necessary for proper licensing or modifications to existing State FCC license(s).
2) Complete 601 forms requesting the proposed sites with the proposed channels, apply and work with coordinator, RPF (Regional Plan Chairman) and FCC.
3) Provide licensing research and site surveys, as applicable.
4) Work with Public Safety RPC (Regional Plan Chairman)
5) Complete contour studies and coverage analysis, as needed.
6) Work with designated person to prepare Slow Growth letter request and implementation schedule if more than one year is needed to become fully constructed and operational.
7) Complete final licensing package file with FCC, track FCC processing, handle FCC correspondence until FCC issues license grants and include associated FCC fees, as required.
    a) Restrictions:
        i. CONTRACTOR assumes no liability or responsibility for inadequate frequency availability or frequency licensing issues.
        ii. CONTRACTOR is not responsible for issues outside of its immediate control. Such issues include, but are not restricted to, improper frequency coordination by others and non-compliant operation of other radios.
        iii. CONTRACTOR is not responsible for co-channel interference due to errors in frequency coordination by APCO or any other unlisted frequencies, or the improper design, installation or operation of systems installed or operated by others.

NOTE: Final frequency assignment will be determined upon receiving consent from incumbent licensees as needed, availability of NPSPAC per the RPC and in accordance to FCC rules and regulations per 90.621. If frequencies cannot be assigned and additional frequencyreviews are required after the original submissions, this will require a separate quote.

b. Expectations of STATE:

1) Confirm list of frequencies for use.
2) Provide licensee and frequency information as needed to assist with the CONTRACTOR submissions.
    a) Assist with Frequency Mining / Identification of Frequency Candidates
    b) Negotiations with incumbents, cutover timing and governance, as needed.

3) As licensee, the State is responsible to review and approve the final licensing for submission.

c. Acceptance Criteria:

1) Licensing complete for all frequencies.

16. DELIVERABLE 2: ORDER & MANUFACTURING, SHIP

a. Expectations of CONTRACTOR:

1) Enter order into CONTRACTOR's Customer Order Fulfillment (COF) system.
2) Create equipment orders.
3) Reconcile the equipment list(s) to the Contract.
4) Procure third-party equipment if applicable.
5) Manufacture the Equipment necessary for the system based on equipment order.
6) Ship to Field

b. Expectations of STATE:

1) Approve shipping location(s).

c. Acceptance Criteria:

1) Verify that the Equipment List contains the correct model numbers, version, options and delivery data.
2) Trial validation completed.
3) Bridge the equipment order to the manufacturing facility.
4) Equipment shipped to the field, as applicable.
    a) Ship Site Facility Equipment – tower, shelter, etc.
    b) Ship Antenna / Line Equipment
    c) Ship Fixed Network Equipment

17. DELIVERABLE 2-9: SYSTEM CONFIGURATION – FLEETMAPPING

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Fleetmapping.

Fleetmapping is the process of configuring the features and programming parameters of a system to function according to the unique operational requirements of each participating agency. Programming decisions for system infrastructure, dispatch consoles and radios are inherent to tailoring system performance. Fleetmapping determines how the radio communications for each user group of an organization is controlled and includes:

1) Assigning talkgroups to the radios issued to personnel
2) Assigning talkgroups to the dispatcher control positions

3) Defining the feature subsets available to the personnel using the radios and dispatcher control positions

b. <u>Expectations of CONTRACTOR:</u>

1) CONTRACTOR shall lead the configuration effort for system fleetmapping. CONTRACTOR's major deliverables are to provide and configure the system's database parameters and console screens. NOTE: The STATE is responsible for all subscriber radio templates, as needed. Services not contained in this SOW can be provided via the change order process upon request.
2) Develop customized Fleetmap Development Best Practice for STATE.
3) ASTRO 25 Systems Fleetmapping
    a) Provide technical consultation on talkgroup, radio user to the fleetmap committee.
    b) Deliver final fleetmap documentation.
4) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.
5) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.
6) CONTRACTOR shall provide programmed test radios for live testing on STATE system.

c. <u>Expectations of STATE:</u>

1) STATE shall make necessary configuration decisions including the following:
    a) Appoint a representative who will become the fleetmap committee chairperson with signature responsibilities for all fleetmapping decisions.
    b) Identify agency champions that will become members of the fleetmapping committee.
    c) Set Standard Operating Procedure that will apply to all end users.
    d) Define and verify user groups and corresponding radio allocations.
    e) Develop talkgroup naming convention plan for each user group.
    f) Develop Radio ID distribution plan for each user group.
    g) Develop list of other jurisdictions' trunking systems with system ID numbers to include in radio programming.
    h) Develop Memorandum of Understanding (MOU) for each trunking system jurisdiction that STATE plans to interoperate. The MOU should include talkgroups, radio identification range and alias authorizations and system key provisions.
    i) Complete the Radio Subscriber Template requirements for each unique radio purchased.
    j) Provide template information to CONTRACTOR for use during the Staging and System Testing, as needed.

k) Complete and sign memorandum of understandings for other jurisdictional trunking systems.

l) Develop conventional channel list.

m) Obtain approval letters and access allowing CONTRACTOR authority to program other jurisdiction talkgroups into STATE'S radios.

n) Develop and approve zone/channel layouts for each user group.

o) Develop list of talkgroups/conventional channels to display on the dispatch console and log.

p) Determine emergency configuration plan (to include radios and consoles).

q) Determine feature configurations to include but not limited to Call Alert, Private Call, Telephone Interconnect, Scan, Status/Message, Secure, Failsoft and Site Preferences for both radios and consoles.

2) STATE shall provide requested information and documentation as needed to configure the system.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE. NOTE: Fleetmap Configuration definition will be completed but, actual configuration will be completed during the System Configuration Deliverable.

2) State completes and approves Fleetmapping requirements.

3) Successful demonstration of the configuration and reporting capabilities NOTE: Fleetmap Configuration definition will be completed but, actual configuration will be completed during the System Configuration Deliverable.

18. DELIVERABLE 2-9 (INCLUDES DELIVERABLE 2-CIVIL.24-68; DELIVERABLE DELVRCIV.24-68 AND DELVRAL.24-68): SYSTEM CONFIGURATION – SITE DEVELOPMENT

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Civil Work/Site Development.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.

2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.

3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.

4) Deliver civil equipment to proposed warehouse/storage locations, as needed. (DELVRCIV.1 and 24-68; DELVRAL.24-68)

NOTE: See Civil Scope of Work Responsibilities for each of the proposed sites in Civil Work Statement of Work in Section 31.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.
2) STATE shall provide requested information and documentation as needed to configure the system.
3) See Civil Scope of Work in section 31 for Civil responsibilities.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the proposed Civil Work specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE. NOTE: If additional requirements beyond the proposed Civil Work scope definition are needed a separate quote can be provided.
2) Successful demonstration of the completed configuration ~~and reporting capabilities~~/completed Civil Work as proposed. (Deliverable 2-CIVIL.24-68)

NOTE: "Reporting Capabilities" are not applicable to the CONTRACTOR CivilWork.

19. DELIVERABLE 2-9; 2-FNE INSTALL.1 AND 24-68; DELVRFNE.1 AND 24-68: SYSTEM CONFIGURATION – FNE INSTALLATION

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Install of antenna/line, proposed fixed network equipment for the radio sites. Note below that "reporting capabilities" is not applicable to antenna/line and site equipment installations.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.
2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.
3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.
4) CONTRACTOR shall install the following per the proposed equipment list:
    a) Install Antenna/Line
        i. See Civil Scope of Work for each proposed site in section 31 for responsibilities.
    b) Install FNE
        i. Deliver equipment to proposed warehouse/storage locations, as needed. (DELVRFNE.1 and 24-68)

ii. Inspect and inventory all racks, cables, computers and other CONTRACTOR provided equipment.

iii. Deliver equipment to proposed sites from warehouse/storage locations.

iv. Install proposed equipment per Final Design approved floor and rack drawings, cable matrix and other final design documents.

v. Properly install proposed equipment per R56 installation guidelines.

vi. See Civil Work Statements of Work in section 31 for additional site responsibilities.

vii. Properly ground all racks, cabinets and equipment to protect against ground faults, electrical surges and lightning.

viii. Install and connect all necessary cables (i.e. power, data) within each rack / cabinet and between racks / cabinets for system interconnection

a. Cables will be run in the overhead cable trays per R56 guidelines

b. Verify that all cables are properly labeled

ix. Power-up and test equipment.

x. Removal of existing equipment is not proposed, but, if desired, can be quoted upon request.

xi. OPTION PHASE 2/TBD: Install ISSI Gateway Equipment.

a. Install optional gateway and configure per defined STATE provided configuration and talkgroup / fleetmap requirements.

c. <u>Expectations of STATE:</u>

1) STATE shall make necessary configuration decisions.

2) STATE shall provide requested information and documentation as needed to configure the system.

3) STATE shall contract directly and provide required Backhaul (fiber, microwave) per CONTRACTOR defined radio system specifications via DCN or other provider, as applicable.

4) STATE shall provide the following for proposed FNE equipment installation items:

a) Provide designated contact to assist with both the coordination of the receipt of the proposed equipment and inventory all equipment.

b) Provide secure location for the CONTRACTOR-provided equipment at existing sites.

c) Provide or coordinate access to the site, as necessary.

d) Provide site development requirements as defined in Civil Work section 31.

e) Provide existing pre-wire auxiliary input/outputs for interface to the SDM 3000 at RF sites, as applicable.

f) Provide removals of FNE equipment, as needed, at RF sites at the time when the existing VHF system is no longer required for operation.

g) Provide for 3rd party equipment, configuration, software/services which are not proposed as part of this contract.

5) STATE shall provide the following ISSI Equipment items (if option is purchased):

a) PHASE 2 (option): STATE shall provide ISSI technical support as needed during installation.

b) PHASE 2 (option): STATE shall obtain approvals and/or Memorandum of Understanding from other ISSI System owner, as needed.

NOTE: System configuration, equipment and support for the separate system interoperability interface/gateway is the responsibility of the interfacing party System Owner.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE

2) Successful demonstration of the configuration and reporting capabilities; Specific to the proposed radio system this includes completion of FNE hardware installations for the proposed equipment. Reporting capabilities is not applicable to this install of radio equipment deliverable.

20. DELIVERABLE 2-9.24-68: SYSTEM CONFIGURATION – OPTIMIZATION

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Optimization of the proposed radio equipment.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.

2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.

3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE. Specific to the proposed radio system, Optimization Tasks below will be completed.

a) CONTRACTOR and its subcontractors optimize each subsystem.

b) Verify that all equipment is operating properly and that all electrical and signal levels are set accurately.

c) Verify that all audio and data levels are at factory settings.

d) Check forward and reflected power for all radio equipment, after connection to the antenna systems, to verify that power is within tolerances.

e) Check audio and data levels to verify factory settings.

f) Verify communication interfaces between devices for proper operation.

g) Test features and functionality are in accordance with manufacturers' specifications and that they comply with the final configuration established during the CDR.

h) Install and integrate the RF sites with the system, then optimize and activate the controller.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.

NOTE: Radio System optimization decision making is not anticipated for this Deliverable. Configuration decisions are made as part of the earlier fleetmapping process.

2) STATE shall provide requested information and documentation as needed to configure the system.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured and optimized according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE

2) Successful demonstration of the configuration and reporting capabilities.

21. DELIVERABLE 2-9: SYSTEM CONFIGURATION – SUBSCRIBERS

NOTE: Subscribers are not proposed. The responsibilities in this section for subscribers are the State's responsibilities, pending separate purchase.

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes subscriber services (templates, programming, alignment, configuration, installation, as needed).

b. Expectations of CONTRACTOR:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.

2) STATE shall provide requested information and documentation as needed to configure the system.

3) STATE shall provide all subscriber related services for new and / or existing subscribers including but, not limited to: receive and inventory, storage, programming, template building, alignment, installation.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE

2) Successful demonstration of the configuration and reporting capabilities.

NOTE: DELIVERABLE 2-12: TRAINING MANAGEMENT PLAN - Specific to the proposed Motorola Solutions Radio Network the "training management plan" task will be completed during the CDR phase. Detailed tasks and expectations for this deliverable are noted above in the Project Plan and Scope of Work above.

22. DELIVERABLE 2-13.2,3 AND 5-23: TRAINING

a. Description:

CONTRACTOR to conduct end user and administrator system training. See below for the Dispatch Console refresh courses below.

Phase 2 Training:

Supplemental Console Refresh Training – PHASE 2
11 PSAPs: Hillsboro, Grafton, Cavalier, Rugby, Rolla, Bottineau, Stanley, Stanton, Washburn, Valley City, and Langdon
7 PSAPs: Devil's Lake, Grand Forks, Dickinson, Minot, New Town, Jamestown, and Wahpeton
1 PSAP: Bismarck
1 PSAP: Bismarck State Radio
1 PSAP: Williston, Prime
2 PSAPs: Williston, Sheriff's Office, and Emergency Management

Table 35: PSAPs – Hillsboro, Grafton, Cavalier, Rugby, Rolla, Bottineau, Stanley, Stanton, Washburn, Valley City and Langdon: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin **Supervisors** 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	6 (2 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens.						

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator **Dispatchers** 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (2 hour sessions)	1 days	ND	Prior to cutover	6 (2 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 36: PSAPs – Devil's Lake, Grand Forks, Dickinson, Minot, New Town, Jamestown, Wahpeton: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	12 (4 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator **Dispatchers** 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (2 hour sessions)	1 days	ND	Prior to cutover	12 (4 per session) To cover shifts

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 37: PSAP – Fargo: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 4 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	24 (8 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 4 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (2 hour sessions)	1 days	ND	Prior to cutover	24 (8 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 38: PSAP-Bismarck: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 6 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	36 (12 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 6 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (2 hour sessions)	1 days	ND	Prior to cutover	36 (12 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 39: PSAP – Bismarck State Radio: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 8 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	48 (16 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 8 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (2 hour sessions)	1 days	ND	Prior to cutover	48 (16 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 40: PSAP – Williston, Prime: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	12 (4per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 2 training consoles Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (2 hour sessions)	1 days	ND	Prior to cutover	4 (12 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

Table 41: PSAP – Williston, Sheriff's Office and Emergency Management: Console Operator and Supervisor

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500E Dispatch Console Operator and Admin Supervisors 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Supervisors	3 (4 hour sessions)	1.5 days	ND	Prior to cutover	6 (2 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. **Admin Course Synopsis:** This course provides participants with the knowledge and skills to manage and utilize the MCC7000 series console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. NOTE: The first half of the day is the operator class. The second half covers admin training.						
MCC7500E Dispatch Console Operator Dispatchers 1 training console Ratio: 2 per console (Instructor-led)	Dispatch Operators	3 (2 hour sessions)	1 days	ND	Prior to cutover	6 (2 per session) To cover shifts
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.						

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide up-to-date and accurate user manuals and any other training materials that can be given to training participants and future STATE staff.
2) CONTRACTOR shall provide a training syllabus to STATE for review and feedback in advance of the training.
3) CONTRACTOR shall provide qualified instructors.
4) CONTRACTOR shall conduct training sessions at a location and time mutually agreed-upon with STATE.

c. Expectations of STATE:

1) STATE shall review and provide feedback on the training syllabus to verify that desired areas are part of the training.

2) STATE shall make assigned trainees available for the scheduled training sessions.
3) STATE shall provide training facilities and equipment.
4) STATE shall develop and conduct survey of training participants to verify training was effective.
5) STATE shall provide 30-day notice for any request to reschedule training.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Delivery of user manuals and training materials
2) Delivery of training in accordance with the syllabus
3) STATE survey concludes that CONTRACTOR training was effective.
4) Training approach and execution is in alignment with the Training Management Plan

23. DELIVERABLE 2-14: TRAINING

a. Description:

CONTRACTOR to conduct train-the-trainer and administrator system training. The train-the- trainer training will focus on persons that will ultimately perform training for end users. The administrator training will focus on persons that will act as system administrators. See below for specific training courses included:

System Administrator Training – PHASE 2
ASTRO 25 IV&D System Overview
ASTRO 25 IV&D Radio System Administrator Workshop
ASTRO 25 Domain Controller Administration
ASTRO 25 Systems Fleetmapping
ISSI 8000 / CSSI 8000 Feature Overview

Table 42: System Administrator Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Participants
ASTRO 25 Systems Fleetmapping RDS1017 (Instructor-led)	System Administrators	1	4.5 days	ND	Up to 12
Course Synopsis: This workshop addresses topics necessary for the effective planning and mapping of an ASTRO 25 IV&D radio system. During this course, the participants will learn about ASTRO 25 features, capabilities, and restrictions in order to effectively plan for a new or upgraded ASTRO 25 system.					
ASTRO 25 IV&D System Overview AST1038 (Self-paced; On-Line) Prerequisite	System Administrators	1	2.5 hours	On-Line; Self-paced	Up to 12
Course Synopsis: The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered, and an introduction to applications available in the ASTRO®25 system will be provided.					
ASTRO 25 IV&D Radio System Administrator Workshop ACS7171102 (Instructor-led)	System Administrators	1	4.5 days	ND	Up to 12
Course Synopsis: This workshop covers administrator functions for an ASTRO 25 Integrated Voice and Data (IV&D) System. Learning activities in this course focus on how to use the different ASTRO 25 IV&D System Management applications. Participants will be provided with an opportunity to discuss how to structure their organization and personnel for optimal ASTRO 25 IV&D system use.					
ASTRO 25 Domain Controller Administrator AST2015 (Instructor-led)	System Administrators	1	3 days	ND	Up to 12
Course Synopsis: This workshop covers the administrator and management functions in the ASTRO 25 Domain Controller and how these functions affect both users and computers in the ASTRO 25 system. Learning activities in this course focus on how to use the Domain Controllers to authenticate, administer, and authorize users and devices in the ASTRO 25 System. Group Policies and Organizational Units, RADIUS, and DNS structure will be addressed during this course.					
ISSI 8000 / CSSI 8000 Feature Overview AST2005 (On-line; Self-paced)	System Administrators	1	4 hours	On-line; Self-paced	Up to 12
Course Synopsis: The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO 25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios, and an overview of the installation process.					

1st Echelon Technical Training – PHASE 2
ASTRO 25 IV&D System Applied Networking
ASTRO 25 IV&D System Overview
1st Echelon Technical Training
APX CPS Programming and Template Building with Radio Management and OTAP Workshop
ISSI 8000 / CSSI 8000 Feature Overview
ASTRO 25 IV&D M/L Core Workshop
ASTRO 25 IV&D GTR 8000 Repeater Site and IP Digital Simulcast Workshop

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO 25 IV&D System Applied Networking NWT003 (Instructor-led)	1st Echelon	1	4.5 days	ND		Up to 12
Course Synopsis: This course provides the participant with the necessary networking information required for understanding the Network Transport subsystem components installed in an ASTRO 25 IV&D communications system. The course includes familiarization with basic networking concepts and the networking components deployed throughout the system.						
ASTRO 25 IV&D System Overview AST1038 (Self-paced; On-Line) Prerequisite	1st Echelon	1	2.5 hours	On-Line; Self-paced		Up to 12
Course Synopsis: The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered, and an introduction to applications available in the ASTRO®25 system will be provided.						
1st Echelon Technical Training **Specially Tailored** (Instructor-led)	1st Echelon	1	10 days	ND		Up to 12
Course Synopsis: This is a specially tailored class to take the 1st echelon technicians through basic system troubleshooting. This class will enable the 1st echelon technicians to recognize issues , do basic, repairs, and intelligently relay the issues to the 2nd level support team.						

APX CPS Programming and Template Building with Radio Management and OTAP APX7001 & RDS2017 (Instructor-led)	Radio Programmers	1	4 days	ND		Up to 12
CPS Course Synopsis: The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX portable/mobile subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and APX mobile. **Radio Management Course Synopsis:** Participants will learn the capabilities, features, and functions of the APX Radio Management Suite. This course will cover an APX CPS overview, APX Radio Management Overview, Basic Networking Primer, ASTRO25/CEN Networking and UNS Overview, and APX Radio Management Installation, Configuration, and Operations. In addition, the course will contain labs that will focus on installation, configuration, and operation using both wired and POP25 updates to APX Subscriber radios in both a LAN and WAN environment.						
ISSI 8000 / CSSI 8000 Feature Overview AST2005 (On-line; Self-paced)	1st Echelon	1	4 hours	On-line; Self-paced		Up to 12
Course Synopsis: The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO 25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios, and an overview of the installation process.						
ASTRO 25 IV&D M /L Core Workshop ACS7171103 (Instructor-led)	Technicians	1	4.5 days	ND	Prior to maintaining	Up to 12
Course Synopsis: The ASTRO 25 IV&D with M/L Core course teaches advanced troubleshooting skills and best practices for the Trunked Large Systems. The course also focuses on gathering and analyzing system information to implement appropriate action(s) that return a system to full operational status.						
ASTRO 25 GTR8000 Repeater Site and IP Digital Simulcast Workshop ACS717208 & ACS717217 (Instructor-led)	Technicians	1	5 days	ND	Prior to maintaining	Up to 12

GTR 8000 Course Synopsis:

This workshop describes the components in the ASTRO 25 IV&D System Repeater Site with GTR 8000 expandable site subsystem. This course also presents how the GTR 8000 expandable site subsystem operates and explains the tools and methods available for troubleshooting components within the subsystem.

IP Digital Simulcast Course Synopsis:

The ASTRO® 25 IV&D IP Based Digital Simulcast workshop provides an understanding of the components that comprise the ASTRO® 25 IV&D IP Simulcast subsystem, and how they operate in conjunction with each other. The workshop also explains the tools and methods available for troubleshooting components within the IP Based Simulcast subsystem.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide up-to-date and accurate user manuals and any other training materials that STATE trainers can give to training participants and future STATE staff.
2) CONTRACTOR shall provide a training syllabus to STATE for review and feedback in advance of the training.
3) CONTRACTOR shall provide qualified instructors.
4) CONTRACTOR shall conduct training sessions at a location and time mutually agreed-upon with STATE.

c. Expectations of STATE:

1) STATE shall review and provide feedback on the training syllabus to verify that desired areas are part of the training.
2) STATE shall make assigned trainees available for the scheduled training sessions.
3) STATE shall provide training facilities and equipment.
4) STATE shall provide 30-day notice for any request to reschedule training.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Delivery of user manuals and training materials
2) Delivery of train-the-trainer and administrator training in accordance with the syllabus
3) STATE survey concludes that CONTRACTOR training was effective

24. DELIVERABLE 2-5.1 AND 24 THROUGH 68: DATA CONVERSION VALIDATION

a. Description:

CONTRACTOR and STATE shall validate the data conversion effort by reviewing the data loaded into the user acceptance testing environment and making any fixes to the system or data conversion process to ensure data transfers accurately and completely.

Specific to the proposed CONTRACTOR Radio Network validation items for this deliverable will be completed for the following items as defined during the CDR:

1) Programming/Configuration validation, as applicable.

2) Backhaul Link Test

3) Installation – R56 Communication Site Audits

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall initially validate the data conversion into the user acceptance testing environment and resolve any issues prior to STATE data conversion validation efforts.

2) CONTRACTOR shall support STATE's effort to identify and resolve any issues with the data conversion prior to Go Live.

3) Backhaul Test

   a) Perform test to verify site link performance meet CONTRACTOR specification for the proposed radio system.

4) Test alarming requirements as defined per CDR.

5) R56 Site Audit

   a) Perform R56 site-installation quality audits, verifying proper physical installation and operational configurations.

   b) Create site evaluation report to verify site meets or exceeds requirements, as defined in Motorola's Standards and Guidelines for Communication Sites (R56).

c. Expectations of STATE:

1) STATE shall test the data conversion into the user acceptance testing environment.

2) STATE shall identify, document, trouble-shoot and work with CONTRACTOR to resolve any data conversion issues.

3) Backhaul Test

   a) STATE shall make available the required links which meet the specifications defined by CONTRACTOR

   b) Provide preliminary test result information per CONTRACTOR specifications.

4) R56 Site Audit

   a) Provide access/escort to the sites.

   b) Witness tests if desired.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Successful upload of accurate and complete data extract from the legacy system to the user acceptance testing environment.

2) CONTRACTOR review of STATE-documented user acceptance testing issues and recommendations for file extract changes to remediate issues

3) Subsequent load(s) of STATE-provided revised data extracts to confirm resolution of issues, or documented alternatives to resolution.

4) R56 Site Audit successfully completed.

5) Backhaul Test/Link verification successfully completed.

25. DELIVERABLE 2-7.1 AND 24 THROUGH 68: INTERFACE DEVELOPMENT AND RELEASE

a. Description:

CONTRACTOR shall build and release the interface with STATE's XXX application, per the requirements defined during analysis and the Interface Design deliverable.

Specific to the proposed CONTRACTOR Radio Network "interface development and release" the following items will be tested as applicable per phase (i.e. Option - ISSI Gateway for interoperability, CCGW at each RF site). Installation tasks for these items will be performed during the previously completed System Configuration – Installation Deliverable. NOTE: Upon State definition of XXX application, the CONTRACTOR will provide a separate quote as applicable for any additional scope and work which is required.

b. Expectations of CONTRACTOR for proposed infrastructure equipment:

1) CONTRACTOR shall complete development of the interface.
2) CONTRACTOR shall conduct thorough technical testing of the interface as identified in the Testing Management Plan.
3) CONTRACTOR shall resolve issues identified with the interface.
4) CONTRACTOR shall provide configuration for (optional) ISSI Gateway as applicable for the CONTRACTOR P25 System.
5) CONTRACTOR shall provide configuration for the proposed CEN and CCGW requirements.
6) CONTRACTOR shall install and validate the interface in preparation for user acceptance testing.

c. Expectations of STATE:

1) STATE shall provide technical resources and an environment for testing of the interface.
2) STATE shall collaborate with CONTRACTOR to validate CONTRACTOR installed interface correctly.
3) STATE shall validate interface is ready for user acceptance testing.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Release of the interface to STATE's user acceptance testing environment
2) Completion of CONTRACTOR's testing effort and remediation of any testing failures.

e. Acceptance Process

1) Upon completion of a deliverable, the parties shall follow the acceptance process in accordance with this Contract.

26. DELIVERABLE 2-11.1 AND 24 THROUGH 68: PHASE 2 ACCEPTANCE TESTING

a. Description:

CONTRACTOR shall support STATE testing efforts, make fixes and remediate testing issues during STATE's user acceptance testing and performance testing efforts.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall test 80% of code against product specifications and agreed-upon requirements. NOTE: The proposed radio system does not include the customized writing of code. As such, any testing of software will be part of the System Acceptance Testing this includes:
    a) Functional Acceptance Test (field) – see test plan below.
    b) Coverage Verification - (Or, if purchased, an Optional Coverage Test Plan per the coverage reliability maps for the 45 sites based upon final sites as purchased) – see test plan below.
2) CONTRACTOR shall demonstrate system functionality prior to commencement of acceptance testing by STATE.
3) CONTRACTOR shall review and consult on STATE's test scripts to ensure scripts are accurate and thorough.
4) CONTRACTOR shall provide template to document testing results.
5) CONTRACTOR shall provide testing support to identify, troubleshoot and resolve issues.
6) CONTRACTOR shall provide technical assistance with testing, verification and classification of issues.
7) CONTRACTOR shall correct validated issues based on priorities and severities defined by STATE.
8) CONTRACTOR shall work with STATE to ensure the development environment is correctly copied into the testing environment and all users have appropriate access.
9) CONTRACTOR Functional Acceptance Testing:
    a) Verify the operational functionality and features of the individual subsystems and the system supplied by CONTRACTOR, as contracted.
    b) If any major task as contractually described fails, repeat that particular task after CONTRACTOR determines that corrective action has been taken.
    c) Document all issues that arise during the acceptance tests.
10) Document the results of the acceptance tests and present to the STATE for review.
11) Resolve any minor task failures before Final System Acceptance
12) Coverage Verification Test Plan
    a) Perform Talk and Listen verifications per site after final ASR optimization.
    b) Document all issues arising during coverage verification.
13) The RF Site Checklist is included on the following pages:

Base Station Transmit Output Power (GTR)

1. DESCRIPTION

Base station transmit output power is measured by locally keying the base station and measuring the output power with a wattmeter connected to the base station's transmit (TX) port. The output power of every base station was tested as part of the individual unit's tests in Motorola' manufacturing process, and will also be tested as part of the Field Acceptance Test Plan

SETUP

Required equipment: appropriate wattmeter for the station to be tested (band-specific). Optional configuration software and associated client to run the configuration software. Create a table for the site to be tested; this table will be used to record the measurements.

VERSION #1.000

2. TEST

Step 1. Disable all base stations using a management terminal/configuration software.

Step 2. Insert a wattmeter between Base Station #1's TX antenna port and the corresponding base station's combiner/duplexer/antenna destination port.

Step 3. Turn on Base Station #1's Power Amplifier (key) using local management terminal/configuration software.

Step 4. Measure the base-station output power and record the measurement in the separately created table.

Step 5. De-key the base station under test by de-activating the PA via local management terminal/configuration software.

Step 6. Repeats Steps 2-5 for the remaining base stations at the site.

Step 7. Restore all antenna connections when completed.

Step 8. Verify that all measured output power of each station shall adhere to the base station's FCC-licensed output power requirements.

Pass____ Fail____

Transmitter Combiner Port Power Loss

1. DESCRIPTION

The transmitter combiner port power losses are tested by taking RF power measurements at various points in the radio-frequency (RF) distribution network. The RF power level is measured when a single base station has it's power amplifier (PA) engaged (keyed). The first measurement is made with a wattmeter placed on the base station port of the combiner. A second measurement is taken with the wattmeter placed on the antenna port of the combiner. The difference between the two measurements is the combiner loss, typically specificed in Decibels (dB).

SETUP

Required equipment: appropriate wattmeter for the station to be tested (band-specific). Optional configuration software and associated client to run the configuration software. Create a table for the site to be tested; this table will be used to record the measurements.

VERSION #1.090

2. TEST

Step 1. Disable all base stations using either the access enable/disable button located on the front panel, or via a management terminal/configuration software, and disconnect the transmission line jumper from the combiner's station input port for the base station.

Step 2. Insert a wattmeter between the combiner's station port and the transmission line jumper, and turn on Base Station #1's Power Amplifier (key) using the local Push-To-Talk (PTT) button located on the front panel, or via a local management terminal/configuration.

Step 3. Measure the combiner's station port input power and record the measurement in the table created previously.

Step 4. De-key the base station under test by releasing the local PTT button, or by de-activating the PA via a local management terminal/configuration software, remove the wattmeter, reconnect the transmission line jumper to the combiner's station input port, and

Step 5. Insert a wattmeter between the combiner's antenna port and the TX antenna transmission line, and repeat Step 4.

Step 6. Measure the combiner's antenna port output power and record the measurement in the table.

Step 7. De-key the base station under test by releasing the local PTT button, or by de-activating the PA via a local management terminal/configuration software.

Step 8. Calculate the Transmitter Combiner Port Power Loss by taking the difference between the Combiner Output Power (Step 3) and the Combiner Input Power (Step 6), and then convert the measurements to Decibels using the formula -dB=10*log (Step 3/Step 6).

Step 9. Repeat step 1 through step 8 for the remaining used transmitter combiner ports at the site.

Step 10. Restore all connections when completed. Verify that the Transmitter Combiner Port Power Loss (Insertion Loss) does not exceed the manufacturer's specficiations.

Pass____ Fail____

Transmitter Antenna Network Reflected Power

1. DESCRIPTION

The Transmitter Antenna Network Reflected Power test will measure the amount of transmitted radio frequency (RF) power reflected back through the transmitter antenna network and into the transmitter combining network. The RF network must be fully installed and optimized prior to being used. This includes the TX transmission line and the TX antenna. The first measurement is made with a wattmeter placed on the antenna port of the combiner. A second measurement is taken with the wattmeter placed on the antenna port of the combiner with the element reversed.

SETUP

Required equipment: appropriate wattmeter for the station to be tested (band-specific). Optional configuration software and associated client to run the configuration software. Create a table for the site to be tested; this table will be used to record the measurements, and should include the channel-by-channel tests from the "Transmitter Combiner Port Power Loss" test.

VERSION #1.070

2. TEST

Step 1. Disable all base stations using either the access enable/disable button located on the front panel, or via a management terminal/configuration software.

Step 2. Insert a wattmeter between Base Station #1's TX antenna port and the corresponding base station's combiner/duplexer/antenna destination port.

Step 3. Turn on Base Station #1's Power Amplifier (key) using the local Push-To-Talk (PTT) button located on the front panel, or via a local management terminal/configuration software.

Step 4. Measure the transmit antenna network's reflected power and record the measurement in the previously created table.

Step 5. De-key the base station under test by releasing the local PTT button, or by de-activating the PA via a local management terminal/configuration software.

Step 6. Calculate the Reflected Power Ratio using the formula %=(Step 4/Combiner Output Port Power)*100. This is the Reflected Power Ratio.

Step 7. Repeats Steps 2-6 for the remaining base stations at the site.

Step 8. Restore all antenna connections when completed.

Step 9. The reflected power from the TX antenna network shall not exceed a ratio of 5% reflected power to forward power.

Pass____ Fail____

Receiver Multicoupler Gain

1. DESCRIPTION

The Receiver Multicoupler Gain will be measured at completion of the site's installation work. First, a 12 dB SINAD measurement will be taken by injecting an RF carrier directly from a service monitor into a base station's receive (RX) port and the audio will be recovered on the base station. Then, a second 12 dB SINAD measurement will be taken by injecting a radio-frequency (RF) carrier into the multicoupler's pre-amplifier (pre-amp) port and the aduio will be recovered on the base station. The difference in measurements will equal the Receiver Multicoupler Gain

SETUP

A properly calibrated service monitor and 12 dB SINAD meter. Create a table to record the results of the tests in.

VERSION #1.020

2. TEST

Step 1. Connect a service monitor to any base station receive (RX) antenna port, and connect a 12 dB SINAD meter or another service monitor to the base station service port under test.

Step 2. Inject a base station receive frequency RF carrier modulated with a 1 kHz tone at 3kHz deviation for the base station under test. Adjust the service monitor's RF carrier level until a 12 dB reading is obtained on the 12 dB SINAD meter or service monitor.

Step 3. Record the RF carrier level in the previously created table.

Step 4. Disconnect the service monitor from the base station RX antenna port, reconnect the base station RX antenna port to it's corresponding multicoupler port, and reconnect the service monitor to the multicoupler's pre-amp port.

Step 5. Leave the 12 dB SINAD meter or service monitor connected to the same base station service port, and inject the same receive frequency RF carrier as per Step 2.

Step 6. Adjust the service monitor's RF carrier level until as 12 dB reading is obtained on the 12 dB SINAD meter or service monitor.

Step 7. Record the carrier level in the table created previously.

Step 8. Restore all connetions when completed.

Step 9. Calculate the multicoupler gain by using the formula dB=(Step 7-Step3). Record these results in the table as well.

Step 10. There is no pass/fail criteria for this test. It's purpose is to record a baseline value of the Receiver Multicoupler Gain for future reference and maintenance. This test does not need to be repeated for the remaining base stations.

Pass____ Fail____

Receiver Preamplifier Gain

1. DESCRIPTION

The receiver network for a communications system includes a Tower Top Amplifier (TTA) and a multicoupler. To test the Receiver Preamplifier Gain, a spectrum analyzer with a tracking generator will be used. The tracking generator will be used to generate a signal across the receive band and the spectrum analyzer will be used to record the carrier signal level at the multicoupler. The carrier signal level will be measured at one of the unused port of the multicoupler. These levels are logged and used to calculate system gain. The front panel current meter reading is also logged for reference. Correct operation of the receiver distribution amplifier helps ensure that subscriber unit, when at a maximum distance from the antenna site, will be received intelligibly.

SETUP

Spectrum analyzer with tracking generator. Create a table to record the results of the tests.

VERSION #1.030

2. TEST

Step 1. Set the tracking generator to 0 dB signal.

Step 2. Set the spectrum analyzer to a center frequency of 815 MHz and 10 dB per division on the vertical scale. Set the the level to 0 and the span to 5 MHz per division.

Step 3. Turn the marker on to read signal level at the marker.

Step 4. Connect the tracking generator output to a multicoupler test port.

Step 5. Connect the spectrum analyzer RF input to any unused multicoupler output port.

Step 6. Measure the RF signal level on the spectrum analyzer. Record the spectrum analyzer signal level in the previously created table.

Step 7. Record the front panel current meter reading of the multicoupler on the previously created table.

Step 8. Restore all connections when completed.

Step 9. There is no pass/fail critera for this test. The purpose of this test is to keep a baseline record of the Receiver Preamplifier Gain for future reference and maintenance. This test does not need to be repeated for the remaining base stations.

Pass____ Fail____

Time Domain Reflectrometry (TDR)/Frequency Domain Reflectometry (FDR) of Transmission Line

1. DESCRIPTION

The Time Domain Reflectometry/Frequency Domain Reflectrometry test ensures the integrity of all transmission line, transmission line connections, and antennae.

Note: Either the Time Domain Reflectometry or the Frequency Domain Reflectometry will be conducted at the site, not both.

SETUP

TDR/FDR Instrument, appropriate configuration software and client to run the application.

VERSION #1.030

2. TEST

Step 1. Disable all base stations using either the access enable/disable button located on the front panel, or via a management terminal/configuration software.

Step 2. Disconnect the TX transmission line from the surge suppression and connect the TDR/FDR instrument to the TX line leaving the site building.

Step 3. Generate a DC Pulse (TDR)/Frequency Sweep (FDR) using the TDR/FDR instrument, up the transmission line, and wait for the instrument to complete the test.

Step 4. Note the results and restore all connections.

Step 5. Disconnect the RX transmission line from the surge suppression, and connect the TDR/FDR instrument to the RX line leaving the building.

Step 6. Generate a DC Pulse (TDR)/Frequency Sweep (FDR) using the TDR/FDR instrument, up the transmission line, and wait for the instrument to complete the test.

Step 7. Note the results and restore all connections.

Step 8. Disconnect the Test Port transmission line from the surge suppression, and connect the TDR/FDR instrument to the Test Port transmission line leaving the building.

Step 9. Generate a DC Pulse (TDR)/Frequency Sweep (FDR) using the TDR/FDR instrument, up the transmission line, and wait for the instrument to complete the test.

Step 10. Note the results and restore all connections.

Pass____ Fail____

Effective System Sensitivity

1. DESCRIPTION

The effective system sensitivity will be measured at completion of the site's installation and optimization work.

SETUP

Signal generator, 12 dB SINAD meter, and a calibrated service monitor. Create a table to record the values of this test.

VERSION #1.030

2. TEST

Step 1. Connect a signal generator into the receiver multicoupler's test port.

Step 2. Connect a 12 dB SINAD meter or service monitor to the base station's service port under test.

Step 3. Inject the base station receive frequency RF carrier modulated with a 1 kHz tone at 3 kHz deviation for the base station under test.

Step 4. Adjust the service monitor's RF carrier level until a 12 dB reading is obtained on the 12 dB SINAD meter or service monitor.

Step 5. Record the service monitor's RF carrier level.

Step 6. Restore all connections when completed.

Step 7. Calculate the effective system sensitivity by using the formula dBm=Step 5 + Test Port Cable Loss + Service Monitor ISO-T Loss.

Step 8. There is no pass/fail criteria for this test. The purpose of this test is to keep a baseline record of effective system sensitivity for future reference and maintenance. This test does not need to be repeated for the remaining base stations.

Pass____ Fail____

Signoff Certificate

By their signatures below, the following witnesses certify they have observed the system Acceptance Test Procedures.

Signatures

WITNESS: _____Date: _____

Please Print Name: _____ _____

Initials:

Please Print Title: _____

WITNESS: _____Date: _____

Please Print Name: _____ _____

Initials:

Please Print Title: _____

c. Expectations of STATE:

1) STATE shall provide the testing environment.
2) STATE shall lead the testing effort and issue resolution process.
3) STATE shall ensure STATE testing occurs according to the project schedule and test results and re are documented.
4) STATE shall create test scripts according to STATE-defined workflows and processes.
5) STATE shall provide adequate and knowledgeable system users to participate in testing.
6) STATE shall perform user acceptance testing.
7) STATE shall perform application performance testing.
8) STATE shall document any identified issues, assign priority and severity and provide results to CONTRACTOR for trouble-shooting.
9) STATE shall provide programmed subscriber units for use in testing of the proposed system.
10) STATE shall provide the following to support the Functional Acceptance Testing:
    a) Witness the functional testing.
    b) Approval of the functional testing.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Completion of system testing and system functionality demonstration by CONTRACTOR
2) Completion of user acceptance testing and performance testing support by CONTRACTOR
3) Testing issues are resolved
4) Testing approach and execution is in alignment with the Testing Management Plan
5) STATE approves the Functional Acceptance Test.
6) STATE approves Coverage Verification

27. DELIVERABLE 2-16.1 AND 24 THROUGH 68: IMPLEMENTATION

a. Description:

CONTRACTOR shall support implementation of the final system. Implementation includes the Cutover / Business migration and Punchlist Resolution.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall participate, contribute and collaborate with STATE for implementation preparations.
2) CONTRACTOR shall make any fixes required in a timely manner to implement the system as approved in the Acceptance Testing deliverable.

3) CONTRACTOR shall provide technical support to STATE as needed for implementation efforts.

4) Cutover/Business Migration

   a) During cutover, follow the written plan (defined during the CDR) and implement the defined contingencies, as required, with little or no impact on the existing system and/or STATE operations

   b) Complete all required/proposed training plans prior to cutover, if applicable.

   c) Coordinate with the STATE to ensure all subscribers planned for cutover are activated in the system.

5) CONTRACTOR shall work with the STATE to resolve punchlist items, documented during the Acceptance Testing phase, in order to meet all the criteria for final system acceptance

c. <u>Expectations of STATE:</u>

1) STATE shall participate, contribute and collaborate with CONTRACTOR for implementation preparations.

2) STATE shall provide the production environment.

3) STATE shall monitor the implementation and notify CONTRACTOR of any issues.

4) STATE Cutover

   a) Notify the user group(s) affected by the cutover (date and time).

   b) Conduct a roll call of all users working during the cutover, in an organized and methodical manner.

   c) Ensure that all subscriber users are trained.

   d) Program, Distribute and install all subscriber devices prior to cutover.

   e) STATE shall Assist CONTRACTOR with resolution of identified punchlist items by providing support, such as access to the sites, equipment and system and approval of the resolved punchlist item(s).

d. <u>Acceptance Criteria:</u>

For the acceptance of this deliverable to occur, the following criteria must be met:

1) CONTRACTOR support during implementation

2) System go live with no unresolved issues

3) Successful migration from the old to new system.

4) All punchlist items resolved and approved by the STATE

28. DELIVERABLE 2-17.1 AND 24 THROUGH 68: POST-IMPLEMENTATION REPORT

a. <u>Description:</u>

CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to provide content for the Post-Implementation Report. Additionally, the proposed radio network project will include applicable project documentation as noted below including project warranty and post warranty documentation, as applicable.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall have project team members participate in the Post-Implementation Survey.
2) CONTRACTOR shall provide the following As Built Project Documentation in PDF System
3) Manual with documents on CD/DVD, as applicable:

NOTE: The following will be provided in Phase 2.

PHASE 2: Typical ASR RF site type documentation (quantity 1 per Phase 2) will be provided as applicable*

   a) Functional Acceptance Test Plan test sheets and results
   b) Equipment Inventory List
   c) ATP Test Checklists
   d) System Block Diagram
   e) RF Site Floor Plan*
   f) RF Site Rack Face*
   g) Antenna Network Drawings for RF Sites*
   h) Site Block Diagrams*
   i) System Diagram

4) CONTRACTOR shall review the items necessary for transitioning the project to warranty support and service
5) CONTRACTOR shall provide a STATE Support Plan detailing the warranty and post warranty support, if applicable, associated with the Contract equipment.
6) CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to develop a Post-Implementation Report that provides, at a minimum, the following:
   a) Key project metrics related to schedule, cost, scope and quality
   b) Business metrics related to project objectives and measurements as defined in the Project Charter
   c) Comprehensive lessons learned valuable to future projects
   d) Success stories from the project
   e) Results of the Post-Implementation Survey

c. Expectations of STATE:

1) STATE's Project Manager shall be responsible for the final product.
2) STATE's Project Manager shall design and conduct the Post-Implementation Survey.
3) The Post-Implementation Report shall follow STATE template.
4) Receive and approve Project Documentation provided by CONTRACTOR.
5) Participate in the Transition Service process.

d. Acceptance Criteria:

1) For the acceptance of this deliverable to occur, CONTRACTOR shall participate in the Post- Implementation Survey and provide content to STATE for the Post-Implementation Report regarding all services, tasks and products delivered by CONTRACTOR:
    a) Key project metrics related to schedule, cost, scope and quality
    b) Business metrics related to project objectives and measurements as defined in the Project Charter
    c) Lessons learned from the project
    d) Success stories from the project
2) Project Documentation provided by CONTRACTOR and received, approved by the STATE.
3) STATE Support Plan provided by CONTRACTOR and approved by STATE.
4) For the acceptance of this deliverable to occur, approval must be obtained from STATE's Executive Steering Committee (ESC).

29. DELIVERABLE 2-18.1 AND 24 THROUGH 68: PHASE 2 PROJECT CLOSEOUT MEETING

a. Description:

CONTRACTOR shall coordinate with STATE to schedule a Closeout Meeting in Bismarck, ND with the core project team and interested stakeholders. STATE's Project Manager shall lead the meeting, though CONTRACTOR may be asked to present on certain agenda items. The Closeout Meeting must present a completed Post-Implementation Report and facilitate discussion of the project closeout.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide content to STATE for detailed agenda in advance of the meeting.
2) CONTRACTOR shall provide STATE any required information for STATE's Project Manager to present the Post-Implementation Report.
3) CONTRACTOR shall expand upon the success stories and lessons learned captured from the Post-Implementation Survey and discuss details related to the lessons learned to provide comprehensive information to future projects.

c. Expectations of STATE:

1) STATE shall finalize and send agenda to invitees.
2) STATE shall coordinate logistics and facilitate the Closeout Meeting.
3) STATE shall expand upon the success stories and lessons learned captured from the Post- Implementation Survey and discuss and further document details related to the lessons learned to provide comprehensive information to future projects.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Phase 2 Closeout Meeting results in:

1) Completion and confirmation of the Post-Implementation Report deliverable

2) Comprehensive lessons learned and success stories valuable to future projects

30. DELIVERABLE 2-19.1 AND 24 THROUGH 68: PHASE 2 FINAL ACCEPTANCE

a. Description:

Upon completion of all deliverables and upon mutual agreement of STATE and CONTRACTOR, the project work will be considered complete and retainage paid to CONTRACTOR (applicable per each site in phase 2 which includes site 1, and sites 24-68).

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall address any outstanding issues or completion of deliverables.

c. Expectations of STATE:

1) STATE shall alert CONTRACTOR to any outstanding issues.

d. Acceptance Criteria:

Final Phase 2 Acceptance Received from the STATE. For the acceptance of this deliverable to occur, the following criteria must be met:

1) No outstanding or unfinished deliverables
2) No outstanding project or system issues

e. Project Administration

1) Progress Milestone Submittal
   a) CONTRACTOR Responsibilities:
      i. Submit progress (non-payment) milestone completion certificate/documentation.
   b) STATE Responsibilities:
      i. Approve milestone, which will signify confirmation of completion of the work associated with the scheduled task.
   c) Completion Criteria:
      i. The STATE approval of the Milestone Completion document(s).

31. CIVIL SCOPE OF WORK

a. Site Development and Construction for the 800 MHz Only Solution

CONTRACTOR has divided civil work (towers, shelters, etc.) on the RF sites in our design into four categories. This is for clarity of costs and responsibilities in each of the four classifications. These categories are

1) Existing Tower Existing Shelter (ETES).
2) Existing Tower New Shelter (ETNS).
3) New (Guyed) Tower Existing Shelter (NTES).
4) New (Guyed) Tower New Shelter (NTNS).

Following is our tailored site development for the State of North Dakota, Public Safety Radio System project.

1) The site development general responsibilities are summarized in Table 43.
2) The Architectural/Engineering Services (A/E) included in CONTRACTOR's response are summarized in Table 44.
3) The assumptions made in developing the site development scope of work for proposed RF sites are provided in section i. CIVIL WORK Assumptions.
4) Existing Towers include pre-defined remediation costs – see Exhibit D: Pricing for detail.
5) All RF sites include pre-defined tribal fee costs – see Exhibit D: Pricing for detail.

Table 43: Site Development and Construction: General Responsibilities

CONTRACTOR Tasks	State sites: ETES	State sites: NTES	State sites: ETNS	State Sites: NTNS
Site design visit to collect pertinent information from the sites.	✓	✓	✓	✓
Prepare a lease exhibit and sketch of the site to communicate to the property owner the proposed lease space and planned development at the particular site location	✓	✓	✓	✓
Prepare site construction drawings, showing the layout of various new and existing site components.	✓	✓	✓	✓
Prepare record drawings of the site showing the as- built information	✓	✓	✓	✓
Task 1 - Limited NEPA compliance/FCC checklist for towers constructed prior to March 16, 2001 or towers with previously filed FCC checklists	✓	✓	✓	✓
Existing Tower structural analysis	✓	N/A	✓	N/A
Existing Tower Mapping	✓	N/A	✓	N/A
Prepare Zoning Drawings	✓	✓	✓	✓

Table 44: CONTRACTOR Proposed Architectural / Engineering Services (by site type)

Tasks	CONTRACTOR	State of North Dakota	Comments
Zoning submittals (if required)	✓		ND to assist by providing information and helping to complete applications
Site Acquisition/Site Use Approvals	✓		With ND providing assistance
Pay for property lease/ownership application fees, taxes and recurring payments.		✓	
Permitting	✓		For work identified as being the responsibility of CONTRACTOR , CONTRACTOR has included pulling all required permits that might be required to complete the scope of work proposed.
If required, prepare and submit Electromagnetic Energy (EME) plans for the site (as a licensee) to demonstrate compliance with FCC RF Exposure guidelines.		✓	With CONTRACTOR providing information on the equipment to be supplied and installed by CONTRACTOR
Installations or up-grades of existing site electrical systems in order to comply with NFPA 70, Article 708		✓	No Installations or Upgrades are expected
Existing sites electric utility service and backup power (generator) upgrades	✓		CONTRACTOR has provided upgrades to the non-Thermobond shelters and utility services at the State sites will be upgraded for those buildings.
Pay for any upgrades to existing antenna support structures necessary to accommodate the new antennas proposed.	✓		CONTRACTOR has accounted for tower steel to remediate existing sites. Foundation has not been included in those upgrades.
Pay for the usage costs of electric power, leased lines and generator fueling beyond the installation effort and on an on-going basis. Includes easement fees.		✓	CONTRACTOR will provide generator first fill and system testing fuel.

Provide property deed or lease agreement and boundary survey, along with assisting CONTRACTOR gathering existing as- built drawings of the site and site components (i.e. towers and tower foundations- For state owned sites)		✓	Required for CONTRACTOR to conduct site engineering.
Provide a right of entry letter from the site owner for CONTRACTOR to conduct field investigations		✓	
Provide adequate and reasonable access to all sites and will facilitate access to all privately- owned sites as required		✓	Includes maintaining access roads (i.e. snow removal, wash out repair, etc.)
Architectural/Engineering Services (A/E) – Related to site development	✓		
NOTES: ETES = Existing Tower Existing Shelter ETNS = Existing Tower New Shelter NTES = New Guyed Tower Existing Shelter NTNS = New Guyed Tower New Shelter			

c. <u>Existing Towers with Existing Shelters: Remediation</u>

1) Site Scope Summary
    a) Engineering services for site drawings and regulatory approvals – Included.
    b) Site acquisition services – Not required.
    c) Zoning Services – Included.
    d) Existing tower – Remediate to support proposed loading- Structural analysis and tower engineering to provide a remediation plan.
2) CONTRACTOR Responsibilities:
    a) Site Engineering
    b) Prepare site construction drawings, showing the layout of various new and existing site components.
    c) Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).
    d) Prepare a lease exhibit and sketch of the site to communicate to the property owner the proposed lease space and planned development at the particular site location.
    e) Prepare record drawings of the site showing the as-built information.
    f) Perform a boundary and topographic survey for the property on which the communication site is located or will be located.
    g) Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter 1, subsection 1.1307 that may be potentially impacted by the proposed construction activity. This does not include the additional field investigations to document site conditions if it is determined that the proposed communication facility “may have a significant environmental impact” (i.e. contaminated soils due to hazardous materials, historical area, proximity to habitats of or evidence of protected species) and thus require additional documentation, submittals, or work.
    h) Perform four-point soil resistivity testing at the time of site visit.
    i) Provide a structural engineering analysis for antenna support structure, to support the proposed antenna system. If the tower structure fails the analysis, further analysis and tower engineering to provide a remediation plan to be executed on the tower have been included. (Excluding existing foundations).
    j) Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.
    k) Furnish 3rd Party Utility Mark-out of site.
3) Site Preparation
    a) Obtain the permits such as electrical, building and construction permits and coordinate any inspections with local authorities that may be needed to complete site development work.

b) Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of CONTRACTOR's control will result in additional costs.

c) Supply and install gravel surfacing to a depth of 6 inches, including herbicide treatment and geotextile fabric installation within the fenced in site compound area and a 3-foot path around it (approximately 200 square feet).

4) Site Components Installation

a) Supply and install one (1) 120/240-volt, 200-amp, single-phase meter pedestal and hook-up for electrical service by the local utility as required

b) Provide all trenching, conduit and cabling necessary for underground hook-up of power to the shelter from nearby utility termination at the shelter as required

c) Conduct one (1) three-point ground resistance test of the site. Should any improvements to grounding system be necessary after ground testing, the cost of such improvements shall be the responsibility of State of North Dakota.

5) Antenna and Transmission Line Installation

a) Install three (3) antenna(s) with 6-foot side arm mounts and 1 TTA for the RF system.

b) Install 1/2-inch transmission line.

c) Install 7/8-inch transmission line.

d) Perform sweep tests on transmission lines.

e) Provide and install six-hole hanger blocks and attachment hardware for supporting transmission lines on the antenna support structure every three feet.

f) Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

6) Miscellaneous Work

a) Furnish materials and labor to install two (2) new 60amp single pole breakers, conduit and wire for new AC Edge Panel as required.

b) Tower Modifications- Engineering analysis and remediation design with installation to support the proposed loading. Tower foundation redesign or additions have not been included.

e. <u>Existing State Sites Requiring Existing Shelters: Upgrades (Non-Thermobond)</u>

1) Site Scope Summary
    a) Engineering services for site drawings and regulatory approvals – Included.
    b) New Cummins 20kW indoor generator with matching Cummins ATS.
    c) New 1-ton BARD, wall-hung HVAC system installation.
    d) Upgrade electrical systems to 200 amps.
    e) Upgrading the site to R56 compliance per scope defined below.
2) CONTRACTOR Responsibilities:
    a) Site Engineering
        i. Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).
        ii. Prepare, submit and track application for local permit fees (zoning, electrical, building etc.), prepare FAA filings and procure information necessary for filing.
        iii. Furnish 3rd Party Utility Mark-out of site.
    b) Site Preparation
        i. Obtain the permits such as electrical, building and construction permits and coordinate any inspections with local authorities that may be needed to complete site development work.
        ii. Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of CONTRACTOR's control will result in additional schedule days.
    c) Site Components Installation
        i. Supply and install one (1) standby power generator (20 kW) located within 20 feet of the ATS, including interconnection wiring between the generator, transfer switch and site electrical service mains.
        ii. Supply and install one (1) 120/240-volt, 200-amp, single-phase meter pedestal and hook-up for electrical service by the local utility.
        iii. Provide all trenching, conduit and cabling necessary for underground hook-up of power to the shelter from nearby utility termination located within 100 cable feet of the shelter.
        iv. Supply and install a perimeter grounding system around the compound, shelter and tower. The ground system is to tie to the fence and all new metal structures within the compound to meet current CONTRACTOR ’s R56 standards.
        v. Conduct one (1) three-point ground resistance test of the site. Should any improvements to grounding system be necessary after ground testing, the results of such improvements shall be negotiated.
    d) Existing Facility Improvement Work

i. Supply and install one (1) 200-amp breaker panel with capacity for 30 circuits.

ii. Supply and install six (6) 20-amp breakers in the distribution panel and wire to outlets located on an average within 35 cable feet.

iii. Install one (1) Type 2 surge protector on electrical service side of the ATS.

iv. Install one (1) automatic transfer switch and connect it to generator and electric main.

v. Supply and install 12-inch-wide cable runway (up to 20 linear feet) inside the existing room.

vi. Ground all metallic objects in the interior of the existing room, to meet current CONTRACTOR's Standards and Guidelines for Communications Sites (R56) requirements and terminate near equipment locations.

vii. Supply and install one (1) wall-mounted 10-pound CO2 fire extinguisher and 1 wall-mounted 20- pound ABC fire extinguisher.

viii. Supply and install "No smoking" EME signage at the site.

ix. Supply and install one (1) eye wash station and 1 first aid kit.

x. Supply one (1) 2-ton air-conditioning unit with low ambient and compressor anti-cycle controls, return and supply grilles, integral 5kW resistance heat strips and washable dust filters.

xi. Install air-conditioning unit controls and wire to breaker panel located within 50 cable feet of the air-conditioning unit.

xii. Supply and install sensors for alarming (Fire, Smoke, Hi/Lo temp, door intrusion), punch block and wiring of contact closures to alarm block.

e) Miscellaneous Work

i. Furnish materials and labor to install two (2) new 60amp single pole breakers, conduit and wire for new AC Edge Panel.

ii. Furnish materials and labor to create openings for new HVAC unit.

iii. Furnish materials and labor to reconfigure existing LP piping for new generator.

g. <u>New Guyed Tower to be Used with Existing Shelter</u>

1) Site Scope Summary
    a) Engineering services for site drawings and regulatory approvals – Included.
    b) Support site negotiation where required and Zoning services as required.
    c) New 50’ x 50’ fenced compound/expansion as required.
    d) New 200’ or 300’ or 500’ guyed tower, field assembled.
    e) New 35 (for 200’tower) or 45(for 300’ tower) or 90(for 500’ tower) cubic yard tower foundation Type – Base + 3 anchors.
2) CONTRACTOR Responsibilities:
    a) Site Acquisition
        i. The CONTRACTOR project manager will assist the State of North Dakota in obtaining the site lease.
        ii. Assist State of North Dakota in negotiating an option/lease/license agreement (lease) and acquiring clear land title/site lease/shared use agreement for the candidate site.
        iii. Coordinate zoning and permitting of the new guyed tower site such that it is in full compliance with applicable jurisdictional requirements.
    b) Site Engineering
        i. Prepare site construction drawings showing the layout of various new and existing site components.
        ii. Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).
        iii. Perform a boundary and topographic survey for the property on which the communication site is located or will be located.
        iv. Prepare a 2C/1A letter certifying the accuracy of the surveyed data for the tower.
        v. Prepare a lease exhibit and sketch of the site to communicate to the property owner the proposed lease space and planned development at the particular site location.
        vi. Prepare zoning drawings that can be used to describe the proposed site installation in sufficient detail.
        vii. Prepare record drawings of the site showing the as-built information.
        viii. Perform construction staking around the site to establish reference points for proposed construction.
        ix. Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the proposed construction activity. This does not include the additional field investigations to document site conditions if it is determined that the proposed communication facility “may have a significant environmental impact” (i.e.

contaminated soils due to hazardous materials, historical area, proximity to habitats of or evidence of protected species) and thus require additional documentation, submittals, or work. Regional Environmental Review (RER) report submittals if required by FEMA have not been included. Perform Cultural Resource study as needed to identify sensitive historical and archaeological monuments that might be impacted by proposed construction

x. Perform a ASTM E 1527-05 certified Phase I Environmental Site Assessment (ESA), to identify obvious and reasonably likely on-site and/or off-site potential sources of contamination that might pose a potential risk of leasing and building on a piece of property and whether further environmental investigations are warranted. This study does not include Phase II assessments, risk/cost evaluations and permitting assistance that may be required if risk factors are indicated.

xi. Conduct up to 35-foot deep soil boring test at tower location and prepare geotechnical report of soil conditions at locations of guyed tower base and each guy anchor point. Grouting of boring holes or access by Automatic Traction Vehicle (ATV) - mounted rig is not included.

xii. Conduct construction inspection of foundation steel prior to pour, materials testing of concrete and field density tests of backfill to ensure quality construction.

xiii. Check tower erection for plumbness, linearity and alignment after installation.

xiv. Perform inspection of the site and the work performed by the Contractor to document that the site is built in accordance with the “Site Plans” and document any deviations or violations.

xv. Prepare, submit and track application for local permit fees (zoning, electrical, building etc.), prepare FAA filings and procure information necessary for filing.

c) Site Preparation

i. Obtain the permits such as electrical, building and construction permits and coordinate any inspections with local authorities that may be needed to complete site development work.

ii. Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of CONTRACTOR's control will result in additional schedule days.

iii. Perform light clearing of brush, grubbing and disposal of vegetation and shrub growth in the site compound area and a 20-foot path around it (approximately 8100 square feet).

iv. Grade the site compound and 10-foot path around it to provide a level, solid, undisturbed surface for installation of site components (approximately 4900 square feet).

v. Provide minimal grading in a 15-foot x 30-foot compound around each of 3 guy anchors to allow anchor installation.

vi. Supply and install gravel surfacing to a depth of 6 inches, including herbicide treatment and geotextile fabric installation within the fenced in site compound area and a 3-foot path around it (approximately 3136 square feet).

vii. Supply and install gravel surfacing to a depth of 6 inches around each of 3 guy anchors, including herbicide treatment and geotextile fabric installation.

viii. Provide silt fence around the compound to control soil erosion (approximately 200 linear feet).

ix. Supply and install 8-foot high chain-link fencing with a ten-foot wide gate around the shelter compound (approximately 200 linear feet).

x. Supply and install 8-foot high chain-link fencing with a four-foot wide gate around a 15-foot x 30-foot compound for each of 3 guy anchors.

xi. Perform site touch up (fertilize, seed and straw) disturbed areas not covered with gravel after completion of construction work. Landscaping, decorative fencing or any other aesthetic improvement that may be required by local jurisdictions has not been included and will be handled through a negotiated contract change notice.

d) Site Components Installation

i. Supply and install a perimeter grounding system around the compound, shelter and tower. The ground system is to tie to the fence and all new metal structures within the compound to meet current CONTRACTOR R56 standards.

ii. Supply and install one (1) freestanding 24-inch-wide cable/ice bridge from the tower to the shelter (approximately 20 linear feet).

e) Tower Work (applicable to sites with new towers, as defined above)

i. Construct tower foundations for a guyed tower (base and three anchors) including excavation, rebar and concrete (35 (for 200'tower) or 45(for 300' tower) or 90(for 500' tower) cubic yard tower foundation).

ii. Rock coring, extensive dewatering of foundations or hazardous material removal has not been included and will be negotiated.

iii. Erect new 200', 300' or 500'- guyed tower with dual-strobe lighting.

iv. Install torque arm on 6-foot guyed tower.

v. Supply and install grounding for the tower base for monopole or guyed towers.

vi. Ground each of the three (3) guy anchors using galvanized steel ground rods.

f) Antenna and Transmission Line Installation

i. Install three (3) antenna(s) and 1 TTA for the RF system.

ii. Install transmission line and perform sweep test.

iii. Provide and install six-hole hanger blocks and attachment hardware for supporting transmission lines on the antenna support structure every three feet.

iv. Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

g) Existing Facility Improvement Work

i. Supply and install six (6) 20-amp breakers in the distribution panel and wire to outlets located on an average within 35 cable feet.

h) Miscellaneous Work

i. Furnish materials and labor to install two (2) new 60amp single pole breakers, conduit and wire for new AC Edge Panel.

h. STATE Responsibilities

STATE Responsibilities	ETNS	ETES	NTNS	NTES
If required, prepare and submit Electromagnetic Energy (EME) plans for the site (as a licensee) to demonstrate compliance with FCC RF Exposure guidelines.	X	X	X	X
Pay for all utility connection, pole or line extensions and any easement or usage fees.	X	X	X	X
Review and approve site design drawings within 7 calendar days of submission by CONTRACTOR or its subcontractor(s). Should a re- submission be required, the STATE shall review and approve the re-submitted plans within 7 calendar days from the date of submittal.	X	X	X	X
Pay for the usage costs of power, leased lines and generator fueling after initial fill.	X	X	X	X
Pay for application fees, taxes and recurring payments for lease/ownership of the property.	X	X	X	X
Provide personnel to observe construction progress and testing of site equipment according to the schedule provided by CONTRACTOR.	X	X	X	X
As applicable (based on local jurisdictional authority), the STATE will be responsible for any installation or up- grades of the electrical system in order to comply with NFPA 70, Article 708	X	X	X	X

Provide property deed or lease agreement and boundary survey, along with existing as-built drawings of the site and site components to CONTRACTOR for conducting site engineering.	**X**	**X**	**X**	**X**
Maintain existing access road in order to provide clear and stable entry to the site for heavy-duty construction vehicles, cement trucks and cranes. Sufficient space must be available at the site for these vehicles to maneuver under their own power, without assistance from other equipment.	**X**	**X**		**X**
Arrange for space on the structure for installation of new antennas at the proposed heights on designated existing antenna- mounting structures.	**X**	**X**		
Provide space, HVAC, backup power, where applicable (generator), outlets, grounding, surge suppression, lighting and cabling facilities for the equipment room per CONTRACTOR's R56 specifications. Ceiling and cable tray heights in the equipment rooms should be such as to accommodate 7-- foot equipment racks and the ceiling should be 8 feet or greater. (HVAC upgrades proposed to Non - Thermo bond state shelters)		**X**		**X**
Confirm that there is adequate utility service to support the new equipment and ancillary equipment.		**X**		**X**
If required, remove or relocate any existing facilities, equipment and utilities to create space for new site facilities and equipment.		**X**		**X**
If required, provide any physical improvements (walls, roofing, flooring, painting, etc.) necessary to house the equipment in the existing room.		**X**		**X**
NOTES: ETES = Existing Tower Existing Shelter ETNS = Existing Tower New Shelter NTES = New Guyed Tower Existing Shelter NTNS = New Guyed Tower New Shelter				

i. CIVIL WORK Assumptions

Assumptions	ETNS	ETES	NTNS	NTES
No prevailing wage, certified payroll, mandatory union workers or mandatory minority workers are required for this work	X	X	X	X
All work is assumed to be done during normal business hours as dictated by time zone (Monday thru Friday, 7:30 a.m. to 5:00 p.m.).	X	X	X	X
All recurring and non- recurring utility costs [including, but not limited to, generator fuel (except first fill), electrical, Telco] will be borne by the STATE or site owner.	X	X	X	X
All utility installations shall be paid for by the site owner and located at jointly agreed to location within or around the new communications shelter or equipment room.	X	X	X	X
Site will have adequate electrical service, see matrix specified distance for CONTRACTOR provided power feed for the new shelter. Utility transformer, transformer upgrades, line, or pole extensions have not been included.	X		X	
Pricing has been based on National codes such IBC or BOCA.	X	X	X	X
Hazardous materials are not present at the work location. Testing and removal of hazardous materials, found during site investigations, construction or equipment installation will be the responsibility of the STATE.	X	X	X	X

Assumptions	ETNS	ETES	NTNS	NTES
A maximum of 30 days will be required for obtaining approved building permits from time of submission and a maximum of 60 days will be required for zoning approvals from time of submittal.	X	X	X	X
No improvements or specialized rigging will be required for concrete trucks, drill rigs, shelter delivery and crane access.	X	X	X	X
If extremely harsh or difficult weather conditions delay the site work for more than a week, CONTRACTOR will request delays.	X	X	X	X
In the absence of geotechnical test data, sites are assumed to be in presumptive soils as defined by current TIA/EIA 222 guidelines	X		X	X
On existing tower sites power is assumed within 100ft of proposed shelter location.	X	X		
Site acquisition fees are excluded from this proposal.	X	X		
Tribal fees are included up to a total reflected in the Cost Proposal. Any additional tribal fees above allotted amount will result in a pass thru cost to the STATE.	X	X	X	X
Assumes no storm water design or implementation is included.	X	X	X	X
The new guyed tower location will pass the FAA hazard study, zoning, FCC and environmental permitting.			X	X
The existing ground system and soil resistivity at the site is sufficient to achieve resistance of 10 ohms or less. Communication site grounding will be designed and installed per CONTRACTOR's R56 standards.	X	X		X

Assumptions	ETNS	ETES	NTNS	NTES
The existing site has adequate room to expand and install the shelter, including lay-down and staging areas, without encroaching on wetlands, easements, setbacks, right- of-way's, or property lines.	X			
AM detuning or electromagnetic emission studies will not be required.	X	X		
Lead paint testing of existing painted towers has not been included.	X	X		
On the existing tower, the antenna locations for the proposed antenna system design will be available at the time of installation.	X	X		
The new shelter can be located within approximately 20 feet of the existing tower location and the generator/fuel tank can be located within approximately 25 feet of the shelter.	X			
Restoration of the site surroundings by fertilizing, seeding and strawing the disturbed areas will be adequate.	X	X	X	X
Underground utilities are not present in the construction area and as such no relocation will be required.	X	X	X	X
The existing antenna support foundation is structurally capable of supporting the new antenna, cables and ancillary equipment proposed and will not need to be removed or rebuilt at the existing site. The supporting structure meets all applicable current EIA/TIA-222 foundation, ice, wind, and twist and sway requirements. CONTRACTOR has not included any cost for foundation upgrades to the antenna support structure.	X	X		

Assumptions	ETNS	ETES	NTNS	NTES
Structural analyses for towers or other structures that have not been performed by CONTRACTOR will relinquish CONTRACTOR from any responsibility for the analysis report contents and/or recommendation therein.	X	X		
Foundations for shelter, generator and fuel tank are based presumptive soil conditions as defined by current TIA/EIA 222 standards. Footings deeper than 30 inches, raised piers, rock coring, dewatering, or hazardous material removal have not been included.	X	X	X	X
Assumes existing fenced in compounds have the required space for installation of proposed shelter and LP tank. No compound expansion required.	X			
The site has adequate utility service to support the proposed equipment loading		X		X
Alarming at existing sites will be limited to new component installations and will have to be discussed and agreed to on a site-by-site basis.		X		X
A clear obstruction-free access exists from the antenna location to the equipment room.	X	X		
The floor can support the proposed new loading. Physical or structural improvements to the existing room will not be required.		X		X
Tower and foundation sizing is based on the tower loading requirements as a result of the RF Antenna System design.			X	X

Assumptions	ETNS	ETES	NTNS	NTES
If as a result of NEPA studies, any jurisdictional authority should determine that a proposed communications facility "may have a significant environmental impact", the environmental impact studies or field testing and evaluation related to such determination have not been included.	X		X	X
For new guyed towers greater than 200 feet in overall height, FAA dual obstruction lighting has been included. Painting of any new guyed towers has not been included.			X	X
The site location can be finalized and lease agreement can be reached with the property owner within 60 calendar days after the start of the site acquisition effort.			X	X
A waiver to zoning requirements like setbacks, tower height limitations, etc. can be obtained.	X		X	X
The soil resistivity at the site is sufficient to achieve resistance of ten (10) ohms or less. Communications site grounding will be designed and installed per CONTRACTOR's Standards and Guidelines for Communications Sites (R56).			X	X
Spoils from the tower foundations can be dispersed on the property and will not be required to be transported to a dump location.			X	X
Existing tower and Legacy equipment will remain in place and room for new guyed tower will be approximately 20ft of existing shelter.				X

Assumptions	ETNS	ETES	NTNS	NTES
NOTES: ETES = Existing Tower Existing Shelter ETNS = Existing Tower New Shelter NTES = New Guyed Tower Existing Shelter NTNS = New Guyed Tower New Shelter				

j. Site Development Completion Criteria

1) Site development completed per issued for construction (IFC) construction drawings, project requirements, contractual obligations (including any STATE /CONTRACTOR approved changes) and approved by State of North Dakota.
2) This shall be confirmed by contractor and reviewed with CONTRACTOR construction manager and project manager before inspections occur.
3) All jurisdictional and contractual required testing and inspections to be performed by the contractor. (Contractual testing and inspections defined and agreed to with project team and STATE prior to project kick off; vendor solely responsible for conducting, coordinating and paying for all jurisdictional testing and inspections).
4) CONTRACTOR site development checklist shall be completed and signed off by contractor prior to STATE inspection. (Review with project team and STATE and amend checklist as required at project kick off or before work begins).
5) Site turn-over package completed and turned over to CONTRACTOR (As defined and agreed to with project team and STATE).
6) All punch list and deficiencies shall be completed prior to STATE and CONTRACTOR inspections.

32. ATTACHMENTS

a. System Network Diagrams

Reference the five PDF files named:

- 20190116 North_Dakota_P25_MasterSite_Zone1_NetwDiag
- 20190116 North_Dakota_P25_3CH_800MHZ_ASR_NetwDiag
- 20190116 North_Dakota_P25_5CH_800MHZ_SimRem_NetwDiag
- 20190116 North_Dakota_P25_5CH_800MHZ_SimRemandPrime_NetwDiag
- 20190116 North_Dakota_P25_Dispatch_NetwDiag

33. SCHEDULE

a. 800 MHz Solution Preliminary Schedule

The preliminary schedule below is based on the proposed main offering and assumes all deliverables are completed per schedule. This schedule will be jointly

reviewed with the STATE prior to the Contract Design Review to accommodate any additionally purchased options, requested changes and the final Contract start date. Items such as frequency coordination, FCC approvals and permitting as applicable, are estimates only and are not under CONTRACTOR'S control.

EXHIBIT B-2A – Phase 2 Draft Schedule

Reference PDF file named 20190116 DRAFT ND Schedule Phase Two.

EXHIBIT B-2B – Phase 2 Payment Schedule

As Deliverable acceptance is given in conjunction with the Phase 2 Statement of Work, STATE will make payments to CONTRACTOR within thirty (30) days after the date of each invoice. STATE will make payments when due in the form of a check, cashier's check, or wire transfer drawn on a U.S. financial institution and in accordance with the following milestones.

Total Phase 2 Value ($18,684,177)	
Contract Design Review (CDR)	
Project Kickoff Complete – Deliverable 2-1	$467,750
Project Plan (Schedule Baselined) – Deliverable 2-SCHED	$233,875
Project Plan Complete – Deliverable 2-2	$233,875
CDR Complete - Deliverable 2-CDR	$1,281,653
Frequency Coordination - Deliverable 2-FREQ	$309,524
Total CDR Milestone	$2,526,676
Less 15% Retainage	*$379,001*
Net CDR Milestone Payments	$2,147,675
Civil Works Complete by Site	
Civil Works Complete by site - Deliverable 2-CIVIL.24-68 (see breakdown by site on Exhibit D)	$8,958,023
Less 15% Retainage	*$1,343,703*
Net Civil Works Milestone Payments	$7,614,320
Delivery of Site Facility Equipment by Site	
Delivery of Equipment by site – Deliverable 2-DLVRCIV.24-68 (see breakdown by site on Exhibit D)	$2,001,700
Less 15% Retainage	*$300,255*
Net Site Delivery Milestone Payments	$1,701,445
Delivery of Antenna/Line Equipment by Site	
Delivery of Equipment by site – Deliverable 2-DLVRAL.24-68 (see breakdown by site on Exhibit D)	$1,774,996
Less 15% Retainage	*$266,249*
Net Antenna/Line Delivery Milestone Payments	$1,508,746
Delivery of RF Infrastructure Equipment (from Staging, as applicable)	
Delivery of Equipment – Deliverable 2-DLVRFNE.1 and 24-68	$9,330,459
Less Applicable Contract Incentives	*$8,722,267*
Total Equipment Delivery Milestone	$608,193
Less 15% Retainage	*$91,229*
Net RF Equipment Delivery Milestone Payments	$516,964
FNE Install Complete by Site	
Installation Complete by site – Deliverable 2-FNEINSTALL.1 and 24-68 (see breakdown by site on Exhibit D)	$2,338,143
Less 15% Retainage	*$350,722*
Net Installation Milestone Payments	$1,987,422
System Admin Training	

Training Complete – Deliverable 2-14 (see breakdown on Exhibit D)	$273,435
Less 15% Retainage	*$41,015*
Net Training Milestone Payments	$232,420
PSAP REFRESH Training Complete by Site	
Training Complete by site – Deliverable 2-13.2,3 and 5-23 (see breakdown by site on Exhibit D)	$203,011
Less 15% Retainage	*$30,452*
Net Training Milestone Payments	$172,559
Final Acceptance by Site (Payment of Retainage)	
Final Acceptance by site – Deliverable 2-19.1 and 24-68 (see breakdown by site on Exhibit D)	$2,802,627

CONTRACTOR shall make partial shipments of equipment and will request payment upon delivery of such equipment as reflected on a per site basis within the referenced exhibit. In addition, CONTRACTOR shall invoice for installations completed on a site-by-site basis or when professional services are completed, when applicable, as per the referenced exhibit. For invoicing purposes only, contract incentives will be applied to payments as explicitly reflected within the Phase 2 payment milestones herein. Overdue invoices will bear simple interest at the maximum allowable rate by state law.

For Lifecycle Support Plan and Subscription Based Services

CONTRACTOR will invoice STATE annually in advance of each year of the plan.

EXHIBIT B-3 – Phase 3 Statement of Work

1. PHASE 3 SYSTEM OVERVIEW

Phase 3 completes the system build out, adding to the work in the Phase 1 and 2. This Phase utilizes the installed and operational Master site core as provided in Phase 1, which is at a supported system release version. All equipment and services from the Phase 1 and 2 stages are utilized. This Phase shall provide each region with 85% portable coverage, with 95% reliability. The Phase shall also provide each region with 95% mobile coverage throughout the geographically bounded area of the region at 95% reliability. The following scope is included:

1) 20dB in-building coverage in populated areas of Bismarck, Mandan, Dickinson, Williston, Minot, Grand Forks, Fargo, West Fargo, and Jamestown per RFP requirements, and portable on-street statewide per RFP requirements.
2) Seven (7) 800 MHz simulcast sub-systems (total of 18 IP simulcast sites)
3) 76 total 800 MHz ASR RF Sites
4) OPTION: Over the Air Re-Keying with KMF for 25,000 users (Infrastructure/Console Only).
5) OPTION: BAFO Civil to increase tower loading for the original proposed 9 towers + 2 towers from the additional 23 sites (no tower maintenance).
6) OPTION: ISSI Gateway to Neighboring systems (5 interfaces).
7) Training: Not Applicable
8) Connectivity through DCN: Quoted but to be paid directly by ITD
9) Warranty: One Year for the proposed infrastructure equipment
10) Complete Implementation as detailed in the Statement of Work below including:
    a. Staging.
    b. Installation & Optimization.
    c. Civil Work as detailed.
    d. Complete Acceptance Testing.
    e. Coverage Testing.
    f. 60 Day Burn-In.

a. Radio System Equipment Included:

1) Phase 3 Core Network System Licenses.

License	Description of License	Qty
ASTRO 25 TDMA Site	License for the ASTRO 25 TDMA sites in the system. One license is required for every ASR and simulcast remote site.	94
ASTRO 25 TDMA Base Radio	License for the ASTRO 25 TDMA Base Radios in the system. One license is required for every TDMA Base Radio.	304

2) Seven (7) 800 MHz simulcast subsystems (total of 18 IP simulcast sites) located in urban areas/cities per Table below. NOTE: 4 sites from Phase 1 will be converted to IP simulcast.

iii. Four (4) 24 Port Prime Site Ethernet Switches with GBIC Modules and Fiber Cables.

iv. Two (2) GGM 8000 Subsites Access Gateways with Encryption.

v. Two (2) GCP 8000 Prime IP Simulcast Controllers (Redundant).

vi. GCM 8000 IP Comparator Modules – one (1) per TDMA channel.

vii. Five (5) IP Comparator Modules at Bismarck/Mandan IP Simulcast.

viii. Four (4) IP Comparator Modules at Fargo/West Fargo IP Simulcast.

ix. Four (4) IP Comparator Modules at each of the Five IP Simulcast subsystems.

c) Each IP Simulcast Remote Site includes the following equipment:

i. One (1) 7.5' Open Rack GTR 8000 Expanded Site System (ESS), AC Only.

ii. Five (5) 7/800 MHz GTR 8000 IP Simulcast (Bismarck/Mandan IP Simulcast Only)

iii. Four (4) 7/800 MHz GTR 8000 IP Simulcast (Fargo/West Fargo IP Simulcast Only).

iv. Four (4) 7/800 MHz GTR 8000 IP Simulcast (at each of the remaining Five IP Simulcast Sites Only).

v. One (1) Primary 6 Port Cavity Combiner.

vi. One (1) Cabinet Plus Site and Cabinet Receiver Multicoupler, 12 ports, (Bismarck/Mandan and Fargo/West Fargo IP Simulcast Sites Only).

vii. One (1) Cabinet Receiver Multicoupler.

viii. One (1) Transmit Filters, 800 MHz.

ix. One (1) 7.5' Open Rack and Rackmount AC Power Strips.

x. Two (2) GGM 8000 Gateways with Encryption and Common Criteria.

xi. Two (2) 24 Port Ethernet Backhaul Switches with GBIC Modules and Fiber Cables.

xii. One (1) TRAK 9100 GPS site reference.

xiii. One (1) TXRX 428 E Control Monitoring Unit (CMU, AC Only).

xiv. One (1) SDM 3000 RTU (AC Only) for site's Auxiliary Digital Inputs forwarding to UEM.

xv. One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

xvi. Two (2) UPS, SEPS Inc. 9PX, 2700W, 120V, Softwired, 23 Min Runtime Rack Mounted.

d) Antenna Network

i. Three (3) RFI CC807-11T1 Antennas (one Transmit and two Receive Antenna for a second branch receiver diversity design) for all sites,

except Fargo and 1038763 will use RFI CC807-06 Antennas. One (1) TXRX 428 E Tower Top Amplifier (TTA).

ii. 7/8" Coaxial transmit line plus connectors and jumpers. OPTION: Any tower 300' or higher optionally may have 1 5/8" coaxial transmit line plus connectors and jumpers.

iii. 7/8" Coaxial receive line plus connectors and jumpers.

iv. 1/2" Coaxial test line plus connectors and jumpers.

3) Seventy-six (76) ASTRO 25 Site Repeater (ASR), 3 channel, Sites (800 MHz, APCO 25 Phase 2, TDMA). See Exhibit D Pricing for the complete list of 76 ASR sites included in Phase 3.

a) The proposed RF equipment at each three (3) channel ASR Site includes:

i. One (1) 7.5' Open Rack GTR 8000 Expanded Site System (ESS), AC or DC Power Distribution.

ii. Three (3) 7/800 MHz GTR 8000 ASTRO 25 Repeaters.

iii. One (1) Primary 6 Port Cavity Combiner.

iv. One (1) Cabinet Receiver Multicoupler.

v. One (1) Transmit Filters, 800 MHz.

vi. Two (2) Site Controllers.

vii. Two (2) GGM 8000 Gateways with Encryption and Common Criteria (AC Power).

b) One (1) 7.5' Open Rack and Rackmount AC Power Strips.

i. One (1) SDM 3000 RTU (AC Only) for site's Auxiliary Digital Inputs forwarding to UEM.

ii. One (1) TXRX 428 E Control Monitoring Unit (CMU, AC Only).

iii. One (1) GGM 8000 High Density Conventional Channel Gateway (CCGW) for support of up to 8 analog conventional channels (4-wire Tone Remote Control).

iv. Two (2) UPS, SEPS Inc. 9PX, 2700W, 120V, Softwired, 23 Min Runtime Rack Mounted.

c) Antenna Network

i. Two (2) RFI CC807-11T1 Antennas (one Transmit and one Receive Antenna).

ii. One (1) TXRX 428 E Tower Top Amplifier (TTA).

iii. 7/8" Coaxial transmit line plus connectors and jumpers. OPTION: Any tower 300' or higher optionally may have 1 5/8" coaxial transmit line plus connectors and jumpers.

iv. 7/8" Coaxial receive line plus connectors and jumpers.

v. 1/2" Coaxial test line plus connectors and jumpers.

b. Civil Work (Towers, Shelters):

1) 9+2 sites – new tower, new shelter with power.

2) 62+21 third-party owned sites – use existing tower, new shelters with power.

3) Installation Services and Civil Scope.

Each ASR site will include installation services per the Statement of Work and the Civil Scope per Section 31. All sites include a new 12'x 32' x 9' shelter with HVAC, generator, and UPS.

A total of 83 sites (3rd party owned) will reuse the existing tower at the site. Assumptions for civil work for existing sites with an existing tower and new shelter include:

i. Tower Remediation Contingency is included based on an anticipated average $75,000 per tower. Remediation work on any of the 83 existing towers may not commence until the parties mutually agree on the extent of remediation necessary for each tower, and the cost of the remediation for each tower.
ii. Tribal Fee Contingency is included based on an anticipated $10,000 per tower site (monitoring not included).
iii. Existing tower assumed available for use.
iv. Space assumed available in compound to accommodate the shelter.

A total of 11 sites with a new tower and new shelter include the following assumptions:

i. Tribal fees - Not to Exceed $10,000 per site (monitoring not included).
ii. Space assumed available to accommodate the shelter and tower.
iii. State is responsible for property deed or lease as applicable.

c. SPARES: Simulcast Sites and ASR Site Spares

SPARE TYPE	LOCATION	QTY	NOMENCLATURE	DESCRIPTION
SIMULCAST	PRIME SITES	7	DSTRAK91061	FOUR PORT DDM
SIMULCAST	PRIME SITES	7	CLN1859	2620-48 ETHERNET SWITCH
SIMULCAST	PRIME SITES	7	DLN6966	FRU: GCP 8000/GCM 8000/GPB 8000
SIMULCAST	PRIME SITES	7	DLN6455	CONFIGURATION/SERVICE SOFTWARE
SIMULCAST	PRIME SITES	7	DSTRAK91061	FOUR PORT DDM
SIMULCAST	PRIME SITES	7	DLN6455	CONFIGURATION/SERVICE SOFTWARE
SIMULCAST	PRIME SITES	7	DLN6781	FRU: POWER SUPPLY
SIMULCAST	PRIME SITES	7	DLN6895	FRU: PA 7/800 MHz
SIMULCAST	PRIME SITES	7	DLN6885	FRU: XCVR 7/800 MHZ V2

SIMULCAST	PRIME SITES	7	DLN6898	FRU: FAN MODULE
SIMULCAST	PRIME SITES	7	DLN6634	FRU: 700/800 MHZ SITE LNA
SIMULCAST	PRIME SITES	7	DLN1306	FRU: 700/800 MHZ CABINET RMC MODULE
SIMULCAST	PRIME SITES	7	DLN6677	FRU: G-SERIES XHUB
ASR	23 RF SITES	23	DLN6455	CONFIGURATION/SERVICE SOFTWARE
ASR	23 RF SITES	23	DLN6781	FRU: POWER SUPPLY
ASR	23 RF SITES	23	DLN6895	FRU: PA 7/800 MHz
ASR	23 RF SITES	23	DLN6885	FRU: XCVR 7/800 MHZ V2
ASR	23 RF SITES	23	DLN6898	FRU: FAN MODULE
ASR	23 RF SITES	23	DLN6634	FRU: 700/800 MHZ SITE LNA
ASR	23 RF SITES	23	DLN1306	FRU: 700/800 MHZ CABINET RMC MODULE

d. <u>OPTION: Adds BAFO Civil to add increased Tower Loading capability (foundations/steel) for new towers (no tower maintenance).</u>

1) OPTION: For the originally proposed 9 guyed towers included in the Final Phase.
2) OPTION: For the additional 2 guyed towers included with the 23 sites

CONTRACTOR originally had provided for tower loading for the three (3) proposed new system antennas plus 100% growth. Per the State's request, this optional offering, if purchased, provides a guyed tower design to be less than 50%- loaded with the proposed new system antennas, as well as, the State-requested antenna equipment as follows:

1) (5) DB 224 antennas or similar with side arms mounts.
2) 3' parabolic antenna.
3) Safety climb system.
4) Required tower lighting with mounts.
5) Lightning rod.
6) Anchors: Caisson type preferred. If dead-man anchors used, anchor shafts must be entirely incased in concrete below grade. Concrete shall extend a minimum of 6" above grade.
7) Designs based on TIA-222-G

a) Structural class III, Exposure category C, Topographic category 1.

The updated guyed tower design includes standard caisson anchor arms (updated from dead-man anchors) and is in accordance with ANSI/TIA-222-G to meet the following parameters:

b) Structural Class III

Structures used primarily for essential communications such as: civil or national defense, emergency, rescue or other disaster operations, military and navigation facilities.

c) Exposure Category C

Open terrain with scattered obstructions having heights generally less than 30 feet. This category includes flat, open country, grasslands and shorelines in hurricane prone regions. Exposure C is the standard default for exposure categories.

d) Topographic Category 2

Structures located at or near the crest of an escarpment. Wind speed up shall be considered to occur in all directions. Structures located on the lower half of an escarpment or beyond 8 times the height of the escarpment from its crest, shall be permitted to be considered at Topographic Category I.

e. <u>OPTION: Over the Air Re-Keying with KMF for 25,000 users (Infrastructure/Console Only)</u>

The hardware and software licenses required to support this feature have been included as an option in our offering. This option requires that the IV&D option must be purchased.

In the ASTRO 25 system, radios can communicate securely using voice encryption. The encryption keys can be distributed to radios by either connecting to a KVL keyloader directly or more conveniently distributed over the air using the ASTRO 25 Integrated Voice and Data (IV&D) system. This is accomplished since only users with keys in common are able to communicate in “secure” mode. Utilizing a centralized key manager (KMF), key material can easily be created, inventoried, archived and distributed to end-users. Combining centralized key management with standards-based OTAR enables effective planning, implementation and execution of robust security procedures for a diverse set of user requirements.

OTAR is designed to work on an ASTRO 25 integrated voice and data system. Since OTAR is defined in the Project 25 standards, any subscriber with this feature will be able to operate on the proposed system if the subscriber OTAR functionality is implemented per the P25 standard.

The Key Management Facility (KMF) is the essential management controller for the APCO 25 OTAR system. The controller is a distributed computer network consisting of a Microsoft Windows® server, up to 65 Microsoft Windows® clients, one or more Encryption Module Controllers (EMC) and the appropriate software suite. The KMF formulates and originates the OTAR messages and acts as the key manager for the system.

The KMF Server provides the following primary functions:

i. Maintains all KMF Operator Accounts and Privileges.
ii. Maintains the OTAR Event Log.
iii. Encrypts and decrypts all inner and outer layer Key Management Messages.
iv. May create Key Material using a random number generator.
v. Maintains Key Material in the Key Kettle.

vi. Maintains the Entity and Relationship Database including units, secure talk groups and keys.
vii. Executes all Key Management Operations including the formulating and routing of all Key Management Messages.
viii. The KMF Client provides the following primary functions:
a) Key manager (Operator) interface to OTAR and Key Management Services.
b) The access point for local and or remote KVL 3000 key uploads and downloads.
c) Provides access to the KMF System Administration.

The optional OTEK (Over the Ethernet Keying) feature is proposed to support and simplify management of the secure keys for the MCC7500E dispatch positions and Archiving Interface Servers.

f. OPTION: ISSI Gateway to Neighboring systems (5 interfaces).

To address the request for interoperability between States with a minimum of 5 simultaneous talk paths with each bordering state, CONTRACTOR has included 5 ISSI links for the North Dakota SIRN system to neighboring systems in South Dakota, Minnesota, Montana, Saskatchewan, and Manitoba. The neighboring systems will be responsible for purchasing the ISSI opposite end to complete the ISSI interface link.

The optional Inter RF SubSystem Interface (ISSI) enables users to be interoperable with neighboring system based on a Project 25 standard. ISSI link between systems offers users a way to extend coverage by the user selecting on their radio a talkgroup resource of the neighboring system and be able to reach back to their primary voice communications system.

Applicable installation services for the optional ISSI interface is defined in the following Statement of Work. Year 1 warranty is included in the proposed optional pricing. Post Warranty Maintenance services are separately quoted.

g. OPTION: Replace the proposed transmit antenna line which is currently 7/8” with 1 5/8” line.

h. OPTION: SDM 3000 removal from the proposed RF site offering.

2. PROJECT PLAN AND SCOPE OF WORK

a. Scope of Work Overview

CONTRACTOR’S team is committed to the State of North Dakota Statewide Interoperable Radio Network (SIRN) Replacement Project with a team that has significant experience in the efficient implementation of Statewide Public Safety, Project 25 Radio Systems.

This implementation experience, locally and across the country, allows us to offer the State specific benefits that are unmatched by other vendors.

i. Phased Deployment Plan to provide flexibility and to address both Rural and Urban Needs. The proposed solution allows for phases to be completed as the State funding permits. Each phase contains the necessary hardware, equipment, software, firmware and the corresponding planning, design, construction, permitting,

configuration programming, testing, optimization, transitioning, infrastructure, post-delivery warranty and maintenance services as described in our proposal.

ii. Low risk with proven Project 25 technology design and optimization processes to meet the scale and complexity of a Statewide Radio network for North Dakota.

iii. Experienced Team with Long Term Commitment provides unparalleled service during the design and implementation of the system.

iv. Maximize Reuse while Planning for Long Term through the evaluation and reuse of existing radio system sites and backhaul while balancing the need for replacement.

Project Manager (PM) CONTRACTOR has included a Project Manager (PM) will serve as the primary project liaison to State of North Dakota. The PM will track the progress of the project and take proactive measures to ensure the project proceeds as planned. The PM will work with the State's Project Manager to ensure contractual commitments are delivered and fulfilled. The PM will manage and allocate all required resources, personnel, budgets and materials to ensure the system is implemented to your satisfaction and that the system meets our standards on the specifications as agreed to during the Contract Design Review, while maintaining the highest standards of quality and STATE satisfaction. The PM will ensure all project related tasks are performed to meet the scheduled completion.

1) Other responsibilities are:

   a) Implementing the project plan and monitor schedule adherence.

   b) Conducting regular (as agreed upon with the State/bi-weekly) status meetings to include published agendas, meeting minutes, status reports, action item tracking and project schedule updates.

   c) Tracking delivery and installation progress to the master project plan and plan, recommend and order changes to the schedule or resources to ensure on time completion of critically sequenced deliverables.

   d) Directing technical individuals responsible for the installation, configuration and quality of the project.

   e) Monitoring and controlling the installation, integration, testing and acceptance of the proposed system.

   f) Coordinating the development and execution of technical and user training plans, if applicable.

   g) Managing and directing all subcontracting activities.

   h) Mitigating risks in order to ensure that the system meets the design specifications and is delivered on time.

   i) Overseeing change management.

   j) Ensuring quality workmanship by all CONTRACTOR vendors and subcontractors.

   k) Ensuring that our team works collaboratively with State of North Dakota personnel throughout the project.

3. CONTRACT ADMINISTRATION

a. Expectations of CONTRACTOR:

1) Assign a Project Manager, as the single point of contact throughout the duration of the project life-cycle, with authority to make project decisions.
2) Assign Project Engineer to be assigned throughout the duration of the project life-cycle.
3) Assign other required resources necessary for project implementation.
4) Schedule the project kickoff meeting with STATE prior to start of the project.

b. Expectations of STATE:

1) Assign a Project Manager, as the single point of contact responsible for STATE - signed approvals.
2) Assign other resources necessary to ensure completion of project tasks for which STATE is responsible.

c. Completion Criteria:

1) CONTRACTOR internal processes are set up for project management.
2) Both CONTRACTOR and STATE assign all required resources.
3) Project kickoff meeting is scheduled.

4. DELIVERABLE 3-1: PROJECT KICKOFF MEETING

a. Description:

CONTRACTOR shall coordinate with STATE to schedule a Kickoff Meeting in Bismarck, ND, with the core project and planning team. CONTRACTOR'S Project Manager shall lead the meeting. The Kickoff Meeting must facilitate the introduction of CONTRACTOR and STATE core project team members and level-set understanding and awareness of project objectives, scope, governance, schedule and project risks and issues.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide content to STATE for a detailed agenda in advance of the meeting.
2) CONTRACTOR and STATE shall facilitate the meeting and discuss and further define, at a minimum, the following:
    a) Effective project communication
    b) Project vision, background, purpose and objectives
    c) Project governance structure and project roles and responsibilities
    d) Approach to creating the Project Plan
    e) Initial risk assessment
    f) CONTRACTOR Project Manager shares CONTRACTOR'S Safety Plan.

c. Expectations of STATE:

1) STATE shall finalize agenda and send agenda to invitees.

2) STATE shall coordinate the logistics and co-facilitate the Kickoff Meeting.
3) STATE's Project Sponsor and project team members shall participate in the Kickoff Meeting.
4) STATE shall provide schedule / availability for any required site surveys.
5) STATE shall provide site access, permissions and escort, as required.
6) STATE shall provide safety rules to be followed during the integration phase of this project.

d. Completion Date:

CONTRACTOR shall start work with STATE within five (5) working days after the commencement of the STATE providing written authorization directing the initiation of work.

e. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Kickoff Meeting results in:

1) Facilitation of Kickoff Meeting using a clearly defined agenda
2) An introduction of critical CONTRACTOR and STATE resources assigned to the project
3) Review of Project Charter to include project governance structure, roles and responsibilities, project purpose, objectives and scope
4) Discussion of communications approach and structure
5) Discussion of known project risks and issues

5. (CDR) DELIVERABLE 3-2 PROJECT PLAN (INCLUDES DELIVERABLE 3-SCHED: PROJECT PLAN BASELINE SCHEDULE)

a. Description:

CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to develop a baseline Project Plan. The Project Plan will include the project schedule.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall participate, contribute and collaborate with STATE to provide content that includes, at a minimum, the following:
    a) Management plans to control cost, schedule, scope and quality
        i. Governance structure for the project
        ii. Roles and responsibilities of the project team
        iii. Integrated change control process
        iv. Communication management plan
        v. Risk management plan
        vi. Issue management plan
        vii. Human resources management plan

viii. Procurement management plan

2) CONTRACTOR shall provide CONTRACTOR tasks and participate and collaborate with STATE on a detailed project schedule created in Microsoft Project. The Microsoft Project format and settings will be mutually agreed-upon and the project schedule will follow STATE best practices, including:
   a) Project has appropriate start date
   b) Project has appropriate Work Breakdown Structure
   c) All project tasks have appropriate predecessors and successors, with the exception of summary tasks
   d) All project tasks are auto-scheduled using predecessors to drive the task dates (dates are not manually entered)
   e) Minimal use of constraints
   f) Both STATE and CONTRACTOR tasks are included
   g) Project tasks are broken down into timeframes that can be reasonably managed – STATE encourages a maximum task length of approximately 80 hours/two (2) weeks
   h) Project tasks have appropriate resources assigned with appropriate and reasonable allocation
   i) Schedule has appropriate working times and incorporates STATE and CONTRACTOR holidays and nonworking times
3) CONTRACTOR shall provide written confirmation from an authorized individual confirming contents of the Project Plan.

c. <u>Expectations of STATE:</u>

1) STATE shall lead the project planning effort.
2) STATE'S Project Manager shall be responsible for the Project Plan.
3) The Project Plan shall follow STATE template.
4) STATE's Project Manager shall incorporate STATE tasks into the project schedule.
5) STATE shall obtain written confirmation from an authorized individual at CONTRACTOR for the contents of the Project Plan.

d. <u>Completion Date:</u>

CONTRACTOR shall start work with STATE within five (5) working days after the commencement of the STATE providing written authorization directing the initiation of work.

e. <u>Acceptance Criteria:</u>

1) For the acceptance of this deliverable to occur, CONTRACTOR shall provide content to STATE for the Project Plan regarding all services, tasks and products delivered by CONTRACTOR:
   a) Mutually agreed-upon detailed baseline scope and schedule for the project (3-SCHED)

b) Management plans to control scope, schedule, cost and quality, including the variance

c) Governance structure for the project

d) Roles and responsibilities of the project team

e) Quality assurance and quality control plans

f) Integrated change control process

g) Communication management plan

h) Risk management plan

i) Issue management plan

j) Human resources management plan

k) Procurement management plan

2) The Project Plan shall adhere to the Project Management Body of Knowledge

3) For the acceptance of this deliverable to occur, approval must be obtained from STATE's Executive Steering Committee (ESC).

6. CONTRACT DESIGN REVIEW: (CDR) SITE SURVEYS

a. Description:

CONTRACTOR shall visit and review each proposed site to determine viability and applicable information as needed for the radio system planning and implementation.

b. Expectations of CONTRACTOR:

1) Visit each site.

2) Gather / record site information.

3) Document and provide site summary.

c. Expectations of STATE

1) Provide site access and escort.

2) Participate as needed during site surveys.

3) Review site summary.

d. Acceptance Criteria:

1) Site visits complete

2) Site summaries documented and provided to STATE.

7. (CDR) DELIVERABLE 3-3: DATA/RADIO NETWORK CONVERSION PLAN

a. Description:

CONTRACTOR shall participate, contribute and collaborate with STATE to create a Data/ Radio Network Conversion Plan. The plan is intended to address the overall approach that will be followed for the data/proposed radio network conversion effort and will be a subordinate plan to the Implementation (Project) Plan deliverable. The plan will define methodology, strategies, required competencies, tools, templates, quality standards, data cleansing and data discrepancy resolution strategies, as

applicable.

Specific to the radio system this Plan includes the following sub-items: Backhaul, Equipment List, Installation – Site layout, Power requirement, Site alarming requirement planning.

NOTE: The term data in this deliverable and associated deliverables does not refer to any feature on the proposed system.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the data conversion planning effort.
2) CONTRACTOR shall create a Data Radio Network Conversion Plan that will outline the approach to convert the agreed-upon data by collaborating with and gathering input from STATE. Specific to this offering the key data conversion items for the proposed radio system include:
    a) Backhaul Requirements Definition
        i. Installation
        ii. Power Requirement
        iii. Site Alarming Requirement
3) CONTRACTOR shall be responsible for the final product.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.
2) STATE shall provide support and make any necessary decisions in a timely manner per the project schedule.
3) STATE shall review and provide feedback to CONTRACTOR in a timely manner per the project schedule.
4) STATE shall work with CONTRACTOR to develop approaches planned for STATE's data cleansing efforts.
5) STATE shall provide existing system, site information and documentation available.
6) STATE shall provide backhaul/connectivity to all sites as required, per CONTRACTOR specification.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Data Radio Network Conversion Plan must include:

1) Data/ Radio Network conversion methodologies and strategies to be used including a repeatable extract, transform and load (ETL) process
2) Details regarding the tools and templates to be used
3) Outline of strategies and actions planned to resolve data discrepancies and mapping issues, which may include customizations and data cleansing
4) Outline of the testing approach and methodology, including defined success criteria and quality standards
5) Executive summary

8. (CDR) DELIVERABLE 3-4: DATA/RADIO NETWORK CONVERSION DESIGN

a. Description:

CONTRACTOR shall design the overall data/radio network conversion approach to convert data/radio network from the legacy radio system(s).

Radio specific conversion design includes:

1) System Description with final equipment list
2) Backhaul Design specifications
3) Installation Layout – floor and rack diagrams
4) Power Requirement
5) Site Alarming Requirement

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the data conversion design effort.
2) CONTRACTOR shall provide all necessary data conversion documentation to STATE.
3) CONTRACTOR shall provide example conversion files to STATE to assist STATE in generating successful data conversion files. As applicable to the proposed radio network specific requirements this includes establishing a baseline for the system design including: System description, final backhaul specifications, final RF equipment list, installation layout, frequency / channels, power calculations per site, defined alarming per site and confirm demarcation points, as applicable.

c. Expectations of STATE:

1) STATE shall assist CONTRACTOR'S review and design of data elements applicable to data conversion.
2) STATE shall provide necessary and relevant resources to make design decisions.
3) STATE shall provide support and make any necessary decisions in a timely manner per the project schedule.
4) STATE shall review and provide feedback to CONTRACTOR in a timely manner per the project schedule.
5) STATE shall provide backhaul design plan information as required.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Data Conversion Design must include:

1) Proposed system context and workflow to be accomplished with the customizations
2) Documentation of development and how the development meets the requirements outlined in the Gap Analysis deliverable

NOTE: DELIVERABLE 3-5: DATA CONVERSION VALIDATION - Specific to the proposed CONTRACTOR Radio Network the "validation" task will be completed during testing which is prior to Final Acceptance.

9. (CDR) DELIVERABLE 3-6: INTERFACE DESIGN

a. Description:

CONTRACTOR shall design the interface from the system to STATE's XXX application, including any configurations or customizations required to support the integration of the interface with the system. Specific to the CONTRACTOR Radio Network the interface design work will be completed as applicable. (NOTE: Designated interface work is not included in this phase unless additional Options such as ISSI or other are purchased.)

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the interface design effort.
2) CONTRACTOR shall develop a high-level conceptual design for the interfaces, as applicable.
3) CONTRACTOR shall collaborate with STATE to finalize design.

c. Expectations of STATE:

1) STATE shall review conceptual designs and provide feedback and clarification as requested.
2) STATE shall provide technical resources and subject matter experts who will assist and collaborate with CONTRACTOR during the design process.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the Interface Design must include:

1) Design documentation for the interface
2) Document detailing any customizations to support the integration between the systems

NOTE: DELIVERABLE 3-7: INTERFACE DEVELOPMENT and RELEASE - Specific to the proposed CONTRACTOR Radio Network the "Interface Development and Release" task will be completed during testing which is prior to Final Acceptance.

10. (CDR) DELIVERABLE 3-8: GAP ANALYSIS

a. Description:

CONTRACTOR to review, analyze and confirm understanding of system functionality, business practices, interfaces, configurations and customizations. Specific to the proposed CONTRACTOR Radio Network offering CONTRACTOR will review the State's existing system and the State's requirements and customizations which may require design changes.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the analysis effort.
2) CONTRACTOR shall demonstrate how system's core functionality meets the requirements as defined in the Request for Proposal.
3) CONTRACTOR shall identify and document gaps between the system's out-of-the-box functionality and STATE's requirements and business processes and practices.

4) CONTRACTOR shall identify any gaps that require system configuration or customization changes.

5) CONTRACTOR shall identify any gaps that require system customization beyond the Request for Proposal response.

6) CONTRACTOR shall collaborate with STATE to document agreed-upon changes to the system that may be needed as a result of the review and confirmed understanding.

c. Expectations of STATE:

1) STATE staff shall actively participate in work and analysis sessions.

2) STATE shall collaborate with CONTRACTOR to confirm requirements and gap analysis.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Gap analysis to be presented in a matrix that lists requirements and identifies which requirements can be met out-of-the-box, which need configuration and which need customizations in accordance with CONTRACTOR'S Request for Proposal response.

2) Gap analysis matrix includes a descriptive statement on how CONTRACTOR will meet each requirement.

3) Gap analysis matrix identifies which requirements that, through understanding and analysis, cannot be accomplished without additional efforts, including a recommended approach to resolve the gap and CONTRACTOR'S level of effort.

NOTE: DELIVERABLE 3-9: SYSTEM CONFIGURATION – Specific to the proposed CONTRACTOR Radio Network, the "System Configuration" task will be completed following the FCC Licensing task below.

11. (CDR) DELIVERABLE 3-10: TESTING MANAGEMENT PLAN

a. Description:

CONTRACTOR shall create a Testing Management Plan that outlines the overall testing approach for CONTRACTOR and STATE testing. The proposed radio system testing plan includes the Acceptance Test Plan which also includes the CONTRACTOR proposed:

Phase 3: Coverage Test Plan, Staging Test Plan, Functional Test Plan, 60-Day Burn In Test plan, System Acceptance Test Plan.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the test planning effort.

2) CONTRACTOR shall create a Testing Management Plan with STATE support.

3) CONTRACTOR shall conduct working session(s) with STATE to review and finalize the Test Management Plan prior to start of testing.

4) CONTRACTOR shall coordinate with STATE to schedule all testing activities.

5) CONTRACTOR shall provide tools, existing test cases, user acceptance test case templates and reporting formats for testing.

6) CONTRACTOR shall train STATE to conduct user acceptance tests and report results.

7) CONTRACTOR shall participate, contribute and collaborate with STATE in development of user acceptance test cases.

8) CONTRACTOR shall complete the Acceptance Test Plan.

c. <u>Expectations of STATE:</u>

1) STATE shall actively participate in planning sessions.

2) STATE shall provide support and make any necessary decisions.

3) STATE shall review and provide feedback to CONTRACTOR.

4) STATE shall be responsible for approving the list of test scripts for performance and user acceptance testing, with support and guidance of CONTRACTOR. NOTE: The proposed radio network test scripts/plans will be written by CONTRACTOR. Input will be solicited by the STATE as applicable. The final test scripts/plan will be approved by the STATE.

5) STATE shall conduct application performance testing on STATE server(s). NOTE: Per project scope proposed it is not expected that the STATE will require any testing on STATE provided servers for the proposed radio system.

6) STATE shall conduct user acceptance testing.

7) STATE shall assign a resource as a testing coordinator to facilitate STATE's testing activities.

d. <u>Acceptance Criteria:</u>

For the acceptance of this deliverable to occur, the Testing Management Plan must include:

1) Testing strategy containing:

   a) Agreed-upon high-level testing schedule in accordance with the project schedule

   b) Testing assignments and responsibilities

   c) Test script creation practices including detail regarding system environments used during testing

   d) Method for reporting testing issues and tracking of remediation

   e) Statistical reporting strategy for issues and fixes

   f) CONTRACTOR support

2) Outline of the approaches and strategies for testing the requirements, federal and state reporting, interfaces, data conversion and performance

3) User acceptance test case template

4) Testing issues reporting approach containing:

   a) Template for reporting issues

b) Prioritization and severity methodology, including a Service Level Agreement for CONTRACTOR support and fixes

c) Resolution approach

5) Documentation of what priority and severity issues must be fixed before the system moves into production

6) Description of resources for testing, including numbers of testers and necessary skill-sets

7) Executive summary

NOTE: DELIVERABLE 3-11: ACCEPTANCE TESTING – Specific to the proposed CONTRACTOR Radio Network, the "ACCEPTANCE TESTING" task will be completed in the Audit and Acceptance Testing section below.

12. (CDR) DELIVERABLE 3-15: RADIO NETWORK IMPLEMENTATION AND TRANSITION PLAN

a. Description:

CONTRACTOR shall collaborate with STATE to create an Implementation and Transition Plan to manage the implementation of the product and also transition the product and work from the project structure to maintenance. For the proposed Radio network, this deliverable is the Business Migration/Cutover Plan and the Service Plan.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the planning effort.

2) CONTRACTOR shall create an Implementation and Transition plan with STATE support including the following:

a) Cutover Plan (Business Migration)

b) Service Plan

3) CONTRACTOR shall conduct working session(s) with STATE to review and finalize the Implementation and Transition Plan prior to any implementation or transition work.

c. Expectations of STATE:

1) STATE shall actively participate in planning sessions.

2) STATE shall provide support and make any necessary decisions.

3) STATE shall review and provide feedback to CONTRACTOR.

4) STATE shall Approve Plans

d. Acceptance Criteria:

For acceptance of this deliverable to occur, the Implementation and Transition Plan must include:

1) Implementation strategy

2) Implementation resources and tasks

3) Implementation entry and exit criteria and go/no go decision requirements

4) Implementation contingency plan
5) Business migration (Cutover) strategy
6) Transition resources and tasks
7) CONTRACTOR processes for moving product into maintenance and ensuring ongoing support (Service Plan)
8) Executive summary

13. DELIVERABLE 3-CDR DETAILED CONTRACT DESIGN REVIEW

a. Expectations of CONTRACTOR

1) Prepare change order to reflect updated system design and documentation.
2) System design is finalized in preparation for subsequent project phases.

b. Expectations of STATE

1) Review all CDR deliverables and documents.
2) Approve design review.

c. Acceptance Criteria:

1) Design deliverables and documentation approved by State.

14. DELIVERABLE 3-FREQ; FCC LICENSING AND COORDINATION

a. Expectations of CONTRACTOR:

NOTE: CONTRACTOR has included the services defined below for the original licensing submission for proposed RF sites. If additional submissions are required, this can be quoted separately.

1) CONTRACTOR will assist the State with frequency coordination/modification and licensing by providing any required technical details and parameters necessary for proper licensing or modifications to existing State FCC license(s).
2) Complete 601 forms requesting the proposed sites with the proposed channels, apply and work with coordinator, RPF (Regional Plan Chairman) and FCC.
3) Provide licensing research and site surveys, as applicable.
4) Work with Public Safety RPC (Regional Plan Chairman)
5) Complete contour studies and coverage analysis, as needed.
6) Work with designated person to prepare Slow Growth letter request and implementation schedule if more than one year is needed to become fully constructed and operational.
7) Complete final licensing package file with FCC, track FCC processing, handle FCC correspondence until FCC issues license grants and include associated FCC fees, as required.
    a) Restrictions:
        i. CONTRACTOR assumes no liability or responsibility for inadequate frequency availability or frequency licensing issues.

ii. CONTRACTOR is not responsible for issues outside of its immediate control. Such issues include, but are not restricted to, improper frequency coordination by others and non-compliant operation of other radios.

iii. CONTRACTOR is not responsible for co-channel interference due to errors in frequency coordination by APCO or any other unlisted frequencies, or the improper design, installation or operation of systems installed or operated by others.

NOTE: Final frequency assignment will be determined upon receiving consent from incumbent licensees as needed, availability of NPSPAC per the RPC and in accordance to FCC rules and regulations per 90.621. If frequencies cannot be assigned and additional frequencyreviews are required after the original submissions, this will require a separate quote.

b. Expectations of STATE:

1) Confirm list of frequencies for use.

2) Provide licensee and frequency information as needed to assist with the CONTRACTOR submissions.

   a) Assist with Frequency Mining / Identification of Frequency Candidates

   b) Negotiations with incumbents, cutover timing and governance, as needed.

3) As licensee, the State is responsible to review and approve the final licensing for submission.

c. Acceptance Criteria:

1) Licensing complete for all frequencies.

15. DELIVERABLE 3-SHIP.69-162: ORDER, MANUFACTURING, STAGING, SHIP

Equipment will be ordered, manufactured and staged based upon the final agreed upon design. The system will be exercised while in factory staging, which will allow testing of components and boards for proper operation as a complete system prior to shipping to the State's locations. Once the system or subsystem has been assembled, optimized and integrated as a complete working unit, the system will be tested according to the Factory Functional Acceptance Test procedures. The staging of the system will simulate the final configuration of the SIRN to the extent possible with the State's personnel participating. During testing, all measurements or outcomes will be recorded within the test script, as indicated in the test. The result of a test procedure will be "Pass", "Fail", or a measured value.

Upon satisfactory completion of installation and optimization, CONTRACTOR will coordinate with the State for a factory visit to participate in radio subscriber and system testing. This visit will provide the State with the opportunity to observe the radio subscriber equipment programmed and optimized as an integrated system and to test in a hands-on manner, most functionality and features of the radios that are capable of operation in a factory environment. Factory acceptance testing will comprise all major systems in the radio solution.

a. Expectations of CONTRACTOR:

1) Enter order into CONTRACTOR'S Customer Order Fulfillment (COF) system.

2) Create equipment orders.

3) Reconcile the equipment list(s) to the Contract.
4) Procure third-party equipment if applicable.
5) Manufacture the Equipment necessary for the system based on equipment order.
6) Staging:
    a) Set up and rack the system equipment on a site-by-site basis, as it will be configured in the field at each of the transmitter/receiver sites.
    b) Cut and label cables according to the approved CDR documentation.
    c) Complete the cabling/connecting of the subsystems to each other ("connectorization" of the subsystems).
    d) Assemble required subsystems to assure system functionality.
    e) Power up, program and test all staged equipment.
    f) Confirm system configuration and software compatibility to the existing system.
    g) Load application parameters on all equipment according to input from Systems Engineering.
    h) Complete programming of the Fixed Network Equipment.
    i) Inventory the equipment with serial numbers and installation references.
    j) Complete system documentation.
    k) Third party subsystems may be staged at the manufacturer's facilities and integrated in the field.
    l) Provide a Staging Acceptance Test Plan.
        i. Staging Acceptance Test Procedures
            a. Test and validate system software and features.
            b. Functional testing of standard system features.
            c. Conduct site and system level testing.
            d. Power-up site equipment and perform standardized functionality tests.
            e. Perform STATE -witnessed tests (if requested) based upon Staging Acceptance Test Plan.
    m) Ship Equipment to Field
        i. Pack system for shipment to final destination.
        ii. Arrange for shipment to the field.
        iii. Ship to Field.

b. <u>Expectations of STATE:</u>

1) Approve shipping location(s).
2) Staging:
    a) Provide information on existing system interfaces as may be required.

b) Provide information on room layouts or other information necessary for the assembly to meet field conditions, as applicable.

c) Review and approve proposed Staging Acceptance Test Plan.

i. Staging Acceptance Test Procedures

a. Attend Staging Acceptance Testing (if attendance is desired).

b. Pay for travel, lodging, meals and all incidental expenses for STATE personnel and representatives to witness the Staging Acceptance Testing.

c. Witness, participate and approve SATP.

c. Acceptance Criteria:

1) Verify that the Equipment List contains the correct model numbers, version, options and delivery data.

2) Trial validation completed.

3) Bridge the equipment order to the manufacturing facility.

4) Equipment shipped to either the field or the CCSi staging facility.

5) Staging- System staging completed and ready for testing.

6) Staging Acceptance Test Procedures Performed.

7) Approval of Staging Acceptance Testing.

8) Ship Equipment to Field

a) Ship Site Facility Equipment – tower, shelter, etc.

b) Ship Antenna / Line Equipment

c) Ship Fixed Network Equipment

16. DELIVERABLE 3-9: SYSTEM CONFIGURATION – FLEETMAPPING

NOTE: Fleetmapping is not applicable for Phase 3. Fleetmapping will be provided in Phase 1 and 2.

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Fleetmapping.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort for system and console fleetmapping. CONTRACTOR'S major deliverables are to provide and configure the system's database parameters and console screens. NOTE: The STATE is responsible for all subscriber radio templates, as needed. Services not contained in this SOW can be provided via the change order process upon request.

2) Develop customized Fleetmap Development Best Practice for STATE.

3) ASTRO 25 Systems Fleetmapping

a) Provide technical consultation on talkgroup, radio user programming features to the fleetmap committee.

b) Deliver final fleetmap documentation.

4) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.

5) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.

a) Provide programmed test radios to STATE representatives, as needed, for live testing on STATE system.

c. <u>Expectations of STATE:</u>

1) STATE shall make necessary configuration decisions including the following:

a) Appoint a representative who will become the fleetmap committee chairperson with signature responsibilities for all fleetmapping decisions.

b) Identify agency champions that will become members of the fleetmapping committee.

c) Set Standard Operating Procedure that will apply to all end users.

d) Define and verify user groups and corresponding radio allocations.

e) Develop talkgroup naming convention plan for each user group.

f) Develop Radio ID distribution plan for each user group.

g) Develop list of other jurisdictions' trunking systems with system ID numbers to include in radio programming.

h) Develop Memorandum of Understanding (MOU) for each trunking system jurisdiction that STATE plans to interoperate. The MOU should include talkgroups, radio identification range and alias authorizations and system key provisions.

i) Complete the Radio Subscriber Template requirements for each unique radio purchased.

j) Provide template information to CONTRACTOR for use during the Staging and System Testing, as needed.

k) Complete and sign memorandum of understandings for other jurisdictional trunking systems, if applicable.

l) Develop conventional channel list.

m) Obtain approval letters and access allowing CONTRACTOR authority to program other jurisdiction talkgroups into STATE'S radios.

n) Develop and approve zone/channel layouts for each user group.

o) Develop list of talkgroups/conventional channels to display on the dispatch console and log.

o) Determine emergency configuration plan (to include radios and consoles).

p) Determine feature configurations to include but not limited to Call Alert, Private Call, Telephone Interconnect, Scan, Status/Message, Secure, Failsoft and Site Preferences for both radios and consoles.

q) Complete the staging fleetmap prior to staging of the system.

2) STATE shall provide requested information and documentation as needed to configure the system.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE. NOTE: Fleetmap Configuration definition will be completed but, actual configuration will be completed during the System Configuration Deliverable.

2) State completes and approves Fleetmapping requirements.

3) Successful demonstration of the configuration and reporting capabilities NOTE: Fleetmap Configuration definition will be completed but, actual configuration will be completed during the System Configuration Deliverable.

17. DELIVERABLE 3-9; (INCLUDES DELIVERABLE 3-CIVIL.69-162; DELIVERABLE 3-DELVRCIV.69-162 AND 3-DELVRAL.69-162): SYSTEM CONFIGURATION – SITE DEVELOPMENT

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Civil Work/Site Development.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.

2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.

3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.

4) CONTRACTOR shall deliver proposed civil scope equipment per site. (3-DELVRCIV applicable to sites 69-162)

5) CONTRACTOR shall deliver proposed antenna/line per site (3-DELVRAL applicable to sites 69-162)

NOTE: See Civil Scope of Work Responsibilities for each of the proposed sites in Civil Work Section 31

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.

2) STATE shall provide requested information and documentation as needed to configure the system.

3) See Civil Scope of Work in Section 31 for Civil responsibilities.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the proposed Civil Work specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE. NOTE: If additional requirements beyond the proposed Civil Work scope definition are needed a separate quote can be provided.

2) Successful demonstration of the completed configuration and completed Civil Work as proposed.

NOTE: "Reporting Capabilities" are not applicable to the CONTRACTOR CivilWork.

18. DELIVERABLE 3-9; (INCLUDES DELIVERABLE 3-DELVRFNE.25,41,44,53 AND 69-162; DELIVERABLE 3-FNE INSTALL.25,41,44,53 AND 69-162): SYSTEM CONFIGURATION – FNE INSTALLATION

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Install of antenna/line, proposed fixed network equipment for the radio sites and dispatch centers. Note below that "reporting capabilities" is not applicable to antenna/line, dispatch and site equipment installations.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.

2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.

3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE.

4) CONTRACTOR shall install the following per the proposed equipment list: Install Antenna/Line

   a) See Civil Scope of Work for each proposed site in Section 31 for responsibilities. Install FNE

      i. Deliver equipment to proposed warehouse/storage locations, as needed.(DELVRFNE - per site as applicable)

      ii. Inspect and inventory all racks, cables, computers and other CONTRACTOR provided equipment.

      iii. Deliver equipment to proposed sites from warehouse/storage locations.

      iv. Install proposed equipment per Final Design approved floor and rack drawings, cable matrix and other final design documents.

v. Properly install proposed equipment per R56 installation guidelines.

vi. See Civil Work Statements of Work in Section 31 for additional site responsibilities.

vii. Properly ground all racks, cabinets and equipment to protect against ground faults, electrical surges and lightning.

viii. Install and connect all necessary cables (i.e. power, data) within each rack / cabinet and between racks / cabinets for system interconnection

a. Cables will be run in the overhead cable trays per R56 guidelines

b. Verify that all cables are properly labeled

ix. Power-up and test equipment.

x. Removal of existing equipment is not proposed, but, if desired, can be quoted upon request.

c. <u>Expectations of STATE:</u>

1) STATE shall make necessary configuration decisions.

2) STATE shall provide requested information and documentation as needed to configure the system.

3) STATE shall contract directly and provide required Backhaul (fiber, microwave) per CONTRACTOR defined radio system specifications via DCN or other provider, as applicable.

4) STATE Shall provide the following for proposed FNE equipment installation items:

a) Provide designated contact to assist with both the coordination of the receipt of the proposed equipment and inventory all equipment.

b) Provide secure location for the CONTRACTOR -provided equipment at existing sites.

c) Provide or coordinate access to the site, as necessary.

d) Provide site development requirements as defined in Civil Work section.

e) Provide adequate floor space for installation of equipment in parallel with the existing system for cutover purposes, if applicable.

f) Provide removals of FNE equipment, as needed, at RF sites at the time when the existing VHF system is no longer required for operation, if applicable.

g) Provide for 3rd party equipment, configuration, software/services which are not proposed as part of this contract.

d. <u>Acceptance Criteria:</u>

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE

2) Successful demonstration of the configuration and reporting capabilities; Specific to the proposed radio system this includes completion of FNE hardware installations for the proposed equipment. Reporting capabilities is not applicable to this install of radio equipment deliverable.

19. DELIVERABLE 3-9. 25,41,44,53 AND 69-162: SYSTEM CONFIGURATION – OPTIMIZATION

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes Optimization of the proposed radio equipment.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall lead the configuration effort.
2) CONTRACTOR shall confirm and reach configuration decisions in collaboration with STATE.
3) CONTRACTOR shall configure components in alignment with requirements and decisions confirmed or identified in the Gap Analysis deliverable and demonstrate completed configurations and reporting capabilities to STATE. Specific to the proposed radio system, Optimization Tasks below will be completed.
    a) CONTRACTOR and its subcontractors optimize each subsystem.
    b) Verify that all equipment is operating properly and that all electrical and signal levels are set accurately.
    c) Verify that all audio and data levels are at factory settings.
    d) Check forward and reflected power for all radio equipment, after connection to the antenna systems, to verify that power is within tolerances.
    e) Check audio and data levels to verify factory settings.
    f) Verify communication interfaces between devices for proper operation.
    g) Test features and functionality are in accordance with manufacturers' specifications and that they comply with the final configuration established during the CDR/system staging.
    h) Install and integrate the RF sites with the system, then optimize and activate the controller.
    i) Test and optimize the simulcast system.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.

NOTE: Radio System optimization decision making is not anticipated for this Deliverable. Configuration decisions are made as part of the earlier fleetmapping process.

2) STATE shall provide requested information and documentation as needed to configure the system.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured and optimized according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE

2) Successful demonstration of the configuration and reporting capabilities.

20. DELIVERABLE 3-9: SYSTEM CONFIGURATION – SUBSCRIBERS

NOTE: Subscribers are not proposed. The responsibilities in this section for subscribers are the State's pending separate purchase.

a. Description:

CONTRACTOR shall configure the system according to the requirements established during the Analysis phase and decisions made throughout the configuration effort. For the proposed radio system this deliverable includes subscriber services (templates, programming, alignment, configuration, installation, as needed).

b. Expectations of CONTRACTOR:

Not Applicable – subscriber services have not been proposed.

c. Expectations of STATE:

1) STATE shall make necessary configuration decisions.
2) STATE shall provide requested information and documentation as needed to configure the system.
3) STATE shall provide all subscriber related services for new and / or existing subscribers including but, not limited to: receive and inventory, storage, programming, template building, alignment, installation.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the follow criteria must be met:

1) System configured according to the specifications and requirements documented in the Gap Analysis deliverable and according to the information provided by STATE
2) Successful demonstration of the configuration and reporting capabilities.

21. DELIVERABLE 3-5.25,41,44,53 AND 69-162: DATA CONVERSION VALIDATION

a. Description:

CONTRACTOR and STATE shall validate the data conversion effort by reviewing the data loaded into the user acceptance testing environment and making any fixes to the system or data conversion process to ensure data transfers accurately and completely.

Specific to the proposed CONTRACTOR Radio Network validation items for this deliverable will be completed for the following items as defined during the CDR:

1) Programming/Configuration validation, as applicable.
2) Backhaul Link Test
3) Installation – R56 Communication Site Audits

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall initially validate the data conversion into the user acceptance testing environment and resolve any issues prior to STATE data conversion validation efforts.

2) CONTRACTOR shall support STATE's effort to identify and resolve any issues with the data conversion prior to Go Live.

3) Backhaul Test

   a) Perform test to verify site link performance meet CONTRACTOR specification for the proposed radio system.

4) Test alarming requirements as defined per CDR.

5) R56 Site Audit

   a) Perform R56 site-installation quality audits, verifying proper physical installation and operational configurations.

   b) Create site evaluation report to verify site meets or exceeds requirements, as defined in CONTRACTOR'S Standards and Guidelines for Communication Sites (R56).

c. <u>Expectations of STATE:</u>

1) STATE shall test the data conversion into the user acceptance testing environment.

2) STATE shall identify, document, trouble-shoot and work with CONTRACTOR to resolve any data conversion issues.

3) Backhaul Test

   a) STATE shall make available the required links which meet the specifications defined by CONTRACTOR

   b) Provide preliminary test result information per CONTRACTOR specifications.

4) R56 Site Audit

   a) Provide access/escort to the sites.

   b) Witness tests if desired.

d. <u>Acceptance Criteria:</u>

1) For the acceptance of this deliverable to occur, the following criteria must be met:

   a) Successful upload of accurate and complete data extract from the legacy system to the user acceptance testing environment.

      i. CONTRACTOR review of STATE-documented user acceptance testing issues and recommendations for file extract changes to remediate issues

   b) Subsequent load(s) of STATE-provided revised data extracts to confirm resolution of issues, or documented alternatives to resolution.

      i. R56 Site Audit successfully completed.

      ii. Backhaul Test/Link verification successfully completed.

22. DELIVERABLE 3-7.25,41,44,53 AND 69-162: INTERFACE DEVELOPMENT AND RELEASE

a. <u>Description:</u>

CONTRACTOR shall build and release the interface with STATE's XXX application, per the requirements defined during analysis and the Interface Design deliverable.

Specific to the proposed CONTRACTOR Radio Network “interface development and release” the following items will be tested as applicable per phase (i.e. Optional ISSI if purchased in phase 3).

Installation tasks for these items will be performed during the previously completed System Configuration – Installation Deliverable.

b. Expectations of CONTRACTOR for proposed infrastructure equipment:

1) CONTRACTOR shall complete development of the interface.
2) CONTRACTOR shall conduct thorough technical testing of the interface as identified in the Testing Management Plan.
3) CONTRACTOR shall resolve issues identified with the interface.
4) CONTRACTOR shall install and validate the interface in preparation for user acceptance testing.

c. Expectations of STATE:

1) STATE shall provide technical resources and an environment for testing of the interface.
2) STATE shall collaborate with CONTRACTOR to validate CONTRACTOR installed interface correctly.
3) STATE shall validate interface is ready for user acceptance testing.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Release of the interface to STATE’s user acceptance testing environment
2) Completion of CONTRACTOR’S testing effort and remediation of any testing failures.

e. Acceptance Process

1) Upon completion of a deliverable, the parties shall follow the acceptance process in accordance with this Contract.

23. DELIVERABLE 3-11.25,41,44,53 AND 69-162. ACCEPTANCE TESTING (INCLUDES DELIVERABLE-CATP COVERAGE TESTING)

a. Description:

Contractor shall support STATE testing efforts, make fixes and remediate testing issues during STATE’s user acceptance testing and performance testing efforts.

1) **Field Functional Test** includes completion of the site checklist. Below is a preliminary RF Site Test Checklist to be completed per site:

Base Station Transmit Output Power (GTR)

1. DESCRIPTION

Base station transmit output power is measured by locally keying the base station and measuring the output power with a wattmeter connected to the base station's transmit (TX) port. The output power of every base station was tested as part of the individual unit's tests in Motorola' manufacturing process, and will also be tested as part of the Field Acceptance Test Plan

SETUP

Required equipment: appropriate wattmeter for the station to be tested (band-specific). Optional configuration software and associated client to run the configuration software. Create a table for the site to be tested; this table will be used to record the measurements.

VERSION #1.000

2. TEST

Step 1. Disable all base stations using a management terminal/configuration software.

Step 2. Insert a wattmeter between Base Station #1's TX antenna port and the corresponding base station's combiner/duplexer/antenna destination port.

Step 3. Turn on Base Station #1's Power Amplifier (key) using local management terminal/configuration software.

Step 4. Measure the base-station output power and record the measurement in the separately created table.

Step 5. De-key the base station under test by de-activating the PA via local management terminal/configuration software.

Step 6. Repeats Steps 2-5 for the remaining base stations at the site.

Step 7. Restore all antenna connections when completed.

Step 8. Verify that all measured output power of each station shall adhere to the base station's FCC-licensed output power requirements.

Pass____ Fail____

Transmitter Combiner Port Power Loss

1. DESCRIPTION

The transmitter combiner port power losses are tested by taking RF power measurements at various points in the radio-frequency (RF) distribution network. The RF power level is measured when a single base station has its power amplifier (PA) engaged (keyed). The first measurement is made with a wattmeter placed on the base station port of the combiner. A second measurement is taken with the wattmeter placed on the antenna port of the combiner. The difference between the two measurements is the combiner loss, typically specified in Decibels (dB).

SETUP

Required equipment: appropriate wattmeter for the station to be tested (band-specific). Optional configuration software and associated client to run the configuration software. Create a table for the site to be tested; this table will be used to record the measurements.

VERSION #1.090

2. TEST

Step 1. Disable all base stations using either the access enable/disable button located on the front panel, or via a management terminal/configuration software, and disconnect the transmission line jumper from the combiner's station input port for the base station.

Step 2. Insert a wattmeter between the combiner's station port and the transmission line jumper, and turn on Base Station #1's Power Amplifier (key) using the local Push-To-Talk (PTT) button located on the front panel, or via a local management terminal/configuration.

Step 3. Measure the combiner's station port input power and record the measurement in the table created previously.

Step 4. De-key the base station under test by releasing the local PTT button, or by de-activating the PA via a local management terminal/configuration software, remove the wattmeter, reconnect the transmission line jumper to the combiner's station input port, and

Step 5. Insert a wattmeter between the combiner's antenna port and the TX antenna transmission line, and repeat Step 4.

Step 6. Measure the combiner's antenna port output power and record the measurement in the table.

Step 7. De-key the base station under test by releasing the local PTT button, or by de-activating the PA via a local management terminal/configuration software.

Step 8. Calculate the Transmitter Combiner Port Power Loss by taking the difference between the Combiner Output Power (Step 3) and the Combiner Input Power (Step 6), and then convert the measurements to Decibels using the formula -dB=10*log (Step 3/Step 6).

Step 9. Repeat step 1 through step 8 for the remaining used transmitter combiner ports at the site.

Step 10. Restore all connections when completed. Verify that the Transmitter Combiner Port Power Loss (Insertion Loss) does not exceed the manufacturer's specifications.

Pass____ Fail____

Transmitter Antenna Network Reflected Power

1. DESCRIPTION

The Transmitter Antenna Network Reflected Power test will measure the amount of transmitted radio frequency (RF) power reflected back through the transmitter antenna network and into the transmitter combining network. The RF network must be fully installed and optimized prior to being used. This includes the TX transmission line and the TX antenna. The first measurement is made with a wattmeter placed on the antenna port of the combiner. A second measurement is taken with the wattmeter placed on the antenna port of the combiner with the element reversed.

SETUP

Required equipment: appropriate wattmeter for the station to be tested (band-specific). Optional configuration software and associated client to run the configuration software. Create a table for the site to be tested; this table will be used to record the measurements, and should include the channel-by-channel tests from the "Transmitter Combiner Port Power Loss" test.

VERSION #1.070

2. TEST

Step 1. Disable all base stations using either the access enable/disable button located on the front panel, or via a management terminal/configuration software.

Step 2. Insert a wattmeter between Base Station #1's TX antenna port and the corresponding base station's combiner/duplexer/antenna destination port.

Step 3. Turn on Base Station #1's Power Amplifier (key) using the local Push-To-Talk (PTT) button located on the front panel, or via a local management terminal/configuration software.

Step 4. Measure the transmit antenna network's reflected power and record the measurement in the previously created table.

Step 5. De-key the base station under test by releasing the local PTT button, or by de-activating the PA via a local management terminal/configuration software.

Step 6. Calculate the Reflected Power Ratio using the formula %= (Step 4/Combiner Output Port Power)*100. This is the Reflected Power Ratio.

Step 7. Repeats Steps 2-6 for the remaining base stations at the site.

Step 8. Restore all antenna connections when completed.

Step 9. The reflected power from the TX antenna network shall not exceed a ratio of 5% reflected power to forward power.

Pass____ Fail____

Receiver Multicoupler Gain

1. DESCRIPTION

The Receiver Multicoupler Gain will be measured at completion of the site's installation work. First, a 12 dB SINAD measurement will be taken by injecting an RF carrier directly from a service monitor into a base station's receive (RX) port and the audio will be recovered on the base station. Then, a second 12 dB SINAD measurement will be taken by injecting a radio-frequency (RF) carrier into the multicoupler's pre-amplifier (pre-amp) port and the audio will be recovered on the base station. The difference in measurements will equal the Receiver Multicoupler Gain

SETUP

A properly calibrated service monitor and 12 dB SINAD meter. Create a table to record the results of the tests in.

VERSION #1.020

2. TEST

Step 1. Connect a service monitor to any base station receive (RX) antenna port, and connect a 12 dB SINAD meter or another service monitor to the base station service port under test.

Step 2. Inject a base station receive frequency RF carrier modulated with a 1 kHz tone at 3kHz deviation for the base station under test. Adjust the service monitor's RF carrier level until a 12 dB reading is obtained on the 12 dB SINAD meter or service monitor.

Step 3. Record the RF carrier level in the previously created table.

Step 4. Disconnect the service monitor from the base station RX antenna port, reconnect the base station RX antenna port to its corresponding multicoupler port, and reconnect the service monitor to the multicoupler's pre-amp port.

Step 5. Leave the 12 dB SINAD meter or service monitor connected to the same base station service port, and inject the same receive frequency RF carrier as per Step 2.

Step 6. Adjust the service monitor's RF carrier level until as 12 dB reading is obtained on the 12 dB SINAD meter or service monitor.

Step 7. Record the carrier level in the table created previously.

Step 8. Restore all connections when completed.

Step 9. Calculate the multicoupler gain by using the formula dB= (Step 7-Step3). Record these results in the table as well.

Step 10. There are no pass/fail criteria for this test. Its purpose is to record a baseline value of the Receiver Multicoupler Gain for future reference and maintenance. This test does not need to be repeated for the remaining base stations.

Pass____ Fail____

Receiver Preamplifier Gain

1. DESCRIPTION

The receiver network for a communications system includes a Tower Top Amplifier (TTA) and a multicoupler. To test the Receiver Preamplifier Gain, a spectrum analyzer with a tracking generator will be used. The tracking generator will be used to generate a signal across the receive band and the spectrum analyzer will be used to record the carrier signal level at the multicoupler. The carrier signal level will be measured at one of the unused port of the multicoupler. These levels are logged and used to calculate system gain. The front panel current meter reading is also logged for reference. Correct operation of the receiver distribution amplifier helps ensure that subscriber unit, when at a maximum distance from the antenna site, will be received intelligibly.

SETUP

Spectrum analyzer with tracking generator. Create a table to record the results of the tests.

VERSION #1.030

2. TEST

Step 1. Set the tracking generator to 0 dB signal.

Step 2. Set the spectrum analyzer to a center frequency of 815 MHz and 10 dB per division on the vertical scale. Set the level to 0 and the span to 5 MHz per division.

Step 3. Turn the marker on to read signal level at the marker.

Step 4. Connect the tracking generator output to a multicoupler test port.

Step 5. Connect the spectrum analyzer RF input to any unused multicoupler output port.

Step 6. Measure the RF signal level on the spectrum analyzer. Record the spectrum analyzer signal level in the previously created table.

Step 7. Record the front panel current meter reading of the multicoupler on the previously created table.

Step 8. Restore all connections when completed.

Step 9. There are no pass/fail criteria for this test. The purpose of this test is to keep a baseline record of the Receiver Preamplifier Gain for future reference and maintenance. This test does not need to be repeated for the remaining base stations.

Pass____ Fail____

Time Domain Reflectrometry (TDR)/Frequency Domain Reflectometry (FDR) of Transmission Line

1. DESCRIPTION

The Time Domain Reflectometry/Frequency Domain Reflectometry test ensures the integrity of all transmission line, transmission line connections, and antennae.

Note: Either the Time Domain Reflectometry or the Frequency Domain Reflectometry will be conducted at the site, not both.

SETUP

TDR/FDR Instrument, appropriate configuration software and client to run the application.

VERSION #1.030

2. TEST

Step 1. Disable all base stations using either the access enable/disable button located on the front panel, or via a management terminal/configuration software.

Step 2. Disconnect the TX transmission line from the surge suppression and connect the TDR/FDR instrument to the TX line leaving the site building.

Step 3. Generate a DC Pulse (TDR)/Frequency Sweep (FDR) using the TDR/FDR instrument, up the transmission line, and wait for the instrument to complete the test.

Step 4. Note the results and restore all connections.

Step 5. Disconnect the RX transmission line from the surge suppression, and connect the TDR/FDR instrument to the RX line leaving the building.

Step 6. Generate a DC Pulse (TDR)/Frequency Sweep (FDR) using the TDR/FDR instrument, up the transmission line, and wait for the instrument to complete the test.

Step 7. Note the results and restore all connections.

Step 8. Disconnect the Test Port transmission line from the surge suppression, and connect the TDR/FDR instrument to the Test Port transmission line leaving the building.

Step 9. Generate a DC Pulse (TDR)/Frequency Sweep (FDR) using the TDR/FDR instrument, up the transmission line, and wait for the instrument to complete the test.

Step 10. Note the results and restore all connections.

Pass____ Fail____

Effective System Sensitivity

1. DESCRIPTION

The effective system sensitivity will be measured at completion of the site's installation and optimization work.

SETUP

Signal generator, 12 dB SINAD meter, and a calibrated service monitor. Create a table to record the values of this test.

VERSION #1.030

2. TEST

Step 1. Connect a signal generator into the receiver multicoupler's test port.

Step 2. Connect a 12 dB SINAD meter or service monitor to the base station's service port under test.

Step 3. Inject the base station receive frequency RF carrier modulated with a 1 kHz tone at 3 kHz deviation for the base station under test.

Step 4. Adjust the service monitor's RF carrier level until a 12 dB reading is obtained on the 12 dB SINAD meter or service monitor.

Step 5. Record the service monitor's RF carrier level.

Step 6. Restore all connections when completed.

Step 7. Calculate the effective system sensitivity by using the formula dBm=Step 5 + Test Port Cable Loss + Service Monitor ISO-T Loss.

Step 8. There are no pass/fail criteria for this test. The purpose of this test is to keep a baseline record of effective system sensitivity for future reference and maintenance. This test does not need to be repeated for the remaining base stations.

Pass____ Fail____

Signoff Certificate

By their signatures below, the following witnesses certify they have observed the system Acceptance Test Procedures.

Signatures

WITNESS: _____Date: _____

Please Print Name: _____ _____

Initials:

Please Print Title: _____

WITNESS: _____Date: _____

Please Print Name: _____ _____

Initials:

Please Print Title: _____

Successful completion of functional acceptance testing requires the system to be operational and the necessary parties to be available to participate in the testing. During testing, all measurements or outcomes will be recorded within the test script, as indicated in the test. The result of a test procedure will be “Pass”, “Fail”, or a measured value. A checkmark in the “Pass” field or in the appropriate box will be sufficient to indicate that a step has passed the test. When all steps in a specific test pass, a representative from CONTRACTOR and the State will sign the test procedure form to indicate the system has passed that test.

If a failure occurs, a check will be placed in the “Fail” field within the test procedure and an entry made on a Punchlist Form. Procedures that fail will be remedied and retested. The Punchlist Form includes the date and time the entry was opened, the date closed, the test number and step and a description of the failure.

Field Functional Acceptance Testing Documentation and Results

Following completion of functional acceptance testing, CONTRACTOR will document the results of the acceptance test plan and provide them to the State in a final system documentation package. The documentation will include:

- Testing procedures utilized.
- Test dates and locations.
- Testing results.

2) Coverage Test Requirements include the following:

Once the Field Functional Acceptance Testing is complete, the Coverage Acceptance Test Plan will be performed. CONTRACTOR has included a preliminary CATP in Section 32. Upon successful completion of the CATP the 60-day Operational Testing will begin.

3) 60-Day Operational Testing (per RFP Requirements)

The operational test is a 60-day standalone performance test designed to demonstrate successful operation of the Phase 3 sites over an extended period of time. A final plan for the 60 day operational test will be defined during CDR for Phase 3.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall test 80% of code against product specifications and agreed-upon requirements. NOTE: The proposed radio system does not include the customized writing of code. As such, any testing of software will be part of the System Acceptance Testing this includes:
   a) Functional Acceptance Test (field)
   b) Coverage Test
   c) 60 Day Burn In Test
2) CONTRACTOR shall demonstrate system functionality prior to commencement of acceptance testing by STATE.
3) CONTRACTOR shall review and consult on STATE’s test scripts to ensure scripts are accurate and thorough.

4) CONTRACTOR shall provide template to document testing results.
5) CONTRACTOR shall provide testing support to identify, troubleshoot and resolve issues.
6) CONTRACTOR shall provide technical assistance with testing, verification and classification of issues.
7) CONTRACTOR shall correct validated issues based on priorities and severities defined by STATE.
8) CONTRACTOR shall work with STATE to ensure the development environment is correctly copied into the testing environment and all users have appropriate access.
9) CONTRACTOR Functional Acceptance Testing:
    a) Verify the operational functionality and features of the individual subsystems and the system supplied by CONTRACTOR, as contracted.
    b) If any major task as contractually described fails, repeat that particular task after CONTRACTOR determines that corrective action has been taken.
    c) Document all issues that arise during the acceptance tests.
        i. Document the results of the acceptance tests and present to the STATE for review.
        ii. Resolve any minor task failures before Final System Acceptance
10) CONTRACTOR Coverage Testing: (DELIVERABLE 3-CATP) (to be completed upon all sites being installed/tested and optimized)
    a) CONTRACTOR and STATE shall review and approve CATP prior to execution (see Section 32)
    b) Supply and set-up required coverage test kits per CATP.
    c) Execute CATP with STATE per Plan.
    d) Submit CATP test reports to STATE within the agreed period per the Plan.
    e) Document all issues that arise during the coverage testing per the Plan.
    f) Submit final test reports, according to the agreed period per the Plan
11) CONTRACTOR 60 Day Burn In (to be completed upon all sites being installed/tested and optimized)
    a) Submit written notification to the State that the system is ready for the 60-day Burn-in test. NOTE: Initial user training and initial subscriber transitions have been successfully completed by the State, as applicable, unless procured from CONTRACTOR.
    b) Respond to any problems, according to the agreed period as defined per the 60-day Burn in plan.
    c) Resolve any problems, according to the agreed period as defined per the 60-day burn in plan.
    d) Categorize the problems, based upon agreed definitions as established during the Contract Design Review.

c. Expectations of STATE:

1) STATE shall provide the testing environment.
2) STATE shall lead the testing effort and issue resolution process.
3) STATE shall ensure STATE testing occurs according to the project schedule and test results and resolutions are documented.
4) STATE shall create test scripts according to STATE-defined workflows and processes.
5) STATE shall provide adequate and knowledgeable system users to participate in testing.
6) STATE shall perform user acceptance testing.
7) STATE shall perform application performance testing.
8) STATE shall document any identified issues, assign priority and severity and provide results to CONTRACTOR for trouble-shooting.
9) STATE shall provide programmed subscriber units for use in testing of the proposed system.
10) STATE shall provide the following to support the Functional Acceptance Testing:
    a) Witness the functional testing.
    b) Approval of the functional testing.
11) STATE shall provide the following to support Coverage Testing:
    a) Provide subscribers to be used in the Coverage Testing per the final agreed upon CATP (see Section 32).
    b) Provide drivers and resources to witness and participate in the coverage testing per the final agreed upon CATP.
    c) Review the test results in a timely manner.
    d) Timely approval of the test results, if the reports indicate compliance with the agreed requirements.
12) STATE shall provide the following to support the 60 Day Burn-In Test:
    a) Conduct 60-day test period
    b) Report all issues immediately to CONTRACTOR Project Manager
    c) Approval of the 60-Day Burn In.

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

1) Completion of system testing and system functionality demonstration by CONTRACTOR
2) Completion of user acceptance testing and performance testing support by CONTRACTOR
3) Testing issues are resolved

4) Testing approach and execution is in alignment with the Testing Management Plan
5) STATE approves the Functional Acceptance Test.
6) STATE approves the Coverage Test
7) STATE approves the 60 Day Burn In Test

24. DELIVERABLE 3-16: IMPLEMENTATION; (INCLUDES DELIVERABLE ANTREM.24-68 ANTENNA REMOVAL)

a. Description:

CONTRACTOR shall support implementation of the final system. Implementation includes the Cutover / Business migration and Punchlist Resolution.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall participate, contribute and collaborate with STATE for implementation preparations.
2) CONTRACTOR shall make any fixes required in a timely manner to implement the system as approved in the Acceptance Testing deliverable.
3) CONTRACTOR shall provide technical support to STATE as needed for implementation efforts.
4) Cutover/Business Migration
    a) During cutover, follow the written plan (defined during the CDR) and implement the defined contingencies, as required, with little or no impact on the existing system and/or STATE operations
    b) Coordinate with the STATE to ensure all subscribers planned for cutover are activated in the system.
    c) Remove antenna/lines at the sites proposed in Civil Work Section (ANTREM.24-68)
5) CONTRACTOR shall work with the STATE to resolve punchlist items, documented during the Acceptance Testing phase, in order to meet all the criteria for final system acceptance

c. Expectations of STATE:

1) STATE shall participate, contribute and collaborate with CONTRACTOR for implementation preparations.
2) STATE shall provide the production environment.
3) STATE shall monitor the implementation and notify CONTRACTOR of any issues.
4) STATE Cutover
    a) Notify the user group(s) affected by the cutover (date and time).
    b) Conduct a roll call of all users working during the cutover, in an organized and methodical manner.
    c) Ensure that all subscriber users are trained.
    d) Program, Distribute and install all subscriber devices prior to cutover.

e) STATE shall Assist CONTRACTOR with resolution of identified punchlist items by providing support, such as access to the sites, equipment and system and approval of the resolved punchlist item(s).

d. Acceptance Criteria:

For the acceptance of this deliverable to occur, the following criteria must be met:

a) CONTRACTOR support during implementation

b) System go live with no unresolved issues

c) Successful migration from the old to new system.

d) All punchlist items resolved and approved by the STATE

25. DELIVERABLE 3-17.1-162: POST-IMPLEMENTATION REPORT

a. Description:

CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to provide content for the Post-Implementation Report. Additionally, the proposed radio network project will include applicable project documentation as noted below.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall have project team members participate in the Post-Implementation Survey.

2) CONTRACTOR shall provide the following As-Built Project Documentation in PDF System Manual with documents on CD/DVD, as applicable:

NOTE: PHASE 3: System Manual documentation for RF sites will be provided.

a) Functional Acceptance Test Plan test sheets and results

b) Equipment Inventory List

c) ATP Test Checklists

d) System Block Diagram (upon final system completion)

e) RF Site Floor Plan

f) RF Site Rack Face

g) Antenna Network Drawings for RF Sites

h) Site Block Diagrams

i) System Diagram (upon final system completion)

j) Manuals (Technical, Maintenance) as defined per CDR

3) CONTRACTOR shall review the items necessary for transitioning the project to warranty support and service

4) CONTRACTOR shall provide a Customer Support Plan detailing the warranty and post warranty support, if applicable, associated with the Contract equipment.

5) CONTRACTOR shall participate, contribute and collaborate with STATE, led by STATE's Project Manager, to develop a Post-Implementation Report that provides, at a minimum, the following:

a) Key project metrics related to schedule, cost, scope and quality

b) Business metrics related to project objectives and measurements as defined in the Project Charter

c) Comprehensive lessons learned valuable to future projects

d) Success stories from the project

e) Results of the Post-Implementation Survey

c. Expectations of STATE:

1) STATE's Project Manager shall be responsible for the final product.

2) STATE's Project Manager shall design and conduct the Post-Implementation Survey.

3) The Post-Implementation Report shall follow STATE template.

4) Receive and approve Project Documentation provided by CONTRACTOR.

5) Participate in the Transition Service process.

d. Acceptance Criteria:

1) For the acceptance of this deliverable to occur, CONTRACTOR shall participate in the Post- Implementation Survey and provide content to STATE for the Post-Implementation Report regarding all services, tasks and products delivered by CONTRACTOR:

a) Key project metrics related to schedule, cost, scope and quality

b) Business metrics related to project objectives and measurements as defined in the Project Charter

c) Lessons learned from the project

d) Success stories from the project

2) Project Documentation provided by CONTRACTOR and received, approved by the STATE.

3) Customer Support Plan provided by CONTRACTOR and approved by STATE.

4) For the acceptance of this deliverable to occur, approval must be obtained from STATE's Executive Steering Committee (ESC).

26. DELIVERABLE 3-18.1-162: PHASE 3 PROJECT CLOSEOUT MEETING

a. Description:

CONTRACTOR shall coordinate with STATE to schedule a Closeout Meeting in Bismarck, ND with the core project team and interested stakeholders. STATE's Project Manager shall lead the meeting, though CONTRACTOR may be asked to present on certain agenda items. The Closeout Meeting must present a completed Post-Implementation Report and facilitate discussion of the project closeout.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall provide content to STATE for detailed agenda in advance of the meeting.

2) CONTRACTOR shall provide STATE any required information for STATE's Project Manager to present the Post-Implementation Report.

3) CONTRACTOR shall expand upon the success stories and lessons learned captured from the Post-Implementation Survey and discuss details related to the lessons learned to provide comprehensive information to future projects.

c. Expectations of STATE:

1) STATE shall finalize and send agenda to invitees.
2) STATE shall coordinate logistics and facilitate the Closeout Meeting.
3) STATE shall expand upon the success stories and lessons learned captured from the Post- Implementation Survey and discuss and further document details related to the lessons learned to provide comprehensive information to future projects.

d. Acceptance Criteria:

For the Phase 3 acceptance of this deliverable to occur, the Closeout Meeting results in:

1) Completion and confirmation of the Post-Implementation Report deliverable
2) Comprehensive lessons learned and success stories valuable to future projects

27. DELIVERABLE 3-19.1-162: PHASE 3 FINAL ACCEPTANCE

a. Description:

Upon completion of all deliverables and upon mutual agreement of STATE and CONTRACTOR, the project work will be considered complete and retainage paid to contractor.

b. Expectations of CONTRACTOR:

1) CONTRACTOR shall address any outstanding issues or completion of deliverables.

c. Expectations of STATE:

1) STATE shall alert CONTRACTOR to any outstanding issues.

d. Acceptance Criteria:

Phase 3 Final System Acceptance Received from the STATE.

For the acceptance of this deliverable to occur, the following criteria must be met:

1) No outstanding or unfinished deliverables
2) No outstanding project or system issues

e. Project Administration

1) Progress Milestone Submittal
   a) CONTRACTOR Responsibilities:
      i. Submit progress (non-payment) milestone completion certificate/documentation.
   b) STATE Responsibilities:
      i. Approve milestone, which will signify confirmation of completion of the work associated with the scheduled task.
   c) Completion Criteria:
      i. The STATE approval of the Milestone Completion document(s).

28. CIVIL SCOPE OF WORK

a. Site Development and Construction for the 800 MHz Only Solution

A comprehensive scope of work, repeatable methodology and experienced subcontractors help avoid unexpected costs and turn CONTRACTOR'S best-in-class site design into your radio communications solution.

From single site projects to large-scale projects with hundreds of sites, we have a complete portfolio of industry leading strategic partner companies for Architectural and Engineering and Site Development Services, ensuring efficient and cost effective full-service integration solutions.
CONTRACTOR'S National Site Design and Integration Team (NSDIT) is a dedicated group of professional resources chartered to lead and manage these services, ensuring they are dynamic, competitive and flexible enough to specifically meet your needs and keep you on the critical path to successful site installation.

CONTRACTOR has divided civil work (towers, shelters, etc.) on the RF sites in our design into four categories. This is for clarity of costs and responsibilities in each of the four classifications. These categories are

- Existing Tower Existing Shelter (ETES).
- Existing Tower New Shelter (ETNS).
- New (Guyed) Tower Existing Shelter (NTES).
- New (Guyed) Tower New Shelter (NTNS).

Following is our tailored site development for the State of North Dakota, Public Safety Radio System project.

- The site development general responsibilities are summarized in Table 46: Site Development and Construction: General Responsibilities.
- The Architectural/Engineering Services (A/E) included in CONTRACTOR'S response are summarized in Table 47: CONTRACTOR Proposed Architectural / Engineering Services (by site type).
- The assumptions made in developing the site development scope of work for proposed RF sites are provided in section e. Assumptions.
- Existing Towers include pre-defined remediation costs – see price pages for detail.
- All RF sites include pre-defined tribal fee costs – see price pages for detail.

Table 46: Site Development and Construction: General Responsibilities

CONTRACTOR Tasks	3rd party ETNS	NTNS-Green site: New Build
Site design visit to collect pertinent information from the sites.	✓	✓
Prepare a lease exhibit and sketch of the site to communicate to the property owner the proposed lease space and planned development at the particular site location	✓	✓
Prepare site construction drawings, showing the layout of various new and existing site	✓	✓

components.		
Prepare record drawings of the site showing the as- built information	✓	✓
Task 1 - Limited NEPA compliance/FCC checklist for towers constructed prior to March 16, 2001 or towers with previously filed FCC checklists	✓	✓
Existing Tower structural analysis	✓	N/A
Existing Tower Mapping	✓	N/A
Prepare Zoning Drawings	✓	✓

Table 47: CONTRACTOR Proposed Architectural / Engineering Services (by site type)

Tasks	CONTRACTOR	State of North Dakota	Comments
Zoning submittals (if required)	✓		ND to assist by providing information and helping to complete applications
Site Acquisition/Site Use Approvals	✓		With ND providing assistance
Pay for property lease/ownership application fees, taxes and recurring payments.	✓	✓	
Permitting	✓		For work identified as being the responsibility of CONTRACTOR, CONTRACTOR has included pulling all required permits that might be required to complete the scope of work proposed.
If required, prepare and submit Electromagnetic Energy (EME) plans for the site (as a licensee) to demonstrate compliance with FCC RF Exposure guidelines.		✓	With CONTRACTOR providing information on the equipment to be supplied and installed by CONTRACTOR
Installations or up-grades of existing site electrical systems in order to comply with NFPA 70, Article 708		✓	No Installations or Upgrades are expected
Existing sites electric utility service and backup power (generator) upgrades	✓		CONTRACTOR has provided upgrades to the non-Thermobond shelters and utility services at the State sites will be upgraded for those buildings.

Pay for any upgrades to existing antenna support structures necessary to accommodate the new antennas proposed.	✓		CONTRACTOR has accounted for tower steel to remediate existing sites. Foundation has not been included in those upgrades.
Pay for the usage costs of electric power, leased lines and generator fueling beyond the installation effort and on an on-going basis. Includes easement fees.		✓	CONTRACTOR will provide generator first fill and system testing fuel.
Provide property deed or lease agreement and boundary survey, along with assisting CONTRACTOR gathering existing as- built drawings of the site and site components (i.e. towers and tower foundations- For state owned sites)	✓	✓	Required for CONTRACTOR to conduct site engineering.
Provide a right of entry letter from the site owner for CONTRACTOR to conduct field investigations		✓	
Provide adequate and reasonable access to all sites and will facilitate access to all privately- owned sites as required		✓	Includes maintaining access roads (i.e. snow removal, wash out repair, etc.)
Architectural/Engineering Services (A/E) – Related to site development	✓		
Phase 3: Provide for the removal of existing States legacy antennas and related cabling from the Phase 1 sites proposed.	✓		Phase 3: Removal only applies to State's equipment
NOTES: ETES = Existing Tower Existing Shelter ETNS = Existing Tower New Shelter NTES = New Guyed Tower Existing Shelter NTNS = New Guyed Tower New Shelter			

b. <u>New Guyed Towers with New Shelters: Construction of a Greenfield Site</u>

1) Site Scope Summary
   a) Engineering services for site drawings and regulatory approvals – Included.
   b) Support site negotiation where required and Zoning services as required
   c) New 50’ x 50’ fenced compound/expansion as required
   d) Road length requiring improvement
   e) New power run with underground, 200-amp - 120/240-volt, single-phase electrical service.
   f) New 12’ x 32’ Thermobond shelter
   g) New 1000-gallon, propane, above ground fuel tank
   h) New generator size – 20 kW, Type – Indoor.
   i) New guyed tower to be used for antennas – 200’, 300’ or 500’-foot guyed tower-field assembled.
   j) New guyed tower foundation size: 35 (for 200’tower) or 45(for 300’ tower) or 90(for 500’ tower) cubic yard tower foundation Type – Base + 3 anchors.
2) CONTRACTOR Responsibilities:
   a) Site Acquisition
      i. Prepare initial zoning analysis of municipal and zoning districts within each search ring, along with an overview of the zoning and permitting process accompanying timeframes.
      ii. Assist at public meetings and/or hearings to provide expert testimony to assist in obtaining zoning approvals.
      iii. The CONTRACTOR project manager will assist the State of North Dakota in obtaining the site lease.
      iv. Assist State of North Dakota in negotiating an option/lease/license agreement (lease) and acquiring clear land title/site lease/shared use agreement for the candidate site.
      v. Coordinate zoning and permitting of the new guyed tower site such that it is in full compliance with applicable jurisdictional requirements.
   b) Site Engineering
      i. Prepare site construction drawings showing the layout of various new and existing site components.
      ii. Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).
      iii. Perform a boundary and topographic survey for the property on which the communication site is located or will be located.
      iv. Perform construction staking around the site to establish reference points for proposed construction.

v. Prepare a lease exhibit and sketch of the site to communicate to the property owner the proposed lease space and planned development at the particular site location.

vi. Prepare zoning drawings that can be used to describe the proposed site installation in sufficient detail.

vii. Prepare record drawings of the site showing the as-built information.

viii. Conduct flood plain analysis of the site location.

ix. Conduct utility investigation and coordinate with local utility company for power hook up.

x. Prepare photo renderings of how a specific site or sites would look after completion.

xi. Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the proposed construction activity. This does not include the additional field investigations to document site conditions if itis determined that the proposed communication facility “may have a significant environmental impact” (i.e. contaminated soils due to hazardous materials, historical area, proximity to habitats of or evidence of protected species) and thus require additional documentation, submittals, or work. Regional Environmental Review (RER) report submittals if required by FEMA have not been included. Perform Cultural Resource study as needed to identify sensitive historical and archaeological monuments that might be impacted by proposed construction

xii. Perform an ASTM E 1527-05 certified Phase I Environmental Site Assessment (ESA), to identify obvious and reasonably likely on-site and/or off-site potential sources of contamination that might pose a potential risk of leasing and building on a piece of property and whether further environmental investigations are warranted. This study does not include Phase II assessments, risk/cost evaluations and permitting assistance that may be required if risk factors are indicated.

xiii. Conduct up to 35-foot deep soil boring test at tower location, backfill holes with spoils and prepare geotechnical report of soil conditions at locations of guyed tower base and each guy anchor point. Grouting of boring holes or access by Automatic Traction Vehicle (ATV) - mounted rig is not included.

xiv. Conduct construction inspection of foundation steel prior to pour, materials testing of concrete and field density tests of backfill to ensure quality construction.

xv. Check tower erection for plumbness, linearity and alignment after installation.

xvi. Conduct tension test to ensure that the guy wires have been tensioned properly.

xvii. Perform inspection of the site and the work performed by the Contractor to document that the site is built in accordance with the “Site Plans” and document any deviations or violations.

xviii. Prepare, submit and track application for local permit fees (zoning, electrical, building etc.), prepare FAA filings and procure information necessary for filing.

xix. Furnish 3rd Party Utility Mark-out of site as required

xx. File for FAA determination and ASR filing as required.

c) Site Preparation

i. Obtain the permits such as electrical, building and construction permits and coordinate any inspections with local authorities that may be needed to complete site development work.

ii. Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of CONTRACTOR’S control will result in additional schedule days.

iii. Perform light clearing of brush, grubbing and disposal of vegetation and shrub growth in the site compound area and a 20-foot path around it (approximately 8100 square feet).

iv. Perform clear light brush, grub roots and dispose vegetation and shrub growth in a 15-foot wide access road to the site (approximately 3136 feet in length).

v. Grade the site compound and 10-foot path around it to provide a level, solid, undisturbed surface for installation of site components (approximately 2000 square feet).

vi. Provide minimal grading in a 15-foot x 30-foot compound around each of 3 guy anchors to allow anchor installation.

vii. Supply and install gravel surfacing to a depth of 6 inches, including herbicide treatment and geotextile fabric installation within the fenced in site compound area and a 3-foot path around it (approximately 3136 square feet).

viii. Supply and install gravel surfacing to a depth of 6 inches around each of 3 guy anchors, including herbicide treatment and geotextile fabric installation.

ix. Provide a 15-foot wide access road (approximately 200 feet in length), including surface grading and graveling

x. Supply and install nine (9) guard posts as required.

xi. Construct swales around the compound to control soil erosion (approximately 200 linear feet).

xii. Provide silt fence around the compound to control soil erosion (approximately 200 linear feet).

xiii. Supply and install 8-foot high chain-link fencing with a ten-foot wide gate around the shelter compound (approximately 200 linear feet).

xiv. Supply and install 8-foot high chain-link fencing with a four-foot wide gate around a 15-foot x 30-foot compound for each of 3 guy anchors.

xv. Perform site touch up (fertilize, seed and straw) disturbed areas not covered with gravel after completion of construction work. Landscaping, decorative fencing or any other aesthetic improvement that may be required by local jurisdictions has not been included and will be handled through a negotiated contract change notice.

d) Site Components Installation

i. Construct one (1) reinforced concrete foundation necessary for a 12-foot x 32-foot shelter.

ii. Construct one (1) concrete slab for 1000 gallon above-ground Liquid Propane (LP) fuel tank at 3000 psi with reinforcing steel necessary for foundations.

iii. Supply and install one (1) prefabricated Thermobond shelter 12-foot x 32-foot.

iv. Supply and install one (1) 1000-gallon Liquid Propane (LP) fuel tank(s), fill it with fuel and connect it to the generator.

v. Supply and install fuel tank monitors on the tanks to monitor low fuel in tanks and run alarm wiring to the building located within 50 feet of the tank.

vi. Supply and install one (1) 120/240-volt, 200-amp, single-phase meter pedestal and hook-up for electrical service by the local utility.

vii. Provide all trenching, conduit and cabling necessary for underground hook-up of power to the shelter from nearby utility termination located within approximately 100 cable feet of the shelter.

viii. Provide all trenching and conduit necessary for underground hook-up of telco lines to the shelter from nearby within approximately 100 cable feet of the shelter.

ix. Supply and install a perimeter grounding system around the compound, shelter and tower. The ground system is to tie to the fence and all new metal structures within the compound to meet current CONTRACTOR'S R56 standards.

x. Conduct one (1) three-point ground resistance test of the site. Should any improvements to grounding system be necessary after ground testing, the result of such improvements shall negotiated

xi. Supply and install one (1) freestanding 24-inch-wide cable/ice bridge from the tower to the shelter (up to 20 linear feet).

e) Tower Work

i. Construct tower foundations for a guyed tower (base and three anchors) including excavation, rebar and concrete (35 (for 200'tower) or 45(for 300' tower) or 90(for 500' tower) cubic yard tower foundation).

ii. Rock coring, extensive dewatering of foundations or hazardous material removal has not been included and will be negotiated.

iii. Erect new 200', 300' or 500' -foot guyed tower with strobe lighting.

iv. Install torque arm on 6-foot guyed tower.

v. Supply and install grounding for the tower base for monopole or guyed towers

vi. Ground each of the 3 guy anchors using galvanized steel ground rods.

f) Antenna and Transmission Line Installation

i. Install three (3) antenna(s) with 1 TTA for the RF system.

ii. Install transmission line and perform sweep tests.

iii. Provide and install six-hole hanger blocks and attachment hardware for supporting transmission lines on the antenna support structure every three feet.

iv. Supply and install one (1) ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

g) Miscellaneous Work

i. Furnish and install structural fill for tower foundation and guy anchor foundations.

c. <u>Third-Party Site with Existing Tower and New Shelter Requiring Structural Remediation</u>

1) Site Scope Summary
    a) Engineering services for site drawings and regulatory approvals – Included.
    b) Support site negotiation where required and Zoning services as required
    c) New fenced compound/expansion size – 20-foot x 50-foot.
    d) New 100’ power run with Underground, 200-amp - 120/240-volt, single-phase electrical service.
    e) New 12’ x 32’ Thermobond shelter.
    f) New Propane, above ground, 1000-gallon fuel tank.
    g) New Indoor, 20 kW generator.
    h) Existing 3rd party Tower to be used for antennas.
    i) Remediation to be provided to support proposed loading (CONTRACTOR has allocated an amount per site in the Cost Proposal which does not include foundation modifications or replacements.)
2) CONTRACTOR Responsibilities:
    a) Site Acquisition
        i. Assist State of North Dakota in negotiating an option/lease/license agreement (lease) and acquiring clear land title/site lease/shared use agreement for the candidate site.
    b) Site Engineering
        i. Prepare site construction drawings, showing the layout of various new and existing site components.
        ii. Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).
        iii. Prepare a lease exhibit and sketch of the site to communicate to the property owner the proposed lease space and planned development at the particular site location.
        iv. Prepare zoning drawings that can be used to describe the proposed site installation in sufficient detail.
        v. Prepare record drawings of the site showing the as-built information.
        vi. Perform a boundary and topographic survey for the property on which the communication site is located or will be located.
        vii. Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter 1, subsection 1.1307 that may be potentially impacted by the proposed construction activity. This does not include the additional field investigations to document site conditions if it is determined that the proposed communication facility “may have a significant environmental impact” (i.e. contaminated soils

due to hazardous materials, historical area, proximity to habitats of or evidence of protected species.) and thus require additional documentation, submittals, or work.

viii. Perform four-point soil resistivity testing at the time of site visit.

ix. Provide a structural engineering analysis for antenna support structure, if necessary, to support the proposed antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of State of North Dakota. NOTE: structural measurement survey, materials testing, geotechnical investigation and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

x. Conduct construction inspection of foundation steel prior to pour, materials testing of concrete and field density tests of backfill to ensure quality construction.

xi. Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

xii. Furnish 3rd Party Utility Markout of site

c) Site Preparation

i. Assist with obtaining permits such as electrical, building and construction permits and coordinate any inspections with local authorities that may be needed to complete site development work.

ii. Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of CONTRACTOR'S control will result in additional schedule days.

iii. Perform light clearing of brush, grubbing and disposal of vegetation and shrub growth in the site compound area and a 20-foot path around it (approximately 1800 square feet).

iv. Grade the site compound and 10-foot path around it to provide a level, solid, undisturbed surface for installation of site components (approximately 1800 square feet).

v. Provide earth fill to raise surface level in the site compound (approximately 20 cubic yards).

vi. Supply and install gravel surfacing to a depth of 6 inches, including herbicide treatment and geotextile fabric installation within the fenced in site compound area and a 3-foot path around it (approximately 1456 square feet).

vii. Supply and install 9 guard posts as required.

viii. Provide silt fence around the compound to control soil erosion (approximately 140 linear feet).

ix. Supply and install 8-foot high chain-link fencing with a ten-foot wide gate around the shelter compound (approximately 140 linear feet).

x. Perform site touch up (fertilize, seed and straw) disturbed areas not covered with gravel after completion of construction work. Landscaping, decorative fencing or any other aesthetic improvement that may be required by local jurisdictions has not been included and will be handled through a negotiated contract change notice.

d) Site Components Installation

i. Construct one (1) reinforced concrete foundation necessary for a 12-foot x 32-foot shelter.

ii. Construct one (1) concrete slab for 1000 gallon above-ground Liquid Propane (LP) fuel tank at 3000 psi with reinforcing steel necessary for foundations.

iii. Supply and install one (1) prefabricated Thermobond shelter 12-foot x 32-foot.

iv. Supply and install one (1) 1000-gallon Liquid Propane (LP) fuel tank(s), fill it with fuel and connect it to the generator.

v. Supply and install fuel tank monitors on the tanks to monitor low fuel in tanks and run alarm wiring to the building located within 50 feet of the tank.

vi. Supply and install one (1) 120/240-volt, 200-amp, single-phase meter pedestal and hookup for electrical service by the local utility.

vii. Provide all trenching, conduit and cabling necessary for underground hookup of power to the shelter from nearby utility termination located within 100 cable feet of the shelter.

viii. Provide all trenching and conduit necessary for underground hookup of telco lines to the shelter from nearby within 100 cable feet of the shelter.

ix. Supply and install a perimeter grounding system around the compound and shelter. The ground system is to tie to the fence and all new metal structures within the compound to meet current CONTRACTOR'S R56 standards.

x. Conduct one (1) three-point ground resistance test of the site. Should any improvements to grounding system be necessary after ground testing, the cost of such improvements shall be the responsibility of State of North Dakota.

xi. Supply and install one (1) freestanding 24-inch-wide cable/ice bridge from the tower to the shelter (approximately 20 linear feet).

e) Antenna and Transmission Line Installation

i. Install three (3) antenna(s) for the RF system.

ii. Supply and install 3 6-foot side arm(s) for antenna mounts.

iii. Install one (1) tower top amplifier(s).

iv. Install 1/2-inch transmission line as required.

v. Install 7/8-inch transmission line as required

vi. Perform sweep tests on transmission lines.

vii. Provide and install six-hole hanger blocks and attachment hardware for supporting transmission lines on the antenna support structure every three feet.

viii. Supply and install 24-inch-wide cable ladder to support RF transmission lines (280 linear feet).

ix. Supply and install one (1) ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

f) Miscellaneous Work

i. Furnish labor to remove and dispose of existing fence.

ii. Tower Modifications.

d. STATE Responsibilities

STATE responsibilities	ETNS	ETES	NTNS	NTES
If required, prepare and submit Electromagnetic Energy (EME) plans for the site (as a licensee) to demonstrate compliance with FCC RF Exposure guidelines.	X	X	X	X
Pay for all utility connection, pole or line extensions and any easement or usage fees.	X	X	X	X
Review and approve site design drawings within 7 calendar days of submission by CONTRACTOR or its subcontractor(s). Should a re-submission be required, the STATE shall review and approve the re-submitted plans within 7 calendar days from the date of submittal.	X	X	X	X
Pay for the usage costs of power, leased lines and generator fueling after initial fill.	X	X	X	X
Pay for application fees, taxes and recurring payments for lease/ownership of the property.	X	X	X	X

STATE responsibilities	ETNS	ETES	NTNS	NTES
Provide personnel to observe construction progress and testing of site equipment according to the schedule provided by CONTRACTOR.	X	X	X	X
As applicable (based on local jurisdictional authority), the STATE will be responsible for any installation or up- grades of the electrical system in order to comply with NFPA 70, Article 708	X	X	X	X
Provide property deed or lease agreement and boundary survey, along with existing as-built drawings of the site and site components to CONTRACTOR for conducting site engineering.	X	X	X	X
Maintain existing access road in order to provide clear and stable entry to the site for heavy-duty construction vehicles, cement trucks and cranes. Sufficient space must be available at the site for these vehicles to maneuver under their own power, without assistance from other equipment.	X	X		X
Arrange for space on the structure for installation of new antennas at the proposed heights on designated existing antenna- mounting structures.	X	X		

STATE responsibilities	ETNS	ETES	NTNS	NTES
Provide space, HVAC, backup power, where applicable (generator), outlets, grounding, surge suppression, lighting and cabling facilities for the equipment room per Motorola's R56 specifications. Ceiling and cable tray heights in the equipment rooms should be such as to accommodate 7--foot equipment racks and the ceiling should be 8 feet or greater. (HVAC upgrades proposed to Non -Thermo bond state shelters)		X		X
Confirm that there is adequate utility service to support the new equipment and ancillary equipment.		X		X
If required, remove or relocate any existing facilities, equipment and utilities to create space for new site facilities and equipment.		X		X
If required, provide any physical improvements (walls, roofing, flooring, painting, etc.) necessary to house the equipment in the existing room.		X		X
NOTES: ETES = Existing Tower Existing Shelter ETNS = Existing Tower New Shelter NTES = New Guyed Tower Existing Shelter NTNS = New Guyed Tower New Shelter				

e. Assumptions

Assumptions	ETNS	ETES	NTNS	NTES
No prevailing wage, certified payroll, mandatory union workers or mandatory minority workers are required for this work	X	X	X	X
All work is assumed to be done during normal business hours as dictated by time zone (Monday thru Friday, 7:30 a.m. to 5:00 p.m.).	X	X	X	X
All recurring and non- recurring utility costs [including, but not limited to, generator fuel (except first fill), electrical, Telco] will be borne by the STATE or site owner.	X	X	X	X
All utility installations shall be paid for by the site owner and located at jointly agreed to location within or around the new communications shelter or equipment room.	X	X	X	X
Site will have adequate electrical service, see matrix specified distance for CONTRACTOR provided power feed for the new shelter. Utility transformer, transformer upgrades, line, or pole extensions have not been included.	X		X	
Pricing has been based on National codes such IBC or BOCA.	X	X	X	X
Hazardous materials are not present at the work location. Testing and removal of hazardous materials, found during site investigations, construction or equipment installation will be the responsibility of the STATE.	X	X	X	X
A maximum of 30 days will be required for obtaining approved building permits from time of submission and a maximum of 60 days will be required for zoning approvals from time of submittal.	X	X	X	X

Assumptions	ETNS	ETES	NTNS	NTES
No improvements or specialized rigging will be required for concrete trucks, drill rigs, shelter delivery and crane access.	X	X	X	X
If extremely harsh or difficult weather conditions delay the site work for more than a week, CONTRACTOR will request delays.	X	X	X	X
In the absence of geotechnical test data, sites are assumed to be in presumptive soils as defined by current TIA/EIA 222 guidelines	X		X	X
On existing tower sites power is assumed within 100ft of proposed shelter location.	X	X		
Site acquisition fees are excluded from this proposal.	X	X		
Tribal fees are included up to a total reflected in the Cost Proposal. Any additional tribal fees above allotted amount will result in a pass thru cost to the STATE.	X	X	X	X
Assumes no storm water design or implementation is included.	X	X	X	X
The new guyed tower location will pass the FAA hazard study, zoning, FCC and environmental permitting.			X	X
The existing ground system and soil resistivity at the site is sufficient to achieve resistance of 10 ohms or less. Communication site grounding will be designed and installed per Motorola's R56 standards.	X	X		X

Assumptions	ETNS	ETES	NTNS	NTES
The existing site has adequate room to expand and install the shelter, including lay-down and staging areas, without encroaching on wetlands, easements, setbacks, right- of-way's, or property lines.	X			
AM detuning or electromagnetic emission studies will not be required.	X	X		
Lead paint testing of existing painted towers has not been included.	X	X		
On the existing tower, the antenna locations for the proposed antenna system design will be available at the time of installation.	X	X		
The new shelter can be located within approximately 20 feet of the existing tower location and the generator/fuel tank can be located within approximately 25 feet of the shelter.	X			
Restoration of the site surroundings by fertilizing, seeding and strawing the disturbed areas will be adequate.	X	X	X	X
Underground utilities are not present in the construction area and as such no relocation will be required.	X	X	X	X

Assumptions	ETNS	ETES	NTNS	NTES
The existing antenna support foundation is structurally capable of supporting the new antenna, cables and ancillary equipment proposed and will not need to be removed or rebuilt at the existing site. The supporting structure meets all applicable current EIA/TIA-222 foundation, ice, wind, and twist and sway requirements. CONTRACTOR has not included any cost for foundation upgrades to the antenna support structure.	X	X		
Structural analyses for towers or other structures that have not been performed by CONTRACTOR will relinquish CONTRACTOR from any responsibility for the analysis report contents and/or recommendation therein.	X	X		
Foundations for shelter, generator and fuel tank are based presumptive soil conditions as defined by current TIA/EIA 222 standards. Footings deeper than 30 inches, raised piers, rock coring, dewatering, or hazardous material removal have not been included.	X	X	X	X
Assumes existing fenced in compounds have the required space for installation of proposed shelter and LP tank. No compound expansion required.	X			
The site has adequate utility service to support the proposed equipment loading		X		X

Assumptions	ETNS	ETES	NTNS	NTES
Alarming at existing sites will be limited to new component installations and will have to be discussed and agreed to on a site-by-site basis.		X		X
A clear obstruction-free access exists from the antenna location to the equipment room.	X	X		
The floor can support the proposed new loading. Physical or structural improvements to the existing room will not be required.		X		X
Tower and foundation sizing is based on the tower loading requirements as a result of the RF Antenna System design.			X	X
If as a result of NEPA studies, any jurisdictional authority should determine that a proposed communications facility "may have a significant environmental impact", the environmental impact studies or field testing and evaluation related to such determination have not been included.	X		X	X
For new guyed towers greater than 200 feet in overall height, FAA dual obstruction lighting has been included. Painting of any new guyed towers has not been included.			X	X
The site location can be finalized and lease agreement can be reached with the property owner within 60 calendar days after the start of the site acquisition effort.			X	X

Assumptions	ETNS	ETES	NTNS	NTES
A waiver to zoning requirements like setbacks, tower height limitations, etc. can be obtained.	X		X	X
The soil resistivity at the site is sufficient to achieve resistance of ten (10) ohms or less. Communications site grounding will be designed and installed per Motorola's Standards and Guidelines for Communications Sites (R56).			X	X
Spoils from the tower foundations can be dispersed on the property and will not be required to be transported to a dump location.			X	X
Existing tower and Legacy equipment will remain in place and room for new guyed tower will be approximately 20ft of existing shelter.				X
NOTES: ETES = Existing Tower Existing Shelter ETNS = Existing Tower New Shelter NTES = New Guyed Tower Existing Shelter NTNS = New Guyed Tower New Shelter				

1) Site Development Completion Criteria

   a) Site development completed per issued for construction (IFC) construction drawings, project requirements, contractual obligations (including any STATE/ CONTRACTOR approved changes) and approved by the STATE.

   b) This shall be confirmed by contractor and reviewed with CONTRACTOR construction manager and project manager before inspections occur.

   c) All jurisdictional and contractual required testing and inspections to be performed by the contractor. (Contractual testing and inspections defined and agreed to with project team and STATE prior to project kick off; vendor solely responsible for conducting, coordinating and paying for all jurisdictional testing and inspections).

   d) CONTRACTOR site development checklist shall be completed and signed off by contractor prior to STATE inspection. (Review with project team and STATE and amend checklist as required at project kick off or before work begins).

e) Site turn-over package completed and turned over to CONTRACTOR (As defined and agreed to with project team and STATE).

f) All punch list and deficiencies shall be completed prior to STATE and CONTRACTOR inspections.

29. COVERAGE ACCEPTANCE TEST PLAN

a. CATP Overview

Coverage Acceptance Test (CATP) is designed to verify the voice radio system implemented by CONTRACTOR meets or exceed the coverage defined as shown in the coverage prediction maps within State of North Dakota's jurisdictional boundaries. The CATP defines the coverage testing method and procedure, the coverage acceptance criteria, the test documentation and the responsibilities of both CONTRACTOR and the State of North Dakota.

Coverage Acceptance Testing is based upon a coverage prediction that accurately represents the implemented infrastructure and parameters that are consistent with the contract agreements. If the implemented system varies from the design parameters, then a revised coverage map will be prepared. New test maps will reflect the measured losses and gains associated with the implemented infrastructure and subscribers. These will be used to define the test configuration and potential areas from which test locations may be included in the evaluation process

b. CATP Definitions

Several definitions are needed to accurately describe the coverage acceptance test method and criteria. Where cited, these terms or methods are defined in TIA TSB-88.1-D[1] or TSB-88.3-D[2]2.

1) Defined Test Area

The defined test area is the geographical area in which communications will be provided that meet or exceed the specified Channel Performance Criterion (CPC) at the specified reliability for the specified equipment configuration(s).

The coverage test will be performed for each service area in all accessible grids.

The Request for Proposal, Statewide Interoperable Radio Network (RFP 112-1801), requires the following coverage test areas:

Regions – Northwest, Northeast, Southwest, Southeast, as defined in Attachment 2 of RFP 112-1801

Urban Area – Cities with greater than 10,000 population

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[1] *Wireless Communication Systems – Performance in Noise- and Interference- Limited Situations—Part 1: Recommended Methods for Technology Independent Performance Modeling* Technical Service Bulletin TSB-88.1-D, Telecommunications Industry Association (TIA), Arlington VA, 2012

[2] *Wireless Communication Systems – Performance in Noise- and Interference- Limited Situations—Part 1: Recommended Methods for Technology Independent PerformanceVerification,* Technical Services Bulletin TSB-88.3-D 2013 Telecommunications Industry Association (TIA), Arlington VA, 2013

Service Area Reliability testing will be performed using the required tile reliability (95%) and the guaranteed percent coverage within the service area as shown below.

CONTRACTOR will guarantee the following coverage:

- 95% Mobile coverage throughout the geographical bounded area of the Region at 95% reliability at a DAQ 3.4 or better.
- 85% Portable on Street coverage throughout the geographical bounded area of the Region at 95% reliability at a DAQ 3.4 or better.
- 95% Portable in 20dB building coverage in the Urban Area at 95% reliability at a DAQ of 3.4 or better.

2) Channel Performance Criterion (CPC)

The CPC is the specified minimum design performance level in a faded channel. {TSB-88.1-DD, §5.2}. The RFP requires that the CPC for the proposed system is Delivered Audio Quality (DAQ) 3.4. The complete TSB-defined DAQ levels are provided in Table 50 {TSB-88.1-DD, §5.4.2, Table 2}.

Table 50: DAQ Definitions

DAQ	Subjective Performance Description
1	Unusable, speech present but unreadable.
2	Understandable with considerable effort. Frequent repetition due to noise/distortion.
3	Speech understandable with slight effort. Occasional repetition required due to noise/distortion.
3.4	**Speech understandable with repetition only rarely required. Some noise/distortion per RFP requirements.**
4	Speech easily understood. Occasional noise/distortion.
4.5	Speech easily understood. Infrequent noise/distortion.
5	Speech easily understood.

The CPC pass/fail criterion is the faded performance threshold, plus any adjustments for antenna performance, external noise and in-building or in-vehicle losses. {TSB-88.1-D, §5.4.2, Figure 5} The faded performance threshold for the specified CPC is determined using the receiver's static reference sensitivity adjusted by the projected CPC parameters for the applicable Modulation Type and DAQ as listed in the current version of TSB-88.1 D, Annex A, Table A-1.

For coverage testing of digital voice radio systems, the faded performance threshold is the applicable Bit Error Rate (BER) from the projected CPC parameters.

3) Reliability Guarantee

The Service Area Reliability is the percentage of locations within the service area that meet or exceed the specified CPC. Service Area Reliability testing will be performed using the required tile reliability (95%) and the required percent coverage within a service area.

After all accessible tiles in the defined test area have been tested, the Service Area Reliability will be determined by dividing the number of tiles tested that meet or

exceed the CPC pass/fail criterion by the total number of tiles tested. [TSB-88.3-D, §5.1, equation 1].

4) Direction(s) of Test – Outbound BER & Inbound and Outbound DAQ

   The direction of tests in Table 51 Coverage Acceptance Test Summary defines the direction(s) which will be tested for coverage acceptance. Outbound (Talk-out) is the path from the fixed equipment outward to the portable radios. Inbound (Talk-in) is the path from the portable radios inward to the fixed equipment. A Bit Error Rate (BER) test will be conducted in the outbound direction. The DAQ audio tests will be conducted in both inbound and outbound directions.

5) Equipment Configurations

   This section defines the equipment configurations and infrastructure design parameters upon which the coverage guarantees and the coverage acceptance tests are based. The equipment configurations are defined in Table 51: SIRN Coverage Acceptance Test Summary and include user equipment, outdoor/in-building definition, defined test area, number of test tiles, reliability, CPC, CPC pass/fail and direction of test. The Infrastructure Design Parameters include site names, site locations and antenna system parameters. If the implemented system equipment configuration and/or infrastructure design parameters vary from these configurations and/or parameters, revised coverage predictions will be required to determine an updated reliability % which will be included in the coverage acceptance test.

   Coverage testing will be conducted with equipment installed per the configurations in Table 51 and with the mobile antennas in unobstructed locations that are not adjacent to other large objects or metallic items which would distort the antenna patterns.

Table 51: SIRN Coverage Acceptance Test Summary

User Equipment Configuration	In-Building Attenuation	Service Area	Estimated Test Tiles	Service Area Reliability	CPC	CPC Pass/Fail	Direction(s) of Test
Urban Area Test							
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Urban – portable plus 20 dB	Urban Area	~3000 (1/4-mile tile)	95%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Inside Buildings	Urban Area	~100 Test Locations	95%	DAQ-3.4	Subjective DAQ	Inbound & Outbound
SW Region Test							
APX Mobile with 1/4 wave roof mounted antenna	Rural - Mobile	Southwest Region	~16000 (1-mile tile)	95%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Rural - portable on street	Southwest Region	~16000 (1-mile tile)	85%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Rural - portable on street	Southwest Region	~100 Test Locations	85%	DAQ-3.4	Subjective DAQ	Inbound & Outbound
SE Region Test							
APX Mobile with 1/4 wave roof mounted antenna	Rural - Mobile	Southeast Region	~16000 (1-mile tile)	95%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Rural - portable on street	Southeast Region	~16000 (1-mile tile)	85%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Rural - portable on street	Southeast Region	~100 Test Locations	85%	DAQ-3.4	Subjective DAQ	Inbound & Outbound

User Equipment Configuration	In-Building Attenuation	Service Area	Estimated Test Tiles	Service Area Reliability	CPC	CPC Pass/Fail	Direction(s) of Test
NW Region Test							
APX Mobile with 1/4 wave roof mounted antenna	Rural - Mobile	Northwest Region	~16000 (1-mile tile)	95%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Rural - portable on street	Northwest Region	~16000 (1-mile tile)	85%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Rural - portable on street	Northwest Region	~100 Test Locations	85%	DAQ-3.4	Subjective DAQ	Inbound & Outbound
NE Region Test							
APX Mobile with 1/4 wave roof mounted antenna	Rural - Mobile	Northeast Region	~16000 (1-mile tile)	95%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Rural - portable on street	Northeast Region	~16000 (1-mile tile)	85%	DAQ-3.4	Objective BER 2%	Outbound
APX Portable with ½ wave whip antenna in swivel case with remote speaker microphone	Rural - portable on street	Northeast Region	~100 Test Locations	85%	DAQ-3.4	Subjective DAQ	Inbound & Outbound

c. BER and DAQ Test Configuration

The Outbound BER test will be conducted as a drive test inside a vehicle. The DAQ Test will be conducted outside the vehicle on street for the Region areas and inside buildings for the Urban Area. A CONTRACTOR Voyager Test Kit (including a test radio, attenuated mag-mount ¼- wave antenna, GPS receiver and laptop computer), will be utilized in the test team's transport vehicle to automatically record Outbound BER measurements.

Voyager consists of:

- A calibrated digital portable test receiver connected to an antenna installed in a representative location on the test vehicle. The portable test receiver will monitor transmissions from the fixed network radio sites.
- A USB connection between the portable test radio and the computer.
- A Global Positioning System (GPS) receiver which will provide the computer through a USB, or nine-pin serial connection with the location and speed of the test vehicle.
- A laptop computer with VoyagerSM software and Hydra test grid shapefiles which include highways, local streets and political boundaries.

The test setup is shown in the following figure.

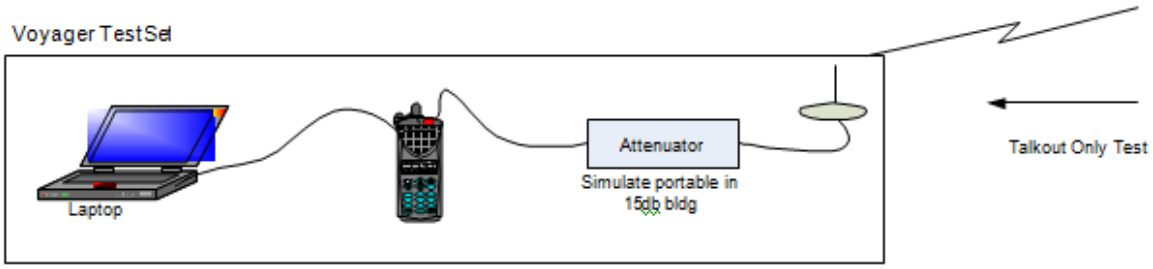

Figure 44: Voyager Test Setup

In addition to recording the Outbound BER, the Voyager Test Kit's GPS location feature may assist the DAQ test team in determining their DAQ test location point. Voyager uses statistically valid methods to capture SSI and BER measurements correctly based on TIA TSB-88.3-D.

d. CPC Pass/Fail Criterion for a Test Tile

For each equipment configuration, the CPC pass/fail criterion for a test tile is stated in Table 51. Each equipment configuration will have only one CPC pass/fail criterion for a test tile.

Coverage for the portable on street (Regions) or in building (Urban area) equipment configurations will be verified for acceptance by attenuation of the test radio for the outbound BER tests. The attenuation will be the difference between the test radio's antenna system and the additional loss used in CONTRACTOR'S coverage

prediction to account for portable antenna performance. The attenuator values are provided in Table 52.

This provides a method of verifying that the radio system provides the required outbound BER for the specified CPC for each of the defined equipment configurations.

Below are the attenuator values required to evaluate each equipment configuration. The methodology to determine the attenuator value is demonstrated in TSB-88.1-D §5.4.2, Figure 5. The attenuator value includes the proper values for the equipment configuration requirement plus adjustments for the test equipment setup. Should the test equipment setup losses (e.g. cable length) vary, an adjustment to the attenuator value may be required to represent the required equipment configuration accurately.

Table 52: 7/800 MHz Attenuator Values to Evaluate Each Equipment Configuration

User Equipment Configuration	Attenuator Value
Mobile	None
Portable On Street Portable ½-wave Whip in swivel case with RSM Performance: -8.6 dBd	Mobile ¼-wave Whip Mag-mount Performance: -1 dBd Attenuator = (8.6 dBd) – (1 dBd) – Ant Cable Loss + Height Correction (1 dB per 20" above 40")
Portable In 20 dB Building Portable ½-wave Whip in swivel case with RSM Performance: -28.6 dBd	Mobile ¼-wave Whip Mag-mount Performance: -1 dBd Attenuator = (28.6 dBd) – (1 dBd) – Ant Cable Loss + Height Correction (1 dB per 20" above 40")

e. Required Number of Test Tiles in the Defined Test Area

The method used to test coverage is a statistical sampling of the defined test area to verify that the CPC is met or exceeded at the required reliability for each of the defined equipment configurations. It is impossible to verify every point within a defined test area, because there are infinite points; therefore, coverage reliability will be verified by sampling a statistically significant number of randomly selected locations, quasi-uniformly distributed throughout the defined test area.

Coverage acceptance testing will be performed in the defined test areas, 4 Regions and the Urban Area as defined in the RFP. To verify that the reliability requirement is met, the defined service area will be divided into uniformly sized test tiles. The number of test tiles indicated in Table 51 is an estimate of accessible tiles and is at least the minimum required by the Estimate of Proportions formula [TSB-88.3-D, §5.2.1, equation 2]. The outbound BER test and the DAQ test points will be combined to arrive at a total number of test points for each service area (4 Regions and the Urban Area).

Per TSB-88.3-D, the stated minimum outdoor tile size is 100 by 100 wavelengths; however, the minimum practical test tile size is typically about 400 by 400 meters (about 0.25 by 0.25 miles). The minimum practical tile size for any system is determined by the distance traveled at the speed of the test vehicle while sampling, GPS error margin and availability of road access within very small test tiles. A related consideration is the time, resources and cost involved in testing very large numbers

of very small tiles. For a given defined test area, all test tiles must be of equal size. The maximum test tile size is 2 by 2 km (1.24 by 1.24 miles) [TSB-88.3-D, §5.5.1]. In some wide-area systems, this constraint on maximum tile size may dictate a greater number of test tiles than the minimum number required by the Estimate of Proportions formula.

CONTRACTOR expects to test approximately 3000 tiles within the urban area and 16000 tiles in each Region.

No acceptance testing will be performed in locations outside the defined service areas. CONTRACTOR and the State of North Dakota may agree to perform "information only" tests in locations outside the defined test area; however, these "information only" test results will not be used for coverage acceptance. Any "information only" test locations must be defined before starting the test. If the added locations require significant additional time and resources to test, a change order will be required and CONTRACTOR may charge the State of North Dakota on a time-and-materials basis.

f. Accessibility to Test Tiles

Prior to testing, CONTRACTOR and the State of North Dakota will plan the route for the test vehicles through the defined test area, to ensure that at least the minimum required number of tiles is tested. While planning the route (if possible) or during the test, CONTRACTOR and the State of North Dakota will identify any test tiles that are inaccessible for the coverage test (due to lack of roads, restricted land, etc.). Inaccessible tiles will be eliminated from the acceptance test calculation. [TSB-88.3-D, §5.5.4]

If elimination of inaccessible test tiles results in less than a statistically significant number of test tiles or substantially alters the defined test area, CONTRACTOR reserves the right to adjust the committed reliability based on the reduced number of accessible test tiles within the altered test area and the Estimate of Proportions formula.

g. Random Selection of a Test Location in Each Tile

This CATP provides an objective method of randomly selecting and tracking test locations using CONTRACTOR'S Voyager℠ coverage testing tool. The method follows TIA TSB-88, "Performance Confirmation" and has direct correlation with CONTRACTOR'S coverage prediction methodology.

Using Voyager, the actual test location within each test tile will be randomly selected by the test vehicle crossing into the tile at an arbitrary point, with an arbitrary speed and direction. If the selected test location is in a shielded area such as a tunnel or underground parking garage, the data from that test location must be eliminated and a replacement test location must be used.

h. CPC Measurements in Each Tile

An Outbound BER measurement will be performed in each test tile. A series of sequential measurements (subsamples) will be made while the test vehicle is moving

at a typical speed for the surrounding environment. This test tile measurement, containing a number of subsamples, constitutes the test sample for this location. The test sample will establish the mean BER within the test tile. The BER subsamples will typically be measured for at least 1 second for BER. A mean of multiple BER subsamples are used rather than a single measurement to ensure that the measurement is not biased by taking a single sample that might be at a peak or null point on the radio wave.

In addition to the drive BER test, a Portable on street DAQ test will conducted in up to 100 test locations in each Region. In addition to the drive BER test for the urban area, up to 100 test measurements inside buildings will be conducted. For each DAQ test location, a voice test exchange will be initiated using a predetermined text typical of a common voice exchange between the fixed location and the test location. Both inbound and outbound will be tested. If a failure occurs inside a building, CONTRACTOR will measure the building penetration loss at the test point location. If the building loss exceeds 20db the test point will not be included in the Pass/Fail criteria.

i. Test Team Configuration

Each field and dispatch team will consist of at least one CONTRACTOR representative and two State of North Dakota representatives. In order to comfortably accommodate the test team members and all required testing equipment, CONTRACTOR will provide the required test vehicles. At the beginning of each test day, the individual test teams will be assigned a block of tiles to be tested for the day. The exact number of field and dispatch test teams required to meet the proposed project schedule will be mutually agreed to by the State and CONTRACTOR. Each test team will be expected to conduct coverage testing eight hours a day for up to several weeks, excluding weekends and holidays.

j. CATP Procedures

A coverage acceptance test will be performed using CONTRACTOR'S Voyager tool to randomly select test locations within a test tile.

Voyager consists of the following:

- A voice test radio connected to an antenna installed in a representative location on the test vehicle. The test radio will monitor transmissions from the fixed network radio site(s).
- A Global Positioning System (GPS) receiver, which will provide the computer with the location and speed of the test vehicle.
- A laptop computer with Voyager software and a mapping database, which includes highways and local streets and political boundaries.

The procedure for the objective BER coverage measurements will be as follows:

- The Voyager tool will be installed in a test vehicle, which will be driven over a route planned to cover the accessible tiles within the defined test area.
- During the coverage test, the laptop computer screen will display the vehicle's location on a map of the defined test area overlaid with the grid of test tiles.

Voyager will automatically initiate measurements when the GPS receiver indicates that a test tile has been entered. The computer will provide a visual indication that a measurement has been completed in a tile. Voyager will manage the data collection and will store the outbound measurements for each tested tile for later analysis.

- BER measurements will be collected and provided in the coverage test report.

If a BER test tile should fail, CONTRACTOR will perform a DAQ audio test at the same location. If the DAQ test passes, then the tile will be deemed a pass.

In addition to the outbound BER test, up to 100 DAQ test measurements within each service area will be conducted. The results of the DAQ test will be added to the BER test results for each service area to determine pass/fail criteria for the test. The procedure for the subjective DAQ test measurements will be as follows:

- A subjective listening test will be performed to verify talk-in and talk-out DAQ performance of the system.
- Talk-out and talk-in will both be required to pass for a test tile to pass
- It is very important that the personnel participating in the subjective DAQ test be familiar with the sound of radio conversations. Before subjectively testing, all personnel who will evaluate audio quality must be “calibrated” by listening to examples of audio that pass and fail the subjective DAQ test.
- A fixed dispatch location will be established. Prior to testing, the State and CONTRACTOR will agree upon a procedure to allow each audio transmission to be evaluated for approximately five seconds.
- The test participants will be divided into teams, each consisting of personnel from both the State and CONTRACTOR. Each team will have members that operate a portable radio in the field and members that are stationed at the fixed dispatch location.
- Test locations on street and inside buildings will be randomly selected. If the DAQ test is performed at the same time as the BER test, then the Voyager test kit may be used to log the talk-in and talk-out pass/fail result as well as any pertinent notes for the location.
- At each test tile location, each field test team member will listen to a talk-out audio transmission and will record his or her subjective pass/fail evaluation of the DAQ for the tile. Team members stationed at the dispatch location will evaluate talk-in audio quality of transmissions from the test radio(s) in that tile. Each team member will maintain a test log to record date, time and subjective pass/fail evaluation for each test tile location. Subjective pass/fail evaluation will be based on the DAQ descriptions in Table 50: DAQ Definitions. The determination of whether each test tile passes or fails the required DAQ value will be the majority vote of all team members’ pass/fail subjective evaluations for that tile. An odd number of team members is required to avoid ties for the pass/fail majority vote.
- Should any subjective DAQ test tile fail, a retry of the transmission will occur. Should the retry pass, the test tile will be considered a pass. If a retry should occur, it will be noted in the test log notes for that test tile for informational purposes.

k. CATP Documentation and Coverage Acceptance

During the coverage acceptance test, Voyager generates computer files that include the raw test data for BER. The collection of the raw data and the results from

processing it will be presented to the State of North Dakota for informational purposes only. A copy of this data will be provided to State of North Dakota at the conclusion of the coverage test. CONTRACTOR will process this data to produce a map detailing the coverage test results and to determine whether the coverage test was passed for each user equipment configuration.

The coverage acceptance criterion will be the voice radio system implemented by CONTRACTOR for the State of North Dakota meets or exceeds the Service Area Reliability stated in Table 51: SIRN Coverage Acceptance Test Summary for each user equipment configuration and service area as determined by the number of passing BER and DAQ test locations divided by the total number of test points (Service Area Reliability). The overall acceptance criteria for the CATP will be based on combining the results of the objective BER test with the results of the subjective DAQ test (Inbound and Outbound) to determine a combined overall reliability. The coverage acceptance criterion will be the successful passing of each of the user equipment configurations defined in Table 51: SIRN Coverage Acceptance Test Summary;

- Mobile (Regions)
- Portable on Street (Regions)
- Portable in 20dB buildings (Urban Area)

CONTRACTOR reserves the right to review any test tiles that fail. If a coverage test, or a portion thereof, is suspected by CONTRACTOR to have failed due to external interference, those tiles suspected of being affected by an interferer may be re-tested. If the test tiles re-tested are confirmed to have failed due to interference or external noise, those test tiles will be excluded from all acceptance calculations and CONTRACTOR will work with State of North Dakota to identify potential solutions to the interference issues.

CONTRACTOR will conduct this Coverage Acceptance Test only once. If any portion of the test is determined to be affected by proven equipment malfunctions or failures, CONTRACTOR will repeat the portion of the test affected by the equipment malfunction or failure. State of North Dakota will have the option to accept the coverage at any time prior to completion of the coverage test or documentation process.

CONTRACTOR will submit to State of North Dakota a report detailing the coverage test results. This report will include a document, which is to be signed by both State of North Dakota and CONTRACTOR, indicating the test was performed in accordance with this CATP and the results of the test indicate the acceptance or non-acceptance of the coverage portion of the system

EXHIBIT B-3A – Phase 3 Draft Schedule

Reference PDF file named 20190116 DRAFT ND Schedule Phase Three.

EXHIBIT B-3B – Phase 3 Payment Schedule

As Deliverable acceptance is given in conjunction with the Phase 3 Statement of Work, STATE will make payments to CONTRACTOR within thirty (30) days after the date of each invoice. STATE will make payments when due in the form of a check, cashier's check, or wire transfer drawn on a U.S. financial institution and in accordance with the following milestones.

Total Phase 3 Value ($64,770,750)	
Project Kickoff Complete – Deliverable 3-1	$1,013,046
Project Plan (Schedule Baselined) Complete – Deliverable 3-SCHED	$506,523
Project Plan Complete – Deliverable 3-2	$506,523
CDR Complete – Deliverable 3-CDR	$2,779,937
Frequency Coordination- Deliverable 3-FREQ	$646,562
Total CDR Milestone	$5,452,591
Less 15% Retainage	*$817,889*
Net CDR Milestone Payments	$4,634,702
Civil Works Complete by Site	
Civil Works Complete by site – Deliverable 3-CIVIL.69-162 (see breakdown by site on Exhibit D)	$22,914,880
Less 15% Retainage	*$3,437,232*
Net Civil Works Milestone Payments	$19,477,648
Delivery of Site Facility Equipment by Site	
Delivery of Equipment by site – Deliverable 3-DLVRCIV.69-162 (see breakdown by site on Exhibit D)	$13,485,110
Less 15% Retainage	*$2,022,767*
Net Site Delivery Milestone Payments	$11,462,344
Delivery of Antenna/Line Equipment by Site	
Delivery of Equipment by site – Deliverable 3-DLVRAL.69-162 (see breakdown by site on Exhibit D)	$3,872,743
Less 15% Retainage	*$580,911*
Net Antenna/Line Delivery Milestone Payments	$3,291,831
Delivery of RF Infrastructure Equipment (from Staging, as applicable)	
Delivery of Equipment – Deliverable 3-DLVRFNE.25,41,44,53 and 69-162	$22,838,013
Less Applicable Contract Incentives	*$10,623,764*
Total Equipment Delivery Milestone	$12,214,249
Less 15% Retainage	*$1,832,137*
Net RF Equipment Delivery Milestone Payments	$10,382,111
FNE Install Complete by Site	
Installation Complete – Deliverable 3-FNEINSTALL.25,41,44,53 and 69-162 (see breakdown by site on Exhibit D)	$5,051,158
Less 15% Retainage	*$757,674*
Net Installation Milestone Payments	$4,293,484
CATP Complete	
CATP Complete – Deliverable 3-CATP	$1,330,020

Less 15% Retainage	*$199,503*
Net CATP Milestone Payments	$1,130,517
Legacy Antenna Removal Complete by Site	
Antenna Removal Complete by site – Deliverable 3-ANTREM.24-68 (see breakdown by site on Exhibit D)	$450,000
Less 15% Retainage	*$67,500*
Net Antenna Removal Milestone Payments	$382,500
Final Acceptance by Site (Payment of Retainage)	
Final Acceptance by site – Deliverable 3-19.1-162 (see breakdown by site on Exhibit D)	$9,715,612

CONTRACTOR shall make partial shipments of equipment and will request payment upon delivery of such equipment as reflected on a per site basis within the referenced exhibit. In addition, CONTRACTOR shall invoice for installations completed on a site-by-site basis or when professional services are completed, when applicable, as per the referenced exhibit. For invoicing purposes only, contract incentives will be applied to payments as explicitly reflected within the Phase 3 payment milestones herein. Overdue invoices will bear simple interest at the maximum allowable rate by state law.

For Lifecycle Support Plan and Subscription Based Services
CONTRACTOR will invoice STATE annually in advance of each year of the plan.

EXHIBIT C – Warranty and Maintenance

The following sub-exhibits are included in this exhibit:

Exhibit C-1 – Phase 1-Console and Core Warranty / Optional Maintenance

Exhibit C-2 – Phase 2-RF Site Warranty / Optional Maintenance

Exhibit C-3 – Phase 3-RF Site Warranty / Optional Maintenance

Exhibit C-4 – Maintenance and System Upgrade Agreement Pricing

Exhibit C-1 – Phase 1-Console and Core Warranty / Optional Maintenance

1. INFRASTRUCTURE REPAIR OVERVIEW

CONTRACTOR provides a hardware repair service for all of the CONTRACTOR and select third-party infrastructure equipment supplied by CONTRACTOR. The CONTRACTOR authorized Repair Depot manages and performs the repair of CONTRACTOR supplied equipment as well as coordinating the equipment repair logistics process.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

2. DESCRIPTION OF SERVICES

Infrastructure components are repaired at a CONTRACTOR authorized Infrastructure Depot Operations (IDO). At CONTRACTOR's discretion, select third party Infrastructure may be sent to the original equipment manufacturer or third party vendor for repair.

3. SCOPE

Repair Authorizations are obtained by contacting the Solutions Support Center (SSC) which is available 24 hours a day, 7 days a week.

Repair authorizations can also be obtained online via Motorola Online at https://businessonline.motorolasolutions.com, under Repair Status/Submit Infrastructure RA.

b. Geographic Availability

Infrastructure repair is supported globally; geographic proximity will determine repair location.

c. Inclusions

Infrastructure repair is available on CONTRACTOR sold communication systems which may include some aspect of third party hardware and software. CONTRACTOR will make a "Commercially Reasonable Effort" to repair CONTRACTOR manufactured infrastructure products for seven years after product cancellation.

d. Exclusions

If infrastructure is no longer supported by CONTRACTOR, the original equipment manufacturer or a third party vendor, CONTRACTOR may return said equipment to the STATE without repair or replacement. The following items are excluded from Infrastructure Repair:

1) All CONTRACTOR infrastructure hardware over seven (7) years from product cancellation date.
2) All Third party infrastructure hardware over two (2) years from product cancellation date.
3) All Broadband infrastructure over three (3) years from product cancellation date
4) Physically damaged infrastructure.
5) Third party equipment not shipped by CONTRACTOR
6) Consumable items including, but not limited to, batteries, connectors, cables, toner/ink cartridges, tower lighting, laptop computers, monitors, keyboards and mouse.

7) Video retrieval from Digital In-Car Video equipment.
8) Infrastructure backhaul including but not limited to, Antennas, Antenna Dehydrator, Microwave[1], Line Boosters, Amplifier, Data Talker Wireless Transmitter, Short haul modems, UPS[1]
9) Test equipment.
10) Racks, furniture and cabinets.
11) Firmware and/or software upgrades.

1 Excluded from service agreements but may be repaired on an above contract, time and material basis. All UPS Systems must be shipped to IDO for repair. Note! Excludes batteries and on-site services

e. <u>CONTRACTOR has the following responsibilities:</u>

1) Enable STATE access to the CONTRACTOR call Center operational 24 hours a day, 7 days per week, to create requests for repair service.
2) Provide repair return authorization numbers when requested by STATE.
3) Receive malfunctioning infrastructure from STATE and document its arrival, repair and return.
4) Perform the following service on CONTRACTOR infrastructure:
    a) Perform an operational check on the infrastructure to determine the nature of the problem.
    b) Replace malfunctioning Field Replacement Units (FRU) or components.
    c) Verify that CONTRACTOR infrastructure is returned to CONTRACTOR manufactured specifications, as applicable.
    d) Perform a box unit test on all serviced infrastructure.
    e) Perform a system test on select infrastructure.
5) Provide the following service on select third party infrastructure:
    a) Perform pre-diagnostic and repair services to confirm infrastructure malfunction and eliminate sending infrastructure with no trouble found (NTF) to third party vendor for repair, when applicable.
    b) Ship malfunctioning infrastructure components to the original equipment manufacturer or third party vendor for repair service, when applicable.
    c) Track infrastructure sent to the original equipment manufacturer or third party vendor for service.
    d) Perform a post-test after repair by CONTRACTOR, original equipment manufacturer, or third party vendor to confirm malfunctioning infrastructure has been repaired and functions properly in a CONTRACTOR system configuration, when applicable.
    e) Re-program repaired infrastructure to original operating parameters based on software/firmware provided by STATE as required by section 1.6.7. If the STATE software version/configuration is not provided, shipping times will be delayed. If the Infrastructure repair depot determines that the malfunctioning infrastructure is due to a software defect, the repair depot reserves the right to reload infrastructure with a similar software version.

f) Properly package repaired infrastructure.

g) Ship repaired infrastructure to the STATE specified address during normal operating hours of Monday through Friday 7:00am to 7:00pm CST, excluding holidays. FRU will be sent two-day air unless otherwise requested. CONTRACTOR will pay for such shipping, unless STATE requests shipments outside of the above mentioned standard business hours and/or carrier programs, such as NFO (next flight out). In such cases, STATE will be responsible for payment of shipping and handling charges.

f. <u>The STATE has the following responsibilities:</u>

1) Contact or instruct Servicer to contact the CONTRACTOR System Support Center (SSC) and request a return authorization number prior to shipping malfunctioning infrastructure.

2) Provide model description, model number and serial number, type of system, software and firmware version, symptom of problem and address of site location for FRU or infrastructure.

3) Indicate if infrastructure or third party infrastructure being sent in for service was subjected to physical damage or lightning damage.

4) Follow CONTRACTOR instructions regarding inclusion or removal of firmware and software applications from infrastructure being sent in for service.

5) Provide STATE purchase order number to secure payment for any costs described herein.

6) Properly package and ship the malfunctioning FRU, at STATE'S expense. STATE is responsible for properly packaging the malfunctioning infrastructure FRU to ensure that the shipped infrastructure arrives un-damaged and in repairable condition.

7) Clearly print the return authorization number on the outside of the packaging.

8) Maintain versions and configurations for software/applications and firmware to install repaired equipment.

9) Provide CONTRACTOR with proper software/firmware information to reprogram equipment after repair unless current software has caused this malfunction.

10) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the infrastructure repair services to STATE.

4. STATEMENT OF WORK OPTION: ASTRO 25 CUSTOM SYSTEM UPGRADE AGREEMENT(C-SUA)

a. <u>Description of Service and Obligations</u>

1) As system releases become available, CONTRACTOR agrees to provide the STATE with the software, hardware and implementation services required to execute up to one system infrastructure upgrade in the one-year warranty period and if purchased for the optional service years starting in year six, up to one system infrastructure upgrade in a four-year period. At the time of the system release upgrade, CONTRACTOR will provide applicable patches and service pack updates when and if available. Currently, CONTRACTOR's service includes 3rd party software such as Microsoft Windows and Server Operating Systems (OS), Red Hat Linux, Sun Solaris and any CONTRACTOR software service packs that may be available.

CONTRACTOR will only provide patch releases that have been analyzed, pre-tested, and certified in a dedicated ASTRO 25 test lab to ensure that they are compatible and do not interfere with the ASTRO 25 network functionality.

2) ASTRO 25 system releases are intended to improve the system functionality and operation from previous releases and may include some minor feature enhancements. At CONTRACTOR's option, system releases may also include significant new feature enhancements that CONTRACTOR may offer for purchase. System release software and hardware shall be pre-tested and certified in CONTRACTOR's Systems Integration Test lab.

3) The price quoted for the C-SUA requires the STATE to choose from a list of certified system upgrade paths provided by CONTRACTOR at the time of upgrade planning. Should the STATE elect a different upgrade path from those provided, the STATE agrees that additional costs may be incurred to complete the implementation of the certified system upgrade. In this case, CONTRACTOR agrees to provide a price quotation for any additional materials and services necessary.

4) ASTRO 25 C-SUA entitles a STATE to past software versions for the purpose of downgrading product software to a compatible release version.

5) The following ASTRO 25 certified system release software for the following products are covered under this ASTRO 25 C-SUA: base stations, site controllers, comparators, routers, LAN switches, servers, dispatch consoles, logging equipment, network management terminals, Network Fault Management ("NFM") products, network security devices such as firewalls and intrusion detection sensors and associated peripheral infrastructure software.

6) Product programming software such as Radio Service Software ("RSS"), Configuration Service Software ("CSS"), and Customer Programming Software ("CPS") are also covered under this C- SUA.

7) ASTRO 25 C-SUA makes available the subscriber radio software releases that are shipping from the factory during the C-SUA coverage period. New subscriber radio options and features not previously purchased by the STATE are excluded from ASTRO 25 C-SUA coverage.

   Additionally, subscriber software installation and reprogramming are excluded from the ASTRO 25 C-SUA coverage.

8) CONTRACTOR will provide certified hardware version updates and/or replacements necessary to upgrade the system with an equivalent level of functionality up to once in a four-year period. Hardware will be upgraded and/or replaced if required to maintain the existing feature and functionality. Any updates to hardware versions and/or replacement hardware required to support new features or those not specifically required to maintain existing functionality are not included. Unless otherwise stated, platform migrations such as, but not limited to, stations, consoles, backhaul, civil, network changes and additions, and managed services are not included.

9) The following hardware components, if originally provided by CONTRACTOR, are eligible for full product replacement when necessary per the system release upgrade:

   a) Servers

   b) PC Workstations

c) Routers

d) LAN Switches

10) The following hardware components, if originally provided by CONTRACTOR, are eligible for board- level replacement when necessary per the system release upgrade. A “board-level replacement” is defined as any Field Replaceable Unit (“FRU”) for the products listed below:

a) GTR 8000 Base Stations

b) GCP 8000 Site Controllers

c) GCM 8000 Comparators

d) MCC 7500 Console Operator Positions

e) PBX Switches for Telephone Interconnect

f) NFM/NFM XC/MOSCAD RTU

11) The ASTRO 25 SUA does not cover all products. Refer to section 3.0 for exclusions and limitations.

12) CONTRACTOR will provide implementation services necessary to upgrade the system to a future system release with an equivalent level of functionality up to once in a four-year period. Any implementation services that are not directly required to support the certified system upgrade are not included. Unless otherwise stated, implementation services necessary for system expansions, platform migrations, and/or new features or functionality that are implemented concurrent with the certified system upgrade are not included.

13) As system releases become available, CONTRACTOR will provide up to once in a four-year period the following software design and technical resources necessary to complete system release upgrades:

a) Review infrastructure system audit data as needed.

b) Identify additional system equipment needed to implement a system release, if applicable.

c) Complete a proposal defining the system release, equipment requirements, installation plan, and impact to system users.

d) Advise STATE of probable impact to system users during the actual field upgrade implementation.

e) Program management support required to perform the certified system upgrade.

f) Field installation labor required to perform the certified system upgrade.

g) Upgrade operations engineering labor required to perform the certified system upgrade.

14) ASTRO 25 C-SUA pricing is based on the system configuration at the time of the original purchase. This configuration is to be reviewed annually from the contract effective date. Any change in system configuration may require an ASTRO 25 C-SUA price adjustment.

15) The ASTRO 25 C-SUA applies only to system release upgrades within the ASTRO 25 7.x platform.

16) CONTRACTOR will issue Software Maintenance Agreement ("SMA") bulletins on a periodic basis and post them in soft copy on a designated extranet site for STATE access. Standard and optional features for a given ASTRO 25 system release are listed in the SMA bulletin.

5. UPGRADE ELEMENTS AND CORRESPONDING PARTY RESPONSIBILITIES

Upgrade Planning and Preparation: All items listed in this section are to be completed at least 6 months prior to a scheduled upgrade.

a. CONTRACTOR Responsibilities:

1) Obtain and review infrastructure system audit data as needed.
2) Identify additional system equipment needed to implement a system release, if applicable.
3) Complete a proposal defining the system release, equipment requirements, installation plan, and impact to system users.
4) Advise STATE of probable impact to system users during the actual field upgrade implementation.
5) Inform STATE of high speed internet connection requirements.
6) Assign program management support required to perform the certified system upgrade.
7) Assign field installation labor required to perform the certified system upgrade.
8) Assign upgrade operations engineering labor required to perform the certified system upgrade.
9) Deliver release impact and change management training to the primary zone core owners, outlining the changes to their system as a result of the upgrade path elected. This training needs to be completed at least 12 weeks prior to the scheduled upgrade. This training will not be provided separately for user agencies who reside on a zone core owned by another entity. Unless specifically stated in this document, CONTRACTOR will provide this training only once per system.

b. STATE Responsibilities:

1) Contact CONTRACTOR to schedule and engage the appropriate CONTRACTOR resources for a system release upgrade.
2) Provide high-speed internet connectivity at the zone core site(s) for use by CONTRACTOR to perform remote upgrades and diagnostics. High-speed internet connectivity must be provided at least 12 weeks prior to the scheduled upgrade. In the event access to a high-speed connection is unavailable, STATE may be billed additional costs to execute the system release upgrade.
3) Assist in site walks of the system during the system audit when necessary.
4) Provide a list of any FRUs and/or spare hardware to be included in the system release upgrade when applicable.
5) Purchase any additional software and hardware necessary to implement optional system release features or system expansions.

6) Provide or purchase labor to implement optional system release features or system expansions.

7) Participate in release impact training at least 12 weeks prior to the scheduled upgrade. This applies only to primary zone core owners. It is the zone core owner's responsibility to contact and include any user agencies that need to be trained or to act as a training agency for those users not included.

6. SYSTEM READINESS CHECKPOINT

All items listed in this section must be completed at least 30 days prior to a scheduled upgrade.

a. CONTRACTOR Responsibilities:

1) Perform appropriate system backups.

2) Work with the STATE to validate that all system maintenance is current.

3) Work with the STATE to validate that all available patches and antivirus updates have been updated on the STATE'S system.

b. STATE Responsibilities:

1) Validate system maintenance is current.

2) Validate that all available patches and antivirus updates to their system have been completed.

7. SYSTEM UPGRADE

a. CONTRACTOR Responsibilities:

1) Perform system infrastructure upgrade in accordance with the system elements outlined in this SOW.

b. STATE Responsibilities

1) Inform system users of software upgrade plans and scheduled system downtime.

2) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide software upgrade services.

8. UPGRADE COMPLETION

a. CONTRACTOR Responsibilities:

1) Validate all certified system upgrade deliverables are complete as contractually required.

2) Deliver post upgrade implementation training to the STATE as needed, up to once per system.

3) Obtain upgrade completion sign off from the STATE.

b. STATE Responsibilities:

1) Cooperate with CONTRACTOR in efforts to complete any post upgrade punch list items as needed.

2) Cooperate with CONTRACTOR to provide relevant post upgrade implementation training as needed. This applies only to primary zone core owners. It is the zone core

owner's responsibility to contact and include any user agencies that need to be trained or to act as a training agency for those users not included.

3) Provide CONTRACTOR with upgrade completion sign off.

9. EXCLUSIONS AND LIMITATIONS

a. The parties agree that Systems that have non-standard configurations that have not been certified by CONTRACTOR Systems Integration Testing are specifically excluded from the ASTRO 25 C-SUA unless otherwise agreed in writing by CONTRACTOR and included in this SOW.

b. The parties acknowledge and agree that the ASTRO 25 C-SUA does not cover the following products:

1) MCC5500 Dispatch Consoles

2) MIP5000 Dispatch Consoles

3) Plant/E911 Systems

4) MOTOBRIDGE Solutions

5) CONTRACTOR Public Sector Applications Software ("PSA")

6) Custom SW, CAD, Records Management Software

7) Data Radio Devices

8) Mobile computing devices such as Laptops

9) Non-CONTRACTOR two-way radio subscriber products

10) Genesis Products

11) Point-to-point products such as microwave terminals and association multiplex equipment

c. ASTRO 25 C-SUA does not cover any hardware or software supplied to the STATE when purchased directly from a third party, unless specifically included in this SOW.

d. ASTRO 25 C-SUA does not cover software support for virus attacks or other applications that are not part of the ASTRO 25 system, or unauthorized modifications or other misuse of the covered software. CONTRACTOR is not responsible for management of anti-virus or other security applications (such as Norton).

e. Upgrades for equipment add-ons or expansions during the term of this ASTRO 25 C-SUA are not included in the coverage of this SOW unless otherwise agreed to in writing by CONTRACTOR.

10. SPECIAL PROVISIONS

a. STATE acknowledges that if its System has a Special Product Feature, additional engineering may be required to prevent an installed system release from overwriting the Special Product Feature. Upon request, CONTRACTOR will determine whether a Special Product Feature can be incorporated into a system release and whether additional engineering effort is required. If additional engineering is required CONTRACTOR will issue a change order for the change in scope and associated increase in the price for the ASTRO 25 C-SUA.

b. STATE will only use the software (including any System Releases) in accordance with the applicable Software License Agreement.

c. ASTRO 25 C-SUA services do not include repair or replacement of hardware or software that is necessary due to defects that are not corrected by the system release, nor does it include repair or replacement of defects resulting from any nonstandard, improper use or conditions; or from unauthorized installation of software.

d. ASTRO 25 C-SUA coverage and the parties' responsibilities described in this Statement of Work will automatically terminate if CONTRACTOR no longer supports the ASTRO 25 7.x software version in the STATE'S system or discontinues the ASTRO 25 C-SUA program; in either case, CONTRACTOR will refund to STATE any prepaid fees for ASTRO 25 C-SUA services applicable to the terminated period.

e. If STATE cancels a scheduled upgrade within less than 12 weeks of the scheduled on site date, CONTRACTOR reserves the right to charge the STATE a cancellation fee equivalent to the cost of the pre-planning efforts completed by the CONTRACTOR Upgrade Operations Team.

f. The SUA annualized price is based on the fulfillment of the four-year term. If STATE terminates, except if CONTRACTOR is the defaulting party, STATE will be required to pay for the balance of payments owed if a system release upgrade has been taken prior to the point of termination.

Appendix A – ASTRO 25 System Release Upgrade Paths

Platform Release	Certified Upgrade Paths	
Pre-7.7	**Upgrade to Current Release**	
7.7		
7.8		
7.9		
7.11	NA	7.14
7.13	7.14	7.15
7.14	7.15	7.16
7.15	7.16	7.17
7.16	7.17	7.18 (Planned)
7.17	7.18 (Planned)	7.19 (Planned)

The information contained herein is provided for information purposes only and is intended only to outline CONTRACTOR's presently anticipated general technology direction. The information in the roadmap is not a commitment or an obligation to deliver any product, product feature or software functionality and CONTRACTOR reserves the right to make changes to the content and timing of any product, product feature or software release.

The most current system release upgrade paths can be found in the most recent SMA bulletin.

Appendix B - System Pricing Configuration

This configuration is to be reviewed annually from the contract effective date. Any change in system configuration may require an ASTRO 25 SUA price adjustment.

Core	
Master Site Configuration	0
Zones in Operation (Including DSR and Dark Master Sites)	0
Zone Features: IV&D, TDMA, Telephone Interconnect, CNI, HPD, CSMS, IA, POP25, Text Messaging, Outdoor Location, ISSI 8000, InfoVista, KMF/OTAR	0
RF System	
Voice RF Sites & RF Simulcast Sites (including Prime Sites)	0
Repeaters/Stations (FDMA)	0
Repeaters/Stations (TDMA)	0
HPD RF Sites	0
HPD Stations	0
Dispatch Console System	
Dispatch Sites	0
Gold Elite Operator Positions	0
MCC 7500 Operator Positions (GPIOM)	0
MCC 7500 Operator Positions (VPM)	0
Conventional Channel Gateways (CCGW)	0
Conventional Site Controllers (GCP 8000 Controller)	0
Logging System	
Number of AIS Servers	0
Number of Voice Logging Recorder	0
Number of Logging Replay Clients	0
Network Management and MOSCAD NFM	
Network Management Clients	0
MOSCAD NFM Systems	0
MOSCAD NFM RTUs	0
MOSCAD NFM Clients	0
Fire Station Alerting (FSA)	
FSA Systems	0
FSA RTUs	0
FSA Clients	0
Fire Station Alerting (FSA)	
Voice Subscribers non-APX	0
Voice Subscribers APX	0
HPD Subscribers	0
Computing and Networking Hardware (for SUA / SUA, actual replacement qty may be less than shown)	
Workstations - High Performance	0
Workstations - Mid Performance	0
Servers - High Performance	0
Servers - Mid Performance	0
LAN Switch - High Performance	0
LAN Switch - Mid Performance	0
Routers	0

NETWORK MONITORING OVERVIEW

CONTRACTOR's Network Monitoring Operations (NMO) within the CONTRACTOR Solutions Support Center (SSC) provides real-time fault monitoring for radio communications networks on a continuous basis. NMO utilizes sophisticated tools for remote monitoring and event characterization of your communications networks. When an event is detected, NMO technologists acknowledge and assess the situation, and initiate a defined response.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

1. DESCRIPTION OF NETWORK MONITORING SERVICES

Network Monitoring is a service designed to electronically monitor elements of a communication system for events, as set forth in the Monitored Elements Table. When the SSC detects an event, (based on the severity of the event) trained technologists acknowledge and remotely diagnose the event and initiate an appropriate response in accordance with the STATE handling procedure. Appropriate responses could include, but are not limited to, continuing to monitor the event for further development, attempting remote remediation via engagement of Technical Support resources, or initiating dispatch[1] of a Field Servicer for onsite remediation.

c. Availability

Network Monitoring service is available 24 hours a day, 7 days a week. Network Monitoring availability is based on the level of contracted service and defined in the Customer Support Plan (CSP).

d. Geographic Availability

Network Monitoring is a globally provided service unless limited by data export control regulations. Timeframes are based on the STATE'S local time zone.

e. Inclusions

Network monitoring service can be delivered on CONTRACTOR sold infrastructure as stated in Monitored Elements Table.

f. Limitations and Exclusions

1) Does not include monitoring of anything outside of the radio network or monitoring of infrastructure provided by a third party, unless specifically stated. Monitored elements must be within the radio network and capable of sending traps to the Unified Event Manager (UEM).

2) Additional support charges above and beyond the contracted service agreements may apply if it is determined that system faults were caused by the STATE making changes to critical system parameters.

3) The following activities are outside the scope of the Network Monitoring service, but are optional services that are available to remote Network Monitoring STATE at an additional cost:

   a) Emergency on-site visits required to resolve technical issues that cannot be resolved by with SSC working remotely with the local STATE technical resource.

   b) System installations, upgrades, and expansions.

   c) STATE training.

d) Hardware repair and/or exchange.

e) Network security services.

f) Network transport.

g) Information Assurance.

h) Any services not expressly included in this statement of work.

4) Reference the event catalogue to confirm monitored equipment.

5) Dispatch service with OnSite Response is a separate service that is required with Network Monitoring.

g. <u>CONTRACTOR has the following responsibilities:</u>

1) Provide dedicated connectivity through a network connection necessary for monitoring communication networks. The Connectivity Matrix further describes the connectivity options.

2) If determined necessary by CONTRACTOR, provide CONTRACTOR owned equipment for monitoring system elements. If CONTRACTOR installs or replaces CONTRACTOR owned equipment, the type of equipment and location installed is listed in the CONTRACTOR Owned & Supplied Equipment Table.

3) Verify connectivity and event monitoring prior to system acceptance or start date.

4) Monitor system continuously during hours designated in the CSP in accordance with the pre-defined times specified in Section 8 below.

5) Remotely access the STATE'S system to perform remote diagnosis as permitted by STATE pursuant to Section 8.

6) Create a case, as necessary. Gather information to perform the following:

a) Characterize the issue

b) Determine a plan of action

c) Assign and track the case to resolution.

7) Cooperate with STATE to coordinate transition of monitoring responsibilities between CONTRACTOR and STATE as specified in Section 8.

8) Maintain communication with the STATE in the field as needed until resolution of the case

h. <u>The STATE has the following responsibilities:</u>

1) Allow CONTRACTOR continuous remote access to enable the monitoring service.

2) Provide continuous utility service to any CONTRACTOR equipment installed or utilized at STATE'S premises to support delivery of the service.

3) Provide CONTRACTOR with pre-defined STATE information and preferences prior to Start Date necessary to complete the CSP, including, but not limited to:

a) Case notification preferences and procedure

b) Repair Verification Preference and procedure

c) Database and escalation procedure forms.

d) Submit changes in any information supplied to CONTRACTOR and included in the CSP to the CSM

4) Provide the following information when initiating a service request:
   a) Assigned system ID number
   b) Problem description and site location
   c) Other pertinent information requested by CONTRACTOR to open a Case.
5) Notify the SSC when STATE performs any activity that impacts the system. (Activity that impacts the system may include, but is not limited to, installing software or hardware upgrades, performing upgrades to the network, or taking down part of the system to perform maintenance.)
6) Allow Servicers access to equipment (including any connectivity or monitoring equipment) if remote service is not possible.
7) Allow Servicers access to remove CONTRACTOR owned monitoring equipment upon cancellation of service.
8) Provide all STATE managed passwords required to access the STATE'S system to CONTRACTOR upon request or when opening a case to request service support or enable response to a technical issue.
9) Pay additional support charges above and beyond the contracted service agreements that may apply if it is determined that system faults were caused by the STATE making changes to critical system parameters
10) Obtain all third party consents or licenses required to enable CONTRACTOR to provide the monitoring service.
11) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the services described in this SOW.
12) Contact CONTRACTOR to coordinate transition of monitoring when monitoring responsibility is to be transferred to or from CONTRACTOR. (I.e. normal business hours to after-hours monitoring) as set forth in pre-defined information provided by STATE CSP.
    a) Upon contact, STATE must provide name, site id, status on any open cases, severity level, and brief description of case and action plan to CONTRACTOR.
13) Acknowledge that cases will be handled in accordance with the times and priorities as defined in the Event Definition table- Appendix A .
14) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the Network Monitoring service.

The event types are based on the defined levels as follows:

Appendix A Engagement Matrix

Severity Level	Severity Definition	Engagement Times
1	This is defined as a critical/major incident that causes the system and/or infrastructure to experience a loss of call processing functionality and no work-around or immediate solution is available. The following are examples of this kind of failure: o 33% of call processing resources impaired o Remote Site/sub-system severed o Site Environment alarms: o Smoke o Unauthorized access o Temperature o Power failure	Response provided 24 hours, 7 days a week, including US Holidays.
2	This is defined as a moderate/minor incident that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of failure: o Less than 33% of call processing resources impaired o Failure of a single redundant component	Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

3	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: o Faults that have no impact in how the user perceives the system to work o Intermittent issues o Requests for information o Preventive Maintenance or upgrade related work	Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

CONTRACTOR'S failure to meet the above defined Response Times or Resolution Times in any given month during the term and any renewal term shall be deemed a service level default ("Service Level Default") and STATE may obtain the non-exclusive remedies set forth below.

Response and Resolution Service Levels (calculated monthly on a per incident basis)	Service Level Credit (Prorated Fees – Monthly)
Meets Response or Resolution Time	0%
1st Failure to meet Response or Resolution Time	Warning, 0%
2nd Failure to meet Response or Resolution Time	10%
3rd Failure to meet Response or Resolution Time	20%

In the event STATE is eligible for a 20% Service Level Credit under this section for any two (2) consecutive months of the term, STATE may terminate this Contract without penalty upon written notice to CONTRACTOR.

Credits shall be applied against the next invoice. In the event a Service Level Default occurs after a party has given notice of termination, or STATE has made final payment to CONTRACTOR for the software support services and no further invoices shall issue as a result, CONTRACTOR shall refund to STATE the amount of the appropriate Service Level Credit due for the period of default.

Notwithstanding the foregoing, a Service Level Default will not have occurred nor will CONTRACTOR provide Service Level Credits in the event CONTRACTOR, is unable to meet the above Response or Resolution Times due to forces outside of its control, including a Force Majeure or any action by a third party, including the STATE, that renders CONTRACTOR unable to comply with the above service level requirements.

2. CONNECTIVITY MATRIX

Request connectivity 8 weeks in advance of service start date

System Type	Connectivity	Set up and Maintenance
ASTRO® 25	Internet VPN	CONTRACTOR
ASTRO® 25	T1	CONTRACTOR

3. CONTRACTOR OWNED & SUPPLIED EQUIPMENT TABLE

Equipment Type	Location Installed
Firewall/Router	Master Site
Service Delivery Management Server	Master Site for each Zone

4. MONITORED ELEMENTS TABLE

Master Site Infrastructure	RF Site Equipment	Dispatch Site Equipment
Servers & Back up Servers	Channels	Consoles
MOSCAD (digital inputs & RS232 serial alarms)	MOSCAD (digital inputs & RS232 serial alarms)	AIS Servers
TRAK	RF Site Communication Path	Operator Position (OP)
Core LAN Switch	Switch	CONTRACTOR Gold Elite Gateway (MGEG)
Packet Data Gateway (PDG)	Site Controller	Call Processor
Radio Network Gateway (RNG)	Router	Logging Replay Station (only within the RNI)
Zone Database Server (ZDS)	Site	Ambassador (AMB)
Gateway Router	Gateway Router	Client Station
Controller – Zone & Domain	Network Time Protocol (NTP)	Voice Processing Module (VPM)
Firewall Manager Servers	Firewall	MCC 7500 IP Logging Recorders
Air Traffic Router (ATR)	SmartX Site Converter (only the converter, not the legacy sites)	MCC 7100 (only within the RNI)
Unified Event Manager (UEM)		
Zone Statistical Server (ZSS)		
Install Server		

**Some or all of the above equipment may be monitored depending on system configuration and need. Other equipment (not listed) may be monitored as an option, consult with your Customer Support Manager for details.*

5. ONSITE INFRASTRUCTURE RESPONSE AND DISPATCH SERVICE OVERVIEW

CONTRACTOR's OnSite Infrastructure Response & Dispatch service provides case management and escalation for onsite technical service requests. The service is delivered by the CONTRACTOR's Solutions Support Center (SSC) in conjunction with a local service provider. The SSC is responsible for opening a case for onsite support and monitoring the status of that case to ensure strict compliance to committed response times.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

6. DESCRIPTION OF SERVICES

The CONTRACTOR SSC will receive STATE request for OnSite service provider and dispatch a servicer. The servicer will respond to the STATE location based on pre-defined Severity Levels set forth in Section 4.0 - Severity Level Definitions able and Response times set forth in Section 5.0 – Severity Level Response Time Commitments table in order to restore the system.

CONTRACTOR will provide case management as set forth herein. The SSC will maintain contact with the on-site CONTRACTOR Service Shop until system restoral and case closure. The SSC will continuously track and manage cases from creation to close through an automated case tracking process.

7. SCOPE

OnSite Infrastructure Response & Dispatch service is available 24 hours a day, 7 days a week in accordance with Severity Level Definitions and Severity Level Response Time Commitments listed in sections 4.0 and 5.0 of this document.

a. Geographic Availability

OnSite Infrastructure Response and Dispatch is available to customers worldwide where CONTRACTOR servicers are present. Response times are based on the customer's local time zone.

b. Inclusions

Onsite Infrastructure Response and Dispatch Service can be delivered on CONTRACTOR-sold infrastructure.

c. CONTRACTOR has the following responsibilities:

1) Receive service requests.
2) Create a case as necessary when service requests are received. Gather information to perform the following:
    a) Characterize the issue.
    b) Determine a plan of action.
    c) Assign and track the case to resolution.
3) Dispatch a servicer as required by CONTRACTOR standard procedures and provide necessary case information collected.
4) Ensure the required personnel have access to STATE information as needed.
5) Servicer will perform the following on-site:
    a) Run diagnostics on the Infrastructure or Field Replacement Units (FRU).
    b) Replace defective Infrastructure or FRU, as supplied by STATE[1].
    c) Provide materials, tools, documentation, physical planning manuals, diagnostic/test equipment and any other requirements necessary to perform the maintenance service.

d) If a third party vendor is needed to restore the system, the Servicer may accompany that vendor onto the STATE'S premises.

6) Verify with STATE that restoration is complete or system is functional, if required by STATE'S repair verification in the Customer Support Plan required by section 3.2. If verification by STATE cannot be completed within 20 minutes of restoration, the case will be closed and the Servicer will be released.

7) Escalate the case to the appropriate party upon expiration of a response time.

8) Close the case upon receiving notification from STATE or servicer, indicating the case is resolved.

9) Notify STATE of case status as defined by the Customer Support Plan:

   a) Open and closed; or

   b) Open, assigned to the servicer, arrival of the servicer on-site, deferred or delayed, closed.

10) Provide Case activity reports to STATE if requested.

d. <u>STATE has the following responsibilities:</u>

1) Contact CONTRACTOR, as necessary, to request service.

2) Provide CONTRACTOR with the following pre-defined STATE information and preferences prior to start date necessary to complete Customer Support Plan (CSP):

   a) Case notification preferences and procedure.

   b) Repair verification preference and procedure.

   c) Database and escalation procedure forms.

   d) Submit changes in any information supplied in the CSP to the Customer Support Manager (CSM).

3) Provide the following information when initiating a service request:

   a) Assigned system ID number.

   b) Problem description and site location.

   c) Other pertinent information requested by CONTRACTOR to open a case.

4) Allow Servicers access to equipment.

5) Supply infrastructure or FRU, as applicable, in order for CONTRACTOR to restore the system as set forth in Section 17.

6) Maintain and store in an easily accessible location any and all software needed to restore the system.

7) Maintain and store in an easily accessible location proper system backups.

8) For E911 systems, test the secondary/backup Public Safety Answering Point (PSAP) connection to be prepared in the event of a catastrophic failure of a system. Train appropriate personnel on the procedures to perform the function of switching to the backup PSAP.

9) Verify with the SSC that restoration is complete or system is functional, if required by repair verification preference provided by STATE in accordance with Section 19.

10) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide these services.

1.Infrastructure Repair with Advanced Replacement (IRAR) is a service offering that provides repair and replacement of infrastructure equipment. IRAR enhances Onsite and Dispatch Service by enabling a faster response and repair times.

8. 4.0 SEVERITY LEVEL DEFINITIONS

The following severity level definitions will be used to determine the maximum response times:

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of severity: □ 33% of call processing resources impaired □ Site Environment alarms: o Smoke o Unauthorized access o Temperature o Power failure
Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of severity: □ Less than 33% of call processing resources impaired □ Failure of a single redundant component
Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: □ Intermittent faults that are infrequent and minor impact to core services □ Statistical reporting problems
Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: □ Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. □ Faults that have no impact in how the user perceives the system to work. □ Cosmetic issues. □ Requests for information. □ Preventive Maintenance

9. SEVERITY LEVEL RESPONSE TIME COMMITMENTS

(STATE'S Response Time Classification is designated in the Customer Support Plan.)

Severity Level	Standard Response Time	Resolution Time
Severity 1*	Within 4 hours from receipt of notification continuously	8 hours (1 business day)
Severity 2	Within 4 hours from receipt of notification Standard Business Day	8 hours (1 business day)
Severity 3	Within 8 hours from receipt of notification Standard Business Day	40 hours (1 business week)
Severity 4	Within 12 hours from receipt of notification Standard Business Day	40 hours (1 business week)

* Severity Level 1 & 2: Based on field replacement unit (FRU) availability, otherwise next business day. Additional FRU can be purchased locally in addition to those provided in the project and part of maintenance.

SECURITY UPDATE SERVICE OVERVIEW

To verify compatibility with your ASTRO system, CONTRACTOR's Security Update Service (SUS) provides pre-tested 3rd party software (SW) security updates.

This service was formerly called Pre-tested Software Subscription (PTSS). Additionally, SUS Platinum has been eliminated. The additional SUS Platinum features have been merged into this one SUS offering.

This Statement of Work ("SOW") is subject to the terms and conditions of CONTRACTOR's Professional Services Agreement, Service Agreement or other applicable agreement in effect between the parties ("Agreement"). CONTRACTOR and STATE may be referred to herein individually as a "Party or together as "Parties."

1. DESCRIPTION OF SECURITY UPDATE SERVICES

CONTRACTOR shall maintain a dedicated vetting lab for each supported ASTRO release for the purpose of pre-testing security updates. In some cases, when appropriate, CONTRACTOR will make the updates available to outside vendors, allow them to test, and then incorporate those results into this offering. Depending on the specific ASTRO release and STATE options, these may include updates to antivirus definitions, OEM vendor supported Windows Workstation and Server, Solaris and RedHat Linux (RHEL) operating system patches, VMware ESXi Hypervisor patches, Oracle database patches, PostgreSQL patches, and patches for other 3rd party Windows applications such as Adobe Acrobat and Flash.

CONTRACTOR has no control over the schedule of releases. The schedule for the releases of updates is determined by the Original Equipment Manufacturers (OEMs), without consultation with CONTRACTOR. Antivirus definitions are released every week. Microsoft patches are released on a monthly basis. CONTRACTOR obtains and tests these updates as they are released. Other products have different schedules or are released "as-required." CONTRACTOR will obtain and test these updates on a quarterly basis.

SUS (Self- Installed) is the baseline offer. Sections describing the optional delivery methods and reboot support service are only applicable if purchased.

SUS Delivery Methods

Patch Delivery Method	Download Responsibility	Installation Responsibility	Reboot Support
SUS (Self-Installed)	STATE	STATE	*Option
Remote SUS			*Option
On-Site Delivery of SUS			Included

Packages for L & M Cores

Packages	SUS (Self Installed)	RSUS	On-Site Delivery of SUS	Reboot Support
Essential / +	✓			Optional
Advanced / +	✓	✓	Optional	Optional
Premier	✓	✓	Optional	Included

SUS - Included in Warranty Year 1 and Optionally in Years 2-5

Once tested, CONTRACTOR will post the updates to a secured extranet website and send an email notification to the STATE. If there are any recommended configuration changes, warnings, or workarounds, CONTRACTOR will provide detailed documentation along with the updates on the website. The STATE will be responsible for the download and deployment of these updates to their ASTRO System.

Remote Delivery of SUS (RSUS) - Included in Warranty Year 1

Remote Delivery of SUS. CONTRACTOR's dedicated staff remotely installs the required security updates and operating system patches onto your radio network. Vulnerabilities from third party software are addressed as soon as the validation of recommended patches is completed. CONTRACTOR will also provide reports outlining updates made for your team's review and awareness. Patch transfers are transparent to the end user. After the patches are transferred, a report is sent out to inform our customers which machines they will need to reboot the appropriate devices to enable the new patches and antivirus definitions.

Reboot Support Delivery of SUS/RSUS - Optional

This optional enhancement provides support for rebooting impacted servers and workstations after the patches have been downloaded/pushed and installed. Once installation is complete, CONTRACTOR will deploy trained technicians to reboot servers and workstations at the STATE locations.

ON-SITE Delivery of SUS - Optional

For convenience, a trained technician will be contacted to provide the complete patching service. At the STATE location, the technician will download patches, perform the required installation services and coordinate the rebooting of servers and dispatch ops.

2. SCOPE

Security Update Service supports the currently shipping CONTRACTOR ASTRO System Release (SR) and strives to support 4 releases prior. CONTRACTOR reserves the right to adjust which releases are supported as business conditions dictate. Contact your Customer Service Manager for the latest supported releases.

SUS is available for any L or M core system in a supported release.

Systems that have non-standard configurations that have not been certified by CONTRACTOR Systems Integration and Testing (SIT) are specifically excluded from this Service unless otherwise agreed in writing by CONTRACTOR. Service does not include pre-tested intrusion detection system (IDS) updates for IDS solutions. Certain consoles, MOTOBRIDGE, MARVLIS, Symbol Equipment, AirDefense Equipment, AVL, and Radio Site Security products are also excluded. CONTRACTOR will determine, in its sole discretion, the third party software that is supported as a part of this offering.

Antivirus updates - Antivirus updates are released weekly. The target release for these updates is by close of business each Tuesday. While the release often occurs early, this is the time and date committed to by vetting.

Windows - Updates are downloaded on Microsoft Patch Tuesday (2nd Tuesday of the month). Updates are incorporated, tested and vetted in the Windows Motopatch disk over the next few weeks. The target release is by the last day of the month.

Windows 3rd Party updates - for Adobe Reader and Adobe Flash are included on the standard Motopatch for Windows disk and follow the Windows patching schedule.

RHEL - Security updates are downloaded the last week of the first month of the quarter. Updates include any updates that are available at that time. We then prepare, test and vet the RHEL 5, and RHEL 6, Motopatch disks and target to release the disks by the last day of the quarter.

VMware - Security updates are downloaded the last week of the first month of the quarter for ESXi. These updates are downloaded from HP directly. The updates are incorporated into the Motopatch for ESXi disk. We then prepare, test and vet the ESXi Motopatch and target to release the disk by the last day of the quarter.

PostgreSQL* - Security updates are downloaded the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The Motopatch for PostgreSQL disk target release is by the last day of the quarter. *7.14 and later major releases

McAfee Patch Updates - Security patches are downloaded from McAfee the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The Motopatch for McAfee disk target release is by the last day of the quarter.

DOT HILL DAS Firmware disk - Security patches are downloaded from DOT HILL the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The disk target release is by the last day of the quarter.

e. CONTRACTOR has the following responsibilities:

1) Obtain relevant 3rd party security updates as made available and supported from the OEM's. This includes antivirus definition, OEM vendor available/supported operating systems patches, VMWare patches, database patches, and selected other 3rd party patches covered by SUS. CONTRACTOR does not control when these updates are released, but current release schedules are listed for reference:

   McAfee Antivirus definitions– Weekly

   Microsoft PC and Server OS patches – Monthly

   Solaris, RHEL OS, VMware hypervisor patches – Quarterly Other 3rd party patches - Quarterly

2) Each assessment will consist of no less than 36 hours of examination time to evaluate the impact each update has on the system.
3) Testing of updates to verify whether they degrade or compromise system functionality on a dedicated ASTRO test system with standard supported configurations.
4) Address any issues identified during testing by working with CONTRACTOR selected commercial supplier and/or CONTRACTOR product development engineering team. If a solution for the identified issues cannot be found, the patch will not be posted on CONTRACTOR's site.
5) Pre-test STIG recommended remediation when applicable.
6) Release all tested updates to CONTRACTOR's secure extranet site.
7) Include documentation for installation, recommended configuration changes, and identified issues and remediation for each update release.
8) Include printable labels for customers who download the updates to CD's.
9) Notify STATE of update releases by email.
10) A supported SUS ASTRO release matrix will be kept on the extranet site for reference.

f. The STATE has the following responsibilities:

1) Provide CONTRACTOR with pre-defined information prior to contract start date necessary to complete a Customer Support Plan (CSP).
2) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).
3) Provide means for accessing pre-tested files (Access to the extranet website).
4) Deploy pre-tested files to the STATE system as instructed in the "Read Me" text provided.
5) Implement recommended remediation(s) on STATE system, as determined necessary by STATE.
6) Upgrade system to a supported system release as necessary to continue service.
7) Adhere closely to the System Support Center (SSC) troubleshooting guidelines provided upon system acquisition. A failure to follow SSC guidelines may cause the

STATE and CONTRACTOR unnecessary or overly burdensome remediation efforts. In such case, CONTRACTOR reserves the right to charge an additional service fee for the remediation effort.

8) Comply with the terms of the applicable license agreement between the STATE and the non-CONTRACTOR software copyright owner.

3. DISCLAIMER:

CONTRACTOR disclaims any and all warranties with respect to pre-tested antivirus definitions, database security updates, hypervisor patches, operating system software patches, intrusion detection sensor signature files, or other 3rd party files, express or implied. Further, CONTRACTOR disclaims any warranty concerning the non-CONTRACTOR software and does not guarantee that STATE'S system will be error-free or immune to security breaches as a result of these services.

ANNUAL PREVENTIVE MAINTENANCE STATEMENT OF WORK

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

Annual Preventative Maintenance will provide annual operational tests on the STATE'S infrastructure equipment (Infrastructure or Fixed Network Equipment or "FNE") to monitor the Infrastructure's conformance to specifications, as set forth in the applicable attached Exhibit(s), all of which are hereby incorporated by this reference.

1. SCOPE

Annual Preventive Maintenance will be performed during standard business hours (unless otherwise agreed to in writing). If the system or STATE requirements dictate this service must occur outside of standard business hours, an additional quotation will be provided. STATE is responsible for any charges associated with unusual access requirements or expenses.

a. Inclusions

Annual Preventive Maintenance service will be delivered on CONTRACTOR sold infrastructure including integrated 3rd party products per the level of service as defined in Table 1.

b. Limitations and Exclusions

Unless specifically called out in Table 1, the following activities are outside the scope of the Annual Preventive Maintenance service, however, can be included as optional services that are available to Annual Preventive Maintenance STATE at an additional cost:

1) Emergency on-site visits required to resolve technical issues.
2) Third party support for equipment not sold by CONTRACTOR as part of the original system.
3) System installations, upgrades, and expansions.
4) STATE training.
5) Hardware repair and/or exchange.
6) Network security services.
7) Network transport.
8) Information Assurance.

c. CONTRACTOR services not included in this statement of work.

1) Any maintenance required as a result of a virus or unwanted intrusion is excluded if the system is not protected against these security threats by CONTRACTOR's Pre-tested Security Update Service when applicable.
2) Tower climbs, tower mapping analysis or tower structure analysis

d. CONTRACTOR has the following responsibilities:

1) Notify the STATE of any planned system downtime needed to perform this Service.
2) Advise STATE of issues that may require attention.

3) Maintain communication with the STATE as needed until completion of the Annual Preventive Maintenance.

4) Determine, in its sole discretion, when a case requires more than the Annual Preventive Maintenance services described in this SOW and notify STATE of an alternative course of action.

5) Provide STATE with a report documenting system performance against expected parameters along with recommended actions. Time allotment for report completion TBD.

6) Provide trained and qualified personnel with proper security clearance required to complete Annual Preventive Maintenance service.

e. <u>The STATE has the following responsibilities:</u>

1) Provide preferred schedule for Annual Preventative Maintenance to CONTRACTOR.

2) Authorize and acknowledge any scheduled system downtime.

3) Maintain periodic backup of databases, software applications, and firmware.

4) Establish and maintain a suitable environment (heat, light, and power) for the equipment location and provide CONTRACTOR full, free, and safe access to the equipment so that CONTRACTOR may provide services. All sites shall be accessible by standard service vehicles.

5) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).

6) Provide site escorts in a timely manner if required.

7) Provide CONTRACTOR with requirements necessary for access to secure facilities.

8) Obtain at STATE'S cost all third party consents or licenses required to enable CONTRACTOR to provide the Service.

f. <u>The Servicer has the following responsibilities:</u>

1) Perform the Preventive Maintenance tasks as set forth in Table 1 at the level of service the STATE has purchased.

2) Perform the Site Performance Verification Procedures in Table 2 for each site type on the system.

3) Provide required diagnostic/test equipment necessary to perform the Preventive Maintenance service.

4) As applicable, use the Method of Procedure (MOPs) as defined for each task.

Table 1 Preventive Maintenance Tasks

MASTER SITE CHECKLIST - LEVEL 1	
SERVERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
NM Client Applications	Review UEM events and transport medium types, (microwave/leased line/telco, etc.). Event log review for persistent types. Verify all NM client applications are operating correctly.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
Complete Backup	Verify backups have been done or scheduled. SZ database (BAR), Centracom CDM/ADM database, etc.
Network Time Protocol (NTP)	Verify operation and syncing all devices.
Data Collection Devices (DCD) check (if present)	Verify data collection
Anti-Virus	Verify anti-virus is enabled and that definition files are up to date (within two weeks of current date) on CSMS
ROUTERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on router type. Capture available diagnostic logs.
Verify Redundant Routers	Test redundancy in CWR devices. Core router switchover (coordinate with STATE).
SWITCHES	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on switch type. Capture available diagnostic logs.
Verify Redundant Switches	Test redundancy in CWR devices. Core router switchover (coordinate with STATE).
DOMAIN CONTROLLERS (non-CSA)	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.

Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
FIREWALLS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
LOGGING EQUIPMENT	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Server CPU Health	i.e. memory, HDD, CPU, disk space/utilization.

PRIME SITE CHECKLIST - LEVEL 1	
SOFTWARE	
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
SWITCHES	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on switch type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
ROUTERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on router type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
MISCELLANEOUS EQUIPMENT	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server

	type. Capture available diagnostic logs.
Site Frequency Standard Check (TRAK)	Check lights and indicators for A/B receivers.
SITE CONTROLLERS	
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
COMPARATORS	
Equipment Alarms	Verify no warning/alarm indicators.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways

DISPATCH SITE CHECKLIST - LEVEL 1	
GENERAL	
Inspect all Cables	Inspect all cables/connections to external interfaces are secure
Mouse and Keyboard	Verify operation of mouse and keyboard
Configuration File	Verify each operator position has access to required configuration files
Console Op Time	Verify console op time is consistent across all ops
Screensaver	Verify screensaver set as STATE prefers
Screen Performance	Verify screen operational/performance
Touchscreen	Verify touchscreen operation (if applicable)
Cabling/Lights/Fans	Visual inspection of all equipment - cabling/ lights/ fans
Filters/Fans/Dust	Clean any filters/ fans/ dust- all equipment
Monitor and Hard Drive	Confirm monitor and hard drive do not "sleep"
DVD/CD	Verify / clean DVD or CD drive
Time Synchronization	Verify console time is synchronized with NTP server
Anti-Virus	Verify anti-virus is enabled and that definition files are up to date (within two weeks of current date)

HEADSET UNPLUGGED TESTING	
Speakers	Test all speakers - audio quality, volume, static, drop-outs, excess hiss when turned up.
Channel Audio in Speaker	Verify selected channel audio in select speaker only.
Footswitch Pedals	Verify both footswitch pedals operational
Radio On-Air Light	Verify radio on air light comes on with TX (if applicable)
HEADSET PLUGGED IN TESTING	
Radio TX and RX	Verify radio TX/RX from both headset jacks. Verify levels OK. Check volume controls for noise/static or drop-outs.
Speaker Mute	Verify select speaker muted.
Telephone Operation	Verify telephone operational through both headset jacks. Check volume controls for noise/static or drop-outs.
Audio Switches	Verify select audio switches to speaker when phone off-hook. (if interfaced to phones)
Radio Takeover in Headset	Verify radio-takeover in headset mic when phone off-hook (mic switches to radio during PTT and mutes to phone).
OTHER TESTS	
Phone Status Light	Verify phone status light comes on when phone off-hook (if applicable)
Desk Microphone Operation	Confirm desk mic operation (if applicable)
Radio IRR Operation	Verify radio IRR operational (if applicable) on MOT dispatch
Telephone IRR Operation	Verify telephone [if on radio computer] IRR operational (if applicable) on MOT dispatch
Recording	Verify operator position being recorded on long term logging recorder (if applicable) if included in service agreement
COMPUTER PERFORMANCE TESTING	
Computer Reboot	Reboot op position computer
Computer Operational	Confirm client computer is fully operational (if applicable)
AUDIO TESTING	
Conventional Resources	Confirm all conventional resources are functional with adequate audio levels and quality
Secure Mode	Confirm any secure talkgroups are operational in secure mode
Trunked Resources	Confirm all trunked resources on screen are functioning by placing a call in both directions (at the STATE'S discretion) and at a single op position
Backup Resources	Confirm backup resources are operational
EQUIPMENT ROOM TESTS	

Recording - AIS Test	Verify audio logging of trunked calls
Recording	Test op position logging on analog recorder (with STATE assistance)
System Alarms	Review alarm system on all equipment for errors
Capture Diags	Perform recommended diagnostic tests based on equipment. Capture available diagnostic logs.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
PLAYBACK STATION (CONTRACTOR Provided)	
Capture Diags	Perform recommended diagnostic tests based on equipment. Capture available diagnostic logs.
Recall Audio	Verify that radio/telephone audio can be recalled

RF SITE CHECKLIST - LEVEL 1	
RF PM CHECKLIST	
Equipment Alarms	Verify no warning/alarm indicators.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
Site Frequency Standard Check	Check lights and indicators for A/B receivers.
Basic Voice Call Check	Voice test each voice path, radio to radio.
Control Channel Redundancy (trunking)	Roll control channel, test, and roll back.
Site Controller Redundancy (trunking) - ASR only	Roll site controllers with no dropped audio.
PM Optimization Workbook (See Table 2 for GTR tests)	Complete Base Station Verification tests - Frequency Error, Modulation Fidelity, Forward at Set Power, Reverse at Set Power, Gen Level Desense no Tx

MOSCAD CHECKLIST - LEVEL 1	
MOSCAD SERVER	
Equipment Alarms	Verify no warning/alarm indicators.
Check Alarm/Event History	Review MOSCAD alarm and events to find if there are chronic issues.
Windows Event Logs	Review Windows event logs. Save and clear if full.
Password Verification	Site devices to verify passwords. Document changes if any

	found.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
MOSCAD CLIENT	
Equipment Alarms	Verify no warning/alarm indicators.
Check Alarm / Event History	Review MOSCAD alarm and events to find if there are chronic issues.
Windows Event Logs	Review Windows event logs. Save and clear if full.
Password Verification	Site devices to verify passwords. Document changes if any found.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
MOSCAD RTU's	
Equipment Alarms	Verify no warning/alarm indicators.
Verify Connectivity	Verify Connectivity
Password Verification	Site devices to verify passwords. Document changes if any found.
Check Alarm/Event History	Review MOSCAD alarms and events to find if there are chronic issues.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.

FACILITIES CHECKLIST - LEVEL 1	
VISUAL INSPECTION EXTERIOR	
ASR Sign	Verify that the ASR sign is posted.
Warning Sign - Tower	Verify warning sign is posted on the tower.
Warning Sign - Gate	Verify that a warning sign is posted at the compound gate entrance.
10 Rule Sign	Verify that a 10 rules sign is posted on the inside of the shelter door.
Outdoor Lighting	Verify operation of outdoor lighting/photocell.
Exterior of Building	Check exterior of building for damage/disrepair.
Fences / Gates	Check fences/gates for damage/disrepair.
Landscape / Access Road	Check landscape/access road for accessibility.
VISUAL INSPECTION INTERIOR	
Electrical Surge Protectors	Check electrical surge protectors for alarms.
Emergency Lighting	Verify emergency lighting operation.

Indoor Lighting	Verify indoor lighting.
Equipment Inspection	Visually inspect that all hardware (equipment, cables, panels, batteries, racks, etc.) are in acceptable physical condition for normal operation.
Regulatory Compliance (License, ERP, Frequency, Deviation)	Check station for regulatory compliance. Update station logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
UPS	
Visual inspection (condition, cabling)	Verify corrosion, physical connections, dirt/dust, etc.
GENERATOR	
Visual Inspection	Verify, check panel housing, cracks, rust and weathering. Physical connections, corrosion, dirt/dust, etc.
Fuel	Verify fuel levels in backup generators, document date of last fuel delivered from fuel service provider.
Oil	Check the oil dipstick for proper level. Note condition of oil.
Verify operation (no switchover)	Check, verify running of generator, ease of start or difficult. Is generator "throttling" or running smooth? Any loud unusual noise? Etc.
Motorized Dampers	Check operation
HVAC	
Air Filter	Check air filter and recommend replacement if required.
Coils	Check coils for dirt and straightness
Outdoor Unit	Check that outdoor unit is unobstructed
Wiring	Wiring (insect/rodent damage)
Cooling / Heating	Check each HVAC unit for cooling/heating
Motorized Dampers	Check operation

MICROWAVE CHECKLIST - LEVEL 1	
GENERAL	
Transport Connectivity	Confirm transport performance by viewing UEM for site link warnings or errors.
RADIO	
Alarms	Check alarm / event history
Software	Verify version of application
TX Frequency	Verify transmit frequency

TX Power	Verify transmit power
RX Frequency	Verify receive frequency
RX Signal Level	Verify receive signal level and compare with install baseline documentation
Save configuration	Save current configuration for off-site storage
Backhaul Performance	Monitor UEM status (alarms, logs, etc.) for all links. If UEM not used to monitor microwave, then use provided microwave alarm mgmt. server.
WAVEGUIDE	
Visual Inspection	Inspect for wear or dents (from ground using binoculars).
Connection Verification	Verify all connections are secured with proper hardware (from ground using binoculars).
DEHYDRATOR	
Visual Inspection	Inspect moisture window for proper color
Pressure Verification	Verify pressure of all lines
Re-Pressurization	Bleed lines temporarily to verify the dehydrator re-pressurizes
Run Hours	Record number of hours ran

TOWER CHECKLIST - LEVEL 1	
STRUCTURE CONDITION	
Rust	Check structure for rust.
Cross Members	Check for damaged or missing cross members.
Safety Climb	Check safety climb for damage.
Ladder	Verify that ladder system is secured to tower.
Welds	Check for cracks or damaged welds.
Outdoor lighting/photocell	Test outdoor lighting and photocell.
Drainage Holes	Check that drainage holes are clear of debris.
Paint	Check paint condition.
TOWER LIGHTING	
Lights/Markers	Verify all lights/markers are operational.
Day/Night Mode	Verify day and night mode operation.
Power Cabling	Verify that power cables are secured to tower.
ANTENNAS AND LINES	
Antennas	Visually inspect antennas for physical damage (from ground using binoculars).

Transmission Lines	Verify that all transmission lines are secure on the tower.
GROUNDING	
Structure Grounds	Inspect grounding for damage or corrosion
GUY WIRES	
Tower Guys	Check guy wires for fraying and tension.
Guy Wire Hardware	Check hardware for rust.
CONCRETE CONDITION	
Tower Base	Check for chips or cracks.

Table 2 Site Performance Verification Procedures

ASTRO 25 GTR ESS SITE PERFORMANCE
ANTENNAS
Transmit Antenna Data
Receive (Antenna) System Data
Tower Top Amplifier Data
FDMA MODE
Base Radio Transmitter Tests
Base Radio Receiver Tests
Base Radio Transmit RFDS Tests
Receive RFDS Tests with TTA (if applicable)
Receive RFDS Tests without TTA (if applicable)
TDMA MODE
Base Radio TDMA Transmitter Tests
Base Radio TDMA Receiver Tests
TDMA Transmit RFDS Tests
TDMA Receive RFDS Tests with 432 Diversity TTA
TDMA Receive RFDS Tests with 2 Independent TTA's (if applicable)
TDMA Receive RFDS Tests without TTA (if applicable)

SECURITY MONITORING SERVICE OVERVIEW

CONTRACTOR's Security Monitoring Services includes anti-malware monitoring and authentication log monitoring. There are also options for firewall monitoring, intrusion detection system (IDS) monitoring, and ASTRO system log monitoring.

CONTRACTOR's ASTRO Security Monitoring is a complete solution that provides peace of mind and reduces the risk that your network availability will be impacted by a security threat. The solution includes 24x7x365 monitoring of the radio network security elements by experienced, specialized security technologists with years of experience working with ASTRO mission-critical networks. For highly complex or unusual security events, our technologists have direct and immediate access to CONTRACTOR engineers for rapid resolution.

This Statement of Work ("SOW") is subject to the terms and conditions of CONTRACTOR's Professional Services Agreement, Service Agreement or other applicable agreement in effect between the parties ("Agreement"). CONTRACTOR and STATE may be referred to herein individually as a "Party" or together as "Parties"

1. DESCRIPTION OF SECURITY MONITORING SERVICES

a. Anti-malware Monitoring

ASTRO comes installed with Anti-malware SW. Security Monitoring will ensure that malware definition updates, as provided by the Anti-malware OEM, are installed and running. The anti-malware SW is monitored for activity such as deletion, quarantine, and alerting of suspicious SW.

b. Authentication Monitoring

1) Windows and RSA logins are monitored for repeated failures and locked accounts.

c. Firewall Monitoring

The ASTRO system potentially has several firewall options. See Table 1 in the addendum for a list. In any of these firewall applications, CONTRACTOR provisions and deploys the firewalls with the ASTRO system. CONTRACTOR will monitor each one that has the firewall monitoring option.

d. IDS (Intrusion Detection System) Monitoring

An IDS is an option to ASTRO that may be deployed between the ASTRO firewall and the CEN.

e. Centralized Log Monitoring

ASTRO has an option that provides the ability to forward device syslogs to a single virtual server called Centralized Syslog Server. This allows monitoring of Linux components for authentication events.

2. SCOPE

The CONTRACTOR Secure Operations Center (SOC) consists of highly trained and experienced security professionals. When an event is detected, the technologists will run remote diagnostics and initiate an appropriate response. This response could include, but is not limited to, continuing to monitor the event for further development, attempting to remotely restore the system, or opening of a case for dispatch of a servicer.

a. CONTRACTOR Responsibilities:

1) Provide, maintain, and replace when necessary, HW and SW required to monitor ASTRO security elements. HW may include a firewall, router, or physical server. SW may include virtual servers either on the ASTRO core or a separate physical server, related OS, SIEM collectors, and SW that allows distribution of updates and remote diagnostics.
2) Verify connectivity and monitoring is active prior to system acceptance or start date.
3) Coordinate with STATE to maintain CONTRACTOR service authentication credentials.
4) Maintain properly trained and accredited technicians. Monitor the STATE'S system 24/7/365 for malicious or unusual activity.
5) Reports are posted to the SSC quality webpage. Contact your CSM for access.

b. The STATE has the following responsibilities:

1) Security Monitoring requires a connection from the STATE'S ASTRO system to CONTRACTOR's SOC in Schaumburg. CONTRACTOR offers either a T1 option or a Virtual Private Network (VPN) option through a STATE supplied internet connection. Connectivity needs to be established before service commences.
2) Allow CONTRACTOR continuous remote access to monitor the ASTRO system. This includes keeping the connection plugged-in, providing passwords, and working with CONTRACTOR to understand and maintain proper administration privileges.
3) Provide continuous utility service to any CONTRACTOR equipment installed or utilized at the STATE'S premises to support delivery of this service.
4) Provide STATE contact information necessary to complete the Customer Support Plan. Notify your CSM within 2 weeks of any contact changes.
5) As necessary, upgrade the ASTRO system to supported releases.
6) Allow CONTRACTOR dispatched-servicers physical access to the equipment when required.
7) Comply with the terms of the applicable license agreements between STATE and the non-CONTRACTOR software copyright owners.
8) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the services described in this SOW.

3. DISCLAIMER

CONTRACTOR disclaims any warranty and does not guarantee that STATE'S system will be error-free or immune to security breaches as a result of these services.

Addendum Potential ASTRO Firewalls

CNI	Customer Network Interface. This firewall separates the ASTRO Radio Network from the customer's IT network (often referred to as the CEN or Customer Enterprise network). There are single and redundant (high-availability) options for the CNI, the redundant option meaning there are two firewalls. Both firewalls must be monitored in the redundant case.
DSR	Dynamic System Resilience. This is an ASTRO option where a geographically separated backup master site is implemented as a "hot-standby" in case of disaster at the primary. This option potentially doubles the number of firewalls in the system.
ZCP	Zone Core Protection. This ASTRO option places firewalls at the master site where the RF and console sites connect. This protects the core from attack from a compromised site and propagation of the attack to the other sites. There are always 2 firewalls in this option for redundancy.
TI	Telephone Interconnect. This ASTRO option allows calls to be made to/from ASTRO subscribers. A firewall is required to protect the RNI from the telephone connection. One firewall may serve the dual purpose of the TI and ISSI interface.
ISSI	Inter RF Subsystem Interface. This option allows connectivity to a separate system. The original intent of this option was to connect to another P25 system that could be CONTRACTOR or any other P25 compliant vendor. This standard has since been used to allow connection to non- P25 systems through additional interfaces such as WAVE. In any case, a firewall is necessary to protect the RNI from this connection.
MCC 7100	The MCC 7100 dispatch console may be configured such that it can connect via Virtual Private Network (VPN) through an internet connection. A firewall is required to terminate on the ASTRO side of that connection. This firewall may be physically located at either a console site or the master site and there may be multiple firewalls for this purpose.
Custom	Some may opt to install their own firewalls and want them monitored. The most common location is at console sites. The STATE will have to work with CONTRACTOR to determine if and how custom firewalls can be monitored. There may also be additional charges.

TECHNICAL SUPPORT OVERVIEW

CONTRACTOR's Technical Support service provides telephone consultation for technical issues that require a high level of ASTRO network expertise and troubleshooting capabilities. Remote Technical Support is delivered through the CONTRACTOR System Support Center (SSC) by a staff of technical support specialists skilled in diagnosis and swift resolution of infrastructure performance and operational issues. Technical Support provides access to a solutions database, as well as access to in house test labs and additional CONTRACTOR technical resources

CONTRACTOR applies industry best practices in recording, monitoring, escalating and reporting for Technical Support calls from its contracted customers, reflecting the importance of maintaining mission critical systems.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

1. DESCRIPTION OF TECHNICAL SUPPORT SERVICES

CONTRACTOR's System Support Center (SSC) will provide technical support to assist the STATE'S technical resources of the CONTRACTOR's currently supported infrastructure. This team of highly skilled professionals is available to the STATE as an integrated part of the support and technical issue resolution process. The SSC remotely supports the STATE and works with but not limited to fault diagnostics tools, simulation networks and fault database search engines.

The Technical Support Operations is available 24 hours a day; 7 days per week to support technical requests (see severity level response time commitments). Calls requiring incidents, problems, or service requests will be logged in CONTRACTOR's issue management system. This ensures that technical issues are prioritized, updated, tracked and escalated as necessary, until resolution. The Technical Support Operations shall assign the priority level as in accordance with the agreed Severity Level Definitions stated in this document.

CONTRACTOR will track the progress of each case from initial logging to resolution. CONTRACTOR will ensure that the STATE is advised of the case progress and informed of tasks that require further investigation and assistance from the STATE'S technical resources.

The provision of this service requires that the STATE provides a suitably trained technical resource that delivers maintenance and support to the system, and who is familiar with the operation of that system. CONTRACTOR provides technical consultants to support the local resource in the timely closure of infrastructure, performance and operational issues.

2. SCOPE

Technical Support service is available 24 hours a day, 7 days a week based on Severity Level Definitions.

a. Geographic Availability

Technical Support is available to any customer regardless of their geographic location and timeframes are based on the STATE'S local time zone.

b. Inclusions

Technical Support service will be delivered on CONTRACTOR sold infrastructure

including integrated 3rd party products.

c. Limitations and Exclusions

The following activities are outside the scope of the Technical Support service, but are optional services that are available to remote Technical Support at an additional cost:

1) Emergency on-site visits required to resolve technical issues that cannot be resolved by with SSC working remotely with the local STATE technical resource.
2) Third party support for equipment not sold by CONTRACTOR as part of the original system.
3) System installations, upgrades, and expansions.
4) STATE training.
5) Hardware repair and/or exchange.
6) Network security services.
7) Network transport.
8) Information Assurance.
9) CONTRACTOR services not included in this statement of work.
10) Any technical support required as a result of a virus or unwanted intrusion is excluded if the system is not protected against these security threats by CONTRACTOR's Pre-tested Security Update Service when applicable.

d. CONTRACTOR has the following responsibilities:

1) Enable customer access to the CONTRACTOR Technical Support Center (800-221-7144), 24 hours a day, 7 days per week, to answer, document and respond to requests for support.
2) Respond to requests for Technical Support in accordance with the response times set forth in the Severity Level Response Time Commitments section of this document and the severity level defined in the Severity Level Definitions section of this document.
3) Advise caller of procedure for determining any additional requirements, activities or information relating to issue restoration and/or characterization.
4) Maintain communication with the STATE in the field as needed until resolution of the case
5) Coordinate technical resolutions with agreed upon third party vendors, as needed.
6) Escalate and manage support issues, including systemic issues, to additional CONTRACTOR technical resources, as applicable.
7) Escalate the case to the appropriate party upon expiration of a response time.
8) Determine, in its sole discretion, when a case requires more than the Technical Support services described in this SOW and notify STATE of an alternative course of action.

e. The STATE has the following responsibilities:

1) Provide CONTRACTOR with pre-defined information prior to contract start date necessary to complete Customer Support Plan (CSP).

2) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).
3) Contact the SSC in order to engage the Technical Support service, providing the necessary information for proper entitlement services. Including but not limited to the name of contact, name of customer, system ID number, site(s) in question, and brief description of the problem including pertinent information for initial issue characterization.
4) Maintain suitable trained technical resources that provide field maintenance and technical maintenance services to the system, and who are familiar with the operation of that system.
5) Provide SSC access via the remote connection that has been established through other sold services (e.g. Network Fault Monitoring)
6) Supply suitably skilled and trained on-site presence when requested by the SSC.
7) Validate issue resolution prior to close of the case in a timely manner.
8) Acknowledge that cases will be handled in accordance with the times and priorities as defined in the Severity Level Definitions and in the Severity Level Response Time Commitments section in this document.
9) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the Technical Support service.

3. SEVERITY LEVEL DEFINITIONS

The following severity level definitions will be used to determine the maximum response times:

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of failure: □ 33% of call processing resources impaired □ Site Environment alarms: o Smoke, o Unauthorized access o Temperature o Power failure
Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of failure: □ Less than 33% of call processing resources impaired □ Failure of a single redundant component

Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: □ Intermittent faults that are infrequent and minor impact to core services □ Statistical reporting problems
Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: □ Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. □ Faults that have no impact in how the user perceives the system to work. □ Cosmetic issues. □ Requests for information. □ Preventive Maintenance

4. SEVERITY LEVEL RESPONSE TIME COMMITMENTS

The response times are based on the defined severity levels as follows:

Severity Level	Response Time
Severity 1	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within one hour of the request for support being logged in the issue management system. Continual effort will be maintained to restore the system or provide a workaround resolution. Response provided 24 x 7.
Severity 2	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within four hours of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 3	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

Severity 4	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

5. WARRANTY AND MAINTENANCE OVERVIEW

During the first year warranty of the proposed offering, within each Phase and for the equipment proposed in that phase, CONTRACTOR will provide the State with a complete suite of system support services designed to maximize the network's uptime. See below for the list of Year 1 warranty services. **Optional maintenance services can be purchased, after or during the warranty year, through the term of the contract.*

Summary of Warranty and Maintenance Services

Description	1 Year Warranty	Optional Maintenance*
Dispatch Service and Case Management (24x7x365)	√	√
Four Hour On-Site Response (24x7x365) Major	√	Performed by the State
Infrastructure Board Repair	√	√
Network Preventive Maintenance (Annual)	√	Performed by the State
Technical Support (24x7x365)	√	√
Customer Support Manager	√	√
Customer Support Plan	√	√
CONTRACTOR On-Line (MOL)	√	√
Disaster Recovery Plan	√	√
Remote Network Monitoring	√	√
Remote Security Monitoring	√	√
Remote Security Update Service	√	√
System Upgrade Agreement (Hardware and Software Updates)	√	Optional (Contract Year 6,)

6. WARRANTY AND MAINTENANCE STATEMENTS OF WORK

Year 1 Warranty and Optional additional years of Maintenance statements of work which are included above in this exhibit are:

a. Infrastructure Repair

b. Custom System Upgrade Agreement (Contract Year 6)

c. Network Monitoring

d. Onsite Infrastructure Response and Dispatch Service (Year 1 only)
e. ASTRO 25 Security Update Service (SUS)
f. Annual Preventive Maintenance (Year 1 only)
g. Security Monitoring Service
h. ASTRO 25 Technical Support

Exhibit C-2 – Phase 2-RF Site Warranty / Optional Maintenance

1. INFRASTRUCTURE REPAIR OVERVIEW

CONTRACTOR provides a hardware repair service for all of the CONTRACTOR and select third-party infrastructure equipment supplied by CONTRACTOR. The CONTRACTOR authorized Repair Depot manages and performs the repair of CONTRACTOR supplied equipment as well as coordinating the equipment repair logistics process.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

2. DESCRIPTION OF SERVICES

Infrastructure components are repaired at a CONTRACTOR authorized Infrastructure Depot Operations (IDO). At CONTRACTOR's discretion, select third party Infrastructure may be sent to the original equipment manufacturer or third party vendor for repair.

3. SCOPE

Repair Authorizations are obtained by contacting the Solutions Support Center (SSC) which is available 24 hours a day, 7 days a week.

Repair authorizations can also be obtained online via Motorola Online at https://businessonline.motorolasolutions.com, under Repair Status/Submit Infrastructure RA.

a. Geographic Availability

Infrastructure repair is supported globally; geographic proximity will determine repair location.

b. Inclusions

Infrastructure repair is available on CONTRACTOR sold communication systems which may include some aspect of third party hardware and software. CONTRACTOR will make a "Commercially Reasonable Effort" to repair CONTRACTOR manufactured infrastructure products for seven years after product cancellation.

c. Exclusions

If infrastructure is no longer supported by CONTRACTOR, the original equipment manufacturer or a third party vendor, CONTRACTOR may return said equipment to the STATE without repair or replacement. The following items are excluded from Infrastructure Repair:

1) All CONTRACTOR infrastructure hardware over seven (7) years from product cancellation date.
2) All Third party infrastructure hardware over two (2) years from product cancellation date.
3) All Broadband infrastructure over three (3) years from product cancellation date
4) Physically damaged infrastructure.
5) Third party equipment not shipped by CONTRACTOR
6) Consumable items including, but not limited to, batteries, connectors, cables, toner/ink cartridges, tower lighting, laptop computers, monitors, keyboards and mouse.

7) Video retrieval from Digital In-Car Video equipment.

8) Infrastructure backhaul including but not limited to, Antennas, Antenna Dehydrator, Microwave[1], Line Boosters, Amplifier, Data Talker Wireless Transmitter, Short haul modems, UPS[1]

9) Test equipment.

10) Racks, furniture and cabinets.

11) Firmware and/or software upgrades.

1 Excluded from service agreements but may be repaired on an above contract, time and material basis. All UPS Systems must be shipped to IDO for repair. Note! Excludes batteries and on-site services

d. <u>CONTRACTOR has the following responsibilities:</u>

1) Enable STATE access to the CONTRACTOR call Center operational 24 hours a day, 7 days per week, to create requests for repair service.

2) Provide repair return authorization numbers when requested by STATE.

3) Receive malfunctioning infrastructure from STATE and document its arrival, repair and return.

4) Perform the following service on CONTRACTOR infrastructure:

   a) Perform an operational check on the infrastructure to determine the nature of the problem.

   b) Replace malfunctioning Field Replacement Units (FRU) or components.

   c) Verify that CONTRACTOR infrastructure is returned to CONTRACTOR manufactured specifications, as applicable.

   d) Perform a box unit test on all serviced infrastructure.

   e) Perform a system test on select infrastructure.

5) Provide the following service on select third party infrastructure:

   a) Perform pre-diagnostic and repair services to confirm infrastructure malfunction and eliminate sending infrastructure with no trouble found (NTF) to third party vendor for repair, when applicable.

   b) Ship malfunctioning infrastructure components to the original equipment manufacturer or third party vendor for repair service, when applicable.

   c) Track infrastructure sent to the original equipment manufacturer or third party vendor for service.

   d) Perform a post-test after repair by CONTRACTOR, original equipment manufacturer, or third party vendor to confirm malfunctioning infrastructure has been repaired and functions properly in a CONTRACTOR system configuration, when applicable.

   e) Re-program repaired infrastructure to original operating parameters based on software/firmware provided by STATE as required by section 1.6.7. If the STATE software version/configuration is not provided, shipping times will be delayed. If the Infrastructure repair depot determines that the malfunctioning infrastructure is due to a software defect, the repair depot reserves the right to reload infrastructure with a similar software version.

f) Properly package repaired infrastructure.

g) Ship repaired infrastructure to the STATE specified address during normal operating hours of Monday through Friday 7:00am to 7:00pm CST, excluding holidays. FRU will be sent two-day air unless otherwise requested. CONTRACTOR will pay for such shipping, unless STATE requests shipments outside of the above mentioned standard business hours and/or carrier programs, such as NFO (next flight out). In such cases, STATE will be responsible for payment of shipping and handling charges.

e. <u>The STATE has the following responsibilities:</u>

1) Contact or instruct Servicer to contact the CONTRACTOR System Support Center (SSC) and request a return authorization number prior to shipping malfunctioning infrastructure.

2) Provide model description, model number and serial number, type of system, software and firmware version, symptom of problem and address of site location for FRU or infrastructure.

3) Indicate if infrastructure or third party infrastructure being sent in for service was subjected to physical damage or lightning damage.

4) Follow CONTRACTOR instructions regarding inclusion or removal of firmware and software applications from infrastructure being sent in for service.

5) Provide STATE purchase order number to secure payment for any costs described herein.

6) Properly package and ship the malfunctioning FRU, at STATE'S expense. STATE is responsible for properly packaging the malfunctioning infrastructure FRU to ensure that the shipped infrastructure arrives un- damaged and in repairable condition.

   a) Clearly print the return authorization number on the outside of the packaging.

7) Maintain versions and configurations for software/applications and firmware to install repaired equipment.

8) Provide CONTRACTOR with proper software/firmware information to reprogram equipment after repair unless current software has caused this malfunction.

9) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the infrastructure repair services to STATE.

7. STATEMENT OF WORK OPTION: ASTRO 25 CUSTOM SYSTEM UPGRADE AGREEMENT(C-SUA)

a. <u>Description of Service and Obligations</u>

1) As system releases become available, CONTRACTOR agrees to provide the STATE with the software, hardware and implementation services required to execute up to one system infrastructure upgrade in the one-year warranty period and if purchased for the optional service years starting in year six, up to one system infrastructure upgrade in a four-year period. At the time of the system release upgrade, CONTRACTOR will provide applicable patches and service pack updates when and if available. Currently, CONTRACTOR's service includes 3rd party software such as Microsoft Windows and Server Operating Systems (OS), Red Hat Linux, Sun Solaris and any CONTRACTOR software service packs that may be available.

CONTRACTOR will only provide patch releases that have been analyzed, pre-tested, and certified in a dedicated ASTRO 25 test lab to ensure that they are compatible and do not interfere with the ASTRO 25 network functionality.

2) ASTRO 25 system releases are intended to improve the system functionality and operation from previous releases and may include some minor feature enhancements. At CONTRACTOR's option, system releases may also include significant new feature enhancements that CONTRACTOR may offer for purchase. System release software and hardware shall be pre-tested and certified in CONTRACTOR's Systems Integration Test lab.

3) The price quoted for the C-SUA requires the STATE to choose from a list of certified system upgrade paths provided by CONTRACTOR at the time of upgrade planning. Should the STATE elect a different upgrade path from those provided, the STATE agrees that additional costs may be incurred to complete the implementation of the certified system upgrade. In this case, CONTRACTOR agrees to provide a price quotation for any additional materials and services necessary.

4) ASTRO 25 C-SUA entitles the STATE to past software versions for the purpose of downgrading product software to a compatible release version.

5) The following ASTRO 25 certified system release software for the following products are covered under this ASTRO 25 C-SUA: base stations, site controllers, comparators, routers, LAN switches, servers, dispatch consoles, logging equipment, network management terminals, Network Fault Management ("NFM") products, network security devices such as firewalls and intrusion detection sensors and associated peripheral infrastructure software.

6) Product programming software such as Radio Service Software ("RSS"), Configuration Service Software ("CSS"), and Customer Programming Software ("CPS") are also covered under this C- SUA.

7) ASTRO 25 C-SUA makes available the subscriber radio software releases that are shipping from the factory during the C-SUA coverage period. New subscriber radio options and features not previously purchased by the STATE are excluded from ASTRO 25 C-SUA coverage.

   Additionally, subscriber software installation and reprogramming are excluded from the ASTRO 25 C-SUA coverage.

8) CONTRACTOR will provide certified hardware version updates and/or replacements necessary to upgrade the system with an equivalent level of functionality up to once in a four-year period. Hardware will be upgraded and/or replaced if required to maintain the existing feature and functionality. Any updates to hardware versions and/or replacement hardware required to support new features or those not specifically required to maintain existing functionality are not included. Unless otherwise stated, platform migrations such as, but not limited to, stations, consoles, backhaul, civil, network changes and additions, and managed services are not included.

9) The following hardware components, if originally provided by CONTRACTOR, are eligible for full product replacement when necessary per the system release upgrade:

   a) Servers

   b) PC Workstations

c) Routers

d) LAN Switches

10) The following hardware components, if originally provided by CONTRACTOR, are eligible for board- level replacement when necessary per the system release upgrade. A “board-level replacement” is defined as any Field Replaceable Unit (“FRU”) for the products listed below:

a) GTR 8000 Base Stations

b) GCP 8000 Site Controllers

c) GCM 8000 Comparators

d) MCC 7500 Console Operator Positions

e) PBX Switches for Telephone Interconnect

f) NFM/NFM XC/MOSCAD RTU

11) The ASTRO 25 SUA does not cover all products. Refer to section 3.0 for exclusions and limitations.

12) CONTRACTOR will provide implementation services necessary to upgrade the system to a future system release with an equivalent level of functionality up to once in a four-year period. Any implementation services that are not directly required to support the certified system upgrade are not included. Unless otherwise stated, implementation services necessary for system expansions, platform migrations, and/or new features or functionality that are implemented concurrent with the certified system upgrade are not included.

13) As system releases become available, CONTRACTOR will provide up to once in a four-year period the following software design and technical resources necessary to complete system release upgrades:

a) Review infrastructure system audit data as needed.

b) Identify additional system equipment needed to implement a system release, if applicable.

c) Complete a proposal defining the system release, equipment requirements, installation plan, and impact to system users.

d) Advise STATE of probable impact to system users during the actual field upgrade implementation.

e) Program management support required to perform the certified system upgrade.

f) Field installation labor required to perform the certified system upgrade.

g) Upgrade operations engineering labor required to perform the certified system upgrade.

14) ASTRO 25 C-SUA pricing is based on the system configuration at the time of the original purchase. This configuration is to be reviewed annually from the contract effective date. Any change in system configuration may require an ASTRO 25 C-SUA price adjustment.

15) The ASTRO 25 C-SUA applies only to system release upgrades within the ASTRO 25 7.x platform.

16) CONTRACTOR will issue Software Maintenance Agreement ("SMA") bulletins on a periodic basis and post them in soft copy on a designated extranet site for STATE access. Standard and optional features for a given ASTRO 25 system release are listed in the SMA bulletin.

iv. Upgrade Elements and Corresponding Party Responsibilities

Upgrade Planning and Preparation: All items listed in this section are to be completed at least 6 months prior to a scheduled upgrade.

a. <u>CONTRACTOR Responsibilities:</u>

1) Obtain and review infrastructure system audit data as needed.
2) Identify additional system equipment needed to implement a system release, if applicable.
3) Complete a proposal defining the system release, equipment requirements, installation plan, and impact to system users.
4) Advise STATE of probable impact to system users during the actual field upgrade implementation.
5) Inform STATE of high speed internet connection requirements.
6) Assign program management support required to perform the certified system upgrade.
7) Assign field installation labor required to perform the certified system upgrade.
8) Assign upgrade operations engineering labor required to perform the certified system upgrade.
9) Deliver release impact and change management training to the primary zone core owners, outlining the changes to their system as a result of the upgrade path elected. This training needs to be completed at least 12 weeks prior to the scheduled upgrade. This training will not be provided separately for user agencies who reside on a zone core owned by another entity. Unless specifically stated in this document, CONTRACTOR will provide this training only once per system.

b. <u>STATE Responsibilities:</u>

1) Contact CONTRACTOR to schedule and engage the appropriate CONTRACTOR resources for a system release upgrade.
2) Provide high-speed internet connectivity at the zone core site(s) for use by CONTRACTOR to perform remote upgrades and diagnostics. High-speed internet connectivity must be provided at least 12 weeks prior to the scheduled upgrade. In the event access to a high-speed connection is unavailable, STATE may be billed additional costs to execute the system release upgrade.
3) Assist in site walks of the system during the system audit when necessary.
4) Provide a list of any FRUs and/or spare hardware to be included in the system release upgrade when applicable.
5) Purchase any additional software and hardware necessary to implement optional system release features or system expansions.

6) Provide or purchase labor to implement optional system release features or system expansions.

7) Participate in release impact training at least 12 weeks prior to the scheduled upgrade. This applies only to primary zone core owners. It is the zone core owner's responsibility to contact and include any user agencies that need to be trained or to act as a training agency for those users not included.

8. SYSTEM READINESS CHECKPOINT:

All items listed in this section must be completed at least 30 days prior to a scheduled upgrade.

a. CONTRACTOR Responsibilities:

1) Perform appropriate system backups.

2) Work with the STATE to validate that all system maintenance is current.

3) Work with the STATE to validate that all available patches and antivirus updates have been updated on the STATE'S system.

b. STATE Responsibilities:

1) Validate system maintenance is current.

2) Validate that all available patches and antivirus updates to their system have been completed.

c. System Upgrade

1) CONTRACTOR Responsibilities:

   a) 2.3.1.1 Perform system infrastructure upgrade in accordance with the system elements outlined in this SOW.

2) STATE Responsibilities:

   a) 2.3.2.1 Inform system users of software upgrade plans and scheduled system downtime.

   b) 2.3.2.2 Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide software upgrade services.

d. Upgrade Completion

1) CONTRACTOR Responsibilities:

   a) Validate all certified system upgrade deliverables are complete as contractually required.

   b) Deliver post upgrade implementation training to the STATE as needed, up to once per system.

   c) Obtain upgrade completion sign off from the STATE.

2) STATE Responsibilities:

   a) Cooperate with CONTRACTOR in efforts to complete any post upgrade punch list items as needed.

   b) Cooperate with CONTRACTOR to provide relevant post upgrade implementation training as needed. This applies only to primary zone core owners. It is the zone

core owner's responsibility to contact and include any user agencies that need to be trained or to act as a training agency for those users not included.

c) Provide CONTRACTOR with upgrade completion sign off.

v. Exclusions and Limitations

a. The parties agree that Systems that have non-standard configurations that have not been certified by CONTRACTOR Systems Integration Testing are specifically excluded from the ASTRO 25 C-SUA unless otherwise agreed in writing by CONTRACTOR and included in this SOW.

b. The parties acknowledge and agree that the ASTRO 25 C-SUA does not cover the following products:

1) MCC5500 Dispatch Consoles
2) MIP5000 Dispatch Consoles
3) Plant/E911 Systems
4) MOTOBRIDGE Solutions
5) CONTRACTOR Public Sector Applications Software ("PSA")
6) Custom SW, CAD, Records Management Software
7) Data Radio Devices
8) Mobile computing devices such as Laptops
9) Non-CONTRACTOR two-way radio subscriber products
10) Genesis Products
11) Point-to-point products such as microwave terminals and association multiplex equipment

c. ASTRO 25 C-SUA does not cover any hardware or software supplied to the STATE when purchased directly from a third party, unless specifically included in this SOW.

d. ASTRO 25 C-SUA does not cover software support for virus attacks or other applications that are not part of the ASTRO 25 system, or unauthorized modifications or other misuse of the covered software. CONTRACTOR is not responsible for management of anti-virus or other security applications (such as Norton).

e. Upgrades for equipment add-ons or expansions during the term of this ASTRO 25 C-SUA are not included in the coverage of this SOW unless otherwise agreed to in writing by CONTRACTOR.

vi. Special provisions

a. STATE acknowledges that if its System has a Special Product Feature, additional engineering may be required to prevent an installed system release from overwriting the Special Product Feature. Upon request, CONTRACTOR will determine whether a Special Product Feature can be incorporated into a system release and whether additional engineering effort is required. If additional engineering is required CONTRACTOR will issue a change order for the change in scope and associated increase in the price for the ASTRO 25 C-SUA.

b. STATE will only use the software (including any System Releases) in accordance with the applicable Software License Agreement.

c. ASTRO 25 C-SUA services do not include repair or replacement of hardware or software that is necessary due to defects that are not corrected by the system release, nor does it include repair or replacement of defects resulting from any nonstandard, improper use or conditions; or from unauthorized installation of software.

d. ASTRO 25 C-SUA coverage and the parties' responsibilities described in this Statement of Work will automatically terminate if CONTRACTOR no longer supports the ASTRO 25 7.x software version in the STATE'S system or discontinues the ASTRO 25 C-SUA program; in either case, CONTRACTOR will refund to STATE any prepaid fees for ASTRO 25 C-SUA services applicable to the terminated period.

e. If STATE cancels a scheduled upgrade within less than 12 weeks of the scheduled on site date, CONTRACTOR reserves the right to charge the STATE a cancellation fee equivalent to the cost of the pre-planning efforts completed by the CONTRACTOR Upgrade Operations Team.

f. The SUA annualized price is based on the fulfillment of the four-year term. If STATE terminates, except if CONTRACTOR is the defaulting party, STATE will be required to pay for the balance of payments owed if a system release upgrade has been taken prior to the point of termination.

Appendix A – ASTRO 25 System Release Upgrade Paths

Platform Release	Certified Upgrade Paths	
Pre-7.7	**Upgrade to Current Release**	
7.7		
7.8		
7.9		
7.11	NA	7.14
7.13	7.14	7.15
7.14	7.15	7.16
7.15	7.16	7.17
7.16	7.17	7.18 (Planned)
7.17	7.18 (Planned)	7.19 (Planned)

- The information contained herein is provided for information purposes only and is intended only to outline CONTRACTOR's presently anticipated general technology direction. The information in the roadmap is not a commitment or an obligation to deliver any product, product feature or software functionality and CONTRACTOR reserves the right to make changes to the content and timing of any product, product feature or software release.

- The most current system release upgrade paths can be found in the most recent SMA bulletin.

Appendix B - System Pricing Configuration

This configuration is to be reviewed annually from the contract effective date. Any change in system configuration may require an ASTRO 25 SUA price adjustment.

Core	
Master Site Configuration	0
Zones in Operation (Including DSR and Dark Master Sites)	0
Zone Features: IV&D, TDMA, Telephone Interconnect, CNI, HPD, CSMS, IA, POP25, Text Messaging, Outdoor Location, ISSI 8000, InfoVista, KMF/OTAR	0
RF System	
Voice RF Sites & RF Simulcast Sites (including Prime Sites)	0
Repeaters/Stations (FDMA)	0
Repeaters/Stations (TDMA)	0
HPD RF Sites	0
HPD Stations	0
Dispatch Console System	
Dispatch Sites	0
Gold Elite Operator Positions	0
MCC 7500 Operator Positions (GPIOM)	0
MCC 7500 Operator Positions (VPM)	0
Conventional Channel Gateways (CCGW)	0
Conventional Site Controllers (GCP 8000 Controller)	0
Logging System	
Number of AIS Servers	0
Number of Voice Logging Recorder	0
Number of Logging Replay Clients	0
Network Management and MOSCAD NFM	
Network Management Clients	0
MOSCAD NFM Systems	0
MOSCAD NFM RTUs	0
MOSCAD NFM Clients	0
Fire Station Alerting (FSA)	
FSA Systems	0
FSA RTUs	0
FSA Clients	0
Fire Station Alerting (FSA)	
Voice Subscribers non-APX	0
Voice Subscribers APX	0
HPD Subscribers	0
Computing and Networking Hardware (for SUA / SUA, actual replacement qty may be less than shown)	
Workstations - High Performance	0
Workstations - Mid Performance	0
Servers - High Performance	0
Servers - Mid Performance	0
LAN Switch - High Performance	0
LAN Switch - Mid Performance	0
Routers	0

NETWORK MONITORING OVERVIEW

CONTRACTOR's Network Monitoring Operations (NMO) within the CONTRACTOR Solutions Support Center (SSC) provides real-time fault monitoring for radio communications networks on a continuous basis. NMO utilizes sophisticated tools for remote monitoring and event characterization of your communications networks. When an event is detected, NMO technologists acknowledge and assess the situation, and initiate a defined response.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

1. DESCRIPTION OF NETWORK MONITORING SERVICES

Network Monitoring is a service designed to electronically monitor elements of a communication system for events, as set forth in the Monitored Elements Table. When the SSC detects an event, (based on the severity of the event) trained technologists acknowledge and remotely diagnose the event and initiate an appropriate response in accordance with the STATE handling procedure. Appropriate responses could include, but are not limited to, continuing to monitor the event for further development, attempting remote remediation via engagement of Technical Support resources, or initiating dispatch[1] of a Field Servicer for onsite remediation.

a. Availability

Network Monitoring service is available 24 hours a day, 7 days a week. Network Monitoring availability is based on the level of contracted service and defined in the Customer Support Plan (CSP).

b. Geographic Availability

Network Monitoring is a globally provided service unless limited by data export control regulations. Timeframes are based on the STATE'S local time zone.

c. Inclusions

Network monitoring service can be delivered on CONTRACTOR sold infrastructure as stated in Monitored Elements Table.

d. Limitations and Exclusions

1) Does not include monitoring of anything outside of the radio network or monitoring of infrastructure provided by a third party, unless specifically stated. Monitored elements must be within the radio network and capable of sending traps to the Unified Event Manager (UEM).

2) Additional support charges above and beyond the contracted service agreements may apply if it is determined that system faults were caused by the STATE making changes to critical system parameters.

3) The following activities are outside the scope of the Network Monitoring service, but are optional services that are available to remote Network Monitoring STATE at an additional cost:

   a) Emergency on-site visits required to resolve technical issues that cannot be resolved by with SSC working remotely with the local STATE technical resource.

   b) System installations, upgrades, and expansions.

c) STATE training.

d) Hardware repair and/or exchange.

e) Network security services.

f) Network transport.

g) Information Assurance.

h) Any services not expressly included in this statement of work.

4) Reference the event catalogue to confirm monitored equipment.

5) Dispatch service with OnSite Response is a separate service that is required with Network Monitoring.

e. <u>CONTRACTOR has the following responsibilities:</u>

1) Provide dedicated connectivity through a network connection necessary for monitoring communication networks. The Connectivity Matrix further describes the connectivity options.

2) If determined necessary by CONTRACTOR, provide CONTRACTOR owned equipment for monitoring system elements. If CONTRACTOR installs or replaces CONTRACTOR owned equipment, the type of equipment and location installed is listed in the CONTRACTOR Owned & Supplied Equipment Table.

3) Verify connectivity and event monitoring prior to system acceptance or start date.

4) Monitor system continuously during hours designated in the CSP in accordance with the pre-defined times specified in section 1.6.2 below.

5) Remotely access the STATE'S system to perform remote diagnosis as permitted by STATE pursuant to section 1.6.4.

6) Create a case, as necessary. Gather information to perform the following:

a) Characterize the issue

b) Determine a plan of action

c) Assign and track the case to resolution.

7) Cooperate with STATE to coordinate transition of monitoring responsibilities between CONTRACTOR and STATE as specified in section 1.6.13 and 1.6.13.1.

8) Maintain communication with the STATE in the field as needed until resolution of the case

f. <u>The STATE has the following responsibilities:</u>

1) Allow CONTRACTOR continuous remote access to enable the monitoring service.

2) Provide continuous utility service to any CONTRACTOR equipment installed or utilized at STATE'S premises to support delivery of the service.

3) Provide CONTRACTOR with pre-defined STATE information and preferences prior to Start Date necessary to complete the CSP, including, but not limited to:

a) Case notification preferences and procedure

b) Repair Verification Preference and procedure

c) Database and escalation procedure forms.

4) Submit changes in any information supplied to CONTRACTOR and included in the CSP to the CSM

5) Provide the following information when initiating a service request:

   a) Assigned system ID number

   b) Problem description and site location

   c) Other pertinent information requested by CONTRACTOR to open a Case.

6) Notify the SSC when STATE performs any activity that impacts the system. (Activity that impacts the system may include, but is not limited to, installing software or hardware upgrades, performing upgrades to the network, or taking down part of the system to perform maintenance.)

7) Allow Servicers access to equipment (including any connectivity or monitoring equipment) if remote service is not possible.

8) Allow Servicers access to remove CONTRACTOR owned monitoring equipment upon cancellation of service.

9) Provide all STATE managed passwords required to access the STATE'S system to CONTRACTOR upon request or when opening a case to request service support or enable response to a technical issue.

10) Pay additional support charges above and beyond the contracted service agreements that may apply if it is determined that system faults were caused by the STATE making changes to critical system parameters

11) Obtain all third party consents or licenses required to enable CONTRACTOR to provide the monitoring service.

12) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the services described in this SOW.

13) Contact CONTRACTOR to coordinate transition of monitoring when monitoring responsibility is to be transferred to or from CONTRACTOR. (I.e. normal business hours to after-hours monitoring) as set forth in pre-defined information provided by STATE CSP.

   a) Upon contact, STATE must provide STATE name, site id, status on any open cases, severity level, and brief description of case and action plan to CONTRACTOR.

14) Acknowledge that cases will be handled in accordance with the times and priorities as defined in the Event Definition table- Appendix A .

15) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the Network Monitoring service.

The event types are based on the defined levels as follows:

Appendix A Engagement Matrix

Severity Level	Severity Definition	Engagement Times
1	This is defined as a critical/major incident that causes the system and/or infrastructure to experience a loss of call processing functionality and no work-around or immediate solution is available. The following are examples of this kind of failure: o 33% of call processing resources impaired o Remote Site/sub-system severed o Site Environment alarms: o Smoke o Unauthorized access o Temperature o Power failure	Response provided 24 hours, 7 days a week, including US Holidays.
2	This is defined as a moderate/minor incident that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of failure: o Less than 33% of call processing resources impaired o Failure of a single redundant component	Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

3	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: o Faults that have no impact in how the user perceives the system to work o Intermittent issues o Requests for information o Preventive Maintenance or upgrade related work	Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

CONTRACTOR'S failure to meet the above defined Response Times or Resolution Times in any given month during the term and any renewal term shall be deemed a service level default ("Service Level Default") and STATE may obtain the non-exclusive remedies set forth below.

Response and Resolution Service Levels (calculated monthly on a per incident basis)	**Service Level Credit (Prorated Fees – Monthly)**
Meets Response or Resolution Time	0%
1st Failure to meet Response or Resolution Time	Warning, 0%
2nd Failure to meet Response or Resolution Time	10%
3rd Failure to meet Response or Resolution Time	20%

In the event STATE is eligible for a 20% Service Level Credit under this section for any two (2) consecutive months of the term, STATE may terminate this Contract without penalty upon written notice to CONTRACTOR.

Credits shall be applied against the next invoice. In the event a Service Level Default occurs after a party has given notice of termination, or STATE has made final payment to CONTRACTOR for the software support services and no further invoices shall issue as a result, CONTRACTOR shall refund to STATE the amount of the appropriate Service Level Credit due for the period of default.

Notwithstanding the foregoing, a Service Level Default will not have occurred nor will CONTRACTOR provide Service Level Credits in the event CONTRACTOR, is unable to meet the above Response or Resolution Times due to forces outside of its control, including a Force Majeure or any action by a third party, including the STATE, that renders CONTRACTOR unable to comply with the above service level requirements.

Connectivity Matrix

Request connectivity 8 weeks in advance of service start date

System Type	Connectivity	Set up and Maintenance
ASTRO® 25	Internet VPN	CONTRACTOR
ASTRO® 25	T1	CONTRACTOR

CONTRACTOR Owned & Supplied Equipment Table

Equipment Type	Location Installed
Firewall/Router	Master Site
Service Delivery Management Server	Master Site for each Zone

Monitored Elements Table

Master Site Infrastructure	RF Site Equipment	Dispatch Site Equipment
Servers & Back up Servers	Channels	Consoles
MOSCAD (digital inputs & RS232 serial alarms)	MOSCAD (digital inputs & RS232 serial alarms)	AIS Servers
TRAK	RF Site Communication Path	Operator Position (OP)
Core LAN Switch	Switch	CONTRACTOR Gold Elite Gateway (MGEG)
Packet Data Gateway (PDG)	Site Controller	Call Processor
Radio Network Gateway (RNG)	Router	Logging Replay Station (only within the RNI)
Zone Database Server (ZDS)	Site	Ambassador (AMB)
Gateway Router	Gateway Router	Client Station
Controller – Zone & Domain	Network Time Protocol (NTP)	Voice Processing Module (VPM)
Firewall Manager Servers	Firewall	MCC 7500 IP Logging Recorders
Air Traffic Router (ATR)	SmartX Site Converter (only the converter, not the legacy sites)	MCC 7100 (only within the RNI)
Unified Event Manager (UEM)		
Zone Statistical Server (ZSS)		
Install Server		

**Some or all of the above equipment may be monitored depending on system configuration and need. Other equipment (not listed) may be monitored as an option, consult with your Customer Support Manager for details.*

ONSITE INFRASTRUCTURE RESPONSE AND DISPATCH SERVICE OVERVIEW

CONTRACTOR's OnSite Infrastructure Response & Dispatch service provides case management and escalation for onsite technical service requests. The service is delivered by the CONTRACTOR's Solutions Support Center (SSC) in conjunction with a local service provider. The SSC is responsible for opening a case for onsite support and monitoring the status of that case to ensure strict compliance to committed response times.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

1. DESCRIPTION OF SERVICES

The CONTRACTOR SSC will receive STATE request for OnSite service provider and dispatch a servicer. The servicer will respond to the STATE location based on pre-defined Severity Levels set forth in Section 4.0 - Severity Level Definitions able and Response times set forth in Section 5.0 – Severity Level Response Time Commitments table in order to restore the system.

CONTRACTOR will provide case management as set forth herein. The SSC will maintain contact with the on-site CONTRACTOR Service Shop until system restoral and case closure. The SSC will continuously track and manage cases from creation to close through an automated case tracking process.

2. SCOPE

OnSite Infrastructure Response & Dispatch service is available 24 hours a day, 7 days a week in accordance with Severity Level Definitions and Severity Level Response Time Commitments listed in sections 4.0 and 5.0 of this document.

a. Geographic Availability

OnSite Infrastructure Response and Dispatch is available to customers worldwide where CONTRACTOR servicers are present. Response times are based on the STATE'S local time zone.

b. Inclusions

Onsite Infrastructure Response and Dispatch Service can be delivered on CONTRACTOR-sold infrastructure.

c. CONTRACTOR has the following responsibilities:

1) Receive service requests.
2) Create a case as necessary when service requests are received. Gather information to perform the following:
    b) Characterize the issue.
    c) Determine a plan of action.
    d) Assign and track the case to resolution.
3) Dispatch a servicer as required by CONTRACTOR standard procedures and provide necessary case information collected in 2.2.
4) Ensure the required personnel have access to STATE information as needed.

d. <u>Servicer will perform the following on-site:</u>

1) Run diagnostics on the Infrastructure or Field Replacement Units (FRU).
2) Replace defective Infrastructure or FRU, as supplied by STATE [1].
3) Provide materials, tools, documentation, physical planning manuals, diagnostic/test equipment and any other requirements necessary to perform the maintenance service.
4) If a third party vendor is needed to restore the system, the Servicer may accompany that vendor onto the STATE's premises.
5) Verify with the STATE that restoration is complete or system is functional, if required by STATE'S repair verification in the Customer Support Plan required. If verification by STATE cannot be completed within 20 minutes of restoration, the case will be closed and the Servicer will be released.
6) Escalate the case to the appropriate party upon expiration of a response time.
7) Close the case upon receiving notification from STATE or servicer, indicating the case is resolved.
8) Notify STATE of case status as defined by the Customer Support Plan:
    a) Open and closed; or
    b) Open, assigned to the servicer, arrival of the servicer on-site, deferred or delayed, closed.
9) Provide Case activity reports to STATE if requested.

e. <u>STATE has the following responsibilities:</u>

1) Contact CONTRACTOR, as necessary, to request service.
2) Provide CONTRACTOR with the following pre-defined STATE information and preferences prior to start date necessary to complete Customer Support Plan (CSP):
    a) Case notification preferences and procedure.
    b) Repair verification preference and procedure.
    c) Database and escalation procedure forms.
    d) Submit changes in any information supplied in the CSP to the Customer Support Manager (CSM).
3) Provide the following information when initiating a service request:
    a) Assigned system ID number.
    b) Problem description and site location.
    c) Other pertinent information requested by CONTRACTOR to open a case.
4) Allow Servicers access to equipment.
5) Supply infrastructure or FRU, as applicable, in order for CONTRACTOR to restore the system.
6) Maintain and store in an easily accessible location any and all software needed to restore the system.

7) Maintain and store in an easily accessible location proper system backups.

8) For E911 systems, test the secondary/backup Public Safety Answering Point (PSAP) connection to be prepared in the event of a catastrophic failure of a system. Train appropriate personnel on the procedures to perform the function of switching to the backup PSAP.

9) Verify with the SSC that restoration is complete or system is functional, if required by repair verification preference provided by STATE.

10) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide these services.

1.Infrastructure Repair with Advanced Replacement (IRAR) is a service offering that provides repair and replacement of infrastructure equipment. IRAR enhances Onsite and Dispatch Service by enabling a faster response and repair times.

3. SEVERITY LEVEL DEFINITIONS

The following severity level definitions will be used to determine the maximum response times:

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of severity: □ 33% of call processing resources impaired □ Site Environment alarms: o Smoke o Unauthorized access o Temperature o Power failure
Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of severity: □ Less than 33% of call processing resources impaired □ Failure of a single redundant component
Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: □ Intermittent faults that are infrequent and minor impact to core services □ Statistical reporting problems

Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: □ Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. □ Faults that have no impact in how the user perceives the system to work. □ Cosmetic issues. □ Requests for information. □ Preventive Maintenance

4. SEVERITY LEVEL RESPONSE TIME COMMITMENTS

(STATE'S Response Time Classification is designated in the Customer Support Plan.)

Severity Level	Standard Response Time	Resolution Time
Severity 1*	Within 4 hours from receipt of notification continuously	8 hours (1 business day)
Severity 2	Within 4 hours from receipt of notification Standard Business Day	8 hours (1 business day)
Severity 3	Within 8 hours from receipt of notification Standard Business Day	40 hours (1 business week)
Severity 4	Within 12 hours from receipt of notification Standard Business Day	40 hours (1 business week)

*Severity Level 1 & 2: Based on field replacement unit (FRU) availability, otherwise next business day. Additional FRU can be purchased locally in addition to those provided in the project and part of maintenance.

5. SECURITY UPDATE SERVICE OVERVIEW

To verify compatibility with your ASTRO system, CONTRACTOR's Security Update Service (SUS) provides pre-tested 3rd party software (SW) security updates.

This service was formerly called Pre-tested Software Subscription (PTSS). Additionally, SUS Platinum has been eliminated. The additional SUS Platinum features have been merged into this one SUS offering.

This Statement of Work ("SOW") is subject to the terms and conditions of CONTRACTOR's Professional Services Agreement, Service Agreement or other applicable agreement in effect between the parties ("Agreement"). CONTRACTOR and STATE may be referred to herein individually as a "Party or together as "Parties."

6. DESCRIPTION OF SECURITY UPDATE SERVICES

CONTRACTOR shall maintain a dedicated vetting lab for each supported ASTRO release for the purpose of pre-testing security updates. In some cases, when appropriate, CONTRACTOR will make the updates available to outside vendors, allow them to test, and then incorporate those results into this offering. Depending on the specific ASTRO release and STATE options, these may include updates to antivirus definitions, OEM vendor supported Windows Workstation and Server, Solaris and RedHat Linux (RHEL) operating system patches, VMware ESXi Hypervisor patches, Oracle database patches, PostgreSQL patches, and patches for other 3rd party Windows applications such as Adobe Acrobat and Flash.

CONTRACTOR has no control over the schedule of releases. The schedule for the releases of updates is determined by the Original Equipment Manufacturers (OEMs), without consultation with CONTRACTOR. Antivirus definitions are released every week. Microsoft patches are released on a monthly basis. CONTRACTOR obtains and tests these updates as they are released. Other products have different schedules or are released "as-required." CONTRACTOR will obtain and test these updates on a quarterly basis.

SUS (Self- Installed) is the baseline offer. Sections describing the optional delivery methods and reboot support service are only applicable if purchased.

SUS Delivery Methods

Patch Delivery Method	Download Responsibility	Installation Responsibility	Reboot Support
SUS (Self-Installed)	STATE	STATE	*Option
Remote SUS			*Option
On-Site Delivery of SUS			Included

Packages for L & M Cores

Packages	**SUS (Self Installed)**	**RSUS**	**On-Site Delivery of SUS**	**Reboot Support**
Essential / +	✓			Optional
Advanced / +	✓	✓	Optional	Optional
Premier	✓	✓	Optional	Included

SUS - Included in Warranty Year 1 and Optionally in Years 2-5

Once tested, CONTRACTOR will post the updates to a secured extranet website and send an email notification to the STATE. If there are any recommended configuration changes, warnings, or workarounds, CONTRACTOR will provide detailed documentation along with the updates on the website. The STATE will be responsible for the download and deployment of these updates to their ASTRO System.

Remote Delivery of SUS (RSUS) - Included in Warranty Year 1

Remote Delivery of SUS. CONTRACTOR's dedicated staff remotely installs the required security updates and operating system patches onto your radio network. Vulnerabilities from third party software are addressed as soon as the validation of recommended patches is completed. CONTRACTOR will also provide reports outlining updates made for your team's review and awareness. Patch transfers are transparent to the end user. After the patches are transferred, a report is sent out to inform our customers which machines they will need to reboot the appropriate devices to enable the new patches and antivirus definitions.

Reboot Support Delivery of SUS/RSUS - Optional

This optional enhancement provides support for rebooting impacted servers and workstations after the patches have been downloaded/pushed and installed. Once installation is complete, CONTRACTOR will deploy trained technicians to reboot servers and workstations at the STATE locations.

ON-SITE Delivery of SUS - Optional

For convenience, a trained technician will be contacted to provide the complete patching service. At the STATE location, the technician will download patches, perform the required installation services and coordinate the rebooting of servers and dispatch ops.

7. SCOPE

Security Update Service supports the currently shipping CONTRACTOR ASTRO System Release (SR) and strives to support 4 releases prior. CONTRACTOR reserves the right to adjust which releases are supported as business conditions dictate. Contact your Customer Service Manager for the latest supported releases.

SUS is available for any L or M core system in a supported release.

Systems that have non-standard configurations that have not been certified by CONTRACTOR Systems Integration and Testing (SIT) are specifically excluded from this Service unless otherwise agreed in writing by CONTRACTOR. Service does not include pre-tested intrusion detection system (IDS) updates for IDS solutions. Certain consoles, MOTOBRIDGE, MARVLIS, Symbol Equipment, AirDefense Equipment, AVL, and Radio Site Security products are also excluded. CONTRACTOR will determine, in its sole discretion, the third party software that is supported as a part of this offering.

Antivirus updates - Antivirus updates are released weekly. The target release for these updates is by close of business each Tuesday. While the release often occurs early, this is the time and date committed to by vetting.

Windows - Updates are downloaded on Microsoft Patch Tuesday (2nd Tuesday of the

month). Updates are incorporated, tested and vetted in the Windows Motopatch disk over the next few weeks. The target release is by the last day of the month.

Windows 3rd Party updates - for Adobe Reader and Adobe Flash are included on the standard Motopatch for Windows disk and follow the Windows patching schedule.

RHEL - Security updates are downloaded the last week of the first month of the quarter. Updates include any updates that are available at that time. We then prepare, test and vet the RHEL 5, and RHEL 6, Motopatch disks and target to release the disks by the last day of the quarter.

VMware - Security updates are downloaded the last week of the first month of the quarter for ESXi. These updates are downloaded from HP directly. The updates are incorporated into the Motopatch for ESXi disk. We then prepare, test and vet the ESXi Motopatch and target to release the disk by the last day of the quarter.

PostgreSQL* - Security updates are downloaded the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The Motopatch for PostgreSQL disk target release is by the last day of the quarter. *7.14 and later major releases

McAfee Patch Updates - Security patches are downloaded from McAfee the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The Motopatch for McAfee disk target release is by the last day of the quarter.

DOT HILL DAS Firmware disk - Security patches are downloaded from DOT HILL the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The disk target release is by the last day of the quarter.

a. CONTRACTOR has the following responsibilities:

1) Obtain relevant 3rd party security updates as made available and supported from the OEM's. This includes antivirus definition, OEM vendor available/supported operating systems patches, VMWare patches, database patches, and selected other 3rd party patches covered by SUS. CONTRACTOR does not control when these updates are released, but current release schedules are listed for reference:

   McAfee Antivirus definitions– Weekly

   Microsoft PC and Server OS patches – Monthly

   Solaris, RHEL OS, VMware hypervisor patches – Quarterly Other 3rd party patches - Quarterly

2) Each assessment will consist of no less than 36 hours of examination time to evaluate the impact each update has on the system.

3) Testing of updates to verify whether they degrade or compromise system functionality on a dedicated ASTRO test system with standard supported configurations.

4) Address any issues identified during testing by working with CONTRACTOR selected commercial supplier and/or CONTRACTOR product development

engineering team. If a solution for the identified issues cannot be found, the patch will not be posted on CONTRACTOR's site.

5) Pre-test STIG recommended remediation when applicable.
6) Release all tested updates to CONTRACTOR's secure extranet site.
7) Include documentation for installation, recommended configuration changes, and identified issues and remediation for each update release.
8) Include printable labels for customers who download the updates to CD's.
9) Notify STATE of update releases by email.
10) A supported SUS ASTRO release matrix will be kept on the extranet site for reference.

b. <u>The STATE has the following responsibilities:</u>

1) Provide CONTRACTOR with pre-defined information prior to contract start date necessary to complete a Customer Support Plan (CSP).
2) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).
3) Provide means for accessing pre-tested files (Access to the extranet website).
4) Deploy pre-tested files to the STATE system as instructed in the "Read Me" text provided.
5) Implement recommended remediation(s) on STATE system, as determined necessary by STATE.
6) Upgrade system to a supported system release as necessary to continue service.
7) Adhere closely to the System Support Center (SSC) troubleshooting guidelines provided upon system acquisition. A failure to follow SSC guidelines may cause the STATE and CONTRACTOR unnecessary or overly burdensome remediation efforts. In such case, CONTRACTOR reserves the right to charge an additional service fee for the remediation effort.
8) Comply with the terms of the applicable license agreement between the STATE and the non-CONTRACTOR software copyright owner.

8. DISCLAIMER

CONTRACTOR disclaims any and all warranties with respect to pre-tested antivirus definitions, database security updates, hypervisor patches, operating system software patches, intrusion detection sensor signature files, or other 3rd party files, express or implied. Further, CONTRACTOR disclaims any warranty concerning the non-CONTRACTOR software and does not guarantee that STATE'S system will be error-free or immune to security breaches as a result of these services.

ANNUAL PREVENTIVE MAINTENANCE STATEMENT OF WORK

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

Annual Preventative Maintenance will provide annual operational tests on the STATE'S infrastructure equipment (Infrastructure or Fixed Network Equipment or "FNE") to monitor the Infrastructure's conformance to specifications, as set forth in the applicable attached Exhibit(s), all of which are hereby incorporated by this reference.

1. SCOPE

Annual Preventive Maintenance will be performed during standard business hours (unless otherwise agreed to in writing). If the system or STATE requirements dictate this service must occur outside of standard business hours, an additional quotation will be provided. STATE is responsible for any charges associated with unusual access requirements or expenses.

a. Inclusions

Annual Preventive Maintenance service will be delivered on CONTRACTOR sold infrastructure including integrated 3rd party products per the level of service as defined in Table 1.

b. Limitations and Exclusions

Unless specifically called out in Table 1, the following activities are outside the scope of the Annual Preventive Maintenance service, however, can be included as optional services that are available to Annual Preventive Maintenance at an additional cost:

1) Emergency on-site visits required to resolve technical issues.
2) Third party support for equipment not sold by CONTRACTOR as part of the original system.
3) System installations, upgrades, and expansions.
4) STATE training.
5) Hardware repair and/or exchange.
6) Network security services.
7) Network transport.
8) Information Assurance.
9) CONTRACTOR services not included in this statement of work.
10) Any maintenance required as a result of a virus or unwanted intrusion is excluded if the system is not protected against these security threats by CONTRACTOR's Pre-tested Security Update Service when applicable.
11) Tower climbs, tower mapping analysis or tower structure analysis

c. CONTRACTOR has the following responsibilities:

1) Notify the STATE of any planned system downtime needed to perform this Service.
2) Advise STATE of issues that may require attention.

3) Maintain communication with the STATE as needed until completion of the Annual Preventive Maintenance.

4) Determine, in its sole discretion, when a case requires more than the Annual Preventive Maintenance services described in this SOW and notify STATE of an alternative course of action.

5) Provide STATE with a report documenting system performance against expected parameters along with recommended actions. Time allotment for report completion TBD.

6) Provide trained and qualified personnel with proper security clearance required to complete Annual Preventive Maintenance service.

d. <u>The STATE has the following responsibilities:</u>

1) Provide preferred schedule for Annual Preventative Maintenance to CONTRACTOR.

2) Authorize and acknowledge any scheduled system downtime.

3) Maintain periodic backup of databases, software applications, and firmware.

4) Establish and maintain a suitable environment (heat, light, and power) for the equipment location and provide CONTRACTOR full, free, and safe access to the equipment so that CONTRACTOR may provide services. All sites shall be accessible by standard service vehicles.

5) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).

6) Provide site escorts in a timely manner if required.

7) Provide CONTRACTOR with requirements necessary for access to secure facilities.

8) Obtain at STATE'S cost all third party consents or licenses required to enable CONTRACTOR to provide the Service.

e. <u>The Servicer has the following responsibilities:</u>

1) Perform the Preventive Maintenance tasks as set forth in Table 1 at the level of service the STATE has purchased.

2) Perform the Site Performance Verification Procedures in Table 2 for each site type on the system.

3) Provide required diagnostic/test equipment necessary to perform the Preventive Maintenance service.

4) As applicable, use the Method of Procedure (MOPs) as defined for each task.

Table 1 Preventive Maintenance Tasks

MASTER SITE CHECKLIST - LEVEL 1	
SERVERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
NM Client Applications	Review UEM events and transport medium types, (microwave/leased line/telco, etc.). Event log review for persistent types. Verify all NM client applications are operating correctly.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
Complete Backup	Verify backups have been done or scheduled. SZ database (BAR), Centracom CDM/ADM database, etc.
Network Time Protocol (NTP)	Verify operation and syncing all devices.
Data Collection Devices (DCD) check (if present)	Verify data collection
Anti-Virus	Verify anti-virus is enabled and that definition files are up to date (within two weeks of current date) on CSMS
ROUTERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on router type. Capture available diagnostic logs.
Verify Redundant Routers	Test redundancy in CWR devices. Core router switchover (coordinate with STATE).
SWITCHES	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on switch type. Capture available diagnostic logs.
Verify Redundant Switches	Test redundancy in CWR devices. Core router switchover (coordinate with STATE).
DOMAIN CONTROLLERS (non-CSA)	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.

Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
FIREWALLS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
LOGGING EQUIPMENT	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Server CPU Health	i.e. memory, HDD, CPU, disk space/utilization.

PRIME SITE CHECKLIST - LEVEL 1	
SOFTWARE	
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
SWITCHES	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on switch type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
ROUTERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on router type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
MISCELLANEOUS EQUIPMENT	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server

	type. Capture available diagnostic logs.
Site Frequency Standard Check (TRAK)	Check lights and indicators for A/B receivers.
SITE CONTROLLERS	
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
COMPARATORS	
Equipment Alarms	Verify no warning/alarm indicators.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways

DISPATCH SITE CHECKLIST - LEVEL 1	
GENERAL	
Inspect all Cables	Inspect all cables/connections to external interfaces are secure
Mouse and Keyboard	Verify operation of mouse and keyboard
Configuration File	Verify each operator position has access to required configuration files
Console Op Time	Verify console op time is consistent across all ops
Screensaver	Verify screensaver set as STATE prefers
Screen Performance	Verify screen operational/performance
Touchscreen	Verify touchscreen operation (if applicable)
Cabling/Lights/Fans	Visual inspection of all equipment - cabling/ lights/ fans
Filters/Fans/Dust	Clean any filters/ fans/ dust- all equipment
Monitor and Hard Drive	Confirm monitor and hard drive do not "sleep"
DVD/CD	Verify / clean DVD or CD drive
Time Synchronization	Verify console time is synchronized with NTP server
Anti-Virus	Verify anti-virus is enabled and that definition files are up to date (within two weeks of current date)

HEADSET UNPLUGGED TESTING	
Speakers	Test all speakers - audio quality, volume, static, drop-outs, excess hiss when turned up.
Channel Audio in Speaker	Verify selected channel audio in select speaker only.
Footswitch Pedals	Verify both footswitch pedals operational
Radio On-Air Light	Verify radio on air light comes on with TX (if applicable)
HEADSET PLUGGED IN TESTING	
Radio TX and RX	Verify radio TX/RX from both headset jacks. Verify levels OK. Check volume controls for noise/static or drop-outs.
Speaker Mute	Verify select speaker muted.
Telephone Operation	Verify telephone operational through both headset jacks. Check volume controls for noise/static or drop-outs.
Audio Switches	Verify select audio switches to speaker when phone off-hook. (if interfaced to phones)
Radio Takeover in Headset	Verify radio-takeover in headset mic when phone off-hook (mic switches to radio during PTT and mutes to phone).
OTHER TESTS	
Phone Status Light	Verify phone status light comes on when phone off-hook (if applicable)
Desk Microphone Operation	Confirm desk mic operation (if applicable)
Radio IRR Operation	Verify radio IRR operational (if applicable) on MOT dispatch
Telephone IRR Operation	Verify telephone [if on radio computer] IRR operational (if applicable) on MOT dispatch
Recording	Verify operator position being recorded on long term logging recorder (if applicable) if included in service agreement
COMPUTER PERFORMANCE TESTING	
Computer Reboot	Reboot op position computer
Computer Operational	Confirm client computer is fully operational (if applicable)
AUDIO TESTING	
Conventional Resources	Confirm all conventional resources are functional with adequate audio levels and quality
Secure Mode	Confirm any secure talkgroups are operational in secure mode
Trunked Resources	Confirm all trunked resources on screen are functioning by placing a call in both directions (at the STATE'S discretion) and at a single op position
Backup Resources	Confirm backup resources are operational
EQUIPMENT ROOM TESTS	

Recording - AIS Test	Verify audio logging of trunked calls
Recording	Test op position logging on analog recorder (with STATE assistance)
System Alarms	Review alarm system on all equipment for errors
Capture Diags	Perform recommended diagnostic tests based on equipment. Capture available diagnostic logs.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
PLAYBACK STATION (CONTRACTOR Provided)	
Capture Diags	Perform recommended diagnostic tests based on equipment. Capture available diagnostic logs.
Recall Audio	Verify that radio/telephone audio can be recalled

RF SITE CHECKLIST - LEVEL 1	
RF PM CHECKLIST	
Equipment Alarms	Verify no warning/alarm indicators.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
Site Frequency Standard Check	Check lights and indicators for A/B receivers.
Basic Voice Call Check	Voice test each voice path, radio to radio.
Control Channel Redundancy (trunking)	Roll control channel, test, and roll back.
Site Controller Redundancy (trunking) - ASR only	Roll site controllers with no dropped audio.
PM Optimization Workbook (See Table 2 for GTR tests)	Complete Base Station Verification tests - Frequency Error, Modulation Fidelity, Forward at Set Power, Reverse at Set Power, Gen Level Desense no Tx

MOSCAD CHECKLIST - LEVEL 1	
MOSCAD SERVER	
Equipment Alarms	Verify no warning/alarm indicators.
Check Alarm/Event History	Review MOSCAD alarm and events to find if there are chronic issues.
Windows Event Logs	Review Windows event logs. Save and clear if full.
Password Verification	Site devices to verify passwords. Document changes if any

	found.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
MOSCAD CLIENT	
Equipment Alarms	Verify no warning/alarm indicators.
Check Alarm / Event History	Review MOSCAD alarm and events to find if there are chronic issues.
Windows Event Logs	Review Windows event logs. Save and clear if full.
Password Verification	Site devices to verify passwords. Document changes if any found.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
MOSCAD RTU's	
Equipment Alarms	Verify no warning/alarm indicators.
Verify Connectivity	Verify Connectivity
Password Verification	Site devices to verify passwords. Document changes if any found.
Check Alarm/Event History	Review MOSCAD alarms and events to find if there are chronic issues.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.

FACILITIES CHECKLIST - LEVEL 1	
VISUAL INSPECTION EXTERIOR	
ASR Sign	Verify that the ASR sign is posted.
Warning Sign - Tower	Verify warning sign is posted on the tower.
Warning Sign - Gate	Verify that a warning sign is posted at the compound gate entrance.
10 Rule Sign	Verify that a 10 rules sign is posted on the inside of the shelter door.
Outdoor Lighting	Verify operation of outdoor lighting/photocell.
Exterior of Building	Check exterior of building for damage/disrepair.
Fences / Gates	Check fences/gates for damage/disrepair.
Landscape / Access Road	Check landscape/access road for accessibility.
VISUAL INSPECTION INTERIOR	
Electrical Surge Protectors	Check electrical surge protectors for alarms.
Emergency Lighting	Verify emergency lighting operation.

Indoor Lighting	Verify indoor lighting.
Equipment Inspection	Visually inspect that all hardware (equipment, cables, panels, batteries, racks, etc.) are in acceptable physical condition for normal operation.
Regulatory Compliance (License, ERP, Frequency, Deviation)	Check station for regulatory compliance. Update station logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
UPS	
Visual inspection (condition, cabling)	Verify corrosion, physical connections, dirt/dust, etc.
GENERATOR	
Visual Inspection	Verify, check panel housing, cracks, rust and weathering. Physical connections, corrosion, dirt/dust, etc.
Fuel	Verify fuel levels in backup generators, document date of last fuel delivered from fuel service provider.
Oil	Check the oil dipstick for proper level. Note condition of oil.
Verify operation (no switchover)	Check, verify running of generator, ease of start or difficult. Is generator "throttling" or running smooth? Any loud unusual noise? Etc.
Motorized Dampers	Check operation
HVAC	
Air Filter	Check air filter and recommend replacement if required.
Coils	Check coils for dirt and straightness
Outdoor Unit	Check that outdoor unit is unobstructed
Wiring	Wiring (insect/rodent damage)
Cooling / Heating	Check each HVAC unit for cooling/heating
Motorized Dampers	Check operation

MICROWAVE CHECKLIST - LEVEL 1	
GENERAL	
Transport Connectivity	Confirm transport performance by viewing UEM for site link warnings or errors.
RADIO	
Alarms	Check alarm / event history
Software	Verify version of application
TX Frequency	Verify transmit frequency

TX Power	Verify transmit power
RX Frequency	Verify receive frequency
RX Signal Level	Verify receive signal level and compare with install baseline documentation
Save configuration	Save current configuration for off-site storage
Backhaul Performance	Monitor UEM status (alarms, logs, etc.) for all links. If UEM not used to monitor microwave, then use provided microwave alarm mgmt. server.
WAVEGUIDE	
Visual Inspection	Inspect for wear or dents (from ground using binoculars).
Connection Verification	Verify all connections are secured with proper hardware (from ground using binoculars).
DEHYDRATOR	
Visual Inspection	Inspect moisture window for proper color
Pressure Verification	Verify pressure of all lines
Re-Pressurization	Bleed lines temporarily to verify the dehydrator re-pressurizes
Run Hours	Record number of hours ran

TOWER CHECKLIST - LEVEL 1	
STRUCTURE CONDITION	
Rust	Check structure for rust.
Cross Members	Check for damaged or missing cross members.
Safety Climb	Check safety climb for damage.
Ladder	Verify that ladder system is secured to tower.
Welds	Check for cracks or damaged welds.
Outdoor lighting/photocell	Test outdoor lighting and photocell.
Drainage Holes	Check that drainage holes are clear of debris.
Paint	Check paint condition.
TOWER LIGHTING	
Lights/Markers	Verify all lights/markers are operational.
Day/Night Mode	Verify day and night mode operation.
Power Cabling	Verify that power cables are secured to tower.
ANTENNAS AND LINES	
Antennas	Visually inspect antennas for physical damage (from ground using binoculars).

Transmission Lines	Verify that all transmission lines are secure on the tower.
GROUNDING	
Structure Grounds	Inspect grounding for damage or corrosion
GUY WIRES	
Tower Guys	Check guy wires for fraying and tension.
Guy Wire Hardware	Check hardware for rust.
CONCRETE CONDITION	
Tower Base	Check for chips or cracks.

Table 2 Site Performance Verification Procedures

ASTRO 25 GTR ESS SITE PERFORMANCE
ANTENNAS
Transmit Antenna Data
Receive (Antenna) System Data
Tower Top Amplifier Data
FDMA MODE
Base Radio Transmitter Tests
Base Radio Receiver Tests
Base Radio Transmit RFDS Tests
Receive RFDS Tests with TTA (if applicable)
Receive RFDS Tests without TTA (if applicable)
TDMA MODE
Base Radio TDMA Transmitter Tests
Base Radio TDMA Receiver Tests
TDMA Transmit RFDS Tests
TDMA Receive RFDS Tests with 432 Diversity TTA
TDMA Receive RFDS Tests with 2 Independent TTA's (if applicable)
TDMA Receive RFDS Tests without TTA (if applicable)

SECURITY MONITORING SERVICE OVERVIEW

CONTRACTOR's Security Monitoring Services includes anti-malware monitoring and authentication log monitoring. There are also options for firewall monitoring, intrusion detection system (IDS) monitoring, and ASTRO system log monitoring.

CONTRACTOR's ASTRO Security Monitoring is a complete solution that provides peace of mind and reduces the risk that your network availability will be impacted by a security threat. The solution includes 24x7x365 monitoring of the radio network security elements by experienced, specialized security technologists with years of experience working with ASTRO mission-critical networks. For highly complex or unusual security events, our technologists have direct and immediate access to CONTRACTOR engineers for rapid resolution.

This Statement of Work ("SOW") is subject to the terms and conditions of CONTRACTOR's Professional Services Agreement, Service Agreement or other applicable agreement in effect between the parties ("Agreement"). CONTRACTOR and STATE may be referred to herein individually as a "Party" or together as "Parties"

1. DESCRIPTION OF SECURITY MONITORING SERVICES

a. Anti-malware Monitoring

ASTRO comes installed with Anti-malware SW. Security Monitoring will ensure that malware definition updates, as provided by the Anti-malware OEM, are installed and running. The anti-malware SW is monitored for activity such as deletion, quarantine, and alerting of suspicious SW.

b. Authentication Monitoring

Windows and RSA logins are monitored for repeated failures and locked accounts.

c. Firewall Monitoring

The ASTRO system potentially has several firewall options. See Table 1 in the addendum for a list. In any of these firewall applications, CONTRACTOR provisions and deploys the firewalls with the ASTRO system. CONTRACTOR will monitor each one that has the firewall monitoring option.

d. IDS (Intrusion Detection System) Monitoring.

An IDS is an option to ASTRO that may be deployed between the ASTRO firewall and the CEN.

e. Centralized Log Monitoring

ASTRO has an option that provides the ability to forward device syslogs to a single virtual server called Centralized Syslog Server. This allows monitoring of Linux components for authentication events.

2. SCOPE

The CONTRACTOR Secure Operations Center (SOC) consists of highly trained and experienced security professionals. When an event is detected, the technologists will run remote diagnostics and initiate an appropriate response. This response could include, but is not limited to, continuing to monitor the event for further development, attempting to remotely restore the system, or opening of a case for dispatch of a servicer.

a. CONTRACTOR Responsibilities:

1) Provide, maintain, and replace when necessary, HW and SW required to monitor ASTRO security elements. HW may include a firewall, router, or physical server. SW may include virtual servers either on the ASTRO core or a separate physical server, related OS, SIEM collectors, and SW that allows distribution of updates and remote diagnostics.
2) Verify connectivity and monitoring is active prior to system acceptance or start date.
3) Coordinate with STATE to maintain CONTRACTOR service authentication credentials.
4) Maintain properly trained and accredited technicians. Monitor the STATE'S system 24/7/365 for malicious or unusual activity.
5) Reports are posted to the SSC quality webpage. Contact your CSM for access.

b. The STATE has the following responsibilities:

1) Security Monitoring requires a connection from the STATE'S ASTRO system to CONTRACTOR's SOC in Schaumburg. CONTRACTOR offers either a T1 option or a Virtual Private Network (VPN) option through a STATE supplied internet connection. Connectivity needs to be established before service commences.
2) Allow CONTRACTOR continuous remote access to monitor the ASTRO system. This includes keeping the connection plugged-in, providing passwords, and working with CONTRACTOR to understand and maintain proper administration privileges.
3) Provide continuous utility service to any CONTRACTOR equipment installed or utilized at the STATE'S premises to support delivery of this service.
4) Provide STATE contact information necessary to complete the Customer Support Plan. Notify your CSM within 2 weeks of any contact changes.
5) As necessary, upgrade the ASTRO system to supported releases.
6) Allow CONTRACTOR dispatched-servicers physical access to the equipment when required.
7) Comply with the terms of the applicable license agreements between STATE and the non-CONTRACTOR software copyright owners.
8) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the services described in this SOW.

3. DISCLAIMER

CONTRACTOR disclaims any warranty and does not guarantee that STATE'S system will be error-free or immune to security breaches as a result of these services.

Addendum Potential ASTRO Firewalls

CNI	Customer Network Interface. This firewall separates the ASTRO Radio Network from the customer's IT network (often referred to as the CEN or Customer Enterprise network). There are single and redundant (high-availability) options for the CNI, the redundant option meaning there are two firewalls. Both firewalls must be monitored in the redundant case.
DSR	Dynamic System Resilience. This is an ASTRO option where a geographically separated backup master site is implemented as a "hot-standby" in case of disaster at the primary. This option potentially doubles the number of firewalls in the system.
ZCP	Zone Core Protection. This ASTRO option places firewalls at the master site where the RF and console sites connect. This protects the core from attack from a compromised site and propagation of the attack to the other sites. There are always 2 firewalls in this option for redundancy.
TI	Telephone Interconnect. This ASTRO option allows calls to be made to/from ASTRO subscribers. A firewall is required to protect the RNI from the telephone connection. One firewall may serve the dual purpose of the TI and ISSI interface.
ISSI	Inter RF Subsystem Interface. This option allows connectivity to a separate system. The original intent of this option was to connect to another P25 system that could be CONTRACTOR or any other P25 compliant vendor. This standard has since been used to allow connection to non- P25 systems through additional interfaces such as WAVE. In any case, a firewall is necessary to protect the RNI from this connection.
MCC 7100	The MCC 7100 dispatch console may be configured such that it can connect via Virtual Private Network (VPN) through an internet connection. A firewall is required to terminate on the ASTRO side of that connection. This firewall may be physically located at either a console site or the master site and there may be multiple firewalls for this purpose.
Custom	Some customers may opt to install their own firewalls and want them monitored. The most common location is at console sites. The STATE will have to work with CONTRACTOR to determine if and how custom firewalls can be monitored. There may also be additional charges.

4. TECHNICAL SUPPORT OVERVIEW

CONTRACTOR's Technical Support service provides telephone consultation for technical issues that require a high level of ASTRO network expertise and troubleshooting capabilities. Remote Technical Support is delivered through the CONTRACTOR System Support Center (SSC) by a staff of technical support specialists skilled in diagnosis and swift resolution of infrastructure performance and operational issues. Technical Support provides access to a solutions database, as well as access to in house test labs and additional CONTRACTOR technical resources.

CONTRACTOR applies industry best practices in recording, monitoring, escalating and reporting for Technical Support calls from its contracted customers, reflecting the importance of maintaining mission critical systems.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

5. DESCRIPTION OF TECHNICAL SUPPORT SERVICES

CONTRACTOR's System Support Center (SSC) will provide technical support to assist the STATE'S technical resources of the CONTRACTOR's currently supported infrastructure. This team of highly skilled professionals is available to the STATE as an integrated part of the support and technical issue resolution process. The SSC remotely supports the STATE and works with but not limited to fault diagnostics tools, simulation networks and fault database search engines.

The Technical Support Operations is available 24 hours a day; 7 days per week to support technical requests (see severity level response time commitments). Calls requiring incidents, problems, or service requests will be logged in CONTRACTOR's issue management system. This ensures that technical issues are prioritized, updated, tracked and escalated as necessary, until resolution. The Technical Support Operations shall assign the priority level as in accordance with the agreed Severity Level Definitions stated in this document.

CONTRACTOR will track the progress of each case from initial logging to resolution. CONTRACTOR will ensure that the STATE is advised of the case progress and informed of tasks that require further investigation and assistance from the STATE'S technical resources

The provision of this service requires that the STATE provides a suitably trained technical resource that delivers maintenance and support to the system, and who is familiar with the operation of that system. CONTRACTOR provides technical consultants to support the local resource in the timely closure of infrastructure, performance and operational issues.

6. SCOPE

Technical Support service is available 24 hours a day, 7 days a week based on Severity Level Definitions.

a. Geographic Availability

Technical Support is available to any customer regardless of their geographic location and timeframes are based on the STATE'S local time zone.

b. Inclusions

Technical Support service will be delivered on CONTRACTOR sold infrastructure including integrated 3rd party products.

c. Limitations and Exclusions

The following activities are outside the scope of the Technical Support service, but are optional services that are available to remote Technical Support at an additional cost:

1) Emergency on-site visits required to resolve technical issues that cannot be resolved by with SSC working remotely with the local STATE technical resource.
2) Third party support for equipment not sold by CONTRACTOR as part of the original system.
3) System installations, upgrades, and expansions.
4) STATE training.
5) Hardware repair and/or exchange.
6) Network security services.
7) Network transport.
8) Information Assurance.
9) CONTRACTOR services not included in this statement of work.
10) Any technical support required as a result of a virus or unwanted intrusion is excluded if the system is not protected against these security threats by CONTRACTOR's Pre-tested Security Update Service when applicable.

d. CONTRACTOR has the following responsibilities:

1) Enable STATE access to the CONTRACTOR Technical Support Center (800-221-7144), 24 hours a day, 7 days per week, to answer, document and respond to requests for support.
2) Respond to requests for Technical Support in accordance with the response times set forth in the Severity Level Response Time Commitments section of this document and the severity level defined in the Severity Level Definitions section of this document.
3) Advise caller of procedure for determining any additional requirements, activities or information relating to issue restoration and/or characterization.
4) Maintain communication with the STATE in the field as needed until resolution of the case
5) Coordinate technical resolutions with agreed upon third party vendors, as needed.
6) Escalate and manage support issues, including systemic issues, to additional CONTRACTOR technical resources, as applicable.
7) Escalate the case to the appropriate party upon expiration of a response time.
8) Determine, in its sole discretion, when a case requires more than the Technical Support services described in this SOW and notify STATE of an alternative course of action.

e. **The STATE has the following responsibilities:**

1) Provide CONTRACTOR with pre-defined information prior to contract start date necessary to complete Customer Support Plan (CSP).
2) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).
3) Contact the SSC in order to engage the Technical Support service, providing the necessary information for proper entitlement services. Including but not limited to the name of contact, name of customer, system ID number, site(s) in question, and brief description of the problem including pertinent information for initial issue characterization.
4) Maintain suitable trained technical resources that provide field maintenance and technical maintenance services to the system, and who are familiar with the operation of that system.
5) Provide SSC access via the remote connection that has been established through other sold services (e.g. Network Fault Monitoring)
6) Supply suitably skilled and trained on-site presence when requested by the SSC.
7) Validate issue resolution prior to close of the case in a timely manner.
8) Acknowledge that cases will be handled in accordance with the times and priorities as defined in the Severity Level Definitions and in the Severity Level Response Time Commitments section in this document.
9) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the Technical Support service.

7. SEVERITY LEVEL DEFINITIONS

The following severity level definitions will be used to determine the maximum response times:

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of failure: □ 33% of call processing resources impaired □ Site Environment alarms: o Smoke, o Unauthorized access o Temperature o Power failure

Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of failure: □ Less than 33% of call processing resources impaired □ Failure of a single redundant component
Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: □ Intermittent faults that are infrequent and minor impact to core services □ Statistical reporting problems
Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: □ Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. □ Faults that have no impact in how the user perceives the system to work. □ Cosmetic issues. □ Requests for information. □ Preventive Maintenance

8. SEVERITY LEVEL RESPONSE TIME COMMITMENTS

The response times are based on the defined severity levels as follows:

Severity Level	Response Time
Severity 1	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within one hour of the request for support being logged in the issue management system. Continual effort will be maintained to restore the system or provide a workaround resolution. Response provided 24 x 7.
Severity 2	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within four hours of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

Severity 3	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 4	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

9. OPTIONAL: SITE FACILITY MAINTENANCE

CONTRACTOR'S optional per site facility and tower maintenance plan includes the following services:

1) Additional site component maintenance and repair services with pricing shown for years 1-9 in Exhibit C-4 Maintenance and System Upgrade Agreement Pricing:
   a) Maintenance and repairs, as required, for generator and ATS equipment at sites where CONTRACTOR is responsible for constructing a new equipment building.
   b) Maintenance and repairs, as required, for HVAC equipment at sites where CONTRACTOR is responsible for constructing a new equipment building.
   c) Maintenance and repairs, as required, for UPS backup equipment at all proposed RF sites where CONTRACTOR will provide new UPS equipment.
      i. CONTRACTOR has included replacement of the UPS batteries in year 4 and year 8.
   d) Antenna and transmission line maintenance, as required, for new equipment provided by CONTRACTOR.
   e) Repairs are based on parts availability from the manufacturer.

   If other site or compound upkeep maintenance services are desired in addition to those stated above, CONTRACTOR can provide a separate quote upon request.

10. WARRANTY AND MAINTENANCE OVERVIEW

During the first year warranty of the proposed offering, within each Phase and for the equipment proposed in that phase, CONTRACTOR will provide the State with a complete suite of system support services designed to maximize the network's uptime. See below for the list of Year 1 warranty services. **Optional maintenance services can be purchased, after or during the warranty year, through the term of the contract.*

Summary of Warranty and Maintenance Services

Description	1 Year Warranty	Optional Maintenance*
Dispatch Service and Case Management (24x7x365)	√	√
Four Hour On-Site Response (24x7x365) Major	√	Performed by the State
Infrastructure Board Repair	√	√
Network Preventive Maintenance (Annual)	√	Performed by the State
Technical Support (24x7x365)	√	√
Customer Support Manager	√	√
Customer Support Plan	√	√
CONTRACTOR On-Line (MOL)	√	√
Disaster Recovery Plan	√	√
Remote Network Monitoring	√	√
Remote Security Monitoring	√	√
Remote Security Update Service	√	√
System Upgrade Agreement (Hardware and Software Updates)	√	Optional (Contract Year 6,)

11. WARRANTY AND MAINTENANCE STATEMENTS OF WORK

Year 1 Warranty and Optional additional years of Maintenance statements of work which are included above in this exhibit are:

1) Infrastructure Repair
2) Custom System Upgrade Agreement (Contract Year 6)
3) Network Monitoring
4) Onsite Infrastructure Response and Dispatch Service (Year 1 only)
5) ASTRO 25 Security Update Service (SUS)
6) Annual Preventive Maintenance (Year 1 only)
7) Security Monitoring Service
8) ASTRO 25 Technical Support

Exhibit C-3 – Phase 3-RF Site Warranty / Optional Maintenance

1. INFRASTRUCTURE REPAIR OVERVIEW

CONTRACTOR provides a hardware repair service for all of the CONTRACTOR and select third-party infrastructure equipment supplied by CONTRACTOR. The CONTRACTOR authorized Repair Depot manages and performs the repair of CONTRACTOR supplied equipment as well as coordinating the equipment repair logistics process.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

2. DESCRIPTION OF SERVICES

Infrastructure components are repaired at a CONTRACTOR authorized Infrastructure Depot Operations (IDO). At CONTRACTOR's discretion, select third party Infrastructure may be sent to the original equipment manufacturer or third party vendor for repair.

3. SCOPE

Repair Authorizations are obtained by contacting the Solutions Support Center (SSC) which is available 24 hours a day, 7 days a week.

Repair authorizations can also be obtained online via Motorola Online at https://businessonline.motorolasolutions.com, under Repair Status/Submit Infrastructure RA.

a. Geographic Availability

Infrastructure repair is supported globally; geographic proximity will determine repair location.

b. Inclusions

Infrastructure repair is available on CONTRACTOR sold communication systems which may include some aspect of third party hardware and software. CONTRACTOR will make a "Commercially Reasonable Effort" to repair CONTRACTOR manufactured infrastructure products for seven years after product cancellation.

c. Exclusions

If infrastructure is no longer supported by CONTRACTOR, the original equipment manufacturer or a third party vendor, CONTRACTOR may return said equipment to the STATE without repair or replacement. The following items are excluded from Infrastructure Repair:

1) All CONTRACTOR infrastructure hardware over seven (7) years from product cancellation date.
2) All Third party infrastructure hardware over two (2) years from product cancellation date.
3) All Broadband infrastructure over three (3) years from product cancellation date
4) Physically damaged infrastructure.
5) Third party equipment not shipped by CONTRACTOR
6) Consumable items including, but not limited to, batteries, connectors, cables, toner/ink cartridges, tower lighting, laptop computers, monitors, keyboards and mouse.

7) Video retrieval from Digital In-Car Video equipment.
8) Infrastructure backhaul including but not limited to, Antennas, Antenna Dehydrator, Microwave[1], Line Boosters, Amplifier, Data Talker Wireless Transmitter, Short haul modems, UPS[1]
9) Test equipment.
10) Racks, furniture and cabinets.
11) Firmware and/or software upgrades.

1 Excluded from service agreements but may be repaired on an above contract, time and material basis. All UPS Systems must be shipped to IDO for repair. Note! Excludes batteries and on-site services

d. <u>CONTRACTOR has the following responsibilities:</u>

1) Enable STATE access to the CONTRACTOR call Center operational 24 hours a day, 7 days per week, to create requests for repair service.
2) Provide repair return authorization numbers when requested by STATE.
3) Receive malfunctioning infrastructure from STATE and document its arrival, repair and return.
4) Perform the following service on CONTRACTOR infrastructure:
    a) Perform an operational check on the infrastructure to determine the nature of the problem.
    b) Replace malfunctioning Field Replacement Units (FRU) or components.
    c) Verify that CONTRACTOR infrastructure is returned to CONTRACTOR manufactured specifications, as applicable.
    d) Perform a box unit test on all serviced infrastructure.
    e) Perform a system test on select infrastructure.
5) Provide the following service on select third party infrastructure:
    a) Perform pre-diagnostic and repair services to confirm infrastructure malfunction and eliminate sending infrastructure with no trouble found (NTF) to third party vendor for repair, when applicable.
    b) Ship malfunctioning infrastructure components to the original equipment manufacturer or third party vendor for repair service, when applicable.
    c) Track infrastructure sent to the original equipment manufacturer or third party vendor for service.
    d) Perform a post-test after repair by CONTRACTOR, original equipment manufacturer, or third party vendor to confirm malfunctioning infrastructure has been repaired and functions properly in a CONTRACTOR system configuration, when applicable.
    e) Re-program repaired infrastructure to original operating parameters based on software/firmware provided by STATE as required by section 1.6.7. If the STATE software version/configuration is not provided, shipping times will be delayed. If the Infrastructure repair depot determines that the malfunctioning infrastructure is due to a software defect, the repair depot reserves the right to reload infrastructure with a similar software version.

f) Properly package repaired infrastructure.

g) Ship repaired infrastructure to the STATE specified address during normal operating hours of Monday through Friday 7:00am to 7:00pm CST, excluding holidays. FRU will be sent two-day air unless otherwise requested. CONTRACTOR will pay for such shipping, unless STATE requests shipments outside of the above mentioned standard business hours and/or carrier programs, such as NFO (next flight out). In such cases, STATE will be responsible for payment of shipping and handling charges.

e. <u>The STATE has the following responsibilities:</u>

1) Contact or instruct Servicer to contact the CONTRACTOR System Support Center (SSC) and request a return authorization number prior to shipping malfunctioning infrastructure.

2) Provide model description, model number and serial number, type of system, software and firmware version, symptom of problem and address of site location for FRU or infrastructure.

3) Indicate if infrastructure or third party infrastructure being sent in for service was subjected to physical damage or lightning damage.

4) Follow CONTRACTOR instructions regarding inclusion or removal of firmware and software applications from infrastructure being sent in for service.

5) Provide STATE purchase order number to secure payment for any costs described herein.

6) Properly package and ship the malfunctioning FRU, at STATE'S expense. STATE is responsible for properly packaging the malfunctioning infrastructure FRU to ensure that the shipped infrastructure arrives un- damaged and in repairable condition.

   a) Clearly print the return authorization number on the outside of the packaging.

7) Maintain versions and configurations for software/applications and firmware to install repaired equipment.

8) Provide CONTRACTOR with proper software/firmware information to reprogram equipment after repair unless current software has caused this malfunction.

9) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the infrastructure repair services to STATE.

2. STATEMENT OF WORK OPTION: ASTRO 25 CUSTOM SYSTEM UPGRADE AGREEMENT(C-SUA)

a. <u>Description of Service and Obligations</u>

1) As system releases become available, CONTRACTOR agrees to provide the STATE with the software, hardware and implementation services required to execute up to one system infrastructure upgrade in the one-year warranty period and if purchased for the optional service years starting in year six, up to one system infrastructure upgrade in a four-year period. At the time of the system release upgrade, CONTRACTOR will provide applicable patches and service pack updates when and if available. Currently, CONTRACTOR's service includes 3rd party software such as Microsoft Windows and Server Operating Systems (OS), Red Hat Linux, Sun Solaris and any CONTRACTOR software service packs that may be available.

CONTRACTOR will only provide patch releases that have been analyzed, pre-tested, and certified in a dedicated ASTRO 25 test lab to ensure that they are compatible and do not interfere with the ASTRO 25 network functionality.

2) ASTRO 25 system releases are intended to improve the system functionality and operation from previous releases and may include some minor feature enhancements. At CONTRACTOR's option, system releases may also include significant new feature enhancements that CONTRACTOR may offer for purchase. System release software and hardware shall be pre-tested and certified in CONTRACTOR's Systems Integration Test lab.

3) The price quoted for the C-SUA requires the STATE to choose from a list of certified system upgrade paths provided by CONTRACTOR at the time of upgrade planning. Should the STATE elect a different upgrade path from those provided, the STATE agrees that additional costs may be incurred to complete the implementation of the certified system upgrade. In this case, CONTRACTOR agrees to provide a price quotation for any additional materials and services necessary.

4) ASTRO 25 C-SUA entitles the STATE to past software versions for the purpose of downgrading product software to a compatible release version.

5) The following ASTRO 25 certified system release software for the following products are covered under this ASTRO 25 C-SUA: base stations, site controllers, comparators, routers, LAN switches, servers, dispatch consoles, logging equipment, network management terminals, Network Fault Management ("NFM") products, network security devices such as firewalls and intrusion detection sensors and associated peripheral infrastructure software.

6) Product programming software such as Radio Service Software ("RSS"), Configuration Service Software ("CSS"), and Customer Programming Software ("CPS") are also covered under this C- SUA.

7) ASTRO 25 C-SUA makes available the subscriber radio software releases that are shipping from the factory during the C-SUA coverage period. New subscriber radio options and features not previously purchased by the STATE are excluded from ASTRO 25 C-SUA coverage.

8) Additionally, subscriber software installation and reprogramming are excluded from the ASTRO 25 C-SUA coverage.

9) CONTRACTOR will provide certified hardware version updates and/or replacements necessary to upgrade the system with an equivalent level of functionality up to once in a four-year period. Hardware will be upgraded and/or replaced if required to maintain the existing feature and functionality. Any updates to hardware versions and/or replacement hardware required to support new features or those not specifically required to maintain existing functionality are not included. Unless otherwise stated, platform migrations such as, but not limited to, stations, consoles, backhaul, civil, network changes and additions, and managed services are not included.

10) The following hardware components, if originally provided by CONTRACTOR, are eligible for full product replacement when necessary per the system release upgrade:

    a) Servers

    b) PC Workstations

c) Routers

d) LAN Switches

11) The following hardware components, if originally provided by CONTRACTOR, are eligible for board- level replacement when necessary per the system release upgrade. A “board-level replacement” is defined as any Field Replaceable Unit (“FRU”) for the products listed below:

a) GTR 8000 Base Stations

b) GCP 8000 Site Controllers

c) GCM 8000 Comparators

d) MCC 7500 Console Operator Positions

e) PBX Switches for Telephone Interconnect

f) NFM/NFM XC/MOSCAD RTU

12) The ASTRO 25 SUA does not cover all products. Refer to section 3.0 for exclusions and limitations.

13) CONTRACTOR will provide implementation services necessary to upgrade the system to a future system release with an equivalent level of functionality up to once in a four-year period. Any implementation services that are not directly required to support the certified system upgrade are not included. Unless otherwise stated, implementation services necessary for system expansions, platform migrations, and/or new features or functionality that are implemented concurrent with the certified system upgrade are not included.

14) As system releases become available, CONTRACTOR will provide up to once in a four-year period the following software design and technical resources necessary to complete system release upgrades:

a) Review infrastructure system audit data as needed.

b) Identify additional system equipment needed to implement a system release, if applicable.

c) Complete a proposal defining the system release, equipment requirements, installation plan, and impact to system users.

d) Advise STATE of probable impact to system users during the actual field upgrade implementation.

e) Program management support required to perform the certified system upgrade.

f) Field installation labor required to perform the certified system upgrade.

g) Upgrade operations engineering labor required to perform the certified system upgrade.

15) ASTRO 25 C-SUA pricing is based on the system configuration at the time of the original purchase. This configuration is to be reviewed annually from the contract effective date. Any change in system configuration may require an ASTRO 25 C-SUA price adjustment.

16) The ASTRO 25 C-SUA applies only to system release upgrades within the ASTRO 25 7.x platform.

17) CONTRACTOR will issue Software Maintenance Agreement ("SMA") bulletins on a periodic basis and post them in soft copy on a designated extranet site for STATE access. Standard and optional features for a given ASTRO 25 system release are listed in the SMA bulletin.

4. UPGRADE ELEMENTS AND CORRESPONDING PARTY RESPONSIBILITIES

Upgrade Planning and Preparation: All items listed in this section are to be completed at least 6 months prior to a scheduled upgrade.

a. CONTRACTOR Responsibilities:

1) Obtain and review infrastructure system audit data as needed.
2) Identify additional system equipment needed to implement a system release, if applicable.
3) Complete a proposal defining the system release, equipment requirements, installation plan, and impact to system users.
4) Advise STATE of probable impact to system users during the actual field upgrade implementation.
5) Inform STATE of high speed internet connection requirements.
6) Assign program management support required to perform the certified system upgrade.
7) Assign field installation labor required to perform the certified system upgrade.
8) Assign upgrade operations engineering labor required to perform the certified system upgrade.
9) Deliver release impact and change management training to the primary zone core owners, outlining the changes to their system as a result of the upgrade path elected. This training needs to be completed at least 12 weeks prior to the scheduled upgrade. This training will not be provided separately for user agencies who reside on a zone core owned by another entity. Unless specifically stated in this document, CONTRACTOR will provide this training only once per system.

b. STATE Responsibilities:

1) Contact CONTRACTOR to schedule and engage the appropriate CONTRACTOR resources for a system release upgrade.
2) Provide high-speed internet connectivity at the zone core site(s) for use by CONTRACTOR to perform remote upgrades and diagnostics. High-speed internet connectivity must be provided at least 12 weeks prior to the scheduled upgrade. In the event access to a high-speed connection is unavailable, STATE may be billed additional costs to execute the system release upgrade.
3) Assist in site walks of the system during the system audit when necessary.
4) Provide a list of any FRUs and/or spare hardware to be included in the system release upgrade when applicable.
5) Purchase any additional software and hardware necessary to implement optional system release features or system expansions.

6) Provide or purchase labor to implement optional system release features or system expansions.

7) Participate in release impact training at least 12 weeks prior to the scheduled upgrade. This applies only to primary zone core owners. It is the zone core owner's responsibility to contact and include any user agencies that need to be trained or to act as a training agency for those users not included.

5. SYSTEM READINESS CHECKPOINT

All items listed in this section must be completed at least 30 days prior to a scheduled upgrade.

a. CONTRACTOR responsibilities

1) Perform appropriate system backups.

2) Work with the STATE to validate that all system maintenance is current.

3) Work with the STATE to validate that all available patches and antivirus updates have been updated on the STATE'S system.

b. STATE responsibilities

1) Validate system maintenance is current.

2) Validate that all available patches and antivirus updates to their system have been completed.

6. SYSTEM UPGRADE

a. CONTRACTOR responsibilities

1) Perform system infrastructure upgrade in accordance with the system elements outlined in this SOW.

b. STATE responsibilities

1) Inform system users of software upgrade plans and scheduled system downtime.

2) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide software upgrade services.

7. UPGRADE COMPLETION

a. CONTRACTOR responsibilities

1) Validate all certified system upgrade deliverables are complete as contractually required.

2) Deliver post upgrade implementation training to the STATE as needed, up to once per system.

3) Obtain upgrade completion sign off from the STATE.

b. STATE Responsibilities

1) Cooperate with CONTRACTOR in efforts to complete any post upgrade punch list items as needed.

2) Cooperate with CONTRACTOR to provide relevant post upgrade implementation training as needed. This applies only to primary zone core owners. It is the zone core

owner's responsibility to contact and include any user agencies that need to be trained or to act as a training agency for those users not included.

3) Provide CONTRACTOR with upgrade completion sign off.

8. EXCLUSIONS AND LIMITATIONS

a. The parties agree that Systems that have non-standard configurations that have not been certified by CONTRACTOR Systems Integration Testing are specifically excluded from the ASTRO 25 C-SUA unless otherwise agreed in writing by CONTRACTOR and included in this SOW.

b. The parties acknowledge and agree that the ASTRO 25 C-SUA does not cover the following products:

1) MCC5500 Dispatch Consoles

2) MIP5000 Dispatch Consoles

3) Plant/E911 Systems

4) MOTOBRIDGE Solutions

5) CONTRACTOR Public Sector Applications Software ("PSA")

6) Custom SW, CAD, Records Management Software

7) Data Radio Devices

8) Mobile computing devices such as Laptops

9) Non-CONTRACTOR two-way radio subscriber products

10) Genesis Products

11) Point-to-point products such as microwave terminals and association multiplex equipment

c. ASTRO 25 C-SUA does not cover any hardware or software supplied to the STATE when purchased directly from a third party, unless specifically included in this SOW.

d. ASTRO 25 C-SUA does not cover software support for virus attacks or other applications that are not part of the ASTRO 25 system, or unauthorized modifications or other misuse of the covered software. CONTRACTOR is not responsible for management of anti-virus or other security applications (such as Norton).

e. Upgrades for equipment add-ons or expansions during the term of this ASTRO 25 C-SUA are not included in the coverage of this SOW unless otherwise agreed to in writing by CONTRACTOR.

9. SPECIAL PROVISIONS

a. STATE acknowledges that if its System has a Special Product Feature, additional engineering may be required to prevent an installed system release from overwriting the Special Product Feature. Upon request, CONTRACTOR will determine whether a Special Product Feature can be incorporated into a system release and whether additional engineering effort is required. If additional engineering is required CONTRACTOR will issue a change order for the change in scope and associated increase in the price for the ASTRO 25 C-SUA.

b. STATE will only use the software (including any System Releases) in accordance with the applicable Software License Agreement.

c. ASTRO 25 C-SUA services do not include repair or replacement of hardware or software that is necessary due to defects that are not corrected by the system release, nor does it include repair or replacement of defects resulting from any nonstandard, improper use or conditions; or from unauthorized installation of software.

d. ASTRO 25 C-SUA coverage and the parties' responsibilities described in this Statement of Work will automatically terminate if CONTRACTOR no longer supports the ASTRO 25 7.x software version in the STATE's system or discontinues the ASTRO 25 C-SUA program; in either case, CONTRACTOR will refund to STATE any prepaid fees for ASTRO 25 C-SUA services applicable to the terminated period.

e. If STATE cancels a scheduled upgrade within less than 12 weeks of the scheduled on site date, CONTRACTOR reserves the right to charge the STATE a cancellation fee equivalent to the cost of the pre-planning efforts completed by the CONTRACTOR Upgrade Operations Team.

f. The SUA annualized price is based on the fulfillment of the four-year term. If STATE terminates, except if CONTRACTOR is the defaulting party, STATE will be required to pay for the balance of payments owed if a system release upgrade has been taken prior to the point of termination.

Appendix A – ASTRO 25 System Release Upgrade Paths

Platform Release	Certified Upgrade Paths	
Pre-7.7	**Upgrade to Current Release**	
7.7		
7.8		
7.9		
7.11	NA	7.14
7.13	7.14	7.15
7.14	7.15	7.16
7.15	7.16	7.17
7.16	7.17	7.18 (Planned)
7.17	7.18 (Planned)	7.19 (Planned)

- The information contained herein is provided for information purposes only and is intended only to outline CONTRACTOR's presently anticipated general technology direction. The information in the roadmap is not a commitment or an obligation to deliver any product, product feature or software functionality and CONTRACTOR reserves the right to make changes to the content and timing of any product, product feature or software release.

- The most current system release upgrade paths can be found in the most recent SMA bulletin.

Appendix B - System Pricing Configuration

This configuration is to be reviewed annually from the contract effective date. Any change in system configuration may require an ASTRO 25 SUA price adjustment.

Core	
Master Site Configuration	0
Zones in Operation (Including DSR and Dark Master Sites)	0
Zone Features: IV&D, TDMA, Telephone Interconnect, CNI, HPD, CSMS, IA, POP25, Text Messaging, Outdoor Location, ISSI 8000, InfoVista, KMF/OTAR	0
RF System	
Voice RF Sites & RF Simulcast Sites (including Prime Sites)	0
Repeaters/Stations (FDMA)	0
Repeaters/Stations (TDMA)	0
HPD RF Sites	0
HPD Stations	0
Dispatch Console System	
Dispatch Sites	0
Gold Elite Operator Positions	0
MCC 7500 Operator Positions (GPIOM)	0
MCC 7500 Operator Positions (VPM)	0
Conventional Channel Gateways (CCGW)	0
Conventional Site Controllers (GCP 8000 Controller)	0
Logging System	
Number of AIS Servers	0
Number of Voice Logging Recorder	0
Number of Logging Replay Clients	0
Network Management and MOSCAD NFM	
Network Management Clients	0
MOSCAD NFM Systems	0
MOSCAD NFM RTUs	0
MOSCAD NFM Clients	0
Fire Station Alerting (FSA)	
FSA Systems	0
FSA RTUs	0
FSA Clients	0
Fire Station Alerting (FSA)	
Voice Subscribers non-APX	0
Voice Subscribers APX	0
HPD Subscribers	0
Computing and Networking Hardware (for SUA / SUA, actual replacement qty may be less than shown)	
Workstations - High Performance	0
Workstations - Mid Performance	0
Servers - High Performance	0
Servers - Mid Performance	0
LAN Switch - High Performance	0
LAN Switch - Mid Performance	0
Routers	0

NETWORK MONITORING OVERVIEW

CONTRACTOR's Network Monitoring Operations (NMO) within the CONTRACTOR Solutions Support Center (SSC) provides real-time fault monitoring for radio communications networks on a continuous basis. NMO utilizes sophisticated tools for remote monitoring and event characterization of your communications networks. When an event is detected, NMO technologists acknowledge and assess the situation, and initiate a defined response.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

1. DESCRIPTION OF NETWORK MONITORING SERVICES

Network Monitoring is a service designed to electronically monitor elements of a communication system for events, as set forth in the Monitored Elements Table. When the SSC detects an event, (based on the severity of the event) trained technologists acknowledge and remotely diagnose the event and initiate an appropriate response in accordance with the STATE handling procedure. Appropriate responses could include, but are not limited to, continuing to monitor the event for further development, attempting remote remediation via engagement of Technical Support resources, or initiating dispatch[1] of a Field Servicer for onsite remediation.

a. Availability

Network Monitoring service is available 24 hours a day, 7 days a week. Network Monitoring availability is based on the level of contracted service and defined in the Customer Support Plan (CSP).

b. Geographic Availability

Network Monitoring is a globally provided service unless limited by data export control regulations. Timeframes are based on the STATE'S local time zone.

c. Inclusions

Network monitoring service can be delivered on CONTRACTOR sold infrastructure as stated in Monitored Elements Table.

d. Limitations and Exclusions

1) Does not include monitoring of anything outside of the radio network or monitoring of infrastructure provided by a third party, unless specifically stated. Monitored elements must be within the radio network and capable of sending traps to the Unified Event Manager (UEM).

2) Additional support charges above and beyond the contracted service agreements may apply if it is determined that system faults were caused by the STATE making changes to critical system parameters.

3) The following activities are outside the scope of the Network Monitoring service, but are optional services that are available to remote Network Monitoring at an additional cost:

   a) Emergency on-site visits required to resolve technical issues that cannot be resolved by with SSC working remotely with the local STATE technical resource.

   b) System installations, upgrades, and expansions.

c) STATE training.

d) Hardware repair and/or exchange.

e) Network security services.

f) Network transport.

g) Information Assurance.

h) Any services not expressly included in this statement of work.

4) Reference the event catalogue to confirm monitored equipment.

1 Dispatch service with OnSite Response is a separate service that is required with Network Monitoring.

e. CONTRACTOR has the following responsibilities:

1) Provide dedicated connectivity through a network connection necessary for monitoring communication networks. The Connectivity Matrix further describes the connectivity options.

2) If determined necessary by CONTRACTOR, provide CONTRACTOR owned equipment for monitoring system elements. If CONTRACTOR installs or replaces CONTRACTOR owned equipment, the type of equipment and location installed is listed in the CONTRACTOR Owned & Supplied Equipment Table.

3) Verify connectivity and event monitoring prior to system acceptance or start date.

4) Monitor system continuously during hours designated in the CSP in accordance with the pre-defined times.

5) Remotely access the STATE'S system to perform remote diagnosis as permitted by STATE.

6) Create a case, as necessary. Gather information to perform the following:

a) Characterize the issue

b) Determine a plan of action

c) Assign and track the case to resolution.

7) Cooperate with STATE to coordinate transition of monitoring responsibilities between CONTRACTOR and STATE.

8) Maintain communication with the STATE in the field as needed until resolution of the case

f. The STATE has the following responsibilities:

1) Allow CONTRACTOR continuous remote access to enable the monitoring service.

2) Provide continuous utility service to any CONTRACTOR equipment installed or utilized at STATE'S premises to support delivery of the service.

3) Provide CONTRACTOR with pre-defined STATE information and preferences prior to Start Date necessary to complete the CSP, including, but not limited to:

a) Case notification preferences and procedure

b) Repair Verification Preference and procedure

c) Database and escalation procedure forms.

4) Submit changes in any information supplied to CONTRACTOR and included in the CSP to the CSM

5) Provide the following information when initiating a service request:

   a) Assigned system ID number

   b) Problem description and site location

   c) Other pertinent information requested by CONTRACTOR to open a Case.

6) Notify the SSC when STATE performs any activity that impacts the system. (Activity that impacts the system may include, but is not limited to, installing software or hardware upgrades, performing upgrades to the network, or taking down part of the system to perform maintenance.)

7) Allow Servicers access to equipment (including any connectivity or monitoring equipment) if remote service is not possible.

8) Allow Servicers access to remove CONTRACTOR owned monitoring equipment upon cancellation of service.

9) Provide all STATE managed passwords required to access the STATE'S system to CONTRACTOR upon request or when opening a case to request service support or enable response to a technical issue.

10) Pay additional support charges above and beyond the contracted service agreements that may apply if it is determined that system faults were caused by the STATE making changes to critical system parameters

11) Obtain all third party consents or licenses required to enable CONTRACTOR to provide the monitoring service.

12) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the services described in this SOW.

13) Contact CONTRACTOR to coordinate transition of monitoring when monitoring responsibility is to be transferred to or from CONTRACTOR. (I.e. normal business hours to after-hours monitoring) as set forth in pre-defined information provided by STATE CSP.

   a) Upon contact, STATE must provide customer name, site id, status on any open cases, severity level, and brief description of case and action plan to CONTRACTOR.

14) Acknowledge that cases will be handled in accordance with the times and priorities as defined in the Event Definition table- Appendix A .

15) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the Network Monitoring service.

The event types are based on the defined levels as follows:

Appendix A Engagement Matrix

Severity Level	Severity Definition	Engagement Times
1	This is defined as a critical/major incident that causes the system and/or infrastructure to experience a loss of call processing functionality and no work-around or immediate solution is available. The following are examples of this kind of failure: o 33% of call processing resources impaired o Remote Site/sub-system severed o Site Environment alarms: o Smoke o Unauthorized access o Temperature o Power failure	Response provided 24 hours, 7 days a week, including US Holidays.
2	This is defined as a moderate/minor incident that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of failure: o Less than 33% of call processing resources impaired o Failure of a single redundant component	Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

3	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: o Faults that have no impact in how the user perceives the system to work o Intermittent issues o Requests for information o Preventive Maintenance or upgrade related work	Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

CONTRACTOR'S failure to meet the above defined Response Times or Resolution Times in any given month during the term and any renewal term shall be deemed a service level default ("Service Level Default") and STATE may obtain the non-exclusive remedies set forth below.

Response and Resolution Service Levels (calculated monthly on a per incident basis)	**Service Level Credit (Prorated Fees – Monthly)**
Meets Response or Resolution Time	0%
1st Failure to meet Response or Resolution Time	Warning, 0%
2nd Failure to meet Response or Resolution Time	10%
3rd Failure to meet Response or Resolution Time	20%

In the event STATE is eligible for a 20% Service Level Credit under this section for any two (2) consecutive months of the term, STATE may terminate this Contract without penalty upon written notice to CONTRACTOR.

Credits shall be applied against the next invoice. In the event a Service Level Default occurs after a party has given notice of termination, or STATE has made final payment to CONTRACTOR for the software support services and no further invoices shall issue as a result, CONTRACTOR shall refund to STATE the amount of the appropriate Service Level Credit due for the period of default.

Notwithstanding the foregoing, a Service Level Default will not have occurred nor will CONTRACTOR provide Service Level Credits in the event CONTRACTOR, is unable to meet the above Response or Resolution Times due to forces outside of its control, including a Force Majeure or any action by a third party, including the STATE, that renders CONTRACTOR unable to comply with the above service level requirements.

Connectivity Matrix

Request connectivity 8 weeks in advance of service start date

System Type	Connectivity	Set up and Maintenance
ASTRO® 25	Internet VPN	CONTRACTOR
ASTRO® 25	T1	CONTRACTOR

CONTRACTOR Owned & Supplied Equipment Table

Equipment Type	Location Installed
Firewall/Router	Master Site
Service Delivery Management Server	Master Site for each Zone

Monitored Elements Table

Master Site Infrastructure	RF Site Equipment	Dispatch Site Equipment
Servers & Back up Servers	Channels	Consoles
MOSCAD (digital inputs & RS232 serial alarms)	MOSCAD (digital inputs & RS232 serial alarms)	AIS Servers
TRAK	RF Site Communication Path	Operator Position (OP)
Core LAN Switch	Switch	CONTRACTOR Gold Elite Gateway (MGEG)
Packet Data Gateway (PDG)	Site Controller	Call Processor
Radio Network Gateway (RNG)	Router	Logging Replay Station (only within the RNI)
Zone Database Server (ZDS)	Site	Ambassador (AMB)
Gateway Router	Gateway Router	Client Station

Controller – Zone & Domain	Network Time Protocol (NTP)	Voice Processing Module (VPM)
Firewall Manager Servers	Firewall	MCC 7500 IP Logging Recorders
Air Traffic Router (ATR)	SmartX Site Converter (only the converter, not the legacy sites)	MCC 7100 (only within the RNI)
Unified Event Manager (UEM)		
Zone Statistical Server (ZSS)		
Install Server		

**Some or all of the above equipment may be monitored depending on system configuration and need. Other equipment (not listed) may be monitored as an option, consult with your Customer Support Manager for details.*

ONSITE INFRASTRUCTURE RESPONSE AND DISPATCH SERVICE OVERVIEW

CONTRACTOR's OnSite Infrastructure Response & Dispatch service provides case management and escalation for onsite technical service requests. The service is delivered by the CONTRACTOR's Solutions Support Center (SSC) in conjunction with a local service provider. The SSC is responsible for opening a case for onsite support and monitoring the status of that case to ensure strict compliance to committed response times.

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1. DESCRIPTION OF SERVICES

The CONTRACTOR SSC will receive STATE request for OnSite service provider and dispatch a servicer. The servicer will respond to the STATE location based on pre-defined Severity Levels set forth in Section 4.0 - Severity Level Definitions able and Response times set forth in Section 5.0 – Severity Level Response Time Commitments table in order to restore the system.

CONTRACTOR will provide case management as set forth herein. The SSC will maintain contact with the on-site CONTRACTOR Service Shop until system restoral and case closure. The SSC will continuously track and manage cases from creation to close through an automated case tracking process.

2. SCOPE

OnSite Infrastructure Response & Dispatch service is available 24 hours a day, 7 days a week in accordance with Severity Level Definitions and Severity Level Response Time Commitments listed in sections 4.0 and 5.0 of this document.

a. Geographic Availability

OnSite Infrastructure Response and Dispatch is available to customers worldwide where CONTRACTOR servicers are present. Response times are based on the STATE'S local time zone.

b. Inclusions

Onsite Infrastructure Response and Dispatch Service can be delivered on CONTRACTOR-sold infrastructure.

c. CONTRACTOR has the following responsibilities:

1) Receive service requests.
2) Create a case as necessary when service requests are received. Gather information to perform the following:
   a) Characterize the issue.
   b) Determine a plan of action.
   c) Assign and track the case to resolution.
3) Dispatch a servicer as required by CONTRACTOR standard procedures and provide necessary case.
4) Ensure the required personnel have access to STATE information as needed.

d. <u>Servicer will perform the following on-site:</u>

1) Run diagnostics on the Infrastructure or Field Replacement Units (FRU).
2) Replace defective Infrastructure or FRU, as supplied by STATE[1].
3) Provide materials, tools, documentation, physical planning manuals, diagnostic/test equipment and any other requirements necessary to perform the maintenance service.
4) If a third party vendor is needed to restore the system, the Servicer may accompany that vendor onto the STATE'S premises.
5) Verify with STATE that restoration is complete or system is functional, if required by STATE'S repair verification in the Customer Support Plan required by section 3.2. If verification by STATE cannot be completed within 20 minutes of restoration, the case will be closed and the Servicer will be released.
6) Escalate the case to the appropriate party upon expiration of a response time.
7) Close the case upon receiving notification from STATE or servicer, indicating the case is resolved.
8) Notify STATE of case status as defined by the Customer Support Plan:
    a) Open and closed; or
    b) Open, assigned to the servicer, arrival of the servicer on-site, deferred or delayed, closed.
9) Provide Case activity reports to STATE if requested.

e. <u>STATE has the following responsibilities:</u>

1) Contact CONTRACTOR, as necessary, to request service.
2) Provide CONTRACTOR with the following pre-defined STATE information and preferences prior to start date necessary to complete Customer Support Plan (CSP):
    a) Case notification preferences and procedure.
    b) Repair verification preference and procedure.
    c) Database and escalation procedure forms.
    d) Submit changes in any information supplied in the CSP to the Customer Support Manager (CSM).
3) Provide the following information when initiating a service request:
    a) Assigned system ID number.
    b) Problem description and site location.
    c) Other pertinent information requested by CONTRACTOR to open a case.
4) Allow Servicers access to equipment.
5) Supply infrastructure or FRU, as applicable, in order for CONTRACTOR to restore the system.
6) Maintain and store in an easily accessible location any and all software needed to restore the system.

7) Maintain and store in an easily accessible location proper system backups.

8) For E911 systems, test the secondary/backup Public Safety Answering Point (PSAP) connection to be prepared in the event of a catastrophic failure of a system. Train appropriate personnel on the procedures to perform the function of switching to the backup PSAP.

9) Verify with the SSC that restoration is complete or system is functional, if required by repair verification preference provided by STATE.

10) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide these services.

1.Infrastructure Repair with Advanced Replacement (IRAR) is a service offering that provides repair and replacement of infrastructure equipment. IRAR enhances Onsite and Dispatch Service by enabling a faster response and repair times.

3. SEVERITY LEVEL DEFINITIONS

The following severity level definitions will be used to determine the maximum response times:

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of severity: □ 33% of call processing resources impaired □ Site Environment alarms: o Smoke o Unauthorized access o Temperature o Power failure
Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of severity: □ Less than 33% of call processing resources impaired □ Failure of a single redundant component
Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: □ Intermittent faults that are infrequent and minor impact to core services □ Statistical reporting problems

Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: □ Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. □ Faults that have no impact in how the user perceives the system to work. □ Cosmetic issues. □ Requests for information. □ Preventive Maintenance

4. SEVERITY LEVEL RESPONSE TIME COMMITMENTS

(STATE'S Response Time Classification is designated in the Customer Support Plan.)

Severity Level	Standard Response Time	Resolution Time
Severity 1*	Within 4 hours from receipt of notification continuously	8 hours (1 business day)
Severity 2	Within 4 hours from receipt of notification Standard Business Day	8 hours (1 business day)
Severity 3	Within 8 hours from receipt of notification Standard Business Day	40 hours (1 business week)
Severity 4	Within 12 hours from receipt of notification Standard Business Day	40 hours (1 business week)

*Severity Level 1 & 2: Based on field replacement unit (FRU) availability, otherwise next business day. Additional FRU can be purchased locally in addition to those provided in the project and part of maintenance.

SECURITY UPDATE SERVICE OVERVIEW

To verify compatibility with your ASTRO system, CONTRACTOR's Security Update Service (SUS) provides pre-tested 3rd party software (SW) security updates.

This service was formerly called Pre-tested Software Subscription (PTSS). Additionally, SUS Platinum has been eliminated. The additional SUS Platinum features have been merged into this one SUS offering.

This Statement of Work ("SOW") is subject to the terms and conditions of CONTRACTOR's Professional Services Agreement, Service Agreement or other applicable agreement in effect between the parties ("Agreement"). CONTRACTOR and STATE may be referred to herein individually as a "Party or together as "Parties."

1. DESCRIPTION OF SECURITY UPDATE SERVICES

CONTRACTOR shall maintain a dedicated vetting lab for each supported ASTRO release for the purpose of pre-testing security updates. In some cases, when appropriate, CONTRACTOR will make the updates available to outside vendors, allow them to test, and then incorporate those results into this offering. Depending on the specific ASTRO release and STATE options, these may include updates to antivirus definitions, OEM vendor supported Windows Workstation and Server, Solaris and RedHat Linux (RHEL) operating system patches, VMware ESXi Hypervisor patches, Oracle database patches, PostgreSQL patches, and patches for other 3rd party Windows applications such as Adobe Acrobat and Flash.

CONTRACTOR has no control over the schedule of releases. The schedule for the releases of updates is determined by the Original Equipment Manufacturers (OEMs), without consultation with CONTRACTOR. Antivirus definitions are released every week. Microsoft patches are released on a monthly basis. CONTRACTOR obtains and tests these updates as they are released. Other products have different schedules or are released "as-required." CONTRACTOR will obtain and test these updates on a quarterly basis.

SUS (Self- Installed) is the baseline offer. Sections describing the optional delivery methods and reboot support service are only applicable if purchased.

SUS Delivery Methods

Patch Delivery Method	Download Responsibility	Installation Responsibility	Reboot Support
SUS (Self-Installed)	STATE	STATE	*Option
Remote SUS			*Option

On-Site Delivery of SUS			Included

Packages for L & M Cores

Packages	SUS (Self Installed)	RSUS	On-Site Delivery of SUS	Reboot Support
Essential / +	✓			Optional
Advanced / +	✓	✓	Optional	Optional
Premier	✓	✓	Optional	Included

SUS - Included in Warranty Year 1 and Optionally in Years 2-5

Once tested, CONTRACTOR will post the updates to a secured extranet website and send an email notification to the STATE. If there are any recommended configuration changes, warnings, or workarounds, CONTRACTOR will provide detailed documentation along with the updates on the website. The STATE will be responsible for the download and deployment of these updates to their ASTRO System.

Remote Delivery of SUS (RSUS) - Included in Warranty Year 1

Remote Delivery of SUS. CONTRACTOR's dedicated staff remotely installs the required security updates and operating system patches onto your radio network. Vulnerabilities from third party software are addressed as soon as the validation of recommended patches is completed. CONTRACTOR will also provide reports outlining updates made for your team's review and awareness. Patch transfers are transparent to the end user. After the patches are transferred, a report is sent out to inform our customers which machines they will need to reboot the appropriate devices to enable the new patches and antivirus definitions.

Reboot Support Delivery of SUS/RSUS - Optional

This optional enhancement provides support for rebooting impacted servers and workstations after the patches have been downloaded/pushed and installed. Once installation is complete, CONTRACTOR will deploy trained technicians to reboot servers and workstations at the STATE locations.

ON-SITE Delivery of SUS - Optional

For convenience, a trained technician will be contacted to provide the complete patching service. At the STATE, the technician will download patches, perform the required installation services and coordinate the rebooting of servers and dispatch ops.

2. SCOPE

Security Update Service supports the currently shipping CONTRACTOR ASTRO System Release (SR) and strives to support 4 releases prior. CONTRACTOR reserves the right to adjust which releases are supported as business conditions dictate. Contact your Customer Service Manager for the latest supported releases.

SUS is available for any L or M core system in a supported release.

Systems that have non-standard configurations that have not been certified by CONTRACTOR Systems Integration and Testing (SIT) are specifically excluded from this Service unless otherwise agreed in writing by CONTRACTOR. Service does not include pre-tested intrusion detection system (IDS) updates for IDS solutions. Certain consoles, MOTOBRIDGE, MARVLIS, Symbol Equipment, AirDefense Equipment, AVL, and Radio Site Security products are also excluded. CONTRACTOR will determine, in its sole discretion, the third party software that is supported as a part of this offering.

Antivirus updates - Antivirus updates are released weekly. The target release for these updates is by close of business each Tuesday. While the release often occurs early, this is the time and date committed to by vetting.

Windows - Updates are downloaded on Microsoft Patch Tuesday (2nd Tuesday of the month). Updates are incorporated, tested and vetted in the Windows Motopatch disk over the next few weeks. The target release is by the last day of the month.

Windows 3rd Party updates - for Adobe Reader and Adobe Flash are included on the standard Motopatch for Windows disk and follow the Windows patching schedule.

RHEL - Security updates are downloaded the last week of the first month of the quarter. Updates include any updates that are available at that time. We then prepare, test and vet the RHEL 5, and RHEL 6, Motopatch disks and target to release the disks by the last day of the quarter.

VMware - Security updates are downloaded the last week of the first month of the quarter for ESXi. These updates are downloaded from HP directly. The updates are incorporated into the Motopatch for ESXi disk. We then prepare, test and vet the ESXi Motopatch and target to release the disk by the last day of the quarter.

PostgreSQL* - Security updates are downloaded the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The Motopatch for PostgreSQL disk target release is by the last day of the quarter. *7.14 and later major releases

McAfee Patch Updates - Security patches are downloaded from McAfee the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The Motopatch for McAfee disk target release is by the last day of the quarter.

DOT HILL DAS Firmware disk - Security patches are downloaded from DOT HILL the last week of the first month of the quarter. Whatever updates that are available at that time are used. The disk is then prepared, tested and vetted. The disk target release is by the last day of the quarter.

a. CONTRACTOR has the following responsibilities:

1) Obtain relevant 3rd party security updates as made available and supported from the OEM's. This includes antivirus definition, OEM vendor available/supported operating systems patches, VMWare patches, database patches, and selected other 3rd party patches covered by SUS. CONTRACTOR does not control when these updates are released, but current release schedules are listed for reference:

   McAfee Antivirus definitions– Weekly

   Microsoft PC and Server OS patches – Monthly

   Solaris, RHEL OS, VMware hypervisor patches – Quarterly Other 3rd party patches - Quarterly

2) Each assessment will consist of no less than 36 hours of examination time to evaluate the impact each update has on the system.
3) Testing of updates to verify whether they degrade or compromise system functionality on a dedicated ASTRO test system with standard supported configurations.
4) Address any issues identified during testing by working with CONTRACTOR selected commercial supplier and/or CONTRACTOR product development engineering team. If a solution for the identified issues cannot be found, the patch will not be posted on CONTRACTOR's site.
5) Pre-test STIG recommended remediation when applicable.
6) Release all tested updates to CONTRACTOR's secure extranet site.
7) Include documentation for installation, recommended configuration changes, and identified issues and remediation for each update release.
8) Include printable labels for customers who download the updates to CD's.
9) Notify STATE of update releases by email.
10) A supported SUS ASTRO release matrix will be kept on the extranet site for reference.

b. The STATE has the following responsibilities:

1) Provide CONTRACTOR with pre-defined information prior to contract start date necessary to complete a Customer Support Plan (CSP).
2) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).
3) Provide means for accessing pre-tested files (Access to the extranet website).
4) Deploy pre-tested files to the STATE system as instructed in the "Read Me" text provided.
5) Implement recommended remediation(s) on STATE system, as determined necessary by STATE.

6) Upgrade system to a supported system release as necessary to continue service.

7) Adhere closely to the System Support Center (SSC) troubleshooting guidelines provided upon system acquisition. A failure to follow SSC guidelines may cause the STATE and CONTRACTOR unnecessary or overly burdensome remediation efforts. In such case, CONTRACTOR reserves the right to charge an additional service fee for the remediation effort.

8) Comply with the terms of the applicable license agreement between the STATE and the non-CONTRACTOR software copyright owner.

3. DISCLAIMER:

CONTRACTOR disclaims any and all warranties with respect to pre-tested antivirus definitions, database security updates, hypervisor patches, operating system software patches, intrusion detection sensor signature files, or other 3rd party files, express or implied. Further, CONTRACTOR disclaims any warranty concerning the non-CONTRACTOR software and does not guarantee that STATE'S system will be error-free or immune to security breaches as a result of these services.

ANNUAL PREVENTIVE MAINTENANCE STATEMENT OF WORK

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

Annual Preventative Maintenance will provide annual operational tests on the STATE'S infrastructure equipment (Infrastructure or Fixed Network Equipment or "FNE") to monitor the Infrastructure's conformance to specifications, as set forth in the applicable attached Exhibit(s), all of which are hereby incorporated by this reference.

1. SCOPE

Annual Preventive Maintenance will be performed during standard business hours (unless otherwise agreed to in writing). If the system or STATE requirements dictate this service must occur outside of standard business hours, an additional quotation will be provided. STATE is responsible for any charges associated with unusual access requirements or expenses.

a. Inclusions

Annual Preventive Maintenance service will be delivered on CONTRACTOR sold infrastructure including integrated 3rd party products per the level of service as defined in Table 1.

b. Limitations and Exclusions

Unless specifically called out in Table 1, the following activities are outside the scope of the Annual Preventive Maintenance service, however, can be included as optional services that are available to Annual Preventive Maintenance at an additional cost:

1) Emergency on-site visits required to resolve technical issues.
2) Third party support for equipment not sold by CONTRACTOR as part of the original system.
3) System installations, upgrades, and expansions.
4) STATE training.
5) Hardware repair and/or exchange.
6) Network security services.
7) Network transport.
8) Information Assurance.
9) CONTRACTOR services not included in this statement of work.
10) Any maintenance required as a result of a virus or unwanted intrusion is excluded if the system is not protected against these security threats by CONTRACTOR's Pre-tested Security Update Service when applicable.
11) Tower climbs, tower mapping analysis or tower structure analysis

c. CONTRACTOR has the following responsibilities:

1) Notify the STATE of any planned system downtime needed to perform this Service.
2) Advise STATE of issues that may require attention.

3) Maintain communication with the STATE as needed until completion of the Annual Preventive Maintenance.

4) Determine, in its sole discretion, when a case requires more than the Annual Preventive Maintenance services described in this SOW and notify STATE of an alternative course of action.

5) Provide STATE with a report documenting system performance against expected parameters along with recommended actions. Time allotment for report completion TBD.

6) Provide trained and qualified personnel with proper security clearance required to complete Annual Preventive Maintenance service.

d. <u>The STATE has the following responsibilities:</u>

1) Provide preferred schedule for Annual Preventative Maintenance to CONTRACTOR.

2) Authorize and acknowledge any scheduled system downtime.

3) Maintain periodic backup of databases, software applications, and firmware.

4) Establish and maintain a suitable environment (heat, light, and power) for the equipment location and provide CONTRACTOR full, free, and safe access to the equipment so that CONTRACTOR may provide services. All sites shall be accessible by standard service vehicles.

5) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).

6) Provide site escorts in a timely manner if required.

7) Provide CONTRACTOR with requirements necessary for access to secure facilities.

8) Obtain at STATE'S cost all third party consents or licenses required to enable CONTRACTOR to provide the Service.

e. <u>The Servicer has the following responsibilities:</u>

1) Perform the Preventive Maintenance tasks as set forth in Table 1 at the level of service the STATE has purchased.

2) Perform the Site Performance Verification Procedures in Table 2 for each site type on the system.

3) Provide required diagnostic/test equipment necessary to perform the Preventive Maintenance service.

4) As applicable, use the Method of Procedure (MOPs) as defined for each task.

Table 1: Preventive Maintenance Tasks

MASTER SITE CHECKLIST - LEVEL 1	
SERVERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
NM Client Applications	Review UEM events and transport medium types, (microwave/leased line/telco, etc.). Event log review for persistent types. Verify all NM client applications are operating correctly.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
Complete Backup	Verify backups have been done or scheduled. SZ database (BAR), Centracom CDM/ADM database, etc.
Network Time Protocol (NTP)	Verify operation and syncing all devices.
Data Collection Devices (DCD) check (if present)	Verify data collection
Anti-Virus	Verify anti-virus is enabled and that definition files are up to date (within two weeks of current date) on CSMS
ROUTERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on router type. Capture available diagnostic logs.
Verify Redundant Routers	Test redundancy in CWR devices. Core router switchover (coordinate with STATE).
SWITCHES	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on switch type. Capture available diagnostic logs.
Verify Redundant Switches	Test redundancy in CWR devices. Core router switchover (coordinate with STATE).
DOMAIN CONTROLLERS (non-CSA)	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.

Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
FIREWALLS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
LOGGING EQUIPMENT	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Server CPU Health	i.e. memory, HDD, CPU, disk space/utilization.

PRIME SITE CHECKLIST - LEVEL 1	
SOFTWARE	
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
SWITCHES	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on switch type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
ROUTERS	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on router type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
MISCELLANEOUS EQUIPMENT	
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Capture Diags	Perform recommended diagnostic tests based on server

	type. Capture available diagnostic logs.
Site Frequency Standard Check (TRAK)	Check lights and indicators for A/B receivers.
SITE CONTROLLERS	
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Equipment Alarms	Check LED and/or other status indicators for fault conditions.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
COMPARATORS	
Equipment Alarms	Verify no warning/alarm indicators.
Capture Diags	Perform recommended diagnostic tests based on server type. Capture available diagnostic logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways

DISPATCH SITE CHECKLIST - LEVEL 1	
GENERAL	
Inspect all Cables	Inspect all cables/connections to external interfaces are secure
Mouse and Keyboard	Verify operation of mouse and keyboard
Configuration File	Verify each operator position has access to required configuration files
Console Op Time	Verify console op time is consistent across all ops
Screensaver	Verify screensaver set as customer prefers
Screen Performance	Verify screen operational/performance
Touchscreen	Verify touchscreen operation (if applicable)
Cabling/Lights/Fans	Visual inspection of all equipment - cabling/ lights/ fans
Filters/Fans/Dust	Clean any filters/ fans/ dust- all equipment
Monitor and Hard Drive	Confirm monitor and hard drive do not "sleep"
DVD/CD	Verify / clean DVD or CD drive
Time Synchronization	Verify console time is synchronized with NTP server
Anti-Virus	Verify anti-virus is enabled and that definition files are up to date (within two weeks of current date)

HEADSET UNPLUGGED TESTING	
Speakers	Test all speakers - audio quality, volume, static, drop-outs, excess hiss when turned up.
Channel Audio in Speaker	Verify selected channel audio in select speaker only.
Footswitch Pedals	Verify both footswitch pedals operational
Radio On-Air Light	Verify radio on air light comes on with TX (if applicable)
HEADSET PLUGGED IN TESTING	
Radio TX and RX	Verify radio TX/RX from both headset jacks. Verify levels OK. Check volume controls for noise/static or drop-outs.
Speaker Mute	Verify select speaker muted.
Telephone Operation	Verify telephone operational through both headset jacks. Check volume controls for noise/static or drop-outs.
Audio Switches	Verify select audio switches to speaker when phone off-hook. (if interfaced to phones)
Radio Takeover in Headset	Verify radio-takeover in headset mic when phone off-hook (mic switches to radio during PTT and mutes to phone).
OTHER TESTS	
Phone Status Light	Verify phone status light comes on when phone off-hook (if applicable)
Desk Microphone Operation	Confirm desk mic operation (if applicable)
Radio IRR Operation	Verify radio IRR operational (if applicable) on MOT dispatch
Telephone IRR Operation	Verify telephone [if on radio computer] IRR operational (if applicable) on MOT dispatch
Recording	Verify operator position being recorded on long term logging recorder (if applicable) if included in service agreement
COMPUTER PERFORMANCE TESTING	
Computer Reboot	Reboot op position computer
Computer Operational	Confirm client computer is fully operational (if applicable)
AUDIO TESTING	
Conventional Resources	Confirm all conventional resources are functional with adequate audio levels and quality
Secure Mode	Confirm any secure talkgroups are operational in secure mode
Trunked Resources	Confirm all trunked resources on screen are functioning by placing a call in both directions (at the STATE'S discretion) and at a single op position
Backup Resources	Confirm backup resources are operational
EQUIPMENT ROOM TESTS	

Recording - AIS Test	Verify audio logging of trunked calls
Recording	Test op position logging on analog recorder (with STATE assistance)
System Alarms	Review alarm system on all equipment for errors
Capture Diags	Perform recommended diagnostic tests based on equipment. Capture available diagnostic logs.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
PLAYBACK STATION (CONTRACTOR Provided)	
Capture Diags	Perform recommended diagnostic tests based on equipment. Capture available diagnostic logs.
Recall Audio	Verify that radio/telephone audio can be recalled

RF SITE CHECKLIST - LEVEL 1	
RF PM CHECKLIST	
Equipment Alarms	Verify no warning/alarm indicators.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
Site Frequency Standard Check	Check lights and indicators for A/B receivers.
Basic Voice Call Check	Voice test each voice path, radio to radio.
Control Channel Redundancy (trunking)	Roll control channel, test, and roll back.
Site Controller Redundancy (trunking) - ASR only	Roll site controllers with no dropped audio.
PM Optimization Workbook (See Table 2 for GTR tests)	Complete Base Station Verification tests - Frequency Error, Modulation Fidelity, Forward at Set Power, Reverse at Set Power, Gen Level Desense no Tx

MOSCAD CHECKLIST - LEVEL 1	
MOSCAD SERVER	
Equipment Alarms	Verify no warning/alarm indicators.
Check Alarm/Event History	Review MOSCAD alarm and events to find if there are chronic issues.
Windows Event Logs	Review Windows event logs. Save and clear if full.
Password Verification	Site devices to verify passwords. Document changes if any

	found.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
MOSCAD CLIENT	
Equipment Alarms	Verify no warning/alarm indicators.
Check Alarm / Event History	Review MOSCAD alarm and events to find if there are chronic issues.
Windows Event Logs	Review Windows event logs. Save and clear if full.
Password Verification	Site devices to verify passwords. Document changes if any found.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.
MOSCAD RTU's	
Equipment Alarms	Verify no warning/alarm indicators.
Verify Connectivity	Verify Connectivity
Password Verification	Site devices to verify passwords. Document changes if any found.
Check Alarm/Event History	Review MOSCAD alarms and events to find if there are chronic issues.
Verify System SW CD's	Perform audit of software media on site. Versions, KC numbers, types, etc.

FACILITIES CHECKLIST - LEVEL 1	
VISUAL INSPECTION EXTERIOR	
ASR Sign	Verify that the ASR sign is posted.
Warning Sign - Tower	Verify warning sign is posted on the tower.
Warning Sign - Gate	Verify that a warning sign is posted at the compound gate entrance.
10 Rule Sign	Verify that a 10 rules sign is posted on the inside of the shelter door.
Outdoor Lighting	Verify operation of outdoor lighting/photocell.
Exterior of Building	Check exterior of building for damage/disrepair.
Fences / Gates	Check fences/gates for damage/disrepair.
Landscape / Access Road	Check landscape/access road for accessibility.
VISUAL INSPECTION INTERIOR	
Electrical Surge Protectors	Check electrical surge protectors for alarms.
Emergency Lighting	Verify emergency lighting operation.

Indoor Lighting	Verify indoor lighting.
Equipment Inspection	Visually inspect that all hardware (equipment, cables, panels, batteries, racks, etc.) are in acceptable physical condition for normal operation.
Regulatory Compliance (License, ERP, Frequency, Deviation)	Check station for regulatory compliance. Update station logs.
Clean Fans and Equipment	Use antistatic vacuum to clean cooling pathways
UPS	
Visual inspection (condition, cabling)	Verify corrosion, physical connections, dirt/dust, etc.
GENERATOR	
Visual Inspection	Verify, check panel housing, cracks, rust and weathering. Physical connections, corrosion, dirt/dust, etc.
Fuel	Verify fuel levels in backup generators, document date of last fuel delivered from fuel service provider.
Oil	Check the oil dipstick for proper level. Note condition of oil.
Verify operation (no switchover)	Check, verify running of generator, ease of start or difficult. Is generator "throttling" or running smooth? Any loud unusual noise? Etc.
Motorized Dampers	Check operation
HVAC	
Air Filter	Check air filter and recommend replacement if required.
Coils	Check coils for dirt and straightness
Outdoor Unit	Check that outdoor unit is unobstructed
Wiring	Wiring (insect/rodent damage)
Cooling / Heating	Check each HVAC unit for cooling/heating
Motorized Dampers	Check operation

MICROWAVE CHECKLIST - LEVEL 1	
GENERAL	
Transport Connectivity	Confirm transport performance by viewing UEM for site link warnings or errors.
RADIO	
Alarms	Check alarm / event history
Software	Verify version of application
TX Frequency	Verify transmit frequency

TX Power	Verify transmit power
RX Frequency	Verify receive frequency
RX Signal Level	Verify receive signal level and compare with install baseline documentation
Save configuration	Save current configuration for off-site storage
Backhaul Performance	Monitor UEM status (alarms, logs, etc.) for all links. If UEM not used to monitor microwave, then use provided microwave alarm mgmt. server.
WAVEGUIDE	
Visual Inspection	Inspect for wear or dents (from ground using binoculars).
Connection Verification	Verify all connections are secured with proper hardware (from ground using binoculars).
DEHYDRATOR	
Visual Inspection	Inspect moisture window for proper color
Pressure Verification	Verify pressure of all lines
Re-Pressurization	Bleed lines temporarily to verify the dehydrator re-pressurizes
Run Hours	Record number of hours ran

TOWER CHECKLIST - LEVEL 1	
STRUCTURE CONDITION	
Rust	Check structure for rust.
Cross Members	Check for damaged or missing cross members.
Safety Climb	Check safety climb for damage.
Ladder	Verify that ladder system is secured to tower.
Welds	Check for cracks or damaged welds.
Outdoor lighting/photocell	Test outdoor lighting and photocell.
Drainage Holes	Check that drainage holes are clear of debris.
Paint	Check paint condition.
TOWER LIGHTING	
Lights/Markers	Verify all lights/markers are operational.
Day/Night Mode	Verify day and night mode operation.
Power Cabling	Verify that power cables are secured to tower.
ANTENNAS AND LINES	
Antennas	Visually inspect antennas for physical damage (from ground using binoculars).

Transmission Lines	Verify that all transmission lines are secure on the tower.
GROUNDING	
Structure Grounds	Inspect grounding for damage or corrosion
GUY WIRES	
Tower Guys	Check guy wires for fraying and tension.
Guy Wire Hardware	Check hardware for rust.
CONCRETE CONDITION	
Tower Base	Check for chips or cracks.

Table 2: Site Performance Verification Procedures

ASTRO 25 GTR ESS SITE PERFORMANCE
ANTENNAS
Transmit Antenna Data
Receive (Antenna) System Data
Tower Top Amplifier Data
FDMA MODE
Base Radio Transmitter Tests
Base Radio Receiver Tests
Base Radio Transmit RFDS Tests
Receive RFDS Tests with TTA (if applicable)
Receive RFDS Tests without TTA (if applicable)
TDMA MODE
Base Radio TDMA Transmitter Tests
Base Radio TDMA Receiver Tests
TDMA Transmit RFDS Tests
TDMA Receive RFDS Tests with 432 Diversity TTA
TDMA Receive RFDS Tests with 2 Independent TTA's (if applicable)
TDMA Receive RFDS Tests without TTA (if applicable)

SECURITY MONITORING SERVICE OVERVIEW

CONTRACTOR's Security Monitoring Services includes anti-malware monitoring and authentication log monitoring. There are also options for firewall monitoring, intrusion detection system (IDS) monitoring, and ASTRO system log monitoring.

CONTRACTOR's ASTRO Security Monitoring is a complete solution that provides peace of mind and reduces the risk that your network availability will be impacted by a security threat. The solution includes 24x7x365 monitoring of the radio network security elements by experienced, specialized security technologists with years of experience working with ASTRO mission-critical networks. For highly complex or unusual security events, our technologists have direct and immediate access to CONTRACTOR engineers for rapid resolution.

This Statement of Work ("SOW") is subject to the terms and conditions of CONTRACTOR's Professional Services Agreement, Service Agreement or other applicable agreement in effect between the parties ("Agreement"). CONTRACTOR and STATE may be referred to herein individually as a "Party" or together as "Parties"

1. DESCRIPTION OF SECURITY MONITORING SERVICES

a. Anti-malware Monitoring

ASTRO comes installed with Anti-malware SW. Security Monitoring will ensure that malware definition updates, as provided by the Anti-malware OEM, are installed and running. The anti-malware SW is monitored for activity such as deletion, quarantine, and alerting of suspicious SW.

b. Authentication Monitoring

1) Windows and RSA logins are monitored for repeated failures and locked accounts.

c. Firewall Monitoring

The ASTRO system potentially has several firewall options. See Table 1 in the addendum for a list. In any of these firewall applications, CONTRACTOR provisions and deploys the firewalls with the ASTRO system. CONTRACTOR will monitor each one that has the firewall monitoring option.

d. IDS (Intrusion Detection System) Monitoring

An IDS is an option to ASTRO that may be deployed between the ASTRO firewall and the CEN.

e. Centralized Log Monitoring

ASTRO has an option that provides the ability to forward device syslogs to a single virtual server called Centralized Syslog Server. This allows monitoring of Linux components for authentication events.

2. SCOPE

The CONTRACTOR Secure Operations Center (SOC) consists of highly trained and experienced security professionals. When an event is detected, the technologists will run remote diagnostics and initiate an appropriate response. This response could include, but is not limited to, continuing to monitor the event for further development, attempting to remotely restore the system, or opening of a case for dispatch of a servicer.

a. CONTRACTOR Responsibilities:

1) Provide, maintain, and replace when necessary, HW and SW required to monitor ASTRO security elements. HW may include a firewall, router, or physical server. SW may include virtual servers either on the ASTRO core or a separate physical server, related OS, SIEM collectors, and SW that allows distribution of updates and remote diagnostics.
2) Verify connectivity and monitoring is active prior to system acceptance or start date.
3) Coordinate with STATE to maintain CONTRACTOR service authentication credentials.
4) Maintain properly trained and accredited technicians. Monitor the STATE'S system 24/7/365 for malicious or unusual activity.
5) Reports are posted to the SSC quality webpage. Contact your CSM for access.

b. The STATE has the following responsibilities:

1) Security Monitoring requires a connection from the STATE'S ASTRO system to CONTRACTOR's SOC in Schaumburg. CONTRACTOR offers either a T1 option or a Virtual Private Network (VPN) option through a STATE supplied internet connection. Connectivity needs to be established before service commences.
2) Allow CONTRACTOR continuous remote access to monitor the ASTRO system. This includes keeping the connection plugged-in, providing passwords, and working with CONTRACTOR to understand and maintain proper administration privileges.
3) Provide continuous utility service to any CONTRACTOR equipment installed or utilized at the STATE'S premises to support delivery of this service.
4) Provide STATE contact information necessary to complete the Customer Support Plan. Notify your CSM within 2 weeks of any contact changes.
5) As necessary, upgrade the ASTRO system to supported releases.
6) Allow CONTRACTOR dispatched-servicers physical access to the equipment when required.
7) Comply with the terms of the applicable license agreements between STATE and the non-CONTRACTOR software copyright owners.
8) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the services described in this SOW.

3. DISCLAIMER

CONTRACTOR disclaims any warranty and does not guarantee that STATE'S system will be error-free or immune to security breaches as a result of these services.

Addendum Potential ASTRO Firewalls

CNI	Customer Network Interface. This firewall separates the ASTRO Radio Network from the customer's IT network (often referred to as the CEN or Customer Enterprise network). There are single and redundant (high-availability) options for the CNI, the redundant option meaning there are two firewalls. Both firewalls must be monitored in the redundant case.
DSR	Dynamic System Resilience. This is an ASTRO option where a geographically separated backup master site is implemented as a "hot-standby" in case of disaster at the primary. This option potentially doubles the number of firewalls in the system.
ZCP	Zone Core Protection. This ASTRO option places firewalls at the master site where the RF and console sites connect. This protects the core from attack from a compromised site and propagation of the attack to the other sites. There are always 2 firewalls in this option for redundancy.
TI	Telephone Interconnect. This ASTRO option allows calls to be made to/from ASTRO subscribers. A firewall is required to protect the RNI from the telephone connection. One firewall may serve the dual purpose of the TI and ISSI interface.
ISSI	Inter RF Subsystem Interface. This option allows connectivity to a separate system. The original intent of this option was to connect to another P25 system that could be CONTRACTOR or any other P25 compliant vendor. This standard has since been used to allow connection to non- P25 systems through additional interfaces such as WAVE. In any case, a firewall is necessary to protect the RNI from this connection.
MCC 7100	The MCC 7100 dispatch console may be configured such that it can connect via Virtual Private Network (VPN) through an internet connection. A firewall is required to terminate on the ASTRO side of that connection. This firewall may be physically located at either a console site or the master site and there may be multiple firewalls for this purpose.
Custom	Some customers may opt to install their own firewalls and want them monitored. The most common location is at console sites. The STATE will have to work with CONTRACTOR to determine if and how custom firewalls can be monitored. There may also be additional charges.

TECHNICAL SUPPORT OVERVIEW

CONTRACTOR's Technical Support service provides telephone consultation for technical issues that require a high level of ASTRO network expertise and troubleshooting capabilities. Remote Technical Support is delivered through the CONTRACTOR System Support Center (SSC) by a staff of technical support specialists skilled in diagnosis and swift resolution of infrastructure performance and operational issues. Technical Support provides access to a solutions database, as well as access to in house test labs and additional CONTRACTOR technical resources

CONTRACTOR applies industry best practices in recording, monitoring, escalating and reporting for Technical Support calls from its contracted customers, reflecting the importance of maintaining mission critical systems.

The terms and conditions of this Statement of Work (SOW) are an integral part of CONTRACTOR's Service Agreement or other applicable agreement to which it is attached and made a part thereof by this reference.

1. DESCRIPTION OF TECHNICAL SUPPORT SERVICES

CONTRACTOR's System Support Center (SSC) will provide technical support to assist the STATE'S technical resources of the CONTRACTOR's currently supported infrastructure. This team of highly skilled professionals is available to the STATE as an integrated part of the support and technical issue resolution process. The SSC remotely supports the STATE and works with but not limited to fault diagnostics tools, simulation networks and fault database search engines.

The Technical Support Operations is available 24 hours a day; 7 days per week to support technical requests (see severity level response time commitments). Calls requiring incidents, problems, or service requests will be logged in CONTRACTOR's issue management system. This ensures that technical issues are prioritized, updated, tracked and escalated as necessary, until resolution. The Technical Support Operations shall assign the priority level as in accordance with the agreed Severity Level Definitions stated in this document.

CONTRACTOR will track the progress of each case from initial logging to resolution. CONTRACTOR will ensure that the STATE is advised of the case progress and informed of tasks that require further investigation and assistance from the STATE'S technical resources.

The provision of this service requires that the STATE provides a suitably trained technical resource that delivers maintenance and support to the system, and who is familiar with the operation of that system. CONTRACTOR provides technical consultants to support the local resource in the timely closure of infrastructure, performance and operational issues.

2. SCOPE

Technical Support service is available 24 hours a day, 7 days a week based on Severity Level Definitions.

a. Geographic Availability

Technical Support is available to any customer regardless of their geographic location and timeframes are based on the STATE'S local time zone.

b. Inclusions

Technical Support service will be delivered on CONTRACTOR sold infrastructure including integrated 3rd party products.

c. Limitations and Exclusions

The following activities are outside the scope of the Technical Support service, but are optional services that are available to remote Technical Support at an additional cost:

1) Emergency on-site visits required to resolve technical issues that cannot be resolved by with SSC working remotely with the local STATE technical resource.
2) Third party support for equipment not sold by CONTRACTOR as part of the original system.
3) System installations, upgrades, and expansions.
4) STATE training.
5) Hardware repair and/or exchange.
6) Network security services.
7) Network transport.
8) Information Assurance.
9) CONTRACTOR services not included in this statement of work.
10) Any technical support required as a result of a virus or unwanted intrusion is excluded if the system is not protected against these security threats by CONTRACTOR's Pre-tested Security Update Service when applicable.

d. CONTRACTOR has the following responsibilities:

1) Enable STATE access to the CONTRACTOR Technical Support Center (800-221-7144), 24 hours a day, 7 days per week, to answer, document and respond to requests for support.
2) Respond to requests for Technical Support in accordance with the response times set forth in the Severity Level Response Time Commitments section of this document and the severity level defined in the Severity Level Definitions section of this document.
3) Advise caller of procedure for determining any additional requirements, activities or information relating to issue restoration and/or characterization.
4) Maintain communication with the STATE in the field as needed until resolution of the case
5) Coordinate technical resolutions with agreed upon third party vendors, as needed.
6) Escalate and manage support issues, including systemic issues, to additional CONTRACTOR technical resources, as applicable.
7) Escalate the case to the appropriate party upon expiration of a response time.
8) Determine, in its sole discretion, when a case requires more than the Technical Support services described in this SOW and notify STATE of an alternative course of action.

e. The STATE has the following responsibilities:

1) Provide CONTRACTOR with pre-defined information prior to contract start date necessary to complete Customer Support Plan (CSP).

2) Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).
3) Contact the SSC in order to engage the Technical Support service, providing the necessary information for proper entitlement services. Including but not limited to the name of contact, name of customer, system ID number, site(s) in question, and brief description of the problem including pertinent information for initial issue characterization.
4) Maintain suitable trained technical resources that provide field maintenance and technical maintenance services to the system, and who are familiar with the operation of that system.
5) Provide SSC access via the remote connection that has been established through other sold services (e.g. Network Fault Monitoring)
6) Supply suitably skilled and trained on-site presence when requested by the SSC.
7) Validate issue resolution prior to close of the case in a timely manner.
8) Acknowledge that cases will be handled in accordance with the times and priorities as defined in the Severity Level Definitions and in the Severity Level Response Time Commitments section in this document.
9) Cooperate with CONTRACTOR and perform all acts that are reasonable or necessary to enable CONTRACTOR to provide the Technical Support service.

3. SEVERITY LEVEL DEFINITIONS

The following severity level definitions will be used to determine the maximum response times:

Severity Level	Severity Definition
Severity 1	This is defined as a failure that causes the system and/or infrastructure a loss of voice functionality and no work-around or immediate solution is available. The following are examples of this kind of failure: □ 33% of call processing resources impaired □ Site Environment alarms: o Smoke, o Unauthorized access o Temperature o Power failure
Severity 2	This is defined as a fault that causes the system to operate with a continuous reduction in capacity or functionality of core services (core services include, voice, data or network management). The following are examples of this kind of failure: □ Less than 33% of call processing resources impaired □ Failure of a single redundant component

Severity 3	This is defined as a fault which reduces the functionality, efficiency or usability of core services (voice, data and network management) and there is a viable work-around in place. The following are examples of this kind of severity: □ Intermittent faults that are infrequent and minor impact to core services □ Statistical reporting problems
Severity 4	This is defined as a minor issue, which has little or no impact on the functionality, efficiency or usability of core services. The following are examples of this kind of severity: □ Faults resulting in minor functions or features being unsupported or unreliable in ways that are not noticeable to the user. □ Faults that have no impact in how the user perceives the system to work. □ Cosmetic issues. □ Requests for information. □ Preventive Maintenance

4. SEVERITY LEVEL RESPONSE TIME COMMITMENTS

The response times are based on the defined severity levels as follows:

Severity Level	Response Time
Severity 1	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within one hour of the request for support being logged in the issue management system. Continual effort will be maintained to restore the system or provide a workaround resolution. Response provided 24 x 7.
Severity 2	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within four hours of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.
Severity 3	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

Severity 4	A CONTRACTOR SSC Technician will make contact with the STATE technical representative within the next business day of the request for support being logged at the issue management system. Response provided 8 x 5 on standard business days, which is normally Monday through Friday 8AM to 5PM, excluding US Holidays.

5. OPTIONAL: SITE FACILITY MAINTENANCE

CONTRACTOR'S optional per site facility and tower maintenance plan includes the following services:

a. Additional site component maintenance and repair services with pricing shown for years 1-9 in Exhibit C-4 Maintenance and System Upgrade Agreement Pricing:

1) Maintenance and repairs, as required, for generator and ATS equipment at sites where CONTRACTOR is responsible for constructing a new equipment building.

2) Maintenance and repairs, as required, for HVAC equipment at sites where CONTRACTOR is responsible for constructing a new equipment building.

3) Maintenance and repairs, as required, for UPS backup equipment at all proposed RF sites where CONTRACTOR will provide new UPS equipment.

a) CONTRACTOR has included replacement of the UPS batteries in year 4 and year 8.

4) Antenna and transmission line maintenance, as required, for new equipment provided by CONTRACTOR.

5) Repairs are based on parts availability from the manufacturer.

6) If other site or compound upkeep maintenance services are desired in addition to those stated above, CONTRACTOR can provide a separate quote upon request.

6. WARRANTY AND MAINTENANCE OVERVIEW

During the first year warranty of the proposed offering, within each Phase and for the equipment proposed in that phase, CONTRACTOR will provide the State with a complete suite of system support services designed to maximize the network's uptime. See below for the list of Year 1 warranty services. **Optional maintenance services can be purchased, after or during the warranty year, through the term of the contract.*

Summary of Warranty and Maintenance Services

Description	1 Year Warranty	Optional Maintenance*
Dispatch Service and Case Management (24x7x365)	√	√
Four Hour On-Site Response (24x7x365) Major	√	Performed by the State
Infrastructure Board Repair	√	√
Network Preventive Maintenance (Annual)	√	Performed by the State
Technical Support (24x7x365)	√	√
Customer Support Manager	√	√
Customer Support Plan	√	√
CONTRACTOR On-Line (MOL)	√	√
Disaster Recovery Plan	√	√
Remote Network Monitoring	√	√
Remote Security Monitoring	√	√
Remote Security Update Service	√	√
System Upgrade Agreement (Hardware and Software Updates)	√	Optional (Contract Year 6,)

7. WARRANTY AND MAINTENANCE STATEMENTS OF WORK

Year 1 Warranty and Optional additional years of Maintenance statements of work which are included above in this exhibit are:

a. Infrastructure Repair

b. Custom System Upgrade Agreement (Contract Year 6)

c. Network Monitoring

d. Onsite Infrastructure Response and Dispatch Service (Year 1 only)

e. ASTRO 25 Security Update Service (SUS)

f. Annual Preventive Maintenance (Year 1 only)

g. Security Monitoring Service

h. ASTRO 25 Technical Support

Exhibit C-4 – Maintenance and System Upgrade Agreement Pricing

1. MAINTENANCE AND SYSTEM UPGRADE AGREEMENT

NOTES:

1 **The maintenance costs provided in this table reflect the start of maintenance after the warranty year.**

2 **Maintenance pricing below are estimates only based on estimated rollouts.**

3 **The final option selection and final implementation rollout dates will determine the final maintenance pricing.**

Section	DESCRIPTION:	ESTIMATED ROLLOUT	*TOTAL PRICE Years 1-9	Warranty Year	Year 2 Maintenance	Year 3 Maintenance	Year 4 Maintenance	Year 5 Maintenance	Year 6 Maintenance w/ SUA	Year 7 Maintenance	Year 8 Maintenance	Year 9 Maintenance
3.2.4	Single Zone Core + Network Management Client (1)	PHASE 1	$1,090,523	Included with Purchase	$46,447	$47,607	$48,798	$50,018	$695,452	$65,743	$67,387	$69,071
3.2.8	Dispatch - 22 dispatch sites											
	State Radio	PHASE 1	$330,192	Included with Purchase	$29,076	$29,831	$30,577	$31,341	$103,359	$34,467	$35,329	$36,212
	Backup State Radio	PHASE 1	$194,816	Included with Purchase	$17,792	$18,237	$18,693	$19,160	$59,023	$20,130	$20,633	$21,149
	Barnes County Dispatch	PHASE 1	$146,659	Included with Purchase	$13,140	$13,497	$13,834	$14,180	$44,670	$15,392	$15,776	$16,171
	Bottineau / Renville 911	PHASE 1	$95,161	Included with Purchase	$7,534	$7,723	$7,916	$8,114	$36,137	$9,019	$9,244	$9,475
	Cavalier County 911	PHASE 1	$95,161	Included with Purchase	$7,534	$7,723	$7,916	$8,114	$36,137	$9,019	$9,244	$9,475
	Central Dakota Communications Center	PHASE 1	$288,524	Included with Purchase	$25,092	$25,748	$26,391	$27,051	$92,902	$29,698	$30,441	$31,202
	Grand Forks Public Safety Answering Point	PHASE 1	$241,332	Included with Purchase	$21,339	$21,901	$22,448	$23,010	$75,959	$24,930	$25,553	$26,192
	Lake Region 911 Center	PHASE 1	$119,238	Included with Purchase	$9,526	$9,765	$10,009	$10,259	$44,608	$11,403	$11,688	$11,980
	McLean County 911	PHASE 1	$146,659	Included with Purchase	$13,140	$13,497	$13,834	$14,180	$44,670	$15,392	$15,776	$16,171
	Mercer / Oliver 911	PHASE 1	$117,941	Included with Purchase	$9,526	$9,765	$10,009	$10,259	$43,311	$11,403	$11,688	$11,980
	MHA Communications Center	PHASE 1	$190,921	Included with Purchase	$17,124	$17,580	$18,020	$18,470	$57,721	$20,161	$20,665	$21,181
	Minot Central Dispatch	PHASE 1	$217,592	Included with Purchase	$19,116	$19,622	$20,113	$20,615	$68,786	$22,545	$23,109	$23,686
	Mountrail County Sheriffs Office	PHASE 1	$145,362	Included with Purchase	$13,140	$13,497	$13,834	$14,180	$43,373	$15,392	$15,776	$16,171
	Pembina County 911	PHASE 1	$146,659	Included with Purchase	$13,140	$13,497	$13,834	$14,180	$44,670	$15,392	$15,776	$16,171
	Pierce County 911	PHASE 1	$95,161	Included with Purchase	$7,534	$7,723	$7,916	$8,114	$36,137	$9,019	$9,244	$9,475
	Richland County Communications / 911	PHASE 1	$172,033	Included with Purchase	$15,132	$15,538	$15,927	$16,325	$54,438	$17,776	$18,221	$18,676
	Rolette County 911	PHASE 1	$95,161	Included with Purchase	$7,534	$7,723	$7,916	$8,114	$36,137	$9,019	$9,244	$9,475
	Stark / Dickinson Dispatch	PHASE 1	$192,218	Included with Purchase	$17,124	$17,580	$18,020	$18,470	$59,018	$20,161	$20,665	$21,181
	Stutsman County Communications Center	PHASE 1	$119,238	Included with Purchase	$9,526	$9,765	$10,009	$10,259	$44,608	$11,403	$11,688	$11,980
	Traill / Steele 911	PHASE 1	$96,458	Included with Purchase	$7,534	$7,723	$7,916	$8,114	$37,434	$9,019	$9,244	$9,475
	Walsh County Communications	PHASE 1	$146,659	Included with Purchase	$13,140	$13,497	$13,834	$14,180	$44,670	$15,392	$15,776	$16,171
	Williston / Williams County 911	PHASE 1	$194,812	Included with Purchase	$17,124	$17,580	$18,020	$18,470	$61,612	$20,161	$20,665	$21,181
3.2.3	45 RF Sites	PHASE 2	$2,839,011	Included with Purchase	$212,459	$217,770	$223,214	$228,794	$1,217,465	$240,377	$246,386	$252,546
3.2.3	76 RF Sites + 18 Simulcast Sites	PHASE 3	$5,438,936	Included with Purchase	Not Deployed - Final Release	Not Deployed - Final Release	Yr1 Warranty Included with Purchase	$625,062	$2,847,401	$639,373	$655,358	$671,742
	TOTAL MAIN OFFERING - includes Technical Support, Dispatch, Network Monitoring, Security Update Service, Security Monitoring,		**$12,956,431**	Included with Purchase	**$569,776**	**$584,385**	**$598,994**	**$1,239,031**	**$5,929,699**	**$1,311,781**	**$1,344,576**	**$1,378,190**

3. MAINTENANCE: ITEMS NOT EXECUTED

NOTES:

1 **IMPLEMENTATION PLAN: Final Option selection and rollout will determine final maintenance / SUA pricing.**
2 **FIRE STATION ALERTING: Consolette Replacement Services and maintenance are not included and can be proposed separately upon final quantity and location definition.**
3 **LOCAL PSAP (22) ANALOG LOGGING RECORDERS: SUA for the NRX analog recorders is not included. If desired this can be quoted separately based upon final selection.**
4 **UNICATION PAGERS: Manufacturer's Defect 2 year warranty is included for pager and 1 year for accessories, battery.**
5 **TOWER MAINTENANCE: If desired this can be quoted separately.**

Section	BAFO - MAINTENANCE / SUA YEARS FOR OPTIONS	ESTIMATED ROLLOUT	*TOTAL PRICE Years 1-9	Warranty Year	Year 2 Maintenance	Year 3 Maintenance	Year 4 Maintenance	Year 5 Maintenance	Year 6 Maintenance w/ SUA	Year 7 Maintenance	Year 8 Maintenance	Year 9 Maintenance
3.2.4	BAFO - Maintenance/SUA - Optional Geo Prime ((7) Geographically Redundant Prime RF Sites)	PHASE 3	$758,176	Included with Purchase	Not Deployed - Final Release	Not Deployed - Final Release	Yr1 Warranty Included with Purchase	$119,070	$248,660	$126,321	$130,111	$134,014
3.2.4	BAFO - Maintenance/SUA - Optional DSR	PHASE 1	$605,701	Included with Purchase	$39,181	$40,160	$41,164	$42,194	$306,663	$44,329	$45,437	$46,573
3.2.4	BAFO - Maintenance/SUA -Optional Integrated Voice & Data, Enhanced Data for up to 25,000 users (Infrastructure Only)	PHASE 2	$0	Included with Purchase	No charge if purchased with Core Offering	No charge if purchased with Core Offering	No charge if purchased with Core Offering	No charge if purchased with Core Offering	No charge if purchased with Core Offering	No charge if purchased with Core Offering	No charge if purchased with Core Offering	No charge if purchased with Core Offering
3.2.4	BAFO - Maintenance/SUA - Optional ISSI (ISSI Gateway (5 interfaces) to Neighbor System)	PHASE 2	$770,313	Included with Purchase	$76,561	$78,857	$81,224	$83,660	$175,679	$88,755	$91,417	$94,160
3.2.8	BAFO - Maintenance/SUA - Optional Additional Position at an Existing PSAP (+1 op)	Initial	$23,260	Included with Purchase	$2,108	$2,160	$2,214	$2,270	$7,174	$2,385	$2,444	$2,505
3.2.11	BAFO - Maintenance/SUA - Optional Encryption	Initial	$417,293	Included with Purchase	$44,845	$46,190	$47,576	$49,003	$68,991	$51,987	$53,547	$55,153
3.2.15	BAFO - Maintenance/SUA - Optional NICE IP Clear Logger Recording Solution (CENTRALIZED IP Logging Solution (Main and DSR) with analog recorders at 22 PSAPs). NOTE: The SUA is only included for the IP Loggers.	Initial	$2,266,939	Included with Purchase	$251,758	$259,311	$267,090	$275,103	$311,577	$291,857	$300,612	$309,631
3.2.14	OPTIONAL: GPS Location	PHASE 3	No Additional Charge	Included with Purchase	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge
3.2.13	OPTIONAL: Over The Air Programming	PHASE 3	No Additional Charge	Included with Purchase	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge
3.2.12	OPTIONAL: Over the Air Re-keying	PHASE 3	No Additional Charge	Included with Purchase	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge	No Additional Charge
3.2.16	OPTIONAL: Fire Station Alerting - consolette service and maintenance can be provided upon final quantity and location definition.	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Section	BAFO - MAINTENANCE / SUA YEARS FOR OPTIONS	ESTIMATED ROLLOUT	*TOTAL PRICE Years 1-9	Warranty Year	Year 2 Maintenance	Year 3 Maintenance	Year 4 Maintenance	Year 5 Maintenance	Year 6 Maintenance w/ SUA	Year 7 Maintenance	Year 8 Maintenance	Year 9 Maintenance
	TOTAL BAFO ADDITIONAL and OPTIONAL ITEMS (1st Echelon performed by State)- includes Technical Support, Dispatch, Network Monitoring, Security Update Service, Security Monitoring, Infrastructure Repair		**$4,841,683**	**$0**	**$414,452**	**$426,678**	**$439,268**	**$571,300**	**$1,118,743**	**$605,634**	**$623,569**	**$642,037**
Section	**SUBSCRIBERS - SINGLE UNIT PRICING ONLY**											
	OPTIONAL SUBSCRIBER - Annual Preventative Mtnce per Mobile at service shop		**$786**	$79	$81	$83	$85	$87	$89	$92	$94	$96
	OPTIONAL SUBSCRIBER - Annual Preventative Mtnce per Portable at service shop		**$714**	$72	$74	$75	$77	$79	$81	$83	$85	$87

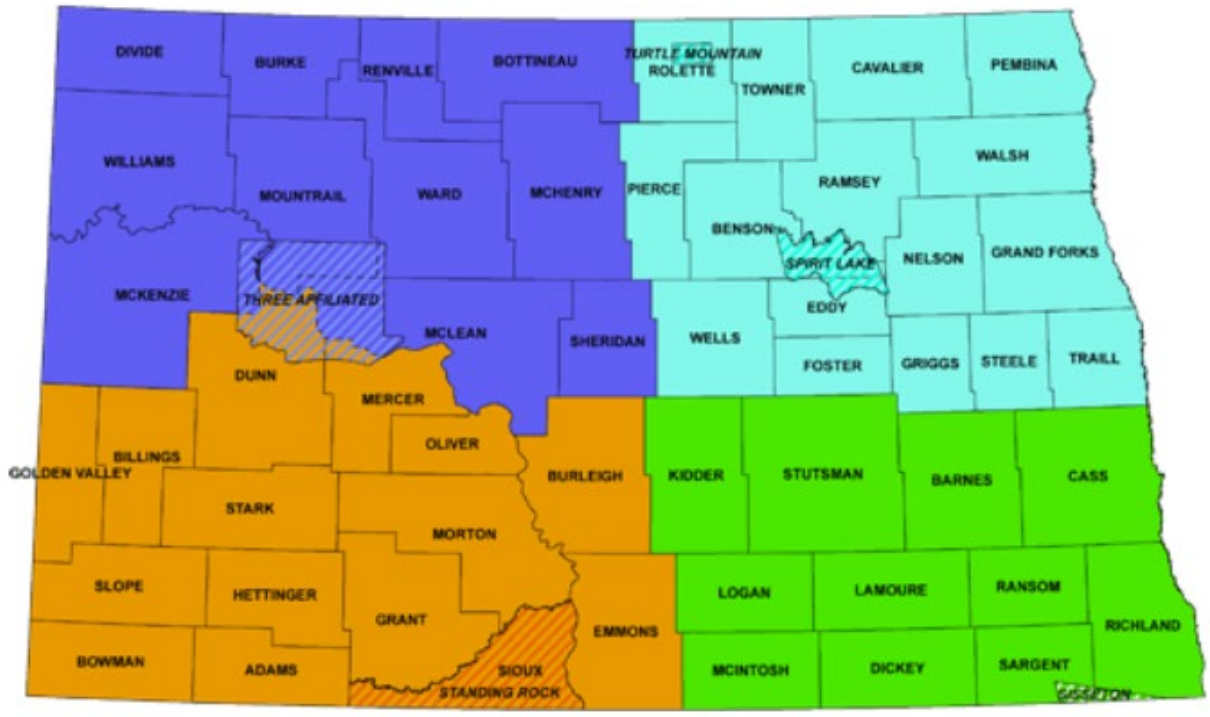
Exhibit D – Pricing

Reference Excel file named 20190116 Exhibit D North Dakota Pricing.

Exhibit E – KMZ Files

Reference .KMZ file named 20190116 ND 800 MHz TDMA 139 Site Coverage Maps.

Exhibit F – Regions



Northwest Region		Northeast Region	
Bottineau	Mountrail	Benson	Ramsey
Burke	Renville	Cavalier	Rolette
Divide	Sheridan	Eddy	Spirit Lake
McHenry	Three Affiliated	Foster	Steele
McKenzie	Ward	Grand Forks	Towner
McLean	Williams	Griggs	Traill
		Nelson	Turtle Mountain
		Pembina	Walsh
		Pierce	Wells

Southwest Region		Southeast Region	
Adams	Hettinger	Barnes	McIntosh
Billings	Mercer	Cass	Ransom
Bowman	Morton	Dickey	Richland
Burleigh	Oliver	Kidder	Sargent
Dunn	Sioux	LaMoure	Stutsman
Emmons	Slope	Logan	
Golden Valley	Stark		
Grant			