8.5 LAND MOBILE RADIO SERVICE (LMRS) (L.34.1.7.1; C.2.14.6)

The offeror shall describe each of the optional services offered. Table L.34.1-9 shows the Wireless, Special, and Access Services that shall be optional to offer. Tables J.9.1.1.2 (b) Technical Stipulated Requirements for Optional IP-Based Services and J.9.1.1.3 (b) Technical Narrative Requirements for Optional IP-Based Services identify the stipulated and narrative requirements, respectively, that shall apply exclusively to optional services.

The offeror shall describe all optional Wireless, Special, and Access Services offered to include:

8.5.1 Technical Description (L.34.1.7.1 (c))

A technical description of how the service requirements (e.g., capabilities, features, interfaces) are satisfied for all proposed optional services.

Agency LMRS can connect to other voice and data Networx services through the Sprint network.

The Sprint Land Mobile Radio Service (LMRS) will provide end-to-end Land Mobile Radio system design, implementation, and operation and management services. LMRS includes the design, implementation, and management of fixed RF systems, each GSA customer’s command/control/dispatch centers, mobile and portable radios handhelds devices, the system infrastructure to operate the network, and interface to external communications systems.

The LMRS Service Delivery Points (SDPs) include portable handheld radio, mobile vehicular mounted radios, and/or fixed station radios or consoles.

The Sprint LMRS will provide a two-way wireless transmission service through the Sprint Land Mobile Radio network. The fixed RF sites and command and dispatch centers are interconnected through a wide area network to form a LMR network.
8.5.1.1 Capabilities (L.34.1.7.1 (c))
These services include the following minimum LMR capabilities as appropriates:

- Push to Talk
- Conferencing/Talk Groups
- Broadcast
- Fixed Frequency Operation
- Trunking
- P25 compatibility/interoperability
- Data Transmission.

The Sprint Team will design, implement, and manage the end-to-end LMR systems that support the three categories of Land Mobile Radio Services. The systems are capable of connecting a GSA customer’s two-way mobile terminal, such as P25 compatible portable and mobile radios or data.
terminals to each other. The services include the design, implementation, and management of fixed RF systems, each GSA customer’s mobile and portable radios handhelds devices, command/control/dispatch centers, the system infrastructure to operate the network, and interface to external communications systems.

Figure 8.5.1-1. An Example of a LMR System

The Sprint LMR solution provides connectivity for mobile and fixed users.
To provide the best services for various LMR systems, Sprint relies on established and proven system engineering processes and engineering practices to design, implement, and manage LMR systems. The Sprint LMR system engineering processes are shown in **Figure 8.5.1-2.** In the following subsections, the Sprint LMR processes are described in detail. By illustrating the processes, it shows how Sprint will conduct the LMRS that fits to each GSA customer’s need for any potential various LMR systems. (J.9 ID 34261)

**Figure 8.5.1-2. Sprint Value-Centric LMR System Engineering Processes**

*The Sprint process covers all aspects of delivering the right solution for the customer.*
**Mission Analysis**

Mission Analysis is the transformation of GSA customer requirements into a set of products that establish a baseline from which processes may be implemented at low operational risk. This process starts by understanding and documenting the GSA customer's mission, such as goals and objectives, operational concepts, mission scenarios, business processes, and lessons learned from previous projects. It also defines the LMR system’s boundaries and external interfaces, operational and physical environments, most promising operational, maintenance and training concepts and identifies risks associated with the development and deployment of the system such as performance, implementation, cost, and schedule. It addresses the minimum re-engineering required to achieve the desired mission value, which maximizes the use of current assets and commercial solutions.

**Site Survey**
System Requirements Analysis

System Requirement Analysis is the transformation of the GSA customer requirements, operational needs and concepts into a necessary and sufficient set of system requirements. Upon the completion of mission analysis and site survey processes, the GSA customer’s service requirements will be allocated into LMR system and subsystem requirements.

The requirements analysis derives from user perspectives and defines threads to capture the end-to-end flow of operational data and functions through the system to ensure the full addressing of needs. Threads trace directly from the user needs, customer objectives, and operational concepts to ensure that mission satisfaction and critical functionality is verifiable.
Detailed System Design

Once the system specifications are established from the System Requirement Analysis process, the Sprint Team will conduct the LMR detailed system design as shown in Figure 8.5.1-3. The detailed system design process can be divided into the subprocesses and described in the following subsections.

RF Spectrum Analysis & Management

LMR systems require the allocation and authorization of RF spectrum use. The Sprint Team will assist each GSA customer in obtaining the radio frequency spectrum authorizations needed to implement the LMRS network. This includes obtaining spectrum certification, authorization, and frequency assignment throughout the regulatory process, supporting any petitions to NTIA and the FCC for exceptions or changes to current rules and regulations.
Figure 8.5.1-3. Detailed System Design Processes

*Figure 8.5.1-3. Detailed System Design Processes*

*Sprint analyzes the requirements and delivers the optimum technical solution.*

The Sprint Team will follow the procedures as indicated in NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management for managing radio frequency. The GSA customer narrow band channels will be used on the Sprint LMR towers to support narrowband voice and data services in complying with NTIA narrow banding mandate for operation and the TIA TSB88-A and TIA TSB88-A-1 Wireless Communications Systems Performance in Noise and Interference Limited Situations standards.

The Sprint Team will conduct the coverage analysis as a part of the RF Spectrum Analysis and Management process. Experienced engineers will optimize site designs, ensuring maximum coverage within the specified radius and compliance with all standards and Bulletin OET 65. Design engineers will
coordinate each site design with the GSA customer for approval. After design approval, Sprint will communicate to the GSA customer any design modifications identified in the field that affect the GSA customer’s spectrum requirements before authorization to proceed. The Sprint approach to spectrum management maximizes the capacity and efficiency of existing GSA customer frequency assignments while consistently maintaining robust operational communications throughout life cycle of the program.

For example, Sprint will use a software program to build a model of the proposed coverage area to simulate RF propagation characteristics of the installation. From this model, the predicted coverage and potential problem areas will be evident. Sprint will produce a coverage map showing the various coverage boundaries, the building, antenna location, and a legend with the threshold levels.

Functional and Performance Analysis

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**LMR System Design**

The Sprint Team will conduct the LMR system design process to meet the system requirements. The tasks include:

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The Sprint designed systems will be compatible with ANSI/TIA/EIA 102 Series APCO Project 25 (P25) Common Air Interface standard for digital conventional and trucked P25 as applicable. The system will meet the NTIA Narrowband (12.5 KHz channel spacing) Operation Directive for operations below 512 MHz and NTIA Narrow banding Mandate for operation.

The numbering and addressing plan of the system will comply with North American Numbering Plan (NANP) and ITU-TSS ISDN E.164 for voice and IPv4 specification, IPv6 specification (IETF RFC 2460), and IPv6 addressing architecture (IETF RFC 2373).
The system interfaces among the LMR system components will comply with the LMRS interfaces requirements specified in TQC-JTB-05-0002 Section C.2.14.6.3.1. The interfaces specification also includes the GSA customer’s wireline and wireless systems and LMR. The system will provide the standard encryption as defined in FIPS 140-2 requirements and offer compatibility with customer-provided Type 1 encryption and other advanced encryption.

Sprint will closely monitor the all new versions, amendments, and modifications to the documents and standards specified in this response. Sprint will use the commercially available products of the new versions for the system design and deployment, as appropriate.

Our RF team will use the results from the site survey and inputs from the system engineering requirements to generate the engineering design for in-building and external area coverage. The engineers will reuse as much of the existing system infrastructure as appropriate in the design. The external engineering design for the repeater will specify the frequencies; power output; filter, cavity and duplexer requirements; grounding, lightning and surge protection requirements, antenna type(s), height, location and support requirements, and antenna cable specifications and physical routing. The external engineering design will ensure minimum external signal and communications requirements are met for mobile radio coverage. The internal
design will ensure internal signal and communications requirements are met for handheld radios within the facility workplace. Our design will specify bi-directional amplifier (BDA) locations, coax cable and “leaky”-coax specifications and routing, in-building antennas, and splitters as required to provide coverage.

*Solutions Trade Studies*

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*Product/System Integration & Verification*

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*Product Trade Study and Selection*

Based on the system design documents and system specifications documents, Sprint will apply the product trade study process to any potential products from different vendors to select the best value products. The examples of potential product trade studies include:

- Analog, digital, and/or P25 radio system trade study
- Antennas trade study
- UPS trade study
- Command and Control Console trade study
**Figure 8.5.1-4. Product/System Integration and Verification Processes**

*Sprint validates and verifies to ensure performance and operational capability.*

**OTAR trade study**

Sprint will document the results of the trade studies. The final selection of products will require factory acceptance tests to ensure that the products comply with the product specifications.

**System Integration and Test**

The Sprint Team will conduct the system integration and test process to assess system integrity, ensuring proper implementation of system functionality, and ensuring the operational readiness of the system. XX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
The tests will document which defects were identified and their fixes, and include test logs and test reports under Configuration Management (CM). Sprint will provide the final product/system test documentation as one of its LMRS tasks.

**Deployment**

After getting the final approval from the GSA customer about the LMR system design, the Sprint deployment team will start the deployment process as shown in XXXXXXXX The deployment process consists of the following subprocesses.
Sprint works with the customer in preparation the system for Agency use.

Deployment Plan

The Sprint Team will install all equipment according to the manufacturer’s installation and operating instructions and specifications. Sprint will comply with all applicable Federal, state and local regulations governing installation, operation and safety. Sprint is a strong proponent of employee and workplace
safety. Sprint will perform all work in strict conformance with applicable Federal (OSHA), state and local health and safety regulations. Further, Sprint intends to apply the applicable requirements of the current issue of NFPA 70, the National Electrical Code (NEC) upon its installers. Sprint believes that it is in the best interests of both the GSA customer and Sprint that all installation work be performed in strict adherence to the NEC. This applies primarily to equipment mounting, cable management, etc., as the GSA customer will be responsible for providing electrical circuits and receptacles required for powering the LMRS equipment.

The Sprint Team will ground all racks installed in the facility to the designated facility ground. All cables will be labeled with to/from designated termination. Upon completion of connecting ground and power, individual
equipment will be placed in the racks per rack diagrams. All equipment will be secured by machine screws on the front panel, and where required, the rack will be mounted to the floor in accordance with local seismic regulations. All cables will be neatly secured to the rack and clearly marked.

Following installation, all work is inspected for compliance with installation standards and the system design documentation, using an installation checklist. Sprint will document any variance from the design submitted with the proposal, triggered by field conditions on the as-built redlined drawings and provide them to the GSA customer POC. Sprint will correct any discrepancies and then prepare the system for testing.

Integration and acceptance tests

Sprint recognizes the importance of verifying that the installed system operates to manufacturers’ specifications, is configured properly to meet NTIA spectral and licensing provisions, and is safe. Formal testing of the equipment and system assures compliance with these requirements. To facilitate proper operation of the system, We developed an LMRS Test Checklist, which will be mutually agreed to prior to the first site installation. The checklist will support the installation and test team in the following necessary on-site activities:

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The Sprint program office will track the completion and delivery of all required items. Once all acceptance items are confirmed by the GSA customer POC as complete, the POC will sign the Acceptance Checklist to signify provisional acceptance of the system, subject to the 14-day post-test acceptance period.

**Training**

[Continued text]
Sprint will also provide the following documents:

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Length of training will be driven by the types and complexity of equipment ordered by a particular site. Sprint will deliver training upon completion of installation and checkout of the site’s equipment.

**Operations and Maintenance**

Sprint will work collaboratively with each GSA customer to plan, schedule, and implement Land Mobile Radio (LMR) Operations and Maintenance (O&M) services. Sprint will tailor services to each Agency’s selected LMR architecture, operating mission requirements, and current or planned customer organizational structure and resources. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

**Sprint designed and implemented LMR systems support**

Sprint will provide overall O&M management of each GSA customer’s LMRS network designed and implemented by the Sprint Team. Sprint will design the LMRS management systems during the system design phase to ensure that management systems are fully integrated with the LMRS.
systems. The LMRS management systems include the network management network, Network Operation Center(s) (NOC), and key management system if required, as shown in Figure 8.5.1-6.

Figure 8.5.1-6. Notional LMR Network Management Architecture

[Diagram of network management architecture]
Maintenance Services

Sprint will establish an inclusive and collaborative team with each GSA customer to develop the required maintenance plans, develop needed technical documentation and training, and implement and monitor the required maintenance services to successfully support Networx LMR systems. The team’s approach to delivering the required maintenance services and support during each program phase is outlined in the following paragraphs.

Warranty Period

Sprint will assume full responsibility for program performance, direct and manage maintenance service and support efforts, and monitor and report performance measures and achievement. Procuring Agencies will have a role in working directly with the Sprint Team throughout the maintenance service planning and implementation process.

Post Warranty Period

Sprint will continue to deliver Networx LMR life cycle system maintenance services or will work with the GSA customer to transition maintenance support services to the GSA customer or a designated 3rd party provider if the user so desires. Procuring Agencies will have a role in working directly with our team throughout the period of performance for all Sprint Team delivered LMRS maintenance services and any subsequent maintenance service transition planning and implementation process.

Sprint Team’s LMR Customer Support Group will use one of two available database tools currently in use to provide system maintenance activity
tracking and performance reporting for each GSA customer. The tool selected for use depends on the needs and requirements of each GSA scheduled procurement. Both fully automated data collection tools provide the ability to enter maintenance activity reporting data and generate performance metrics data comparison reports.

**Maintenance Activity Report Database**

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**Maintenance Tracking System (MTS)**

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Sprint tracks all maintenance issues to ensure high availability of the Agency network.

In summary, the Sprint complementary skill set combined with an integrated set of engineering and RF professionals, certified processes, and proven tools can result in an in-depth, up-front understanding of the operational concept of the GSA customer’s mission. This understanding can enable Sprint to define a solution for Agencies that maximizes objective value from life-cycle cost, schedule, and risk perspectives including technical and business aspects. The Sprint LMRS solution incorporates open-standard technologies to the fullest extent possible to take advantage of economies of
scale, leverage innovation, and manage the risks and benefits associated with technological evolution.

8.5.1.2 Features (L.34.1.7.1 (c))

The Sprint LMRS will provide the features to GSA customers for the Sprint designed and Implemented LMR systems. *Table 8.5.1-1* shows how Sprint delivers the features of LMRS.

**Table 8.5.1-1. Delivery of Features**

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<tr>
<th>ID</th>
<th>Name of Feature</th>
<th>Methods to Deliver</th>
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8.5.1.3 Interfaces (L.34.1.7.1 (c))

Sprint system design will comply with the LMRS Interface requirements as indicated in Table 8.5.1-2.

Table 8.5.1-2. Interfaces

<table>
<thead>
<tr>
<th>UNI Type</th>
<th>Interface Type and Standard</th>
<th>Payload Data Rate or Bandwidth</th>
<th>Protocol Type</th>
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</thead>
<tbody>
<tr>
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Notes:

1. The Payload Data Rate and Protocol Type are highly dependent upon the Agency’s requirement. Exact Payload Data Rate and Protocol Types will be defined and agreed upon as part of each service delivery order.

8.5.2 Performance Metrics (L.34.1.7.1 (d))

A description of the quality of the services with respect to the performance metrics specified in Section C.2 Technical Requirements for each proposed optional service, and other performance metrics used by the offeror.

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For all LMR systems designed, engineered, implemented and delivered by Sprint, Sprint will meet the following performance metrics as outlined in RFP Section C.2.14.6.4.1 and detailed in Table 8.5.1-3.

### Table 8.5.1-3. Performance Metrics

<table>
<thead>
<tr>
<th>Key Performance Indicator (KPI)</th>
<th>Service Level</th>
<th>Performance Standard (Threshold)</th>
<th>Acceptable Quality Level (AQL)</th>
<th>How Measured</th>
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<tbody>
<tr>
<td>Av(LMRS)</td>
<td>Routine</td>
<td>99.5%</td>
<td>&gt;/= 99.5%</td>
<td>See Note 1</td>
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<tr>
<td>Time To Restore (TTR)</td>
<td>Without Dispatch</td>
<td>4 hours</td>
<td>&lt;/= 4 hours</td>
<td>See Note 2</td>
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<tr>
<td></td>
<td>With Dispatch</td>
<td>8 hours</td>
<td>&lt;/= 8 hours</td>
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**Notes:**
1. Availability is measured end-to-end and calculated as a percentage of the total reporting interval time that LMRS is operationally available to the Agency. Availability is computed by...
the standard formula:

\[
\frac{RI(HR) - COT(HR)}{R1(HR)} \times 100
\]

2. See RFP Section C.3.3.1.2.4 for the TTR definitions and measurement guidelines.

The Sprint adherence to the above KPI parameters applies to Sprint designed, engineered, implemented and delivered solutions and as identified in scenarios such as Premise-to-Premise, Premise-to-Far End POP, and POP-to-POP.

8.5.3 Exceeding the Service Requirements (L.34.1.7.1 (e))

If the offeror proposes to exceed the specified service requirements (e.g., capabilities, features, interfaces), a description of the attributes and value of the proposed service enhancements.

Sprint will meet the specified service requirements as stated in RFP Section C.2.14.6.

8.5.4 Experience Delivering Services (L.34.1.7.1 (f))

A description of the offeror’s experience (including major subcontractors) with delivering each proposed optional service.

The Sprint Team is made up of major LMR vendors and RF professional engineering firms. Sprint has demonstrated a strong record of exemplary performance in LMR service areas such as designs, manufactures, markets, and installs conventional and trunked radio systems including land mobile radio base station/repeater networks, and mobile and portable subscriber units. The Sprint Team can handle all aspects of a customer’s LMRS system including system engineering, design, program management, systems integration, system documentation, logistics, help desk services, training, and warranty/maintenance.

Some example experiences of the Sprint delivering services include:

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8.5.5 Value of Offered Optional Services Set (L.34.1.7.1 (g))

If the offeror proposes a set of optional services, a discussion of the value to the Government of a particular set of offered optional services over the value provided by the individual optional services.
8.5.6 Benefits of Network Architecture (L.34.1.7.1 (h))

A description of the overall wireless architecture and an explanation of the benefits of the network architecture design.

LMR Services and systems will be designed and implemented per the unique requirements of each customer or Agency. The network architecture will be designed and implemented as the most beneficial solution to that specific customer or Agency.

8.5.7 Supporting and Ensuring Security, Technological Evolution, Convergence, and Interoperability (L.34.1.7.1 (i))

A description of how the wireless network architecture supports and ensures wireless security and reliability, technological evolution, convergence, and interoperability with present and future commercial networks.

LMR Services and systems will be designed and implemented per the unique requirements of each customer or Agency. The security aspects, technological evolution, convergence and interoperability will be considered as the network is designed, implemented and delivered as the most beneficial solution to that specific customer or Agency.

8.5.8 Testing and Verifying Services (L.34.1.7.1 (j))

A description of the offeror’s approach to perform verification of individual services delivered under the contract, in particular the testing procedures to verify acceptable performance and Key Performance Indicator (KPI)/Acceptable Quality Level (AQL) compliance.

Sprint will provide real-time informational updates on the status of the LMR network and track the particular problem resolution efforts. These updates will provide information appropriate to the service, such as test results (e.g. trace route, latency, bit error rate, and ping), technician log entries, and current status. These data will be used to verify acceptable performance to comply with the Key Performance Indicator and Acceptable Quality Level.
8.5.9 **Impact of Service Delivery on the Network Architecture (L.34.1.7.1 (k))**

A description of how the delivery of any optional services would impact the network architecture (e.g., security, quality and reliability, performance).

Since each LMR solution will be customized to the specific and unique requirements of the ordering Agency, all impacts to any existing network architecture will be analyzed and mitigated in the design phase of service delivery. Sprint will ensure that the final operational capability of the system will meet all feature, design, installation, and operational requirements as defined by each Agency.

8.5.10 **Satisfying NS/EP Functional Requirements (L.34.1.7.1 (l))**

A description of the offeror’s approach to satisfy each NS/EP basic functional requirement listed in Section C.5.2.2.1.1.

8.5.11 **Protecting SS7 Signaling Systems and Satellite Command Links (L.34.1.7.1 (m))**

A description of how the offeror’s approach will satisfy the requirements in Section C.5.2.5 for protection of SS7 signaling systems and satellite command links (if employed).

LMRS has no impact on SS7 signaling systems and satellite command links.
8.5.12 Assuring Service to the National Capital Region  
(L.34.1.7.1 (n))

A description of how the network architecture will satisfy the requirements in Section C.5.2.7 for assured service in the National Capital Region, if applicable.

LMRS has no impact on National Capital Region service assurance.

8.5.13 Meeting Section 508 Provisions (L.34.1.7.1 (o))

A description of the offeror’s approach for providing the capabilities needed to meet Section 508 provisions identified in Section C.6.4 for the proposed optional services.

Sprint can support Section 508 requirements related to Electronic Information Technology (EIT) from a technical operations perspective as noted in the ancillary Voluntary Product Accessibility Templates (VPAT) documentation. The Sprint Team strives for compliance by meeting the standards criteria or equivalent facilitation. The VPATs cover all aspects of the LMRS product and services capabilities ranging from software to hardware, web information, functional capability and documentation. The completed supporting VPAT documentation is noted in Volume 1, Appendix A.

8.5.14 Incorporating Future Technological Enhancements  
(L.34.1.7.1 (p))

A description of the approach for incorporating into the proposed optional services, technological enhancements and improvements that the offeror believes are likely to become commercially available in the timeframe covered by this acquisition, including a discussion of potential problems and solutions.

Technological enhancements are the foundation for achieving operational excellence. The proven Sprint approach to performance will provide the LMRS program with a clear framework for successful performance and improvement. Sprint will continuously improve people, processes, and systems over the life of the LMRS program to provide to each GSA customer the lowest possible program lifecycle cost and the highest level of customer satisfaction.