

COMMUNICATIONS AND SECURITY SERVICES DIVISION

**Goddard Space Flight Center (GSFC)
Land Mobile Radio (LMR) Maintenance
Draft Statement of Work (SOW) for
Greenbelt & Wallops Flight Facility
(WFF)**

January 2015

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Section 1. Introduction

1.1 Overview

This Statement of Work (SOW) describes the functions and requirements to be performed under contract to the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC), for maintenance on its autonomous Land Mobile Radio (LMR) systems on both the Greenbelt, Maryland campus and the Wallops Flight Facility (WFF) campus in Wallops Island, Virginia. The systems support emergency communication requirements in addition to routine mission, logistics, safety, environmental, mechanical, information services, facility, and security communications needs.

The Contractor shall provide maintenance support under one contract for the existing Enhanced Digital Access Communication System (EDACS) LMR systems from M/A-COM Incorporated (now Harris), which has been operating on the Greenbelt campus since 2005, and the WFF campus since 2007.

1.2 Scope

The Greenbelt site which contains one Radio Frequency (RF) transmitter site operating in the Ultra High Frequency (UHF) spectrum is defined in Section 2 (Greenbelt LMR - System Definition). The WFF site, containing two RF sites operating in the Very High Frequency (VHF) spectrum is defined in Section 3 (WFF LMR – System Definition).

The Contractor shall provide preventative and corrective maintenance for all LMR system components at Greenbelt and WFF. Hardware maintenance includes bi-annual preventative maintenance pursuant to manufacturer recommendations and repair or replacement of failed parts. Software maintenance includes the fielding of firmware, application software, and Operating System (OS) updates to improve functionality or the information technology (IT) security and availability of the LMR system; and corrective action as required to maintain operational software.

The Contractor has the responsibility to ensure that replacement parts for the core system are readily accessible to support corrective maintenance service levels defined herein.

Section 2. Greenbelt LMR System Description

2.1 System Overview

The Greenbelt LMR system consists of an integrated multi-site controller (IMC), management server, communication system director (CSD) server, CSD workstation, three C3 maestro dispatch consoles, an Exacom logging recorder, and one 5-channel (multi-site) MASTR III trunking station.

The core equipment and antenna are currently located in Building 16 Brick, however, a project is underway to relocate the equipment, communication lines and antenna to Building 28B no later than March 2015. Repeaters are located at Building 34 and the Greentech IV (Building L40) complex adjacent to campus. The Greenbelt LMR system is not connected to the Internet or any GFE network. A logical drawing and network drawing are included in Figures 2.1 and 2.2 below.

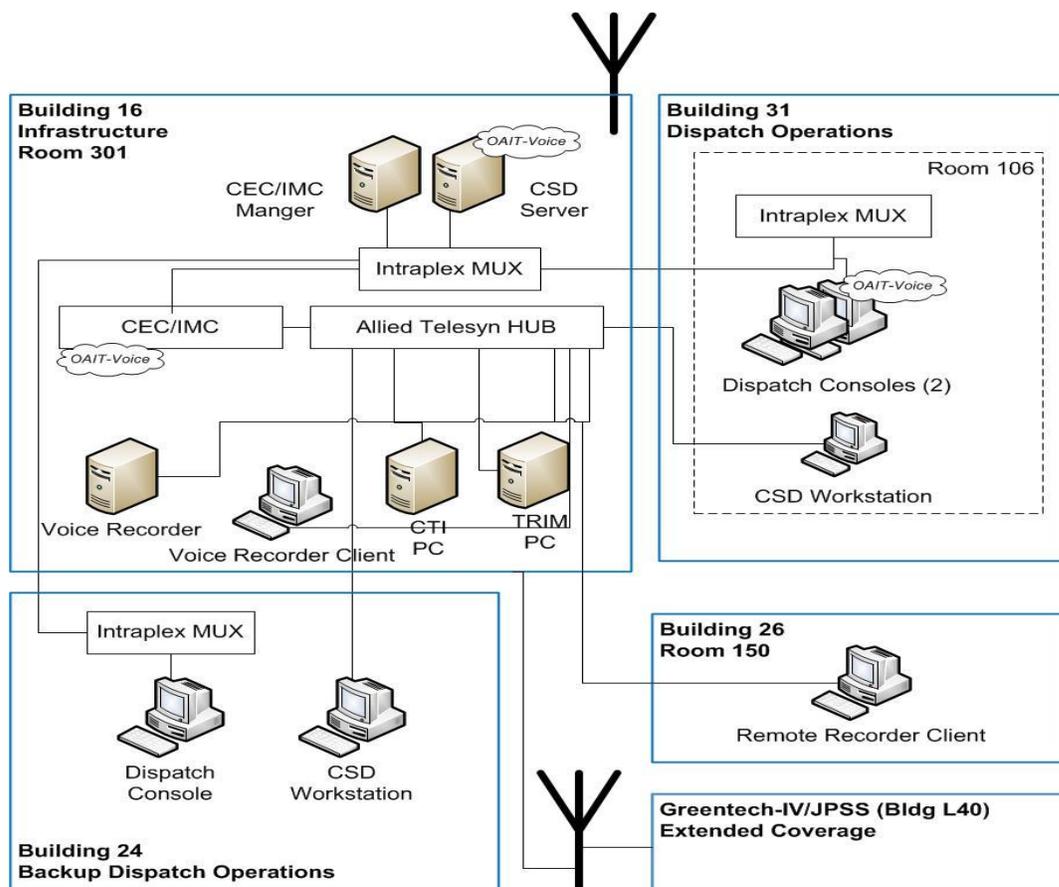


Figure 2-1 Greenbelt LMR – Logical Diagram

GSFC LMR RADIO INSTALLATION
All Building to Building Circuits over
Single Mode Fiber
November 2014

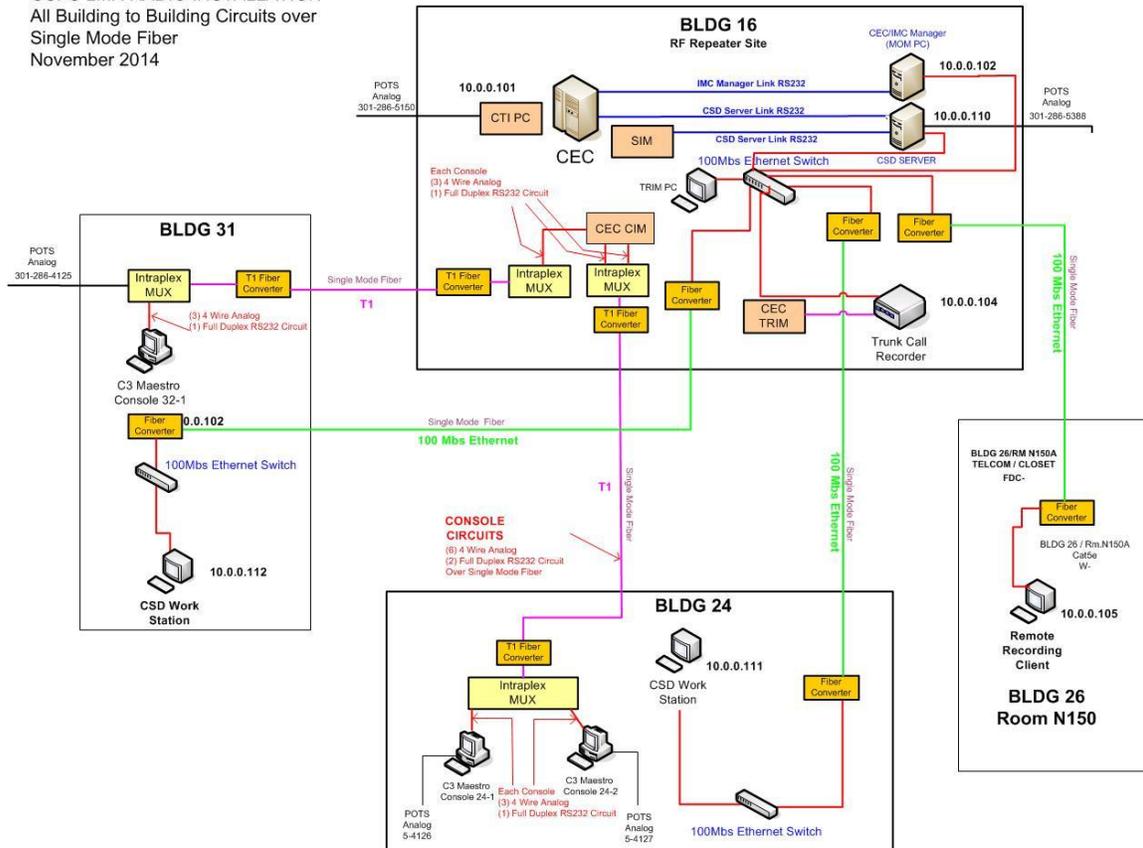


Figure 2-2 Greenbelt LMR – Network Diagram

2.2 System Hardware

2.2.1 Two-way Radios

The Contractor shall maintain and repair the existing Greenbelt hand-held, in-vehicle and desktop radios, unless the units are determined to be broken beyond the economic incentive to repair, pursuant to maintenance requirements defined in Section 6 (Support and Maintenance Requirements). NASA/GSFC currently operates 450 handheld radios (P5130, P7150 and P7170 models), four in-vehicle and five desktop units.

2.2.2 Infrastructure Equipment

The Contractor shall maintain and repair the infrastructure equipment defined in Tables 2.1, 2.2, 2.2, and 2.3 below, and the services provided by such equipment, pursuant to maintenance requirements defined in Section 6 (Support and Maintenance Requirements).

System Infrastructure (Main Site, Building 16B)		
Equipment Type	Description	Quantity
Repeater	MASTR III E-Net complete with Site Pro Controllers	5
Cabinet	83 Inches	2
	69 Inches	1
Enhanced Digital Access Communication System (EDACS)	Site Interface Module	1
	Site Sentry	1
	Site SureCall	1
	Hotline Telephone Interconnect	1
Combiner	5 CH,410-430 MHz (P/N DB4368-5-AD)	1
Multicoupler	RX,380-520 MHz,4 Port (P/N 42-57-01-04N)	1
Antenna	Fiberglass,6 dBd (P/N DB636-A)	2
CEC Switch (2 Cages)	MIM Card	1
	Audio Card	8
	CIM Card	3
	TRIM Card	1
	PIM Card	2
	VMIM Card	1
	MOM Card	1
	CCI Card	1
	CI Card	3
T-1 Multiplexer	ACS T1 MUX AC RJ45, IX-ACS-163-ACC	3
	ASYNC DATA 4PORT 38.4 KBPS, IX-DA-191B	3
	PORT RS232 INTERFACE, IX-MA-404	3
	4CH 4WIRE E&M VOICE, IX-VF-25	3
	4CH 4W VOICE 50 PIN TELCO E&M, IX-MA-305B	3
CSD Server		1
IMC Manager PC		1
T-1 Multiplexer	ACS T1 MUX AC RJ45, IX-ACS-163-ACC	1
	ASYNC DATA 4PORT 38.4 KBPS, IX-DA-191B	1
	PORT RS232 INTERFACE, IX-MA-404	1

Table 2.1 Main Site Infrastructure Equipment

Site 2 Equipment List (Dispatch Operations, Building 31)		
Equipment Type	Description	Quantity
Remote Logging Recorder	Exacom Hindsight Recorder	1
	Remote Logging Recorder Terminal	1
Dispatch Console	C3 Maestro Console	1
	Enhanced Audio Controller Module	1
	Computer with C3S Maestro Software	1
	20 Inch Touch-screen Flat-panel Monitor	1
	Rackmount Speaker Kit with B/G Microphone	1
	Footswitch (single)	1
	Gooseneck Microphone	1
	Supra Headset Prong Adapter	1
	6-wire Headset Jack-box	1
	Headset Jack Module	1
	Call Director Kit	1
	Auxiliary Input/Output Feature	1
	Integrated Stack Paging	1
	Broadcast Intercom	1
	Fire Hall Alerting	1
	Module Status	1
	User Definable Screen/SVC Pak Software	1
	2-channel Ears Point of Recording Recorder	1
	T1 Multiplexor	ACS T1 MUX AC RJ45, IX-ACS-163-ACC
ASYNCR DATA 4PORT 38.4 KBPS, IX-DA-191B		1
PORT RS232 INTERFACE, IX-MA-404		1
4CH 4WIRE E&M VOICE, IX-VF-25		1
4CH 4W VOICE 50 PIN TELCO E&M, IX-MA-305B		1
Bi-Directional Amplifier	61-65-96464	1
Remote CSD Client	Computer with CSD Software	1

Table 2.2 Site 2 Infrastructure Equipment (Dispatch Operations)

Site 3 (Backup Dispatch Operations – Building 4)		
Equipment Type	Description	Quantity
Dispatch Console	C3 Maestro Console	2
	Enhanced Audio Controller Module	2
	Computer with C3S Maestro Software	2
	20 Inch Touch-screen Flat-panel Monitor	2
	Rackmount Speaker Kit with B/G Microphone	2
	Footswitch (single)	2
	Gooseneck Microphone	2
	Supra Headset Prong Adapter	2
	6-wire Headset Jack-box	2
	Headset Jack Module	2
	Call Director Kit	2
	Auxiliary Input/Output Feature	2
	Integrated Stack Paging	2
	Broadcast Intercom	2
	Fire Hall Alerting	2
	Module Status	2
	User Definable Screen/SVC Pak Software	2
	2-channel Ears Point of Recording Recorder	2
T1 Multiplexor	ACS T1 MUX AC RJ45, IX-ACS-163-ACC	1
	ASYNCR DATA 4PORT 38.4 KBPS, IX-DA-191B	1
	PORT RS232 INTERFACE, IX-MA-404	1
	4CH 4WIRE E&M VOICE, IX-VF-25	2
	4CH 4W VOICE 50 PIN TELCO E&M, IX-MA-305B	2
Remote CSD Client	Computer with CSD Software	1

Table 2.3 Site 3 Infrastructure Equipment (Backup Dispatch Operations)

2.3 Coverage Enhancing Equipment

- 2.3.1 The Contractor shall maintain and repair equipment which has been added to the core infrastructure to improve coverage for key locations. This equipment includes two Bi-Directional Amplifier (BDA), six magmount antennas, three Bandpass filters and amplifiers and 1 splitter. This equipment is located in four buildings across the Greenbelt campus, and the Greentech IV Building adjacent to the Greenbelt campus.

Section 3. WFF LMR System Description

3.1 System Overview

The WFF LMR system consists of an integrated multi-site controller (IMC), communication system director (CSD) server, CSD workstation, three C3 maestro dispatch consoles, Nice Call Focus logging recorder, and two 5-channel (multi-site) MASTR III trunking stations. The primary equipment for the Wallops Flight Facility (WFF) Land Mobile Radio (LMR) System backbone is housed in Building F-2, room 109. Repeaters are located in Building F-166 and X-75, and antennas are located on the Water Towers, F-165 and X-46.

The WFF LMR system is a closed system with a mix of 100BaseT Media Converters, T1 Media Converters, and serial interfaces connecting the devices located in Buildings F166, B129, N162, X75, and F2 to the IMC Switch in building F2. A Cabletron ELS100-24 24 Port 100BaseT Switch connects the CSD Server and IMC Computer to the IMC Switch in Building F2. A logical drawing of the WFF LMR system is provided in figure 3.1 below.

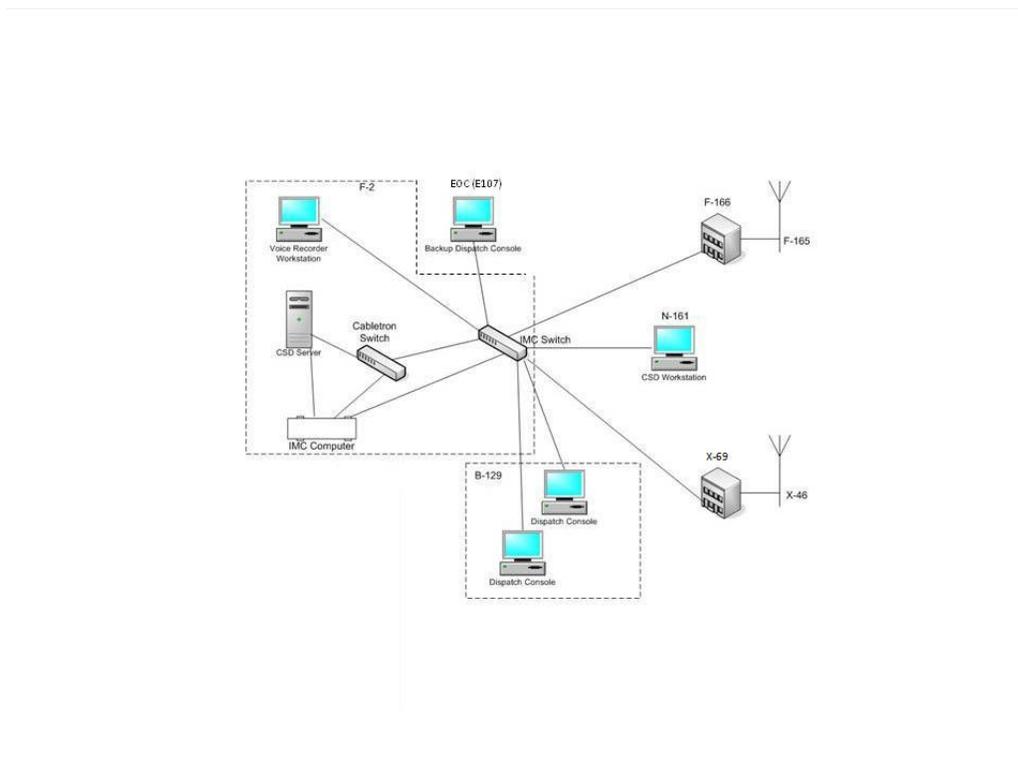


Figure 3-1 WFF LMR – Logical Diagram

3.2 System Hardware

3.2.1 Two-way Radios

WFF currently operates 312 handheld radios (P5130, P7150 and P7170 models), 17 in-vehicle radios, and six desktop units. WFF 2-way radios and base stations will be repaired and maintained by site personnel. The contractor is not responsible for repairing failed radios beyond the protection provided by a manufacturer's warranty, however, WFF may contract separately with the contractor for radio repair beyond the scope of this SOW.

3.2.2 Infrastructure Equipment

The Contractor shall maintain and repair the infrastructure equipment defined in Table 3.1 below, and the services provided by such equipment, pursuant to maintenance requirements defined in Section 5 (Support and Maintenance Requirements).

Equipment Type	Model	Serial #	Location	Qty
Integrated Multi-site Controller (IMC) Computer (Win XP 5.1)	KDV1201070/36R3C	21748	Bldg F-2 Rm 109	1
Communication System Director (CSD) (Win Svr 2003)	17538	CM103032	Bldg F-2 Rm 109	1
CSD Workstation (Win XP 5.1)	DHM	CPTQC61	Bldg N-162 Rm 114	1
Dispatch Console (Win XP 5.1)	2C-KDC-1201069/103R6B	21606	Bldg B-129 Rm 118	1
Dispatch Console (Win XP 5.1)	2C-KDC-1201069/103R6B	21688	Bldg B-129 Rm 118	1
Dispatch Console (Win XP 5.1)	2C-KDC-1201069/103R6B	21717	Bldg E-107 EOC	1
Nice Call Focus Logging Recorder	506C0227-03	41969201	Bldg F-2 Rm 109	1
Centralized Telephone Interconnect (CTI) Workstation	Not Activated	N/A	N/A	1
Logging Recorder Interface Manager (LRIM) Workstation (Win NT)	T70284	SLR04463357	Bldg F-2 Rm 109	1
T1 Modem F-2 to F-166	TC1630S-01-ST-1-12	0582050	Bldg F-2 Rm 109	1
T1 Modem F-166	TC1630S-01-ST-1-12	0582051	Bldg F-166	1
T1 Modem F-2 to X-75 (second site)	TC1630S-L1-1-12	684990	X-75	1
T1 Modem X-75 (second site)	TC1630S-L1-1-12	684991	F-2	1
Ethernet Media Converter	10/100 MC Basic	0434-5-0000059	F-2, Rm 109	1

Table 3.1 WFF LMR – Hardware List

3.3 Coverage Enhancing Equipment

The WFF system does not include BDAs or any other hardware to augment coverage provided by RF sites.

Section 4. Management Requirements

4.1 Program Control

The following positions are NASA points of contact (POC) for monthly reporting and notification of key events. The NASA LMR COR will notify the contractor in writing, should designated personnel change.

Name	Site	Position	E-mail address
Katie Poole	Greenbelt	COR	Katie.Poole@nasa.gov
Jim Brady	WFF	Operations Manager	James.E.Brady@nasa.gov

Table 4.1 NASA Point of Contact

- 4.1.1 The contractor shall provide a monthly report that includes all integration, preventative maintenance, and corrective maintenance activities performed during the given month, and a schedule for planned activities. Both reports shall be sent to the Greenbelt COR by the 10th day of the month following a completed month.
- 4.1.2 The Contractor shall schedule all Greenbelt maintenance activities with the GSFC LMR COR and Wallops activities with the Wallops Operations Manager. All preventative maintenance must be performed on a non-interference basis with NASA/GSFC operations. In the event that down-time for any operational service is required, the Contractor shall provide the NASA LMR COR a minimum of 30 minutes, when appropriate, prior to bringing down the service, and immediately when service is restored.
- 4.1.3 The Contractor shall develop and submit a risk analysis on a yearly basis that proactively identifies areas that need improvement, such as hardware reliability, system timing, coverage assessment, and system configuration. The risk analysis shall include a physical survey of the equipment and operating conditions.

4.2 Regulatory Compliance

- 4.2.1 The Contractor shall comply with its Safety and Health Plan as approved by NASA and included in the contract. In addition, the contractor shall comply with all applicable Federal, State, and local standards, directives, specifications, plans, and reporting procedures

identified in the plan. All LMR equipment shall be installed, operated, and tested in accordance with NASA standards, 29 Code of Federal Regulations (CFR) 1910 Occupational Safety and Health Standards; 29 CFR 1926 Safety and Health Regulations for Construction; NASA Procedural Requirement (NPR) 8715.3 NASA General Safety Program Requirements, and relevant industry standards and practices including but not limited to FCC, NFPA, ANSI, ASME, NEMA, Underwriters Laboratories (UL), and Network Equipment Building System (NEBS) standards for safety.

- 4.2.2 All LMR system components shall comply with IT security standards defined by the OMB Circular A-130, National Institute of Standards and Technology (NIST) Special Publications 800-37 and 800-53a and the NASA Procedural Requirements (NPR) 2810.1a.
- 4.2.3 The Contractor shall conform to MIL-STD810 C and D Environmental Test Methods and Engineering Guidelines.
- 4.2.4 The Contractor shall comply with emergency response standards provided by National Fire Protection Association (NFPA) 1221 and NFPA 1561.

Section 5. Technical Requirements

All Contractor maintenance activities resulting from requirements defined in Section 5 are included in the firm fixed price (FFP) of the contract; with all hardware, software, and labor costs borne by the contractor. The requirements in Section 5 pertain to both the Greenbelt and WFF systems unless otherwise stated.

5.1 Spectrum Management

- 5.1.1 The LMR equipment currently meets all requirements of the current version of National Telecommunications and Information Administration (NTIA) Rules and Regulations for Radio Equipment, and operates entirely within the radio spectrum bands assigned by the NTIA. The assigned frequencies provide clear communication without bleed-over between frequencies. The Contractor shall obtain written permission from the COR before any modifications to frequency or effective power.
- 5.1.2 The Contractor shall maintain and support the 'talk-around' service that provides direct communication between 2-way hand-held and desktop radios.
- 5.1.3 In the event that the Government or Contractor suspects that the LMR system is interfering with GFE systems; the Contractor shall provide a written analysis of frequencies and power densities transmitted by the RF site, and take action to isolate and eliminate the source of interference.

5.2 Greenbelt LMR Coverage

- 5.2.1 All LMR system users shall be able to maintain clear, unbroken, and intermodulation free, two-way communication with site personnel within a minimum of a seven mile radius from the antenna. Two-way communication shall be maintained whether using handheld or desktop radios from any location above or below ground.
- 5.2.2 The Contractor shall ensure the LMR system provides coverage for radio communication within a seven mile radius of the GSFC campus, and specifically in the following areas:
 - a. Cherrywood Lane/Greenbelt Metro Drive (Greenbelt Metro Station)
 - b. Powder Mill Road/Baltimore Washington Parkway
 - c. Riverdale Road/Baltimore Washington Parkway
 - d. 85th Avenue/Harkins Road (New Carrollton Metro Station)
 - e. 10200 Greenbelt Road, Lanham, MD (Aerospace Building)
 - f. Laurel-Bowie Road/Baltimore Washington Parkway
 - g. Powder Mill Road/Edmonston Road (beginning of USDA Farms)

- h. Cherry Lane, Laurel, MD
- i. University of MD, College Park, MD
- j. Martin Luther King Jr. Highway & US Highway 50
- k. Martin Luther King Jr. Highway & Forbes Boulevard
- l. Greentech-IV Building (L40), Hubble Drive, Lanham, MD

5.2.3 In the event that existing service is lost or degraded in any of the required service areas, within, or external to, the GSFC campus, the Contractor shall take action to restore service, which may include the installation of antennas or amplifiers to enhance coverage.

5.3 WFF LMR Coverage

5.3.1 All LMR system users shall be able to maintain clear, unbroken, and intermodulation free, two-way communication with site personnel within the borders of WFF, including the Main Base, Mainland, Island, and direct transit between sites.

5.3.2 The contractor shall assess in-building coverage in key locations provided by the WFF POCs, to identify any known areas with insufficient or intermittent signals to establish a current coverage baseline. The contractor shall ensure that the current in-building coverage baseline is maintained for the term of the contract and take remedial action if coverage degrades below the baseline in any area.

5.3.3 The Emergency Operations Center (911 Center) and Fire Stations, vehicles, and users shall have the capability to communicate on all WFF System frequencies, talk-groups, and mutual aid frequencies, including Navy Security. The mutual aid frequencies are 155.220 MHz, 155.255 MHz, 154.220 MHz, 154.430 MHz, 154.445 MHz, and 155.685 MHz; and includes the following participating counties: Worcester, Wicomico, Somerset, Accomack, Northampton, and the town of Chincoteague.

5.4 Testing

5.4.1 The Contractor shall test all software updates and recommended changes to hardware on a test system before changes are made to the GSFC LMR systems.

5.4.2 The Contractor shall, upon NASA request, assist NASA in the development of a Contingency Plan and the testing of disaster recovery scenarios.

Section 6. Support and Maintenance Requirements

All Contractor maintenance activities resulting from requirements defined in Section 6 are included in the firm fixed price (FFP) of the contract; with all hardware, software, and labor costs borne by the contractor. The requirements in Section 6 pertain to both the Greenbelt and WFF systems unless otherwise stated.

6.1 Preventative Maintenance

- 6.1.1 The Contractor shall perform Preventive Maintenance (PM) on all LMR system hardware on a bi-annual basis, in accordance with manufacturer PM procedures, which may include cleaning, lubrication, mechanical adjustment, electronic alignment, and any other PM activities required to maintain full performance standards.
- 6.1.2 The Contractor shall notify NASA within two months after LMR application software updates are available, including but not limited to patches or product enhancements available through the Software FX maintenance program; identifying the nature of the update and any enhancements or new features contained within the update. The Contractor shall install such updates on fielded LMR components within two months after receiving written approval from NASA, and train NASA when new features are available.
- 6.1.3 The Contractor shall use installed application software to perform an audit of system components and software revision levels, and provide the audit report to NASA in electronic form within two weeks following the installation of software updates or any material changes to the LMR system.
- 6.1.4 The Contractor shall, upon NASA request, assist in a monthly vulnerability scanning process to ensure no operational impact to the LMR system.
- 6.1.5 The Contractor shall, upon NASA request, review results of GFE vulnerability scanning against the operational LMR system, assess the impact of applying recommended configuration or Operating System (OS) updates, and apply updates that are expected to improve the confidentiality, integrity, or availability of the LMR system without adversely affecting performance. The Contractor shall provide NASA a justification for not installing recommended updates.
- 6.1.6 The Contractor shall maintain a M/A-COM Radio Personality Management (RPM) installation to create and reconfigure radio personality profiles for NASA/GSFC. The Contractor shall reconfigure hand-held and desktop radio

with updated personalities when required, and provide updated personalities to NASA/GSFC in electronic form.

- 6.1.7 The Contractor shall reprogram or reconfigure any handheld or desktop radios if required to activate new features, update configuration or firmware settings, or improve radio performance.

6.2 Corrective Maintenance

- 6.2.1 The Contractor shall possess certification by M/A-Com/Tyco-Electronics as an authorized service provider for a multi-site trunked EDACS communication system for a minimum of five consecutive years at the time of contract award; and maintain such certification for the term of the contract.
- 6.2.2 The Contractor shall be available on a 24x7 basis, 365 days per year, for LMR outage notification.
- 6.2.3 If potential system problems cannot be fixed remotely, the Contractor shall arrive on-site at either location to address the failure of LMR infrastructure and coverage enhancing equipment within two hours of outage notification, inclusive of travel time, on a 24x7 basis, 365 days per year. If unable to meet the two-hour criteria, the Contractor shall notify the site personnel as soon as possible.
- 6.2.4 The Contractor shall restore failed services within four hours of arriving on-site at either location, on a 24x7 basis, 365 days per year. The Contractor shall ensure that replacement parts for all infrastructure equipment are readily available in order to meet the four-hour criteria for return to service.
- 6.2.5 The fixed network equipment and coverage extending equipment for switching and audio distribution shall receive full remedial maintenance coverage for failures that occur due to normal operational usage. Upon receipt of a request for maintenance, the Contractor shall assess the problem and perform corrective action to restore the system to nominal operations capability.
- 6.2.6 The Contractor shall perform remedial maintenance service on failed infrastructure components in accordance with manufacturer's recommended maintenance procedures.
- 6.2.7 The Contractor shall use original equipment replacement items when performing remedial maintenance. In the event that original parts are not available, the Contractor may substitute parts of equivalent form and function that have been certified for use by relevant regulatory authorities.
- 6.2.8 The availability of the LMR system to perform its intended function shall be a minimum of 99.995 percent within a consecutive period.
- 6.2.9 For the Greenbelt system only, the Contractor shall repair all non-working handheld and desktop radios and restore to original working condition within four

weeks after receiving the defective unit. If the Contractor determines that a radio is broken beyond the possibility of repair, the Contractor shall return the defective unit to GSFC. The Contractor is not expected to repair lapel microphones, antennas, chargers, holsters, or any other radio accessories.

- 6.2.10 Repair of WFF radios are outside the scope of this SOW.
- 6.2.11 The Contractor shall immediately report Greenbelt network and cable plant issues to the GSFC COR, and WFF network and cable plant issues to the WFF Operations Manager, so that GSFC can contact personnel responsible for maintaining the network and or cable plant.

Section 7. Supplementary Parts and Services

7.1 Supplementary Parts

- 7.1.1 The Contractor shall provide NASA the ability to purchase infrastructure equipment, hand-held, in-vehicle and desktop radios, radio accessories, and labor from qualified engineers for the term of this contract.

Appendix A. Abbreviations and Acronyms

Acronym	Definition
BDA	Bi-directional amplifier
CFR	Code of Federal Regulations
CSD	Communication System Director
COR	Contracting Officer Representative
DCN	Document Change Notice
EDACS	Enhanced Digital Access Communication System
EOC	Emergency Operations Center
FCC	Federal Communications Commission
FFP	Firm Fixed Price
GFE	Government Furnished Equipment
GPS	Global Positioning System
GSFC	Goddard Space Flight Center
IEEE	Institute of Electrical and Electronics Engineers
LMR	Land Mobile Radio
IMC	Integrated Multi-site Controller
IT	Information Technology
ITCD	Information Technology and Communications Directorate

Acronym	Definition
NASA	National Aeronautics and Space Administration
NEBS	Network Equipment Building System
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
O&M	Operations and Maintenance
OS	Operating System
PBX	Private Branch Exchange
POC	Point of Contact
PM	Preventative Maintenance
RPM	Radio Personality Management
RF	Radio Frequency
SOW	Statement of Work
UHF	Ultra High Frequency
UL	Underwriters Laboratories
VHF	Very High Frequency
WFF	Wallops Flight Facility
