



# STATE OF OKLAHOMA

**OKWIN MODERNIZATION PROJECT**

**NOVEMBER 23, 2022**

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Motorola Solutions, Inc.  
500 W Monroe Street, Ste 4400  
Chicago, IL 60661-3781  
USA

Nicholas Carrao- Director  
Department of Public Safety Communications & Electronic Services  
3600 N Martin Luther King BLVD  
Oklahoma City. OK 73111

November 23, 2022

RE: OKWIN Modernization Project

Motorola Solutions, Inc. appreciates the opportunity to provide Oklahoma Department of Public Safety's (OK DPS) quality communications equipment and services. Motorola Solutions' project team has taken great care to propose a solution to address your needs and provide exceptional value.

The proposed offering consists of three main portions. First, upgrading the following Quantar Sites to the P25 GTR 8000 ESS platform in the phases mentioned below:

- 1 Phase I - Big Cabin, Coweta, Grove, Miami and Pryor sites
- 2 Phase II - Carney, Guthrie, Preston, and Stillwater sites
- 3 Phase III - Ada, Arbuckle, Ardmore, Lexington, and Tishomingo sites
- 4 Phase IV - Baker Peak, Chickasha, Fletcher, Geary, and Walters sites

Second, this proposal will include a System Core Upgrade to release A2022.1

Third, we will upgrade the remaining FDMA Sites to TDMA and perform an Antenna System Replacement at the sites indicated in this proposal.

This proposal is based upon and subject to the terms and conditions of the State of Oklahoma Office of Management and Enterprise Services, Oklahoma Statewide Contract No. SW1053M, executed on November 21, 2022, and remains valid for a period of 45 days from the date of this letter. The State may accept this proposal by issuing a purchase order or notice to proceed document referencing the "Subject to the terms and conditions of the State of Oklahoma Office of Management and Enterprise Services, Oklahoma Statewide Contract No. SW1053M."

Any questions OK DPS has regarding this proposal can be directed to Jason Smalley, Account Manager at 918-808-1669, [jason.smalley@motorolasolutions.com](mailto:jason.smalley@motorolasolutions.com).

Sincerely,

Neil Thomas  
Regional Vice-President - West  
MOTOROLA SOLUTIONS, INC





SECTION 1

# SYSTEM DESCRIPTION

## 1.1 INTRODUCTION

Motorola Solutions is pleased to provide OK DPS with a proposal to upgrade the system to the latest hardware and software in three key steps. The proposal covers the Quantar to GTR site upgrades of the existing Quantar SmartX and P25 sites, the upgrade of the existing FDMA P25 GTR sites to TDMA operation and finally a system upgrade to the latest release.

The upgrade of the existing Quantar sites subsystem includes a P25 trunked 800 MHz site based on Motorola Solutions' ASTRO 25 architecture. The sites will connect to the OKWIN master site via customer provided backhaul. Also included is the addition of TDMA and DDM licenses to voice channels at the existing OK DPS's P25 GTR ASR and simulcast sites to equip the OKWIN system towards its long term goal of migration to TDMA operation.

The proposed offering consists of upgrading the following Quantar Sites to the P25 GTR 8000 ESS platform in the phases mentioned below:

- Phase I - Big Cabin, Coweta, Grove, Miami and Pryor sites
- Phase II - Carney, Guthrie, Preston, and Stillwater sites
- Phase III - Ada, Arbuckle, Ardmore, Lexington, and Tishomingo sites
- Phase IV - Baker Peak, Chickasha, Fletcher, Geary, and Walters sites

Each of the voice channels at these sites will be licensed for TDMA and Dual Dynamic Mode (DDM) operation software.

The radio and network equipment will be installed in the existing customer provided shelter, which will need to accommodate 7.5 ft standard racks quoted in this proposal. These racks will house the RF radio site system as well as the networking and site monitoring equipment. The existing antenna systems will be reused for phases I to IV except at the Bakers Peak Site where a new antenna system is proposed. Antenna system replacement will be performed at the sites mentioned in the table included in section 1.2.3.

At the existing P25 sites which have GGM8000 routers, Motorola will re-use these routers to implement the GTR8000 ESS on the 7.17.3 OKWIN core. For the SmartX sites which do not have GGM8000 routers, Motorola has provided interim GGM8000 routers for this 7.17.3 implementation.

A detailed description of the proposed system architecture and hardware components with this phase is provided in the system description below in Section 1.2.1.

The second part of the project would be to support OK DPS in the pursuit of upgrading the existing OKWIN ASTRO 25 network to a more current ASTRO 25 system release. The proposed system upgrade is based on OK DPS infrastructure only. Any system scope outside of what is captured in this proposal will be addressed separately with the corresponding





agency. The proposed system upgrade will be followed by enabling the core for future site expansion by introducing the Juniper Core Routers at the OKWIN Core.

The third step, which is the TDMA upgrades to the existing sites, is covered in Section 1.2.3.

## 1.2 SOLUTION COMPONENTS

### 1.2.1 Quantar to GTR Site Upgrades

All the existing Quantar base station sites have been included in this GTR upgrade proposal. Each site will receive GTR base stations with the indicated number of channel capacity to go from the old Quantar base stations to the new GTR Expandable Sub System.

The proposed offering consists of upgrading the nineteen (19) Quantar Sites to the P25 GTR 8000 ESS platform in four (4) different phases as described below:

Phase #	Site #	Existing Site Type	Site Name	Latitude	Longitude	Channel Count
Phase 1	1	P25 ASR	Big Cabin	36.5653	-95.2878	7
	2	P25 ASR	Coweta	35.9872	-95.6542	6
	3	P25 ASR	Grove	36.6914	-94.7022	7
	4	P25 ASR	Miami	36.8828	-94.7963	6
	5	P25 ASR	Pryor	36.32	-95.4119	7
Phase 2	6	P25 ASR	Carney	35.8103	-97.0664	7
	7	P25 ASR	Guthrie	35.9253	-97.3797	6
	8	P25 ASR	Preston	35.7248	-95.9883	5
	9	P25 ASR	Stillwater	36.0625	-97.0744	5
Phase 3	10	P25 ASR	Ada	34.6831	-96.7621	5
	11	P25 ASR	Arbuckle	34.4178	-97.15	5
	12	P25 ASR	Ardmore	34.1917	-97.1586	4
	13	P25 ASR	Lexington	35.0142	-97.1878	8
	14	P25 ASR	Tishomingo	34.2622	-96.7103	4
Phase 4	15	SMARTX ASR	Bakers Peak	34.8397	-98.8033	5
	16	P25 ASR	Chickasha	35.0481	-97.8903	7
	17	P25 ASR	Fletcher	34.7992	-98.2944	8
	18	P25 ASR	Geary	35.5453	-98.2373	5
	19	P25 ASR	Walters	34.3586	-98.3216	5

The proposed solution includes the following equipment for each of the existing ASR Quantar Sites:





- Master site licenses for TDMA, Dual Dynamic Mode (DDM) and Enhanced Data
- GTR8000 Expandable Site Subsystem with 100 W 800 MHz base stations.
- One (1) site router
- One (1) advanced site manager.
- One (1) Advance Power Monitor (APM)

One SMARTX site (Bakers Peak) will be transitioning from analog modulation to Project 25, and coverage will vary with a change in modulation. High Power (150W) base station amplifiers are not an option with linear modulation that is utilized with TDMA modulation. Hence, all the ASR sites are proposed with 100W power output from the base station. This will reduce the coverage provided by the site. Motorola recommends use of a receive diversity antenna system for optimal inbound TDMA coverage as TDMA modulation may change the talk-in (user to site) coverage.

Motorola will re-use the existing GGM8000 routers in the system to implement the GTR8000 ESS on the 7.17.3 OKWIN core. For the SmartX sites which do not have GGM8000 routers, Motorola has provided interim GGM8000 routers for this 7.17.3 implementation.

## 1.2.2 ASTRO System Upgrade

In order to keep OK DPS's LMR system current, Motorola is offering one certified system upgrade to OK DPS's ASTRO 25 system. This upgrade includes a complete package of hardware, software, and professional services required to update OK DPS's ASTRO 25 system from A7.17.3 to A2022.1.

Updates to software and hardware components ensure ongoing availability of repair services support, system expansion (e.g. addition of RF sites, dispatch positions, data sub-systems, or network management positions), and the latest cyber security protection.

### Included features

Features Descriptions	A7.17.3 to A2022.1 System Upgrade
Incremental Software Enhancements (Bug Fixes)	✓
Software Release Updates (One Certified System Upgrade)	✓
Hardware Refresh	✓
Factory-certified integration, testing, and supply chain management of new software (SW) and hardware (HW) components	✓
Professional implementation services to upgrade your live system	✓

- Hardware updates include version updates and/or replacements for Motorola's field replaceable units (FRU) and third-party networking and computing hardware when required by the software release. Platform migrations are not included with the proposed system upgrade.



- System releases include commercial OS and application software updates as well as Motorola certified software to improve the system functionality and operation from previous releases as well as significant new feature enhancements that are available for purchase.
- Implementation services include factory integration and testing of new HW and SW components, upgrade planning, and Motorola’s personnel at OK DPS’s site to execute the upgrade.

### 1.2.3 TDMA Site Upgrades

The table below summarizes the TDMA/DDM licenses included in this proposal.

Site Type	Site Count	TDMA and DDM Licenses
Project 25 FDMA GTR Sites	5	29
Project 25 TDMA GTR Sites	3	NONE (Already TDMA)

Motorola understands that the following sites are already TDMA and hence these were not considered in the TDMA licenses add on:

- Mangum ASR Site – 3 TDMA Channel (Existing)
- Pink ASR Site – 6 TDMA Channels (Existing)
- Velma ASR Site – 5 TDMA Channels (Existing)

The following licenses and software upgrades are included in this proposal for each of the above P25 ASR sites:

- Master Site licenses for TDMA and Dual Dynamic Mode for all voice channels
- GTR Base station FDMA to TDMA Software Upgrade
- Dynamic Dual Mode Licenses
- Enhanced Data Site Licenses

The following licenses and software upgrades are included in this proposal for each of the P25 Simulcast systems:

- Master Site licenses for TDMA and Dual Dynamic Mode for all voice channels
- Comparator FDMA to TDMA Software Upgrades
- Site Controller FDMA to TDMA Software Upgrade
- GTR Base station FDMA to TDMA Software Upgrade
- Dynamic Dual Mode Software Upgrade
- Enhanced Data Site License

The table below depicts the detailed list of all the TDMA upgrade sites along with the radio count at each site that has been considered. Any changes to this number will require a change order.





Site Count	Site Name	Channel Count	TDMA Channel Count
1	Tahlequah	7	6
2	Gore	6	5
3	Sarkey (Chicksaw Nation)	7	6
4	Muskogee (HH)	7	6
5	Muskogee (East)	7	6

Motorola understands that currently users are not equipped with the TDMA option on the subscriber radio to take advantage of the TDMA upgrade, and NO flash upgrades or reprogramming of subscriber radios is included as a part of this proposal. Motorola can provide a quote for this upgrade if so desired by OK DPS.

Motorola also recommends use of a receive diversity antenna system to compensate for any loss of coverage because of the transition from FDMA modulation to TDMA modulation. Motorola has included pricing on adding Receive Diversity Antenna systems and replacing both transmit and receive antennas at the sites listed in the tables below.

The table below summarizes the antenna system replacements included in this proposal:

Summary of Antenna System Replacements	Quantity
TOTAL Number of Sites	34
TX Antenna Lines	32
RX Antenna Lines	68

Here is the detailed site list for the proposed antenna system swap. Any changes to this list will require an update to the quote:

Owner	Site Name	Diversity TTA	TX Ant System	Diversity RX Ant System	Tower Height
OK DPS	Tahlequah	1	0	2	300
OK DPS	Gore	1	0	2	200
OK DPS	Sarkey (Chicksaw Nation)	1	0	2	170
City of Muskogee	Muskogee (HH)	1	0	2	250
City of Muskogee	Muskogee (East)	1	0	2	310
OK DPS	Mangum	0	0	2	330
OK DPS	Pink	0	0	2	335
OK DPS	OKC (DPS)	2	2	2	400
OK DPS	OKC (Moore)	2	2	2	170
OK DPS	OKC (UCO)	2	2	2	370





Owner	Site Name	Diversity TTA	TX Ant System	Diversity RX Ant System	Tower Height
OK DPS	OKC (Mid-Dan)	2	2	2	330
OK DPS	OKC (SE)	2	2	2	170
OK DPS	Lawton (East)	1	1	2	480
OK DPS	Lawton (CH)	1	1	2	130
OK DPS	Lawton (West)	1	1	2	260
OK DPS	Carney	1	1	2	430
OK DPS	Lexington	1	1	2	440
OK DPS	Geary	1	1	2	400
OK DPS	Pryor	1	1	2	300
OK DPS	Guthrie	1	1	2	350
OK DPS	Stillwater	1	1	2	300
OK DPS	Preston	1	1	2	300
OK DPS	Big Cabin	1	1	2	280
OK DPS	Miami	1	1	2	500
OK DPS	Chickasha	1	1	2	460
OK DPS	Fletcher	1	1	2	310
OK DPS	Bakers Peak	1	1	2	20
OK DPS	Walters	1	1	2	240
OK DPS	Coweta	1	1	2	250
OK DPS	Grove	1	1	2	180
OK DPS	Arbuckle	1	1	2	200
OK DPS	Ada	1	1	2	340
OK DPS	Tishomingo	1	1	2	380
OK DPS	Ardmore	1	1	2	165

Coverage measurement services have been included at these sites, which will test the newly installed antenna system. Motorola will perform the coverage measurement in a phased approach and test five sites at a time with a maximum of 750 tiles in one phase. Outbound BER readings will be collected and analyzed to make sure the newly installed antenna system is working as designed.





## 1.3 SYSTEM COMPONENTS

### 1.3.1 ASTRO 25 Repeater Site

An ASTRO 25 Repeater Site consists of a single site with up to 28 channels and two site controllers (in a redundant configuration), which can be standalone or housed in a GTR 8000 Expandable Site Subsystem (ESS).

The GTR 8000 Expandable Site Subsystem in a repeater site is configured as a single trunked site, with one active control channel and a number of voice channels at the site. If packet data services are supported at the site, a number of voice channels can be configured with packet data channel capability. Voice traffic is routed from each of the base radios to the system for distribution to other sites and is repeated by the base radios to support other local subscribers. However, data traffic is routed to the GCP 8000 Site Controller. The site controller routes these packets upstream to the zone controller for further processing and routing.

The ASTRO 25 Repeater Site consists of the following components, described in the Component Descriptions section of this System Description.

- GTR 8000 Expandable Site Subsystem (ESS).
- GTR 8000 Repeater/Base Radio.
- GCP 8000 Site Controller.
- Radio Frequency Distribution System (RFDS). This includes a Combiner, Multicoupler and TX filter.
- Sub-Site Ethernet Switch.
- Single GGM 8000 Site Gateway.

### 1.3.2 Radio Frequency Site Component Descriptions

Each site type in an ASTRO 25 system contains various components. Components included in this system design are described in this section.

#### 1.3.2.1 GTR 8000 Expandable Site Subsystem

The GTR 8000 Expandable Site Subsystem (ESS) enclosure can contain reconfigured GTR 8000 base stations, site LAN switches, and GCP 8000 controllers, along with an optional Radio Frequency Distribution System (RFDS), depending on your configuration needs.

Voice traffic is routed from each of the site base stations to the system for distribution to all sites associated with the call. Benefits of the ESS include:

- **Integrated Design** – Provides a smaller footprint at the site.
- **Front/Top Access Design** – Minimized cabling reduces install and service labor.
- **Increased Power Supply** – Provides redundancy through a common power bus.





**Figure 1-1: GTR 8000 Expandable Site Subsystem – Integrates base radios, site controllers, reference distribution modules, and Ethernet LAN switches in a single cabinet.**

Voice traffic is routed from each of the site base stations to the system for distribution to all sites associated with the call.

### 1.3.2.2 G-Series Site Components

G-series site equipment uses a standard chassis (see the figure titled "G-Series Chassis") for individual site components. Six basic modules create the entire G-series platform, resulting in reduced spare parts inventory. Modules have front access to improve serviceability with hot-swap support to ensure channels are back on the air in minimum possible time. Standard battery revert and charging capability is built into every G-series power supply. Integrating these capabilities eliminates the need for a large uninterrupted power supply and saves valuable site space.



**Figure 1-2: G-Series Chassis – A single chassis and six basic modules create the entire G-series platform, resulting in reduced spare parts inventory.**

- **GTR 8000 Site Repeater/Base Radio** – The GTR 8000 base radio consists of a transceiver module, power amplifier module, fan module, and power supply. The transceiver module includes the functionality for the exciter, receiver, and station control. The base radio software, configuration, and network management, as well as



inbound/outbound traffic handling, are performed through this transceiver module. On-board serial and Ethernet ports are located on this module for local servicing through Configuration/Service Software (CSS). The power amplifier module amplifies the low-level modulated RF signal from the transceiver module and delivers the amplified signal on the path to the transmit antenna. The power supply module supports the transceiver and power amplifier modules, and can also provide auxiliary power to a connected site controller or receive multicoupler/low noise amplifier.

- **GCP 8000 Site Controller** – The GCP 8000 Site Controller is used at an ASTRO 25 trunking site to assign voice and data channels, manage and report alarms on site resources, provide Ethernet switching capability, and provide a frequency reference to GTR 8000 Base Radios. The frequency reference is provided either via a GPS receiver or an ultra high stability oscillator. The nature of these frequency references eliminates or minimizes site visits for frequency tuning servicing.

### 1.3.2.3 Gateway

The Gateway is a modular multi-purpose network communications platform, designed to interconnect devices and networks within ASTRO 25 public safety network systems.

It provides a connection to a Wide Area Network (WAN) with no conventional channel interface (V.24, analog, and/or IP).

### 1.3.2.4 GCP 8000 Site Controller

The GCP 8000 Site Controller (GCP 8000) is the control interface between the transmitter/receiver subsystem and the Zone Controller. The GCP 8000 Site Controller comprises redundant site controller modules; one site controller module acts as the active module, and the second module acts as a standby. The redundancy minimizes the possibility of a single point of failure at the site.

The GCP 8000 provides the following functions:

- Manages the channels to maximize throughput and channel availability.
- Administers registration and context activation requests.
- Monitors base stations and RF distribution equipment and interacts with the MOSCAD site device manager to facilitate centralized alarm and control monitoring.
- Provides redundant site control.
- Enables redundant site link routing for patch redundancy.

### 1.3.2.5 Radio Frequency Distribution System

The Radio Frequency Distribution System (RFDS) provides interconnect between the base radios and antennas, allowing for a completely contained and more compact installation footprint. For the transmitters, this can include isolators, combiners, TX filters, diplexers, and power monitors.



For the receivers, this can include duplexers, site preselectors, and multicouplers. Various RFDS options exist for each of the GTR 8000 Base Radio, GTR 8000 Site Subsystem, and GTR 8000 Expandable Site Subsystem.

### 1.3.3 **ASTRO 25 System Upgrade**

The System Upgrade Agreement (SUA) service covers ASTRO 25 certified software releases for the following products:

- Servers.
- Workstations.
- Firewalls.
- Routers.
- LAN switches.
- MCC 7100 Dispatch Consoles.
- MCC 7500 Dispatch Consoles.
- MCC 7500E Dispatch Consoles.
- GTR 8000 Base Stations.
- GCP 8000 Site Controllers.
- DSC 8000 Site Controllers.
- GCM 8000 Comparators.
- Motorola Solutions logging interface equipment.
- PBX switches for telephone interconnect.
- NICE and Verint IP logging solutions (if purchased).

The following hardware components, if originally provided by Motorola Solutions, are eligible for full product replacement when necessary to support the system release update:

- Firewalls.
- Servers.
- Workstations.
- CommandCentral AXS Hub.
- Routers.
- LAN switches.
- PBX switches for telephone interconnect.

The following hardware components, if originally provided by Motorola Solutions, are eligible for board-level replacement when necessary to support the system release update. A “board-level replacement” is defined as any Field Replaceable Unit (“FRU”) for the products listed below:

- GTR 8000 Base Stations.
- GCP 8000 Site Controllers.
- GCM 8000 Comparators.
- MCC 7500 Dispatch Console Voice Processing Module

### 1.3.4 Juniper Core Enablement

As part of the ASTRO 25 roadmap, the Motorola Network Routers (MNR) are migrating to Juniper Routers. Part of the Juniper Router Migration is the Juniper Core Enablement. The Juniper Core Enablement will place Juniper Routers at the existing core after the system is upgraded to A2022.1 and has been included in this solution. This proposal does not include replacement of site routers. More information on MNR support and the Juniper Core Enablement is listed below:

- System must be at a minimum A7.18 release for Juniper Router functionality
- Gateway Router functionality transferred to the Juniper Router platform
- S6000 and S2500 Routers are supported on the A2022.1 release but will need to be migrated over to SRX routers prior to the next system upgrade from A2022.1. Future site expansions to the A2022.1 system will use Juniper Routers only that will require Juniper Routers at the core.

Please refer to the Juniper Core Migration Statement of Work section for more details.

## 1.4 BACKHAUL REQUIREMENTS (PROVIDED BY OK DPS)

Motorola will implement Quantar to GTR upgrade at various sites with their existing T1/Ethernet site links. OK DPS will be responsible for testing the performance of these link per Motorola provided specifications prior to the installation and cutover of the GTR subsystem.

OK DPS will have Ethernet site link conversion project completed at all the RF sites by June30, 2023 to facilitate System upgrade to A2022.1 release.

As discussed earlier, all the existing GGM8000 routers at the P25 sites will be reused for this implementations. The SmartX sites which do not have GGM8000 router will receive interim non-redundant GGM8000 routers as a part of this upgrade.

The system upgrade beyond ASTRO 7.17.3 will require an Ethernet backhaul link to OKWIN master site. OK DPS is responsible for providing these links at all the ASR sites. The specifications for the site link are as follows and OK DPS is responsible for testing these links for it:

### 1.4.1 Bandwidth:

The bandwidths referenced are the minimum 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.

- A minimum of 2 Mbps of bandwidth is required for an ASR Site.



## 1.4.2 Tolerance to Backhaul Network Congestion or Outage:

- Repeater Site Links: 2 seconds

## 1.4.3 Latency

Latency or IP Packet Transfer Delay is defined per RFC 2681. It is usually in the range of 5 to 60 ms one-way per hop, depending on system type, size, structure, etc.

- The maximum End-to-End Delay cannot exceed a total of 100 milliseconds for RF Site

## 1.4.4 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.

In non-simulcast configurations the jitter budget needs to be kept to 20ms or less. The 20ms is a 99<sup>th</sup> percentile value and is based on Y.1541 method of calculation.

## 1.4.5 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 ASTRO 25 network, reordered packets are also considered packet loss.

The specification for end to end packet loss is no more than 0.01%. Packet loss is additive and can be combined among all the link segments.

## 1.4.6 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).
- Layer 2 (802.1p Priority).

Motorola would match the QoS of the Microwave provider between 0 to 7 (7 being the highest). Hence we would need to know this information once you have your link configured.

Below is what we currently recommend:

- Highest Mapped QoS value: 6.
- Number of Priority QoS levels: 4.
- QoS type: CoS –L2







## 1.5 COVERAGE DESIGN

The Proposed solution does not include any coverage guarantee (on street or in-building) or any coverage acceptance testing.

Motorola understands that many of the current OKWIN sites have 150W Quantars in operation currently. The replacement GTR8000 radios are all limited to a maximum output power of 100W. This may result in a reduction in the overall coverage footprint of the system.

When OKWIN transitions to TDMA operations in the future, the coverage will need to be re-evaluated, as TDMA modulation changes coverage performance. Motorola recommends use of diversity receive antenna system to minimize the change in coverage. As a part of this project, Motorola is proposing antenna systems as a part of this project as specified in section 1.2.3.

The coverage from the site is also dependent on the FCC approval of the ERP and contours. If anything changes with respect to ERP or contours, coverage from the site will also change

## 1.6 PROJECT ASSUMPTIONS

The following assumptions were made by Motorola for this proposal. If any of the assumptions are deemed incorrect, a revised proposal will be required. During the implementation stage of the proposal, if any of these assumptions are determined to be invalid, a change order will be processed for the same.

- This project assumes that OK DPS has identified and licensed the frequencies at each of the Quantar and GTR ASR and simulcast remote sites. Frequency coordination services are NOT included as a part of this project. OK DPS will be fully responsible for any frequency licensing services.
- At the sites where antenna systems will be re-used for this project, Motorola will perform a line sweep at each site to baseline operation of the current antenna system. Motorola's demarc is the top of the GTR8000 ESS rack. Any issues/concerns in the antenna system will be resolved by OK DPS. No cost has been included in this proposal for any antenna system upgrades at the sites not mentioned in section 1.2.3.
- No coverage test or guarantee is included in this proposal.
- Dedicated backhaul connectivity from each of the ASR to the Master site is OK DPS' responsibility. It is the customer's responsibility to provide this dedicated public safety grade link of 5Mbps bandwidth or more. Motorola will perform link tests to verify the reliability of the link before connecting the sites to the Master site. Any troubleshooting efforts required based on Motorola's link testing is OK DPS' responsibility.
- Any site/location upgrades or modifications not specified in this proposal are the responsibility of the customer.
- Any Tower upgrades, modifications, or remediation required for successful implementation of project is the responsibility of the customer.
- Motorola Solutions assumes sufficient breaker circuits, power and HVAC capacity is available at each site.





- OK DPS will provide required electrical circuits required for additional equipment at the sites.
- Motorola Solutions is not providing any buildings to house the equipment at the sites nor HVAC. It is the responsibility of the OK DPS to provide space for the new rack at these sites.
- OK DPS is responsible for all grounding and R56 upgrades at the RF sites. OK DPS is responsible for any wall, ceiling, and floor penetrations necessary for equipment installation, antenna system installation, and cable routing at all of the proposed site locations.
- Motorola recommends that each piece of critical equipment reside on a dedicated circuit. This is to avoid an electrical surge on a single circuit causing multiple pieces of equipment being taken down. Electrical circuits will be a customer responsibility.
- If required, the customer will provide any approved local, state, or Federal permits (e.g., building permits, electrical permits, and environmental permits) and licensed engineering drawings as may be required for the installation and operation of the proposed equipment.
- This proposal is designed for the 800 MHz frequency band.
- Any required system interconnections not specifically outlined here will be provided by the customer.
- Motorola is not responsible for interference caused or received by the Motorola provided equipment except for interference that is directly caused by the Motorola-provided transmitter(s) to the Motorola-provided receiver(s). Should the OK DPS system experience interference, Motorola can be contracted to investigate the source and recommend solutions to mitigate the issue.
- Backup power (Generator and UPS) at RF Sites/Prime Sites will be provided by OK DPS.
- Any Inter-local agreements required between the OK DPS and other agencies will be the responsibility of OK DPS.
- Any storage required for equipment will be provided by OK DPS.
- No subscriber flash upgrades or re-programming is included as a part of this proposal.
- No TDMA, GPS or enhanced data flash upgrades or GPS antennas for APX subscribers are included in this proposal.
- Only licenses for enhanced data and location services are included in the proposal for future use purposes. No implementation services/design engineering associated with any location application have been included with this proposal.
- No mapping interface is included in this proposal.
- Customer acknowledges that if the system has a special product feature, that it may be overwritten by the software upgrade. Restoration of that feature is not included in the coverage of this SOW.
- System Upgrade does not cover any hardware or software supplied to the Customer when purchased directly from a third party, unless specifically included in this SOW
- System Upgrade does not cover the labor or materials associated with the backlog accumulation of security patches or antivirus updates.
- At the time of upgrade, Motorola will provide the latest applicable software, patches and antivirus updates when and if available, as a part of the system release upgrade. Motorola 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.

- If the Customer cancels a scheduled upgrade within less than 12 weeks of the scheduled on site date, Motorola reserves the right to charge the Customer a cancellation fee equivalent to the cost of the pre-planning efforts completed by the Motorola Solutions Upgrade Operations Team



SECTION 2

# IMPLEMENTATION STATEMENT OF WORK

## 2.1 INTRODUCTION

This Statement of Work (SOW) provides the most current understanding of the work required by Motorola Solutions (Motorola) and State of Oklahoma Department of Public Safety (OK DPS) to ensure a successful project implementation. It is understood that this SOW is a working document, and that it will be revised as needed to incorporate any changes associated with contract negotiations, Contract Design Review (CDR), and any other changes that may occur during the execution of the project. It is assumed that no prevailing wage, certified payroll, mandatory union workers or mandatory minority workers are required for this work. In the event it is subsequently determined that Prevailing Wages are required, OK DPS will reimburse Motorola for all costs required to attain compliance with Prevailing Wage requirements. The work to be performed is as specified herein and all other work is excluded. Customer responsibilities will occur within the mutually agreeable schedule.

### 2.1.1 Implementation Overview

This project is being procured in response to the ARP act. A draft schedule for the Quantar to GTR upgrade is provided for the installation and cutover in section 3. The schedule will be reviewed as part of the Design Review.

The project implementation consists of:

- Quantar to GTR Upgrade
- System Upgrade to A2022.1
- TDMA upgrades to existing OKWIN sites with an antenna system replacement at the sites stated below.

For the Quantar to GTR upgrade, below is a summary of the site count with phases it will be implemented in, and the system description provides more detail with the specific sites and subsystems.

Phases	Site Count	GTR Count
Phase 1	5	33
Phase 2	4	23
Phase 3	5	26
Phase 4	5	30

The table below summarizes the TDMA/DDM licenses included in this proposal.



Site Type	Site Count	TDMA and DDM Licenses
Project 25 FDMA GTR Sites	5	29
Project 25 TDMA GTR Sites	3	NONE (Already TDMA)

## 2.2 WORK BREAKDOWN STRUCTURE

Motorola has provided a Statement of Work (SOW) and tentative project schedule including the below listed tasks that make up the Work Breakdown Structure (WBS).

- Contract Initiation and Kick-off.
- Design Review.
- Order Processing, Manufacturing, and Warehousing.
- Site Improvements.
- Backhaul.
- Develop Fleetmap and Operational Configuration.
- Mobile and control station Installation
- System Installation and Optimization.
- Acceptance Testing and Transition.
- Training.
- Equipment Removal.
- Punchlist.
- Finalize Project.

### 2.2.1 Contract Initiation and Project Kickoff

Upon contract award, OKWIN and Motorola execute the contract, both parties receive all the necessary documentation, and schedule a project kick-off meeting. Contract initiation and project kickoff responsibilities are summarized in the table below.

**Contract Initiation and Project Kickoff**

Tasks	Motorola	OK DPS	Comments
Assign a Project Manager as Single Point of Contact.	X	X	
Assign Resources as necessary.	X	X	
Introduce Team, Review Roles, and Decision Authority.	X	X	
Present Overview of Project Scope and Objectives.	X		
Discuss Communication Plan, Risk Management Plan, Change Control Procedures, Preliminary Schedule.	X		
Action Item Log.	X		



Tasks	Motorola	OK DPS	Comments
Provide Site Access, Necessary Site Permissions, and Resource for Site Walks.		X	
Begin Detailed Site Walks for Design Review and Transition Planning.	X	X	

## 2.2.2 Design Review

The purpose of the Design Review is to review and finalize detailed aspects of the project, including the final System Design, Statement of Work, and Schedule. Any changes determined in Design Review will be documented through a Change Order. The Design Review responsibilities are summarized in the table below:

**Design Review**

Tasks	Motorola	OK DPS	Comments
Present requirements and impact on equipment.	X		
Present overall project goals and requirements.		X	
Present System Design.	X		
Provide all rights and agreements necessary for Motorola Solutions to operationally configure, access and deploy the system equipment, including sites and equipment owned by third parties. Any delays in providing such agreements will cause the schedule to be extended one day for each day of delay.		X	
Provide existing system information.		X	
Preliminary Transition and Cutover plan and methods to document a detailed procedure. Final cut over details can be completed nearer cut over in consultation with the participating user agencies.	X	X	
Present Equipment Layout Plans and System Design Drawings.	X		
Review Power Requirements.	X	X	
Provide sufficient power and circuit at sites		X	
Review demarcation between Motorola-supplied equipment and Customer interfaces.	X	X	
Present Acceptance Test Procedures. Deviations from the proposed ATP will be mutually agreed upon and may represent a change in scope.	X		
Review Preliminary Work Breakdown, Project Tasks and Responsibilities.	X	X	
Review Detailed Schedule.	X	X	



Tasks	Motorola	OK DPS	Comments
Identify and license frequencies.		X	
Configuration and Performance of reused equipment including but not limited to antenna systems, UPS, generator, logging, HVAC, and backhaul.		X	
As mandated by the FCC, OKWIN, as the licensee, has the ultimate responsibility for providing all required radio licensing or licensing modifications for the system prior to system installation. This responsibility includes paying for FCC licensing and frequency coordination fees. Provide the FCC “call sign” station identifier for each site prior to system installation.		X	
Complete Design Documentation, which may include updated System Description, Equipment List, and schedule. Incorporate any deviations from the proposed system into the contract documents accordingly.	X		
Prepare Change Order to Reflect Updated System Design and Documentation.	X		
System design is “frozen” in preparation for subsequent project phases such as Order Processing and Manufacturing.	X	X	
Approve Design Review within 5 working days of submission.		X	

### 2.2.3 Order Processing, Manufacturing, and Warehouse

The order processing and manufacturing are summarized in the table below. There is no staging in this project.

**Order Processing, Manufacturing, and Staging**

Tasks	Motorola	OK DPS	Comments
Place and track equipment orders.	X		
Provide warehouse for equipment.	X		
Receipt of Shipments and Record of Shipments	X	X	
Inventory	X		
Ship equipment to the field.	X		

### 2.2.4 Site Improvements

Existing facilities with HVAC, UPS, grounding, generators, and antenna systems will be utilized unless included in the scope of work presented in the proposal. Site work is the



responsibility of OK DPS. This proposal does not include the service or hardware to bring the building, rooms, or towers to R56 Standard. This proposal does provide the services and hardware to ground the Motorola proposed equipment to customer provided ground. Please see the Appendix – Site Development for further details regarding the antenna installation. The breakdown of civil work responsibility is in the table below.

**Civil Work- Site Development and Construction.**

Tasks	Motorola	OK DPS	Comments
Provide sites with permissions, lease agreements, zoning variances, right of entry, space, power to the top of the rack, cable raceways, and antenna mounting locations as necessary. There will be a day for day schedule extension until all necessary permissions and agreements are complete.		X	Existing facilities with HVAC, UPS, grounding, generators, and antenna systems will be utilized.
Performance and maintenance of existing equipment, services, configuration, or anything provided by others.		X	
UPS protected electrical panel with capacity and breakers for Motorola supplied equipment.  During transition, Motorola will utilize extension cords to supply temporary power to the existing racks. The temporary power will not be on UPS or emergency power due to the lack of sufficient service.		X	
ASR sites, except Baker's Peak: Assuming sufficient power at existing panel. Assuming the electrical panel will be within 30' of the equipment cabinets, and electrical panels will support standard/common breakers. Assuming Structure wall coring will not be required nor any special rental equipment. Assuming all exiting electrical services are within the room where the new equipment is being installed.  Hardwire 6-8 dedicated 20 amp circuits to the provided OP820 panel at the top of the ESS rack. Upto two (2) OP820 panels Trip 1 Supply (4) temporary, 20amp 125v quad outlets near the UPS/OK DPS equipment racks located in the penthouse. Assuming the existing electrical panel is within 20'. Trip 2 Remove the existing electrical panels/boxes from (4) equipment racks. Trip 3 Install (1) 60A 240vac circuit to (1) AC Edge device mounted in a new ASR rack.	X		





Tasks	Motorola	OK DPS	Comments
<p>Baker's Peak: Assuming adequate power in the panel and the existing electrical panel is within 20'.</p> <p>(2) Hardwire 6-8 dedicated 20A circuits to customer provided OP820 panel at the top of ESS rack. Upto two (2) AC panels.</p> <p>Trip 1 Supply (4) temporary, 20amp 125v quad outlets near the UPS/OK DPS equipment racks located in the equipment room.</p> <p>Trip 2 1. Remove the existing electrical panels/boxes from (4) equipment racks.</p> <p>Trip 3 1. Install (1) 60A 240vac circuit to (1) AC Edge device mounted in a new ASR rack.</p>	X		
<p>Baker's Peak TVSS: Transportation of the equipment from the service road to the tower location is limited to ATV access only. Equipment will be un-racked and transported in the bed of ATV's and re-assembled in the shelter.</p> <p>Install TVSS type 1 and Type 2</p> <p>Install one transmit and one receive 8dB omni antenna (no diversity)</p> <p>Tower analysis, tower mapping, NEPA, etc is not included.</p>	X		
Provide NEPA studies, Tower Mapping, Foundation/Tower Design, Tower Analysis, and Geotechnical studies.		X	
Perform tower structural analysis based on customer provided existing structural report.	X		
Perform tower and facility remediation as necessary.		X	
All permitting, permitting fees, zoning and associated zoning costs.		X	
Install antennas, including supplying and installing new side arm mounts	X		
Install tovertop amplifiers if applicable.	X		
Install transmission lines required for system.	X		
Provide structure penetrations for transmission equipment (e.g. antennas & microwave line.).		X	



Tasks	Motorola	OK DPS	Comments
Perform sweep tests on transmission lines.	X		
Provide and install attachment hardware for supporting transmission lines on antenna support structure.	X		
Supply and install ground buss bar at the bottom of each antenna support structure.	X		
Contact closure alarm panel at facilities for monitoring of things such as UPS, generator, door opening, high temp, tower lights, etc.		X	
Connect Customer facility alarms to Motorola provided equipment for SNMP centralized monitoring	X		

## 2.2.5 Backhaul

The backhaul responsibilities are summarized in the table below.

### Backhaul.

Tasks	Motorola	OK DPS	Comments
Provide backhaul and networking requirements to OKWIN.	X		
Backhaul with capacity and performance to accommodate existing ASTRO system during migration.		X	
Backhaul testing per Motorola provided Requirements prior to installation.		X	

## 2.2.6 Develop Fleetmap and Operational Configuration

There are no user radio services included. The fleetmap development and operational configuration responsibilities are summarized in the table below.

### Develop Fleetmap and Operational Configuration.

Tasks	Motorola	OK DPS	Comments
Fleetmap, all radio codeplugs and radio programming.		X	
Provide existing infrastructure and user radio fleetmap and configuration information.		X	
Radio Configuration, Templates, Code plugs, and Flash upgrade labor		X	
Any user training as necessary.		X	
Radio Programming for cutover and after cutover for removal of old 4x system		X	



Tasks	Motorola	OK DPS	Comments
All existing console programming and configuration updates, if necessary, for the transition.		X	

## 2.2.7 System Installation and Optimization–Fixed Network Equipment

The system installation and optimization- fixed network equipment responsibilities are summarized in table below.

**System Installation and Optimization- Fixed Network Equipment.**

Tasks	Motorola	OK DPS	Comments
Install equipment per R56 installation guidelines, NEC, EIA, FAA, and FCC.	X		
Provide backhaul demarcation within 25ft of site routers per network requirements provided by Motorola.  Existing T1 links will be utilized for existing P25 Quantar sites.  Customer provided new T1 links for 4x Quantar to GTR site links		X	
Enable Ethernet with router at existing core for future T1 to Ethernet migration.	X		
Provide as-built documentation.	X		
Configure, optimize, program and integrate Motorola provided Quantar to GTR site upgrades.	X		
Install and apply all site licenses at master sites and base stations	X		
Verify that all equipment is operating properly and that all signal levels are set accurately and measured values are within the design parameters.	X		
Record site optimization data for the as-built.	X		
System Ready for Acceptance Testing.	X		
R56 Site Audits.	X		

## 2.2.8 Acceptance Testing and Transition

Acceptance testing will be performed per the Motorola provided Acceptance Test Plan during customer design review. Acceptance testing responsibilities are summarized in **Error! Reference source not found.**below. There is no coverage acceptance test or coverage guarantee. Motorola has included a day of testing for each RF site where the antenna system is replaced to understand if there are any coverage issues. This will ensure that the antenna system is working as designed.

**Acceptance Testing.**

Tasks	Motorola	OK DPS	Comments
Update detailed cutover plan.	X		
Readiness review for each subsystem prior to cutover.	X	X	
Provide and review acceptance plan test	X		
Perform Field Functional Acceptance Test during cutover of each subsystem. Prior to the transition, optimization will be complete, and optimization sheets will be provided to the Customer.	X		
Perform informational only coverage measurement for sites where the antenna system is replaced.	X		
Witness and Approve Field Functional Acceptance Test.		X	
Provide Customer Support Plan detailing the warranty and post-warranty support.	X		
Transition to Warranty/Service.	X	X	

## 2.2.9 Equipment Removal

Motorola will remove existing base station equipment after cutover and relocate the equipment to OK DPS facility. The old antenna systems will be decommissioned and OK DPS will relocate the equipment to their facility.

**Equipment Removal**

Tasks	Motorola	OK DPS	Comments
Remove Quantar base station and dispatch equipment from the radio sites. Removal is for purpose of disposal and does not include inventory or packaging.	X		
Decommission old antenna systems on the tower.	X		
Dispose of removed equipment		X	

## 2.2.10 Punchlist

Development of a mutually agreed upon punchlist is summarized in the table below.

**Punchlist**

Tasks	Motorola	OK DPS	Comments
Review status of sites that have completed cutover for open issues.	X	X	
Review status of sites with pending cutover to ensure readiness for transition and responsibility of open items.	X	X	



Tasks	Motorola	OK DPS	Comments
Review inventory of all shipped equipment to determine if there are open items.	X	X	
Approve punchlist.	X	X	

## 2.2.11 Finalize Project

The finalization of project responsibilities is summarized in the table below.

### Finalize Project.

Tasks	Motorola	OK DPS	Comments
Resolve punchlists documented in order to meet all the criteria for final system acceptance.	X		
Provide support, such as access to the sites, equipment and system.		X	
Approve punchlist resolution.		X	
Provide as-built documentation in PDF System Manual with native documents on the System Manual CD/DVD.	X		
As-builts to include: <ul style="list-style-type: none"> <li>- Site Equipment Rack Configurations</li> <li>- Optimization Sheets</li> <li>- Equipment Inventory List</li> <li>- Maintenance Manuals.</li> <li>- Technical Service Manuals.</li> </ul>	X		
Review and Approve as-built documentation.		X	

## 2.2.12 System Upgrade Pework (6 Months prior)

The division of project responsibilities for prework associated with the System Upgrade is summarized in the table below. OK DPS will have Ethernet site link conversion done by June 30, 2023 for successful implementation of the system upgrade.

### System Upgrade Pework

Tasks	Motorola	OK DPS	Comments
Obtain and review infrastructure system audit data as needed.	X		
Identify the backlog accumulation of security patches and antivirus updates needed to implement a system release. If applicable, provide a quote for the necessary labor, security patches and antivirus updates.	X		
If applicable, identify additional system hardware needed to implement a system release upgrade and if the customer has added hardware that is not covered under this agreement.	X		



Tasks	Motorola	OK DPS	Comments
Define the installation plan.	X		
Advise Customer of probable impact to system users during the actual field upgrade implementation.	X		
Assign program management support required to perform the certified system upgrade. This project manager will be an upgrade operation personnel.	X		
Assign field installation labor required to perform the certified system upgrade.	X		
Assign upgrade operations engineering labor required to perform the certified system upgrade.	X		
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, Motorola will provide this training only once per system.	X		
Contact Motorola to schedule and engage the appropriate Motorola resources for a system release upgrade.		X	
Purchase the security patches, antivirus updates and the labor necessary to address any security updates backlog accumulation identified. Unless otherwise agreed in writing between Motorola and Customer, the installation and implementation of accumulated backlog security patches and network updates is the responsibility of the Customer.		X	
If applicable, provide the necessary network connectivity at the zone core site(s) for use by Motorola to perform remote upgrades and diagnostics. Network connectivity must be provided at least 12 weeks prior to the scheduled upgrade. In the event access to a network connection is unavailable, Customer may be billed additional costs to execute the system release upgrade.		X	
Assist in site walks of the system during the system audit when necessary.		X	
Provide a list of any FRUs and/or spare hardware to be included in the system release upgrade when applicable.		X	



Tasks	Motorola	OK DPS	Comments
Purchase any additional software and hardware necessary to implement optional system release features or system expansions.		X	
Provide or purchase labor to implement optional system release features or system expansions.		X	
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.		X	

### 2.2.13 System Upgrade Pework (30 Days prior)

The division of project responsibilities for prework associated with the System Upgrade is summarized in **Error! Reference source not found.**below. This needs to be completed at least 30 days prior to the upgrade.

#### System Upgrade Pework.

Tasks	Motorola	OK DPS	Comments
Perform appropriate system backups.	X		
Work with the Customer to validate that all system maintenance is current.	X		
Work with the Customer to validate that all available security patches and antivirus updates have been updated on the customer's system. Note: Motorola reserves the right to charge the Customer for the security patches, antivirus updates and the labor necessary to address any security updates backlog accumulation, in the event that these are not completed by the Customer at the System Readiness Checkpoint.	X		
Validate system maintenance is current.		X	
Validate that all available security patches and antivirus updates to their system have been completed or contract Motorola to complete in time for the System Readiness Checkpoint.		X	

### 2.2.14 System Upgrade

The division of project responsibilities for the System Upgrade is summarized below.



**System Upgrade.**

Tasks	Motorola	OK DPS	Comments
Perform system infrastructure upgrade in accordance with the system elements outlined in this SOW.	X		
Inform system users of software upgrade plans and scheduled system downtime.		X	
Cooperate with Motorola and perform all acts that are reasonable or necessary to enable Motorola to provide software upgrade services.		X	

## 2.2.15 Juniper Core Enablement- Prework

The division of project responsibilities for the Juniper Core Enablement prework is summarized below.

**Juniper Core Enablement Prework.**

Tasks	Motorola	OK DPS	Comments
Obtain and review infrastructure system audit data as needed..	X		
Define the migration plan..	X		
Assign program management support required to perform the migration	X		
Assign field installation labor required to perform the migration.	X		
Contact Motorola to schedule and engage the appropriate Motorola resources for the migration.	X		
Assist in site walks of the system during the system audit when necessary.	X		
Perform appropriate system backups.	X		
Request a copy of TNCT for audit/equipment list/cable matrix purposes	X		
Evaluate Power Requirements and Rack Space availability	X		
Work with the Customer to validate that all system maintenance is current.	X		
Work with the Customer to validate that all available security patches and antivirus updates have been updated on the customer's system.	X		
Validate system maintenance is current.		X	





Tasks	Motorola	OK DPS	Comments
Validate that all available security patches and antivirus updates to their system have been completed or contract Motorola to complete in time for the System Readiness Checkpoint.		X	

## 2.2.16 Juniper Core Enablement

The division of project responsibilities for the Juniper Core Enablement is summarized below.

### Juniper Core Enablement.

Tasks	Motorola	OK DPS	Comments
Rack HP-3800-48 switch and run cabling	X		
Cutover HP 3800-48 switch	X		
Rack Juniper equipment and run cables	X		
Prep Juniper Routers with OS and Configuration load	X		
Update Core Network Transport & Data Subsystem	X		
Cutover to Juniper Edge Router 1 and verify.	X		
Cutover to Juniper Edge Router 2 and verify	X		
Verify Call Processing and Alarms	X		
Post-Cutover cleanup	X		
Cooperate with Motorola and perform all acts that are reasonable or necessary to enable Motorola to provide the migration services.		X	

## 2.3 GENERAL ASSUMPTIONS

Unless otherwise noted above, the Motorola proposal is based on the following assumptions:

- The Work Breakdown Structure and Project schedule with OKWIN site and resource availability assume all work is to be performed during working weekdays. Changes to this scope of work will be documented through the change order process.
- No prevailing wage, certified payroll, mandatory union workers or mandatory minority workers are required for this work. In the event it is subsequently determined that



Prevailing Wages are required, OK DPS will reimburse Motorola for all costs required to attain compliance with Prevailing Wage requirements.

- Motorola cannot be responsible for issues outside of our immediate control such as, site readiness, regulatory approvals, frequency coordination by others and non-compliant operation of other radios.
- Motorola is not responsible for any RF noise or interference issues from external sources or generated within the OKWIN RF network.
- If any of the proposed sites cannot be utilized due to reasons beyond Motorola's control, any changes in costs associated with required site changes or delays will be identified by Motorola for presentation and approval by OK DPS for the change order process.
- Costs associated with unknown site locations are subject to change.
- If extremely harsh or difficult weather conditions delay the site work for more than a week, Motorola will seek excusable delays rather than risk job site safety.
- AM detuning or electromagnetic emission studies are the responsibility of the customer.
- OK DPS will provide FCC-licensed frequencies for the new system and subsystem equipment that will be installed at the site.
- No hazardous material will be found at the sites. Testing and removal of hazardous materials, found during site investigations, construction or equipment installation will be the responsibility of OKWIN.
- With the exception of the Baker's Peak site, the cost of non-standard delivery, while not expected, is not included. Examples of non-standard delivery methods include air-lifts, ATV delivery, deployment of swamp mats, barge delivery, or the improvements or installation of temporary roads, bridges, or access-ways.
- OK DPS provided towers and facilities have adequate space, electrical service, breakers at power panel, HVAC and generator in place prior to Motorola site installation.
- Towers, Cable ladders, and Cable Raceways/Trays at all installation locations will have adequate space at time of installation.
- Physical improvements to walls, roofing, flooring, painting, etc. in existing facilities has not been included.
- Existing towers are sufficient to support any new antenna. Tower remediation is not included.
- Sites will be approved for permitting, zoning, FAA, FCC, NEPA as necessary to meet the schedule.
- Lead paint testing of existing painted towers has not been included.
- Underground utilities are not present in the construction area and as such no relocation will be required.
- Unless otherwise noted, utility service and backup power facilities (UPS, generators) have sufficient extra capacity to support the proposed new equipment load. No new backup power sources have been included.
- Plenum cable and routing is not required.
- As applicable at existing sites, OK DPS will be responsible for any installation or up-grades of the electrical system in order to comply with NFPA 70, Article 708.
- State, Local, and Federal Taxes are not included.
- All recurring and non-recurring utility costs [including, but not limited to, generator fuel (except first fill), electrical, Telco, Tower lease] will be borne by OK DPS or site owner.
- Pricing has been based on National codes such IBC or BOCA. Local codes or jurisdictional requirements have not been considered in this proposal.
- OK DPS will have Ethernet site link conversion complete by June30, 2023 at all the RF sites.



## 2.4 APPENDIX - SITE DEVELOPMENT STATEMENT OF WORK

The work is as stated herein, and all other work is excluded. All antenna installation is based on one example site. Costs will vary by site, and cost changes will be addressed through the change order process. Upon contract award, site walks will occur, and the specific scope for each site can be determined. Tower remediation costs can be provided after tower analysis.

### 2.4.1 Site Scope Summary

- Reuse existing shelters and existing towers or rooftops for new equipment installation
- Engineering services for site drawings, permitting and regulatory approvals for installation of antenna systems on existing towers are included
- Existing towers to be used for antennas.
- One time tower mobilization
- Removal of existing antenna and coax related to RF equipment is included. No additional antennas will be removed.
- Relocation of removed equipment is not included.
- Engineering services for structural analysis Rev G to support proposed antenna system
- Engineering services for regulatory approval
- Engineering services for site construction drawings to support proposed antenna system
- Typical Permitting for co-locate site
- Installation of new equipment in existing equipment shelter at base of tower
- No Zoning Services
- No Clearing type

### 2.4.2 Motorola Responsibilities:

#### Site Engineering

- Conduct site walks to collect pertinent information from the sites (e.g., location of tower, existing facilities, etc.).
- 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.
- Complete a tower appurtenance mapping and site investigation necessary to develop structural analysis for existing structures. Mapping does not include tower foundation mapping or geotechnical investigation that may be required for a rigorous structural analysis per TIA-222, Rev G. Tower mapping is not a maintenance and condition assessment of the structure.
- Perform limited NEPA compliance/ FCC checklist review for existing towers constructed prior to March 16, 2001, or towers with previously filed FCC checklists. If tower is found to be in non-compliance, additional regulatory services may be required prior to co-location of antenna system on existing structure. If the OK DPS is unable



to provide regulatory compliance documentation for towers constructed after March 16, 2001, a full NEPA/ Sec 106 will be required with additional cost.

- Provide tower climbing and tower mapping services to collect information about structural members and existing equipment. (Will require the broadcast antennas to be turned down/off at applicable sites). Does not include foundation mapping
- 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 OK DPS. NOTE: This task does not include materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.
- Prepare, submit, and track application for local permit fees (electrical, building etc.). Prepare regulatory filings and procure information necessary for filing in accordance with guidelines from the FAA & FCC
- 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
- Prepare record drawings of the site showing the as-built information.

### **Site Preparation**

- 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.
- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

### **Antenna and Transmission Line Installation**

- For all the newly swapped out Quantar to GTR sites (since Dec 2020) as mentioned in the section 1.2.3, the entire antenna system will be replaced. At existing GTR sites, only the receive system will be upgraded to support Receive Diversity. See the table in Section 1.2.3 for the list of specific sites and the plan for each.
- Install 2 RX antenna(s) and (1) TTA at or below the top of the tower.
- Install 1 TX antenna(s) 30' below RX antennas.
- Install up to 1 run of 1/2-inch transmission line to RX antenna.
- Install up to 2 runs of 7/8-inch transmission line to RX antenna.
- Install up to 1 runs of 1-1/4-inch transmission line to TX antenna.
- Perform sweep tests on transmission lines.
- Provide and install attachment hardware for supporting new transmission lines on the antenna support structure every three feet.
- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.
- Included are a Gin Pole or Crane for Tower Top Antenna Installation per ANSI/ASSE A10.48 (Includes Class IV Rigging Plan, Permits, & Qualified Engineer Review)
- Remove up to (3) existing antennas and lines within same mobilization
- Core Drill existing shelter wall for new cable entry as required
- Construction Management



### 2.4.3 Oklahoma Department of Public Safety (OK DPS) Responsibilities:

- Remove existing abandoned equipment from existing shelter and tower.
- If required, prepare and submit Electromagnetic Energy (EME) plans for the site (as a licensee) to demonstrate compliance with FCC RF Exposure guidelines.
- As applicable, coordinate, prepare, submit, and pay for all required permits and inspections.
- In the event that the existing structure cannot support the proposed antenna design, coordinate and pay for any required tower remediation design and installation required to support new antenna installations
- Review and approve site design drawings within 7 calendar days of submission by Motorola or its subcontractor(s). Should a re-submission be required, the OK DPS shall review and approve the re-submitted plans within 7 calendar days from the date of submittal.
- Pay for application fees, taxes and recurring payments for lease/ownership of the property.
- Provide personnel to observe construction progress and testing of site equipment according to the schedule provided by Motorola.
- Pay for the usage costs of power, leased lines and generator fuelling both during the construction/installation effort and on an on-going basis
- Provide property deed or lease agreement, and boundary survey, along with existing as-built drawings of the site and site components to Motorola for conducting site engineering.
- Provide a right of entry letter from the site owner for Motorola to conduct field investigations.
- Arrange for space on the structure for installation of new antennas at the proposed heights on designated existing antenna-mounting structures.
- Provide as-built structural and foundation drawings of the structure and site location(s) along with geotechnical report(s) for Motorola to conduct a structural analysis. (In case these drawings are not available, a change order will be processed).
- Adequate electrical service for the new shelter and tower. Utility transformer, transformer upgrades, line, or pole extensions.
- All utility installations shall be coordinated and paid for by the site owner or OK DPS and located at jointly agreed to location within or around the new communications shelter or equipment room.
- Site improvements as required for access.
- On the existing tower, the antenna locations for the proposed antenna system design will be available at the time of installation.
- Underground utilities are not present in the construction area and as such no relocation will be required.
- Coordinate any equipment relocations and/or removals prior to antenna installation within existing shelter
- Existing antenna support structure 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 tower or supporting structure meets all applicable EIA/TIA-222 (Rev G) structural, foundation, ice, wind, and twist and sway requirements. Motorola has not included any cost for structural or foundation upgrades to the antenna support structure.



- Structural analyses for towers or other structures that have not been performed by Motorola will relinquish Motorola from any responsibility for the analysis report contents and/or recommendation therein.
- The existing shelter has sufficient electrical and HVAC capacity to support the propose equipment installation.
- Provide existing equipment shelter that meets or exceeds industry standards, Motorola (R56) Guidelines, and complies with all local and jurisdictional requirements

## 2.4.4 Exclusions

- Assumptions in Statement of Work
- Additional work for 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” and thus require additional documentation, submittals, or work.
- Additional re-trip (mobilization at later date) to remove existing antennas, mounts and lines at or below the top of the tower.
- Relocation of old antenna and antenna lines removed from tower is customer responsibility.
- No certified payroll, mandatory union workers or mandatory minority workers are required for this work
- Work can be performed during normal business hours as dictated by time zone (Monday through Friday, 7:30am to 5:30pm) daylight hours
- Pricing has been based on National codes such IBC or BOCA. Local codes or jurisdictional requirements have not been considered in this proposal
- 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 OK DPS
- No improvements are required for concrete trucks, drill rigs, shelter delivery, and crane access
- No Stormwater Pollution Prevention Plan (SWPP) or detention ponds are required for site development
- If extremely harsh or difficult weather conditions delay the site work for more than a week, Motorola will seek excusable delays rather than risk job site safety
- In the absence of tower specific geotechnical test data at the site, normal/presumptive clay soil conditions have been assumed. Soils are defined as per TIA/EIA-222 guidelines
- The soil resistivity at the site is sufficient to achieve resistance of ten (10) ohms or less with a standard ground rod installation. Communications site grounding will be designed and installed per Motorola's Standards and Guidelines for Communications Sites (R56)



## 2.4.5 Completion Criteria

- Site development completed per issued for construction (IFC) construction drawings, project requirements, contractual obligations (including any approved changes) and approved by OK DPS. This shall be confirmed by the contractor and reviewed with the Motorola construction manager and project manager before inspections occur.
- All jurisdictional and contractual required testing and inspections to be performed by others.
- Motorola site development checklist shall be completed and signed off by contractor prior to OK DPS inspection. (Review with project team and OK DPS and amend checklist as required at project kick off or before work begins)
- Site turn-over package completed and turned over to Motorola (As defined and agreed to with project team and OK DPS).
- All punch list and deficiencies shall be completed prior to OK DPS, and Motorola inspections



SECTION 3

# PROJECT SCHEDULE

The proposed Project Schedule is included below.

QUANTAR TO GTR UPGRADE SCHEDULE												
Task	Q1 2023			Q2 2023			Q3 2023			Q4 2023		
Design Review and Equipment Order	█	█	█									
Install, Optimize & Test(1-4)				█	█	█						
Install, Optimize & Test(5-8)					█	█						
Install, Optimize & Test (9-12)							█	█	█			
Install, Optimize & Test (13-16)								█	█			
Install, Optimize & Test (17-19)										█	█	█
Punchlist items										█	█	█

TDMA UPGRADE and ANTENNA INSTALLATION SCHEDULE												
Task	Q1 2023			Q2 2023			Q3 2023			Q4 2023		
Site Walks, Structural Analysis and Design Review	█	█	█									
Design Lock In and Equipment Order		█	█									
TDMA Upgrade				█	█	█						
Antenna Install & Optimize (1-8)					█	█						
Coverage Measurement (1-8)						█						
Antenna Install & Optimize (9-15)						█						
Coverage Measurement (9-15)							█	█	█			
Antenna Install & Optimize (16-23)								█	█			
Coverage Measurement (16-23)									█			
Antenna Install & Optimize (24-30)									█			
Coverage Measurement (24-30)										█	█	█
Antenna Install & Optimize (31-35)											█	█
Coverage Measurement (31-35)												█
Punchlist items											█	█



SECTION 4

# PRICING SUMMARY

<b>OK DPS ARPA PROJECT</b>	<b>List Price</b>	<b>Contract Price</b>
OKC Southeast- Quantar to GTR	\$3,952,996	\$3,375,937
OKC Northeast- Quantar to GTR	\$2,813,410	\$2,425,380
Tulsa East/Northeast- Quantar to GTR	\$3,297,246	\$2,846,712
OKC Southwest- Quantar to GTR	\$3,663,585	\$3,190,679
System Upgrade to A2022.1	\$2,521,952	\$2,143,659
TDMA Antenna Upgrade	\$8,493,325	\$8,310,615
TDMA License Upgrade	\$1,393,690	\$1,138,690
<b>SUBTOTAL</b>	<b>\$26,136,204</b>	<b>\$23,431,672</b>
<b>2022 Incentive</b>		<b>\$ (3,433,717)</b>
<b>Project Price</b>		<b>\$19,997,955</b>
<b>SW1053M Contract Fee 1%</b>		<b>\$199,980</b>
<b>Contract Fee Included</b>		<b>\$(199,980)</b>



## **PAYMENT TERMS**

Except for a payment that is due on the Effective Date, Customer will make payments to Motorola within thirty (30) days after the date of each invoice. Customer will make payments when due in the form of a check, cashier's check, or ACH/wire transfer drawn on a U.S. financial institution. If Customer has purchased additional Professional or Subscription services, payment will be in accordance with the applicable addenda. Payment for the System purchase will be in accordance with the following milestones.

### **System Purchase (excluding Subscribers, if applicable)**

1. 15% of the Contract Price due upon contract execution (due upon effective date);
2. 30% of the Contract Price due upon completion of design review;
3. 45% of the Contract Price due upon shipment of equipment;
4. 5% of the Contract Price due upon installation of equipment;
5. 5% of the Contract Price due upon final acceptance;

**If Subscribers are purchased, 100% of the Subscriber Contract Price will be invoiced upon shipment (as shipped).**

Motorola reserves the right to make partial shipments of equipment and requires timely payment of partial shipment invoices. In addition, Motorola is entitled to invoice for installations completed on a site-by-site basis or when professional services are completed, when applicable. The value of the equipment shipped/services performed will be determined by the value shipped/services performed as a percentage of the total milestone value. Unless otherwise specified, contract discounts are based upon all items proposed and overall system package. For invoicing purposes only, discounts will be applied proportionately to the FNE and Subscriber equipment values to total contract price. Overdue invoices will bear simple interest at the maximum allowable rate by state law.

### **For Lifecycle Support Plan and Subscription Based Services:**

Motorola will invoice Customer annually in advance of each year of the plan.



SECTION 5

# CONTRACTUAL DOCUMENTATION

***This proposal is subject to the terms and conditions of the State of Oklahoma Office of Management and Enterprise Services, Oklahoma Statewide Contract No. SW1053M, executed on November 21, 2022, and remains valid for a period of 45 days from the date of this letter. The State may accept this proposal by issuing a purchase order or notice to proceed document referencing “Subject to the Terms and Conditions of the State of Oklahoma Office of Management and Enterprise Services, Oklahoma Statewide Contract No. SW1053M.”***

