



April 20, 2015

Dear Prospective Vendor,

The RFP is a comprehensive document that outlines the City's requirements. The City's assumption is each vendor is uniquely qualified and proficient, in the communications field. Vendors should review the RFP and respond accordingly, understanding each vendor will have a different solution for meeting the City's requirements. The City expects vendors to act responsibly and present their solution in a manner that makes their solution(s) the best choice, for the City of Conway.

The RFP contains certain language with the assumption that the City will be joining the state of Arkansas system (AWIN). Vendors should provide (2) two separate proposals. First, a proposal that reflects a system that is completely integrated with the State of Arkansas system, along with pros and cons. Second, a proposal that reflects a standalone system, with pros and cons. The standalone system should include all the equipment, at the City's RF site, should the City decide to join AWIN, requiring minimal cost to the City of Conway. Both proposals should include any additional cost that would be required to meet the coverage requirements in this RFP, i.e. additional tower sites.

With this project, other entities are expected to share in the cost of a new system. The response to the RFP should be detailed. The City needs a comprehensive, individual cost breakdown for each entity, to determine each entities fair share of radios, dispatch consoles, maintenance cost, etc...

The quantity of mobile and handheld radios, as well as other devices, may change. The bid should be such that the City can increase or decrease the number of radios or devices and easily determine the cost. Dispatch workstation costs should be such that the City can easily determine the cost of workstations for the different entities, City of Conway (12), University of Central Arkansas (3), Antenna Tower, Communications Shelter and associated equipment should be such that the City can easily determine the cost of specific items such as the shelter, UPS, and HVAC.

FirstNet

FirstNet will ensure the establishment of the first nationwide public safety broadband network. The network will improve communications among local, state, regional, tribal and national first responders. Please describe your understanding of FirstNet and what steps, if any, you as a vendor are taking to integrate FirstNet technology into your proposed system.

Sincerely,

Lloyd Hartzell
CTO – Information Technology Department



City of Conway
Request for Proposal

Project 25
Phase 2 Trunked Radio System
Specifications

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1. Introduction

1.1 Overview

City of Conway (Conway) intends to purchase a modern and integrated state-of-the-art wide area voice network for use throughout the City of Conway utilizing Project 25 Phase 2 trunked technology. The integrated network should be a highly reliable, fault tolerant system which will meet current needs and provide a growth path for future expansion. Since the system is expected to serve the communication needs of Conway for the next 15 years, it must have the flexibility to adapt to the required system changes and new technology without the need to replace major equipment elements. The City of Conway intends to implement future data applications and add additional users beyond the initial identified requirements, and requires that this network allow for future growth of the network. The network must also allow for the addition of RF sites to increase coverage should the need arise.

Bidders are encouraged to propose a network design that will best meet the requirements of Conway.

The system shall be proposed as a complete network with firm prices for all of the equipment, software and services required by these specifications.

The City of Conway will provide maps (service area boundaries, radio coverage, etc) in ArcView SHP file format. This will make it easier for the Bidders to overlay the predicted RF coverage with the maps provided.

1.2 Current Operations

Agencies within the City of Conway and Faulkner County operate on multiple, disparate LMRS (Land Mobile Radio System) systems.

The City of Conway currently has RF equipment at the following locations:

Conway Emergency Operations Center 2300 Hogan Lane Conway, AR 72034.

VFW Water Tower Site 1855 Old Morrilton Hwy. Conway, AR 72032.

The VFW Water Tower Site will be replaced. The Site will be located North of the Conway Emergency Operations Center on clearwell Road (Approximately Longitude -92.499784 Latitude 35.110684) with a new 200' freestanding Tower.

1.3 System Configuration

Conway requires a Project 25 Phase 2 trunked land mobile radio communications system with wide area communication capabilities for all users throughout the operational area of Conway and users of the Conway System. The City of Conway has been allotted seven 800 MHz band channels in the regional plan.

1.4 Regional Network

Vendors shall describe how Conway's integrated network will interoperate with the state's AWIN system. In particular, Bidders shall describe the additional functional and financial benefits gained by joining the State of Arkansas AWIN system.

1.5 Evaluation Criteria

Conway will determine which technical solution is in its best interest. Evaluation criteria include:

- Guaranteed radio coverage of 95% or higher
- Interoperability with other systems
- Features and functions provided
- Fault tolerant design
- System redundancy
- Cost

1.6 Timetable of Key Events

<u>Event:</u>	<u>Date:</u>
• RPF Release Date	July 1, 2015
• Bidders on Site Visit (Optional)	July 8, 2015
• Final Date to Receive Written Questions	July 20, 2015
• Proposal Due Date and Time	August 12, 2015 4:00pm (CST)
• Recommendation to Mayor & Council	TBD

2. PROJECT 25 Phase 2 System

2.1 General

Figure 2-1 is a system context diagram of the Project 25 [A1]Phase 2[A2] trunked radio system, showing the relationships of the system components.

The backbone of the system shall consist of one repeater site connected to a wide area controller, or switch, to provide reliable wide area voice and data communications to and from mobile and portable units throughout the desired area of coverage. To provide best value to Conway, Bidder shall maximize the use of commercial, off-the-shelf (COTS) Internet Protocol (IP) networking technologies for interconnectivity of network elements.

The network communications architecture shall provide the radio user transparent radio communications across the entire area of coverage.

The proposed system shall permit PTT over a cellular network to directly connect with PROJECT 25 trunk groups using standard PROJECT 25 codes.

The proposed Project 25 Phase 2 trunked radio system shall permit the radio user to roam across the entire area of coverage without requiring manual switching or changing of site information.

Dispatch consoles based upon the latest dispatch console and digital switching technology shall be utilized at the dispatch center sites. LED-based dispatch consoles shall provide the dispatcher with all the features and capabilities of a large, traditional, panel-mounted console in a compact unit. To provide the best value and flexibility to Conway, Bidder shall maximize the use of commercial, off-the-shelf (COTS) Internet Protocol (IP) networking technologies for dispatch console interconnectivity. Bidder shall indicate what types of workflow management are available on their dispatching system.

The PROJECT 25 Phase 2 trunked radio system shall provide automatic interoperability with existing trunked or conventional radio systems from the same or different manufacturers. Interoperability with other PROJECT 25 systems shall be supported through a PROJECT 25 ISSI 8000 (Inter Sub System Interface).

The location of the new PROJECT 25 system(s) shall comply with Motorola's R56 Grounding Standard. If the City chooses to remain at the current RF site the Bidder will do a study to assure that the current site meets or exceeds Motorola's R56 Grounding Standard.

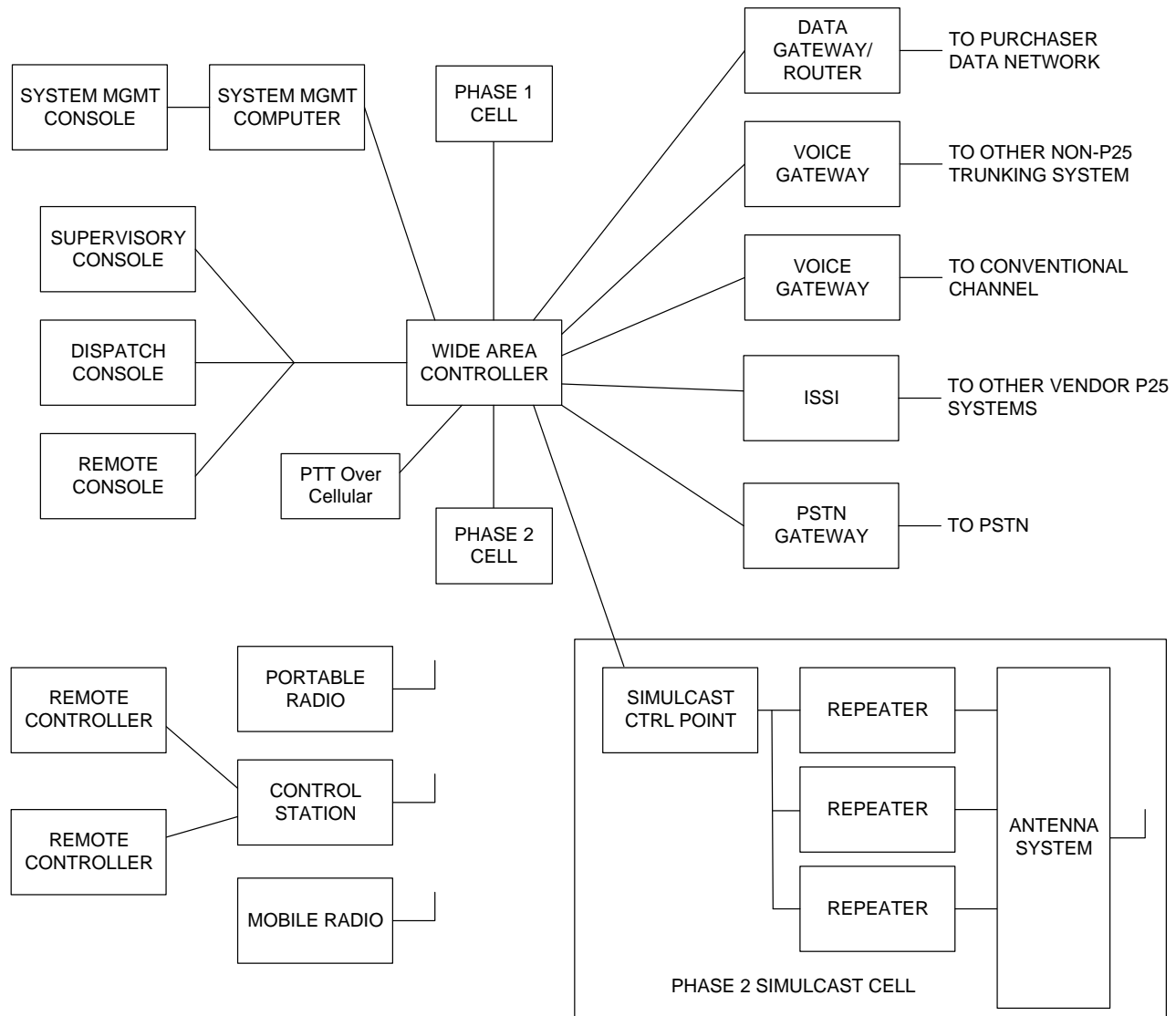


Figure 2-1 Phase 2 System Context Diagram

2.2 Phase 2 System Architecture

2.2.1 System Block Diagram

Bidder shall provide a complete high-level block diagram for the entire proposed system showing the site, wide area controller(s), dispatch consoles, and any other major system components (such as system administration and management computer(s), etc.).

2.2.2 Dispatch Center Locations

Conway desires to purchase 12 dispatch consoles to be located in the Conway Emergency Operations Center, 2300 Hogan Lane Conway, AR 72034 (Dispatch Center). Bidder shall provide a block diagram for the equipment at each dispatch center location, showing all major components and the quantity and type of communication circuits required to connect the dispatch center equipment to the wide area controller. Bidder shall provide a list of all power and air conditioning requirements for the dispatch center equipment.

University of Central Arkansas desires to purchase three consoles to be located in the dispatch center, located at 6 WJ Sowder Drive, Conway, AR 72035. Bidder shall provide a block diagram for the equipment at each dispatch center location, showing all major components and the quantity and type of communication circuits required to connect the dispatch center equipment to the wide area controller. Bidder shall provide a list of all power and air conditioning requirements for the dispatch center equipment.

2.2.3 Wide Area Controller Location

The primary wide area controller will be located at the Conway Emergency Operations Center, 2300 Hogan Lane Conway, AR 72034. The backup / WAC controller will be located at an alternate site determine by the Owner. Bidder may recommend the location of the backup wide area controller. Bidder shall provide a block diagram and floor plan for each wide area controller location, showing all major components and the quantity and type of communication circuits required to connect the wide area controller to remote consoles. Bidder shall provide a list of all power and air conditioning requirements for the wide area controller equipment.

2.3 Radio Coverage Requirements

Bidder will be responsible for demonstrating mobile and portable radio coverage performance in accordance with the test plan defined later in these specifications.

2.3.1 Coverage Predictions

Radio system coverage shall be predicted through use of a radio wave propagation model that has been developed on the basis of theoretical and empirical data, which will take into account terrain irregularity, foliage, urban clutter, noise and long and short term signal variations. The model used for the purposes of the coverage prediction shall be identified, and the rationale for system losses (e.g., power, gain, and loss information used in the model for each site) shall be described in the Bidder's proposal.

2.3.2 Voice Quality

Coverage is defined as the minimum signal required to provide Delivered Audio Quality 3.4 (DAQ 3.4) voice quality, defined as “Speech understandable with repetition only rarely required”, as defined by TSB-88. Bidder shall relate this voice quality to a signal level or BER (Basic Encoding Rules) for acceptance testing purposes.

2.3.3 Mobile Coverage Requirement

Mobile voice coverage shall be provided with 95% or greater reliability. Bidder shall indicate what percentage of Conway (as defined by its political boundary) is predicted to have 95% or greater reliable coverage at DAQ 3.4 for a mobile. The Bidder’s percentage value will become the guarantee for pass/fail criteria for coverage acceptance testing. The boundary of the mobile service area shall be clearly indicated on the Bidder’s coverage maps provided with their proposal. Bidder shall provide all parameters and assumptions used to generate the coverage maps. Bidder shall provide detailed RF propagation coverage prediction analysis for both talk-out and talk-back for mobiles.

2.3.4 Portable Outdoors Coverage Requirement

Portable outdoor voice coverage shall be provided with 95% or greater reliability. Bidder shall indicate what percentage of Conway (as defined by its political boundary) is predicted to have 95% or greater reliable coverage at DAQ 3.4 for a portable. The Bidder’s percentage value will become the guarantee for pass/fail criteria for coverage acceptance testing. Bidder must assume that the user is outdoors and is wearing the portable (with antenna) on his hip and with a speaker microphone (no antenna) at shoulder height. The boundary of the portable service area shall be clearly indicated on the Bidder’s coverage maps provided with their proposal. Bidder shall provide all parameters and assumptions used to generate the coverage maps. Bidder shall provide detailed RF propagation coverage prediction analysis for both talk-out and talk-back for portables outdoors. Bidder shall provide a statement of talk-out to talk-back system balance.

2.3.5 Radio Frequencies

Conway has seven 800 MHz band frequencies allotted. The Bidder shall provide technical assistance to Conway in applying for three additional 800 MHz band frequencies. If no 800 MHz frequency licenses are available, the Bidder shall provide technical assistance to Conway in applying for three additional 700 MHz band frequencies. Conway shall be responsible for maintaining frequency licenses.

Bidder must indicate whether the default setting for talk groups on the system is message or transmission trunking mode; transmission trunking is preferred. Based on the default setting, Bidder must submit a traffic loading analysis that predicts the total number of active units that can be supported during the busy hour using the following profile.

	Per User
Number of messages per hour:	1
Number of PTT’s during a message:	6
Length of PTT spurt:	3.2 sec
Hang time:	0 sec

Bidder's system design must satisfy all requirements outlined by the regional plan and the FCC, regarding conformance to transmitter output power limitations. Bidder must include data in the proposal to demonstrate compliance, such as 40 dB contours[A3].

2.3.6 Tower Top Amplifiers

It is desirable that receiver tower top amplifiers be used to compensate for coaxial cable loss in order to provide the level of portable talk-back coverage specified. Bidders shall include tower top amplifiers.

2.4 System Functional Requirements

The basic operational mode of the system will be Project 25 Phase 2 trunked per TIA/EIA 102 standards, with the field units monitoring an assigned 9600 bit per second control channel. Most of the communications will use this mode with communications taking place over trunked repeater sites located throughout the served area. The mobile and portable radios will also enable users to manually select communication modes such as the use of conventional channels or talk-around mode when out of range of the repeater site.

2.4.1 Wide Area Communications

The system shall provide the ability to place and receive calls to and from any point in the network covered by the Project 25 trunked radio sites.

Bidders must include connectivity between the RF sites and the Dispatch Center. All sites shall be linked to the wide area radio network by means of microwave, fiber optic cable, or a combination thereof.

To provide best value to Conway, Bidder shall maximize the use of commercial, off-the-shelf (COTS) Internet Protocol (IP) networking technologies for interconnectivity of network elements. Bidder must indicate the amount of bandwidth required to support its proposed system design.

2.4.2 General Features

2.4.2.1 Voice and Control

Conway desires to utilize standards-based protocols for the life of the radio system. The system shall provide a minimum of two voice calls per 12.5 kHz of radio channel spectrum. Non-standard, proprietary TDMA (Time Division Multiple Access) solutions will not be accepted. The system must comply with the Project 25 Phase 2 standards, as described by the following published documents:

TIA-102.BBAA, Two-Slot TDMA Overview

TIA-102.BABA-1, Project 25 Half-Rate Coder Annex

TIA-102.BBAB, Project 25 Phase 2 Two-Slot Time Division Multiple Access Physical Layer Protocol Specification

TIA-102.BBAC, Project 25 Phase 2 Two-Slot TDMA Media Access Control Layer Description

TIA-102.CCAA, Two-Slot Time Division Multiple Access Transceiver Measurement Methods

TIA-102.CCAB, Two-Slot Time Division Multiple Access CAI Performance Recommendations

TIA-102.BCAD, Project 25 Trunked Radio System Two-Slot Time Division Multiple Access Voice Services Common Air Interface Conformance Specification

TIA-102.BCAE, Phase 2 Two-Slot Time Division Multiple Access Trunked Voice Services Message and Procedures Conformance Specification

TIA-102.CBBB, Two-Slot TDMA Messages and Procedures Conformance

TIA-102.CABC-B-1, Interoperability Testing for Voice Operation in Trunked Systems Addendum – TDMA Mode

TIA-102.AABC-C-1, Additions to the Phase 1 Trunking Standards for Phase 2 TDMA

TIA-102.AAAD-A, Additions to the Phase 1 Encryption Standards for Phase 2, Encryption Protocol Addendum for Half Rate Coder

Proprietary encryption protocols are not acceptable.

The system must be able to support a mix of legacy Phase 1-only and Phase 2 radios on the Phase 2 system, and to allow for interoperability with neighboring Project 25 Phase 1 systems. The Phase 2 system shall allow legacy Phase 1-only radios to register and affiliate on interoperability groups. In addition, the registration of a Phase 1 radio on any PROJECT 25 site shall not reduce the Grade of Service (GOS) on Phase 2 sites that do not have Phase 1 radios registered on the same group.

2.4.2.2 Radio Disable

The purpose of this feature is to prevent a lost or stolen radio from being used to transmit and receive on the system.

The system shall have the ability to selectively enable or disable an individual radio from the system management computer.

Bidder shall indicate to what extent the proposed system is capable of preventing a stolen radio from accessing the system.

2.4.2.3 Caller Identification

The radio ID shall be included in each transmission. The system shall display this ID on its associated group module in the console at the dispatch center.

Suitably equipped mobile and portable radios shall be able to display the calling unit ID for both individual and group calls.

Each mobile radio, portable radio, control station, and dispatch console shall be capable of displaying an alphanumeric alias corresponding to the unit ID, if available from the transmitting device.

2.4.2.4 System Access by Unauthorized Devices

The system shall prevent access by unauthorized devices. The Bidder shall indicate whether this is accomplished through unit and group validation at the repeater controller, or through a unit authorization/registration procedure, or both.

2.4.2.5 Over-The-Air Provisioning

The system shall provide the ability to provision radio parameters to the mobile and portable radios over the air (without the need to physically connect the radio programmer to the radio). Provisioning shall include the supply of system information such as available radio channels, and user specific information such as talk group lists, scan priorities and user privileges.

2.4.2.6 Encryption and OTAR

Encryption on the system shall be PROJECT 25 standards-based; proprietary encryption protocols are not allowed.

The system shall support over-the-air-rekeying (OTAR) of mobile and portable radios using Project 25 OTAR. The system shall have the ability to schedule OTAR dynamically based on customer needs.

2.4.2.7 Radio to Radio Interoperability

Conway is also interested in purchasing full spectrum radios that operate on VHF, UHF, and 700/800 MHz frequency bands. The radios must operate in both analog conventional mode as well as PROJECT 25 Digital Trunked mode to facilitate cut-over from Conway's current systems to the new PROJECT 25 radio system. Bidder shall provide optional prices for full spectrum portables and mobiles. Bidder must provide a live demonstration of the radio's ability to scan between frequency bands and protocols.

2.4.3 Project 25 Trunked Features

2.4.3.1 Basic Project 25 Trunked Operation

The system shall support voice group operation, where a voice group consists of a number of operational users distributed through the radio network.

The radio user manually selects the voice group he wishes to communicate with, and then presses PTT on the radio. If resources are available the system shall respond by establishing a voice call to the selected group. Once the group call has been established, voice from the source radio is transmitted to all members of the group, which may involve multiple repeater sites.

The system shall track voice group members as they roam through the network and ensure that each multi-site call is routed to all available repeater sites containing members of that voice group.

The system shall support Project 25-defined "announcement group calls" (allowing a dispatcher or authorized user to communicate to a number of individual groups) and "all calls" (allowing a dispatcher or authorized user to communicate to all users on the network).

2.4.3.2 Call Queuing

If resources are not immediately available for a call originating from the network side, the system shall queue the channel request to the base station until the radio channel is available.

2.4.3.3 Voice Group Priority

The base station shall queue calls originating from the network side based on voice group priority, with a minimum of eight priority levels. Calls will be positioned in the queue based on priority, with calls of highest priority (such as emergency calls) being serviced first. Calls of equal priority shall be processed on a first in, first out basis.

2.4.3.4 Group Busy Lockout

This feature prevents other voice group members from interrupting a user who is actively transmitting on a voice group.

If a member of a currently active voice group presses PTT to initiate a call on the same voice group, the system shall refuse to repeat the call. This is independent of the “Busy Channel Lockout” capability of the subscriber unit.

Exceptions to group busy lockout include network originated emergency calls, dispatcher override, and supervisor override.

2.4.3.5 Dispatcher Override

This feature ensures that calls originating from a dispatch console cannot be blocked by normal members of the same voice group.

The system shall permit a call originating from a dispatch console to interrupt a call by a normal member of the same voice group, overriding the call so that other members of the voice group only hear the dispatcher. The exception is the transmitting mobile, which may not hear the dispatcher until after he releases the PTT button.

2.4.3.6 Individual Call

The system shall support individual call mode, where a suitably equipped radio or console user can establish a private call to any other radio user in the network.

In individual call mode the group membership is limited to the source and destination radios and the call will not be overheard by other mobile or portable units.

Bidder shall indicate how an individual call is established in the proposed system.

2.4.3.7 Confirmed Call

Confirmed call is an optional feature where a voice group call is not enabled until most or all of the required system resources are available.

Bidder shall indicate the extent to which confirmed call is supported.

2.4.3.8 Priority Scan

The system shall provide individual radios with the capability of scanning multiple voice groups.

Bidder shall indicate the maximum number of voice groups on the scan list, and how the scan sequence is resolved if several voice groups are active at the same time.

2.4.3.9 Talkback Scan

The system shall provide individual radios with the capability of talking back on a scanned talk group.

2.4.3.10 Scan Group Lockout

The system shall provide the user with the ability to temporarily disable scanning on selected voice groups.

2.4.3.11 Emergency Alert and Emergency Call

The system shall support emergency notification in the mobile and portable radios.

When the emergency button is pressed on a mobile or portable radio, the radio shall immediately transmit an emergency alert message to the central dispatch location. The emergency alert message should include, at a minimum the radio ID talk group of the originating unit and the units location

Upon receipt of an emergency alert message the system shall immediately establish an emergency voice call. All emergency calls shall have the highest priority in the system.

2.4.3.12 Late Call Entry

The system shall permit a user who has just re-entered radio coverage or was engaged in another call to late enter into a call in progress.

2.4.3.13 Anti-Cloning of Radios

Bidder shall describe ability for Conway to prevent unauthorized users from cloning a radio's personality to load into another radio.

2.4.4 Phase 2 Interoperability with Legacy Systems

2.4.4.1 Project 25 Conventional Systems

The Phase 2 system shall provide automatic interoperability with existing Project 25 conventional radio systems from the same or different manufacturers.

Automatic is defined as taking place without operator (user or dispatcher) intervention. It is acceptable for an operator to be required to set up the initial connection. However, all subsequent inter-system communications should occur without human intervention.

Interoperability is defined as the capability to connect to Project 25 conventional voice groups on the Phase 2 radio system through the wide area controller.

It is preferred that a user registered on a PROJECT 25 Conventional channel would use the same talk group as a user on a PROJECT 25 Trunked site. If this feature is not available, then Bidder shall describe how the proposed PROJECT 25 Phase 2 Trunked system will interface with a PROJECT 25 Conventional system, including the steps the users have to take to initiate an inter-system group call.

2.4.4.2 Project 25 Legacy Phase 1 Trunked Systems

The system shall provide automatic interoperability with existing Project 25 Phase 1 trunked radio systems from the same or different manufacturers. Interoperability is defined as the capability to connect or patch Project 25 trunked voice groups on the Phase 2 radio system through the wide area controller with Project 25 trunked voice groups on an existing radio system. This interoperability may be established using network-level connectivity compliant with the PROJECT 25 Inter-Subsystem-Interface 8000 (ISSI 8000).

2.4.4.3 Conventional FM Systems

The system shall provide automatic interoperability with existing conventional FM radio channels, where a voice group on the new system is connected through the wide area controller to a conventional FM radio channel, or alternatively to a CTCSS defined voice group on a conventional FM radio channel. Automatic is defined as taking place without operator (user or dispatcher) intervention. It is acceptable for an operator to be required to set up the initial connection. However, all subsequent inter-system communications should occur without human intervention.

The existing conventional FM radio systems to be interfaced may operate in the VHF, UHF, 700 MHz or 800 MHz frequency bands. The conventional FM station interface shall accommodate any one or all of these. Interoperability is not required at the air interface.

The system shall support statically defined interfaces between CTCSS talk groups on conventional channels and talk groups on the new system, where once the interface is configured it is not changed.

The system shall support dynamically defined dispatch console patch style interfaces between conventional channels and talk groups on the Phase 2 system, where the interface can be configured by the dispatcher.

2.4.4.4 City of Conway Interoperability

Conway requires interoperability with the following agencies:

Agency	System
AWIN	P 25 Motorola
Faulkner County Volunteer Fire Department	VHF

For agencies with proprietary trunking systems, Bidder must propose interoperability through the use of dedicated control stations and interoperability gateways such that a Conway user may simply select an interoperability talk group when communication with a neighboring agency is desired. For agencies with PROJECT 25 trunking systems, Bidder must propose interoperability through the use of a PROJECT 25 Inter Subsystem Interface 8000 (ISSI 8000).

In addition, the system shall control the new trunked radio system and all current VHF and UHF channels. Hard patches, not controlled by the console operator, shall be provided between existing conventional radio channels and selected talk groups during the changeover to the new trunked radio system.

2.4.4.5 Interoperability Block Diagram

Bidder shall provide a block diagram of the network-level interoperability subsystem, including how it ties into the PROJECT 25 Phase 2 trunked radio system. The block diagram shall show all major components and the quantity and type of communication circuits required, including bandwidth requirements, to tie the legacy radio systems into the PROJECT 25 trunked radio network.

2.4.5 System Reliability and Fault Tolerance

System reliability and fault tolerance shall be major objectives in the design of the system. The system shall be designed to operate reliably, so that if a problem develops it will not affect the basic trunking operation and will not propagate to another part of the system.

Bidder shall describe in detail all measures taken to ensure reliable operation of the system including, as a minimum, the Project 25 trunked repeaters, channel controllers, and wide area controllers.

2.4.5.1 Wide Area

The system shall be designed such that there are no situations where a single failure in Bidder supplied equipment will disable wide area operation.

No single point failure within the wide area controller shall prevent the system from normal operation.

Bidders are required to provide hot standby redundancy for the wide area controller. The hot standby equipment shall be placed at a location several miles from the Dispatch Center for geographical redundancy. Upon a failure of the primary network controller, the redundant controller shall automatically take over with no user intervention required.

If the Bidder's solution consists of a single site and wide area multisite, should one or more site elements or site links fail, the rest of the system shall continue wide area communication, and the isolated sites shall continue standalone Project 25 trunked operation. The system shall be reliable such that a failed link to any site will not affect the rest of the wide area communications.

2.4.5.2 PROJECT 25 Trunked Site

The PROJECT 25 trunked repeater site shall not be dependent upon the wide area controller for operation. If a Phase 2 trunked site loses its communication to the wide area controller it shall continue to operate on a single site basis. Wide area communications will continue except for the site that lost its link.

Should a radio channel fail at a multi-channel site, there shall be no functional impact on the operation of the system other than reduced site capacity.

2.4.5.3 System Management Computer

If the proposed architecture consists of a single system management computer, a redundant configuration shall be available. It should be possible to locate the redundant computer at a site several miles from the primary system management computer.

2.4.5.4 Dispatch Console and Console Switch

In case of failure of one console position, no other console position shall fail as a result of that failed console.

If the proposed system requires a separate console switch, the console switch shall have redundant operation such that no single failure within the console switch shall prevent the unit from normal operation.

2.4.5.5 Mobile and Portable Behavior

If an entire site fails, the mobiles and portables using that site shall automatically, as coverage allows, roam to adjacent sites.

2.4.5.6 Failure Mode Analysis

Bidder shall indicate the impact on system operation of each of the following system element failures, how the system responds, and what features, if any, are lost:

- Working Channel Failure
- Control Channel Failure
- Site Controller Failure
- Dispatch Console Failure
- Wide Area Controller Failure
- System Management Computer Failure
- Backhaul Link Failure
- Power failure

2.4.6 Network Security and Information Assurance

While IP-based radio solutions provide benefits such as a common backbone and infrastructure, commercially available standard products, common support and maintenance, and flexibility for newer technologies, the trade-off is to ensure that cybersecurity is established and maintained. The City of Conway must have a communication network that provides confidence and trust that their system is maintaining their confidentiality, the integrity of their data, and the availability of their system. The cybersecurity posture shall meet City of Conway organizational requirements throughout the lifecycle of the system. In addition to required cybersecurity features (i.e. Active Directory, bulk encryption), optional cybersecurity features will be integrated in the systems design per City of Conway discretion to achieve appropriate baseline security posture. The VIDA Network will be secured using a defense-in-depth strategy. This strategy will combine a range of cybersecurity methodologies that incorporates not only technology, but operations and personnel. This strategy provides resilient LMR operations, while minimizing failure and intrusions, and mitigating the risk of any one defense being compromised or circumvented. Therefore, Bidders must explain their cybersecurity methodology as it pertains to:

National Fire Protection Association (NFPA) 1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems, which has a new chapter on data security that is out for comment.

Federal Bureau of Investigation's (FBI) Criminal Justice Information Services (CJIS) Security Policy that includes all those that support the FBI & Do. [CJISD-ITS-DOC-08140-5.0]

NIST Recommendations on Cyber/Computer Security (Special Publications 800 Series)

A Layered Defense – Not depending on a single technology or methodology to provide trust

Defense in Depth - An approach whereby security is addressed with Personnel, Operations, and Technology

Industry Best Practices – As can be demonstrated by Consensus Audit Guidelines, Federal Desktop Guidelines, etc.

COTS Based Solutions - Designed and implemented to industry-standard security practices, as far as it is practical

At a minimum the following optional cybersecurity features should be considered per industry best practices:

- Perimeter Firewalls
- Network Intrusion
- Detection and Prevention
- Link Encryption
- Patch Management
- Host-based Security
- Network Infrastructure Management
- Network Intrusion Management and Monitoring
- Centralized Log Management
- Continuity of Operations and Disaster Recovery
- Security Information and Event Management

2.4.6.1 Successful Implementation of Secure Wireless System

Bidder must provide at least 5 references that demonstrate experience in the integration, design and construction of critical communications systems that require a very high level of survivability and reliability. Further, Bidders should identify and define their capabilities, such as where they have expertise and what their track record with such programs is. Bidder must indicate whether they have the personnel on staff to implement and carry on follow-up support or if this support is out-sourced.

2.4.6.2 Controlling System Access

The main goal of any information system is to restrict access to those who are authorized to and have a need to know, including the ability to audit the information system to ensure that the policies and regulations are being implemented appropriately and to provide accountability for the actions of those with the responsibility of using and administering the system.

2.4.6.2.1 Authentication, Authorization and Accountability

Access control requirements should seek to ensure that the system maintains not only confidentiality of information but also ensures the integrity of that information with role-based access control. Access control should involve the implementation of least privileges, authentication, authorization, and accountability; a vendor should meet the following Access

Control requirements:

Centralized Authentication, Authorization, and Accountability of Users, Role-based management of users and machines, Provide the capability to audit the information system to ensure that the policies and regulations are being implemented appropriately, and Provide accountability for the actions of those with the responsibility of using and administering the system.

Bidder must explain how their network accomplishes these goals.

2.4.6.2.2 Identity Assurance

A key component within Cyber Security and Access Control is the concept and methods of Identity Assurance that addresses minimizing business risk associated with identity impersonation and inappropriate account usage. Access in high-risk situations (e.g. Remote Access) should be performed with the use of two-factor (or strong) authentication by which the user must provide their account name, account password (something they know), and either a token ID (something they have) or biometric information (something they are).

Bidder must use their risk management framework to identify these high-risk areas requiring two-factor authentication and explain how their network accomplishes these goals.

2.4.6.3 Operational Security

Agencies need to integrate security into their operations. A wireless information system, integrated into the overall information system of an organization, needs to take some key aspects into consideration such as

- Centralized Log Management,
- Security Event and Information Monitoring, and
- Business Continuity and Disaster Recovery.

2.4.6.3.1 Interoperability

To minimize duplication of administration, equipment, and time, it is becoming common to interconnect the LMR system with the enterprise network through a highly restricted firewall and/or intrusion prevention system (IPS). Bidder shall describe how their Authentication and

Authorization Server (AAS) integrates with Conway's existing AAS to allow for the sharing of users identifications and passwords, preferably one-way.

To support auditing, detection, and accountability practices, Bidder shall include how their technology will respond to the needs and be a part of a centralized log management system along with having secure long-term data retention capable of NAS, SAN and WORM storage connectivity. A log management solution should be capable of monitoring and recording system and event logs from a large number of the devices on the network, including (but not limited to): Operating System Event Logs, Application Logs, and

Network Device Logs.

Bidder shall ensure that all security appliances and systems are capable of integrating with the existing enterprise SEIM.

2.4.6.3.2 Continuity and Disaster Recovery

During critical operations, the system shall be able to quickly recover devices to bring the users and the system functionality back to full operational status. Bidder shall describe whether their backup solution is easily administered and maintained, supports all operating systems, is capable of bare metal restore, and is cost effective across the entire life cycle of the system. An enterprise backup solution should also have the capability of creating offline backups that can be stored off site.

2.4.6.4 Computer Security

Computer systems have become the primary resource for not only storing information but also the primary workhorse for users to perform their jobs, and therefore has become a primary objective for intruders for either data gathering or destruction. This makes a computer system the end point for security that layers need to be built around to minimize the risk associated with the information they contain or with the trusted capability placed at their disposal.

2.4.6.4.1 Patch Management

A common approach to gaining access to unauthorized systems is to leverage a known vulnerability within a software system, which is why it becomes important to ensure that the system is properly maintained throughout the life cycle of the system with up-to-date software versions and patches that close vulnerabilities and bugs to prevent them from being exploited.

Bidder shall describe how they can accommodate continuous patching of the LMR system that addresses all software provided with the system including operating systems, third-party applications (e.g. PDF readers, Antivirus, Web Browsers, etc.), and vendor applications that have been thoroughly vetted through a verification and validation lab.

The patch management solution should be capable of providing the following minimum functionality:

- Centralized role-based Administration,
- Integration with Authentication and Authorization Server,
- Patch scheduling,

-
- Air-gap patch capability that requires the updating of the Patch Management Server with Mobile Media (e.g. DVD or Thumb Drive) without connectivity to the internet being required,
 - Standard capabilities available from commercially available Patch Management Systems, and
 - The ability to express-test critical vulnerabilities out-of-cycle when the need arise to keep critical systems going.
 - Bidders shall include patch management costs for the first year as part of the base bid and provide annual costs as an option with any multiple year discounts detailed as well.

2.4.6.4.2 Security Policies

The LMR system provided by the Bidder shall include the setting and periodic update of appropriate security policies for the operating systems set according to each devices' capabilities to the maximum possible to allow reliable operation, maintenance, and administration. These security policies shall be configured to provide the least privilege necessary based upon the authorized role of the user from the authentication and authorization server (e.g. Console Dispatchers do not need USB mobile media). Bidder shall describe how their network accomplishes these goals.

2.4.6.4.3 Host-based Security

Host-based Security is applying a suite of software or software functionality within a single application that protects the host computer from malicious behavior. Antivirus is an absolute minimum to protect workstations and servers from malicious code, as most individuals accept for even their home computers, but it does not provide a complete solution for all the vectors that malicious behavior can occur from zero-day viruses which are not found by antivirus software, intentional attacks through bugs, or even accidental user actions. A comprehensive host solution is necessary for ensuring proper protection from known attack vectors and unallowable behaviors to anomaly detection for incident handling and chain of events.

Therefore, the Bidder shall provide antivirus for all systems capable of supporting such an application, and will provide host-based security software (HBSS) for all Servers and high-risk machines, and a centralized server responsible for management, updating, and monitoring of the host security.

2.4.6.5 Network Security

Bidder shall provide multiple network security capabilities to address the risk associated with routed networks including Access Control Lists on Routers, Firewalls, Network Intrusion Detection, and Link Encryption.

2.4.6.5.1 Firewalls

Bidder shall include firewall protection to deliver strong network- and application-layer security, user-based access control, worm mitigation, malware protection, and improved employee productivity. Bidder shall describe how their network accomplishes these goals.

2.4.6.5.2 Network Intrusion Detection & Prevention

Bidder shall include Network Intrusion and Detection Systems (NIDS) to allow for a combination of vulnerability- and anomaly-based inspection methods to analyze network traffic and prevent threats from damaging Conway's network by alerting system administrators or preventing suspicious behavior. The Bidder shall use their risk management framework to determine and explain the placement of Network Intrusion and Detection Systems. The vendor shall also provide a NIDS management console that is capable of correlating attacks with real-time network and user intelligence and centrally manages network security and operational functions, including event monitoring, incident prioritization, forensic analysis, alerting, and reporting.

2.4.6.5.3 Link Encryption

Bidder shall provide link encryption for all backhaul connections or connections that traverse public or insecure zones. Bidder shall describe how their network accomplishes this goal.

2.5 System Performance Requirements

2.5.1 Voice

The system shall support a fleet of at least 5000 registered voice users.
The system shall support a minimum of 2000 voice groups.

2.5.2 Expansion Capability

The system shall be capable of expansion to support a minimum of 50 dispatch consoles.

2.5.3 Failover

A hot standby wide area controller (Site B) shall take full control within 60 seconds after sensing that the primary (Site A) unit has failed. Any loss of voice communications shall be limited to the interval from the failure of the primary unit to the time the standby unit takes full control.

2.5.4 Interoperability

The system shall support a minimum of 20 statically defined interfaces between CTCSS talk groups on conventional channels and talk groups on the new system.

2.6 Equipment Requirements

2.6.1 Repeater Sites

Equipment provided at each site shall consist of repeaters and all other associated hardware and software for a digital Project 25 trunked system.

2.6.1.1 Project 25 Trunked Repeater Stations

The Project 25 trunked repeater station is considered to include the station channel controller. All repeaters shall be capable of being configured to provide Project 25 trunked voice and data transmission to user radios. All repeaters shall be capable of being configured as either a

Project 25 control channel or working channel, and any working channel repeater shall be capable of automatically assuming the role of the control channel in the case of a failure of the control channel repeater.

Repeaters shall provide automatic call sign identification that meets the FCC requirements for identifying Project 25 trunked repeater sites.

The system shall provide the ability to reconfigure individual repeaters through the network backhaul interface. The Bidder shall indicate the extent to which repeater parameters can be configured remotely, and whether this programming is restricted to repeater parameters or also includes repeater software.

2.6.1.1.1 Control and Alarms

The Project 25 trunked repeater station shall be controlled and managed through the system management computer, which shall be capable of remotely controlling the following functions:

- Taking a repeater off-line
- Retrieving and setting repeater operating parameters

2.6.1.1.2 Physical and Environmental

The Project 25 trunked repeater stations, including repeater and station channel controller, shall be housed in standard 19 inch EIA rack mount free standing cabinets, with three stations (or more) per cabinet to conserve space.

All hardware and software necessary for the stations to meet the system requirements shall be provided.

The equipment shall operate over a temperature range of –30 degrees to +60 degrees Celsius. All temperature sensitive specifications shall be referred to +25 degrees Celsius.

All components within the repeater shall be of solid state design.

The repeaters shall meet or exceed all applicable FCC requirements and fully comply with EIA standards as they apply to measurement of specifications.

2.6.1.2 Antenna System

Transmitter combiners and receiver multicouplers shall be installed in cabinets with space available to expand to the number of channels specified in *Section 2 System Architecture*.

2.6.1.2.1 Transmitter Combiner

The transmitter combiner shall be the expandable type supplied with the number of ports specified.

2.6.1.2.2 Receiver Multicoupler

The receiver multicoupler shall be the expandable type supplied with the number of ports specified with all unused ports terminated with 50 ohms. A bandpass cavity filter shall be supplied with the multicoupler to reject out-of-band RF signals.

2.6.1.3 Site Alarms

The system shall be capable of detecting the failure of all major equipment items at the repeater site, including at a minimum:

- repeater operation
- channel controller operation
- status of leased landline or microwave link
- status of antenna system (VSWR)
- status of tower top amplifier (if present)
- failure of AC power (if there is a backup system)
- failure of DC power (if there is a backup system)
- site or rack intrusion alarm

2.6.1.4 Network Equipment

If network equipment is included at the site for IP connectivity, Bidder shall use commercial-off-the-shelf components. Bidder shall identify whether the equipment requires hardware or software modification for use in their radio system.

2.6.2 Wide Area Controller

The wide area controller shall provide intelligent interconnection of the Project 25 trunked radio sites and dispatch consoles to form a fully integrated radio system supporting wide area voice communications.

The wide area controller shall track each Project 25 trunked radio and its affiliated talk group as it roams throughout the coverage area of the multisite network. The wide area controller shall route calls to individuals or groups at the appropriate sites. A mobile or portable radio shall be de-registered from a site when it logs onto a new site, or after a programmable period of inactivity.

The wide area controller shall be capable of interfacing to other wide area controllers.

The wide area controller shall also interface with, or be expandable to accommodate multiple Project 25 conventional radio sites, multiple conventional radio channels, multiple dispatch consoles, centralized telephone interconnect system, voice logging recorder, and system management computer.

Complete control over the wide area controller shall be provided to authorize persons through the system management computer.

The wide area controller shall be powered from 115 VAC 60 Hz. Bidder shall specify current requirements.

The wide area controller shall include a hot standby backup controller, which is geographically separated.

2.6.3 System Management

The system management device shall be a UNIX or Windows 7 based computer with a client/server architecture and single-point database for all system management functions.

The system shall include at least one system management console which provides system management of the entire system. Control of the management console will include a rack mounted KVM over IP the city prefers Raritan Dominion KX II.

The system shall be capable of supporting multiple system management operator consoles operating concurrently at different locations within the wide area network.

The system management computer and consoles shall be powered from 115 VAC 60 Hz. Bidder shall specify current requirements.

2.6.3.1 Polling and Alarms

The system management computer shall support polling and alarms.

System devices which detect that they have changed status or are operating below specification shall automatically transmit an alarm to the system management computer. In some cases device failure will prevent the transmission of an alarm, these situations will be detected through polling.

The system management computer shall automatically and routinely poll system devices to determine status. The polling interval should be automatically adjusted by the system management computer to avoid unnecessary polling, for example if the device has just reported a change in status through the alarm mechanism.

At minimum, detection of the following alarms must be included:

RF Power Failure

Excessive VSWR

Shelter Door Alarms

Cabinet Door Alarms

Line Power Failure

UPS Power Failure

Generator Failure

Smoke Detection

Humidity Detection

HVAC Failure

Low Generator Fuel

Low Battery

2.6.3.2 Network Topology Map

The system management computer shall provide a hierarchical network topology map, showing all managed devices using color coding to represent device status.

Through the network topology map it shall be possible for the operator to determine the current detailed status of a managed object, by double clicking on the object.

2.6.3.3 Fault Browser

The system management computer shall provide a scrollable, time sorted list of alarm messages sent by managed objects.

2.6.3.4 Audible Alert

It should be expected that due to the high reliability of the system, the system management computer console will be unattended most of the time with the operator working in the area on other tasks.

The system management computer shall provide a programmable audible alert to notify the operator of changes in the system status.

2.6.3.5 Data Base Partitioning and System Security

The system management function shall be capable of partitioning the database such that different managers (e.g. supervisor vs. non-supervisor) have control only over the units and groups for which they have been authorized.

The system management function shall have multiple levels of security access.

2.6.3.6 System Administration

The system management computer shall support establishing and updating repeater site parameters, and remotely enabling and disabling radios.

The system management computer shall support the registration of new voice users in the system and assigning voice group membership.

2.6.3.7 Statistics

The system management computer shall collect and save the following statistics for later analysis:

voice traffic volume by subscriber unit per hour

voice traffic volume by repeater per hour

wide area controller voice traffic volume per hour

2.6.3.8 Call Activity Logging

The purpose of this feature is to determine the relative traffic loading and geographic distribution for each of the voice groups using the system. This can be used for billing different user groups, and in engineering the system for increased busy hour capacity.

The system management function shall maintain a record on hard disk of all voice call activity for a period of up to 45 days, with the capability to down load to tape or other storage media when desired.

The system management function shall be able to continue to log call activity when a report is being run, and when downloading to the supported storage media.

The following data should be stored as a minimum:

Date, time, and duration of call

Type of call (group, unit-to-unit, emergency)

Unit initiating call and voice group number (group calls only)

Unit initiating call and target unit number (unit-to-unit calls only)

Repeaters and/or consoles participating in the call

Usage time for each repeater at a site

The number of minutes by site that all of the channels at the site are busy

2.6.3.9 Remote Diagnostics

The system management function shall permit the operator to run remote diagnostics on managed devices to isolate and trouble shoot faults.

2.6.4 Dispatch Consoles

The system shall support dispatch console operation over a district, region, and system wide basis.

The dispatch consoles are of three types: normal, supervisory, and remote consoles.

Console connectivity to the network controller shall use a direct IP interface, allowing consoles to be located wherever IP network connectivity is present. Optional software features for the dispatch console shall be field programmable through changes in firmware or software. Adding or deleting modules and changing module names shall be software programmable.

2.6.4.1 Physical and Environmental

Dispatch console equipment shall be powered from 115 VAC at 60 Hz. Bidder shall specify required current levels.

The dispatch console shall not be affected by temporary power loss and shall be supplied with an uninterruptible power supply (UPS) that supports approximately ten minutes of backup operation in case of power failure.

2.6.4.2 Dispatch Console Equipment

The computer for the console shall have the following minimum hardware specifications:

A LED 22" (minimum) touch screen monitor shall be offered with the console computer and audio system.

A dual headset jack shall be included.

A single footswitch with high durability shall be included to provide PTT for the headset. The footswitch shall be heavy-duty and non-skidding.

The console shall support one select audio speaker and one unselect audio speaker.

2.6.4.3 Supervisory Console

The supervisory console shall have the same features as a normal dispatch console, with the following additions:

The supervisory console shall be able to listen to any of a programmed individual entity radio calls. The supervisory console shall be able to display an emergency declared on an un-programmed talk group. The supervisory console shall be able to disable a non-supervisory console.

The supervisory console shall physically be the same as other consoles except that it has been programmed to have supervisory capabilities.

2.6.4.4 Dispatch Console Functionality

The console application shall run on the Windows-based operating system, Windows 7, Server 2008 R2, or later. The console shall be software driven to allow for access to future features and technologies.

The console shall be easy for a properly trained dispatcher to use. It shall enable the dispatcher to perform dispatch tasks efficiently and with minimal confusion due to screen clutter. The displays on the monitor shall have clearly distinguishable words so that there is no confusion over the operation function of a particular button. The process of maneuvering through functions on the screen shall be possible through the mouse or touch screen.

2.6.4.4.1 Screens

The console shall be able to support up to ten user-defined screen set-ups (appearances) to enable each dispatch shift to set its own screen appearance. These screen appearances shall be pre-configurable and selectable by the dispatcher.

The clock shall display in 12-hour format or 24-hour format.

The console shall have a dedicated display for system related messages. These messages shall include information regarding emergencies, console set-up, patch, and simulselect.

The console shall display in a dedicated panel the individual unit alias with whom the dispatcher is conversing.

The console shall display the console identification number.

The display and operation of the command buttons shall be independent of the display and operation of the page/modules. The console shall allow the flexibility of having operations commands display in combination with any screen. The screen and command button labels shall be displayed with distinguishable text.

2.6.4.4.2 Modules

The console shall support and display audio communications modules, where a module is a dispatcher defined space in a view screen that permits voice communications.

A module shall be programmable to support communication with one or more entities, which could include:

a trunking talk group

an individual call

a conventional channel

another console

status (inbound data messaging)

paging (outbound data messaging)

auxiliary I/O (bi-directional data messaging)

The console shall support a minimum of 100 different modules. If a module is in use at one console, a busy indicator shall be displayed at the other consoles in the system.

For received calls, an alias (alpha-numeric representation of the radio terminal) shall be displayed in the appropriate module.

The console shall permit the operator to monitor call activity using up to four separate speakers, one with select audio and the others with unselect audio. The console shall permit the dispatcher to route any module to the speakers.

Each module shall have its own volume adjustment. The console shall be capable of muting individual modules or 758 all unselected modules.

The console shall be able to display the call history of a particular module. The call history display shall place the most recent call at the top of a scrollable list of up to five entries. The console shall also be able to display a comprehensive call history for each module including up to 64 most recent calls.

2.6.4.4.3 Patches

The console shall support patches, which involves temporarily combining two or more modules. A patch merges the entities into a super group, such that each member hears every other member.

Each console shall be able to support up to five patches with up to 15 entities (groups and/or channels) each. All entities patched together shall be able to communicate with one another. The console shall support pre-configured patches.

2.6.4.4.4 Simulselect

The console shall support simulselect, which involves temporarily summing two or more modules at the console. Simulselect merges the entities for the benefit of the dispatcher, however does not create a super group. Only the dispatcher can hear all simulselect members.

Each console shall be able to support up to four Simulselects with up to 15 entities each. The dispatcher shall be able to communicate with all entities contained in a single simulselect. The console shall support pre-configured simulselects in conjunction with the simulselect feature support within the Project 25 conventional/conventional system.

2.6.4.4.5 Other Consoles

The console shall be capable of muting the audio from other consoles.

For consoles connected to the same switch, two console operators shall be able to communicate with one another through an intercom feature. No RF channel shall be utilized during the inter-console communication.

2.6.4.4.6 Emergency

During emergencies, the console shall give both visual and audible alert. The module and page with the emergency shall be displayed in red. The module and the call history shall display the alias of the unit declaring the emergency. Further, the emergency shall be displayed in the system information panel, which shall be red.

If an emergency is declared when another emergency already exists:

Same group: If the original emergency has not been acknowledged, the console shall display a counter with the emergency message to indicate the number of emergencies for the same group. The declaring alias shall be displayed in the appropriate call history display.

Different group: The new emergency shall also be declared and shall exist with the original emergency. Both modules shall be red. The declaring alias shall be displayed in the appropriate call history display. The emergency message shall correspond to the most recently declared emergency.

The dispatcher shall be able to declare an emergency and clear an emergency at the console.

2.6.4.4.7 Telephone Patch

The console shall be able to interface to equipment to support a telephone patch. Audio shall be routed to a headset, if present. If no headset is used, the telephone audio shall be routed to the select speaker with all other audio routed to the unselect speaker. The console shall be able to display whether or not the console is involved in a phone conversation.

2.6.4.4.8 Conventional Channels

The console shall be able to control conventional channels and (in conjunction with a conventional base station that supports these functions) provide the following functions:

Select the stations transmit/receive frequency pair from a pre-defined list.

Enable the base station to repeat radio-originated audio.

Enable the base station to be controlled by remote controller.

Enable scan of selected channels of a multi-channel base station.

Enable toggling between main conventional base stations and standby conventional base stations.

The console operator and the conventional channel shall be able to use a high fidelity PCM vocoder (i.e. ADPCM) that can carry complex paging plans (outbound calls) and preserve voice quality in marginal RF conditions on the analog channel on inbound calls to the console

and logging recorders. The system shall provide a capability to convert these calls into a format that allows the PROJECT 25 radios to monitor the calls on these interoperability groups.

2.6.4.4.9 Voice Logging Recorders

The bidder shall provide a VPI Digital Voice Recorder (DVR) to support mission critical communications within the City of Conway Emergency Operations Center (CEOC). The proposed DVR shall provide enhanced, recording capabilities for the city's 911, and administrative telephones line, and public safety radio systems. The proposed DVR shall be capable of recording all radio and telephone communications in and out of the city's CEOC. The proposed system shall comply with all the latest applicable P25 standards adopted as TIA and/or ANSI documents at the time of the proposal submission. The system will be delivered in accordance with the ISSI 8000 standards and P25 Phase 2 standards outlined in this RFP.

2.6.4.4.10 Link Failure

The console shall visually notify the dispatcher of link failure to the console switch.

2.6.5 Subscriber Equipment Requirements

Unless otherwise stated, control stations, mobiles, and portables shall meet the following functional requirements:

The radio shall support 700/800 MHz band Project 25 trunked operation on 12.5 kHz private land mobile channels. All radios shall be capable of placing and receiving group calls in Project 25 Phase 2 trunked, PROJECT 25 Phase 1 Trunked, and PROJECT 25 conventional and analog conventional mode.

The radio shall be capable of placing and receiving analog conventional mode calls. Conventional mode of operation shall use continuous tone coded squelch system (CTCSS).

The radio shall have an emergency button and be capable of placing and receiving emergency calls.

The radio shall be capable of conventional analog talk around (mobiles and portables only).

The radio shall be capable of selecting one talk group from a system or zone containing up to 16 talk groups. Multiple systems or zones can be loaded into the radio.

The radio shall be capable of scanning all talk groups logged onto the active radio site within the system or zone, with the selected talk group having priority.

The radio shall provide the user with separate and discrete audible tones to indicate the status of the call.

The radio shall be programmable through a standard Windows-based computer or over-the-air provisioning.

The radio software shall be flash programmable for adding future software enhancements.

All components within the radio shall be of solid state design.

Radios with adaptive noise cancellation technology are desired; bidders shall state whether their proposed radios include this feature.

2.6.5.1 RF Control Stations

The control station shall be a desktop or rack mount radio unit. Each control station shall be capable of supporting a minimum of five desk mounted remote control units.

When a selection is made on one of the remote control units, an indication shall be provided to all control station users so that they will be aware of the current profile and group selection. The control head units must be capable of indicating when any of the remote control units are transmitting.

The control station and control heads shall be powered from 115 VAC at 60 Hz. Bidder shall specify required current levels.

All radios shall meet or exceed all applicable FCC requirements and fully comply with EIA standards as they apply to measurement of specifications.

2.6.5.2 Mobile Radio

The mobile radios shall be supplied with all necessary mounting hardware for a complete installation. All radio controls and inter-cabling shall be supplied, including antenna.

The front mount radio must be self-contained in a single housing.

A trunk mount radio with remote control head shall be available as an option.

A palm-type microphone shall be provided with the radio. A separate external speaker capable of producing a minimum of five watts shall be provided. The speaker must be contained in a housing sufficiently durable to prevent damage to the speaker.

Additional Features:

individual call

display alphanumeric voice group ID

display alphanumeric caller ID

display caller alias

Project 25-compliant AES voice encryption

optional numeric keypad for unlimited individual calls

3 dB gain antenna

internal GPS

All temperature sensitive specifications shall be referred to +25 degrees Celsius.

The mobile radio shall be powered from 12 VDC negative ground. Bidder shall specify required current levels.

All radios shall meet or exceed all applicable FCC requirements and fully comply with EIA standards as they apply to measurement of specifications.

2.6.5.3 Portable Radio

The radio shall be physically small enough to facilitate easy carrying by the operator. It must be self-contained in a single ruggedized housing. The radio housing shall be constructed of high impact material. It shall protect the internal circuitry from dust and moisture. The housing must meet or exceed EIA drop test requirements.

The portable radio shall operate over a temperature range of –30 degrees to +60 degrees Celsius. All temperature sensitive specifications shall be referred to +25 degrees Celsius.

All radios shall meet or exceed all applicable FCC requirements and fully comply with EIA standards as they apply to measurement of specifications.

It is the bidder's responsibility to meet with each department of the City of Conway to determine their portable radio and accessory needs with an IT department representative present.

- portable radios shall be furnished with an Orange emergency button.
- portable radios shall be capable of operating with a remote speaker/microphone.
- Portable radios shall include a 12 hour battery (Standard)
- 16 position rotary switch
- individual call
- top and front display (Color Display Optional)
- display alphanumeric voice group ID
- display alphanumeric caller ID
- display caller alias
- Visual Zone ID (color optional)
- project 25 compliant AES Voice encryption
- spare 16 hour heavy duty battery
- single unit battery charger
- multiple unit battery charger
- numeric keypad for unlimited individual calls
- built in internal GPS (Standard)
- built in Bluetooth (Standard)
- built in WiFi to allow for remote radio software update (standard)
- LTE connectivity (as an option)
- dual speakers
- audio amplifier 1.5W rated 4W max (to facilitate loud noise environment.
- active noise cancelation (to reduce background noise)

- receive text
- all Portables must meet or exceed IP66, IP68 & MIL STD 810G requirements

2.6.6 PTT over Cellular Network

The proposed system shall permit PTT over a cellular network. This connection shall be directly connected with PROJECT 25 trunk groups using standard PROJECT 25 codecs. PTT solution shall support for multiple talk groups, scanning of other talk groups, priority talk groups, secure communication. Bidder shall provide a block diagram of the PTT over Cellular system, including the interface to the PROJECT 25 radio system and the cellular network. Bidder shall not limit the feature to specific cellular carriers. The product shall be Android or IOS based. Vendor shall list operating system versions supported. Vendor shall list number of users supported by the system. Purposed system shall include 125 client/seats licenses at no cost.

2.6.7 Required Equipment Quantities

Table 2-1: Breakdown of Initial User Equipment Quantities by Agency

Agency	Control Stations	Desktop Remote Controllers	Low Grade Mobile/GPS	Low Grade Portable/GPS	Mid-Grade Mobile/GPS	Mid-grade portable/GPS	High Grade Situational Awareness Mobile/GPS	High Grade Situation Awareness Portable/GPS
Conway Police DepT/AWU	0	0			120	125	1	25
Conway EOC	12	0			2	5		
University Central Arkansas	3	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Conway School District	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Sanitation			20	10				
Streets			14	33				
Cache			10	3	10	10		

2.7 GPS Mapping

Conway desires to include in this proposal a GPS mapping solution. The vendor shall provide a backend solution that receives GPS data from Mobile and handheld units in a NEMA data string. The solution should be compatible with ESRI mapping software, and be able to integrate with the city's current CAD software (Southern Software).

3. IMPLEMENTATION REQUIREMENTS

3.1 Implementation Plan

The integrated network shall be proposed as a complete system with firm prices for all of the equipment, software and services required by these specifications.

3.2 Project Schedule

The final system acceptance and all related documentation shall be completed no later than 18 months after receipt of order.

Bidders shall provide a detailed project schedule showing key tasks and milestones. The schedule shall include, but is not limited to:

final design review date

system manufacture and integration time frames

pre-shipment system integration and staging dates

factory/staging acceptance test date

shipping dates

system installation and optimization dates

field acceptance test date

installation configuration audit date

coverage testing dates

training dates

3.3 Project Organization

Bidders shall provide details on the project organization.

3.4 Project Management

Bidder shall appoint one individual to act as project manager and serve as the primary point of contact between Conway and Bidder on contractual matters. Project management shall be provided throughout the implementation of the system by the Bidder. At a minimum the services shall include:

monthly project status reports

system design and final design review

implementation planning, scheduling, and coordination

management of all system integration activities

installation and optimization

acceptance testing

migration and cutover planning

maintenance support

subcontractor management

3.5 Project Engineering

Bidder shall appoint one individual to act as project engineer and serve as the chief technical authority on the project and primary point of contact between Conway and Bidder on technical issues. Project engineering services shall be provided from the final system design through the completion of system acceptance and the warranty period. At a minimum the services shall include:

final system design and review
frequency analysis and planning
coverage prediction and acceptance testing
fleetmap planning
system configuration
implementation support
final system documentation
resolution of technical problems

3.6 Installation Plan

Bidders shall provide details on the planned installation schedule and procedures to ensure that equipment is installed in a timely logical sequence and in a workmanship like manner.

3.7 Acceptance Test Plan

Acceptance testing will comprise Operational Performance Tests and RF Coverage Performance Tests.

3.7.1 Operational Performance Tests

The Operational Performance Tests will include the following basic test procedures:

Verify that all equipment is delivered and installed in a workmanship like manner in accordance with the Contract.

Demonstrate that all equipment performs as specified by examination of test data and the rerunning of specific tests if deemed appropriate.

Bidder shall submit with the proposal a sample Operational Performance Test Plan. The selected contractor shall provide a detailed Operational Performance Test Plan to Conway for approval and shall be agreed upon by Conway and Bidder prior to contract award. This acceptance test plan will define the tests to be performed by the contractor for each phase to verify that the equipment and system perform in accordance with the contract specifications.

3.7.2 RF Coverage Performance Tests

The City of Conway will list all crucial buildings where inside coverage is mandatory.

- Conway PD
- HP Building
- All Conway Schools
- Sheriff's Office/Detention Center
- Faulkner County Jail
- Faulkner County Courthouse
- All Conway colleges
- All major shopping centers
- Faulkner County Courts Building
- Acxiom
- SWN
- Kimberly Clark
- Conway Regional
- New Airport Facility
- All major manufacturing facilities

3.7.2.1 PROJECT 25 System

The RF Coverage Performance Test will be performed independently of the Operational Performance Tests and in accordance with the following basic procedure:

Mobile tests will be performed by traveling over selected routes which have been previously agreed upon and measuring the RF signal level and Bit Error Rates (BER). The routes will be randomly selected and evenly distributed within the predicted coverage area. The mileage to be driven for each site will be based on achieving a high statistical confidence level in the test results.

Bidder shall submit with the proposal a Coverage Acceptance Test Plan (CATP) with Bidder's proposal for verifying radio coverage meets stated requirements. A final Coverage Acceptance Test Plan shall be agreed upon by Conway and Bidder prior to contract award to minimize any potential misunderstanding in the interpretation of contractual commitments for system design and delivery.

3.7.2.1.1 Functional Description

Radio coverage from an installed site will be demonstrated by measuring the RF signal strength or BER in the defined service area surrounding the site. The radio coverage shall be measured with an automated mobile test system. The test system measures and records signal strength and/or BER, test vehicle position, distance traveled, time, and frequency. After measuring radio coverage, the recorded data is processed to produce a drive test plot and statistical distribution of the coverage.

3.7.2.1.2 Coverage Acceptance Test

Radio coverage shall be verified by measuring talk-out (base-to-mobile) signal strength and BER throughout the defined service areas described in Section 2.3 Radio Coverage Requirements and calculating the percentage of measurements that exceed the required levels for acceptable performance. The test shall be considered to pass if this percentage equals or exceeds the percentage guaranteed within the service areas.

3.7.2.1.3 Drive Route Planning

A drive route plan shall be developed to gather a collection of data points evenly distributed throughout the defined service areas and provide a statistically accurate determination of radio coverage performance. The service area shall be divided into grids (for example one mile square) to obtain an even or uniform distribution of test locations. The grids shall be overlaid onto street maps and a drive test route determined that passes through each grid at least once but not more than twice, as much as is practically possible. Bidder shall recommend an appropriate grid size in his proposal.

3.7.2.1.4 Test Level Measurements

The test receiver used for coverage acceptance shall be reliable, accurate test gear that produces repeatable measurement results and is in conformance with industry standards. The test receiver shall perform talk-out signal level and BER measurements at an equal distance interval throughout the entire drive route.

3.7.2.1.5 Data Analysis and Acceptance

The data records collected from the drive test shall be post-processed for each service area defined in Section 2.3 Radio Coverage Requirements using all mean measurements within the defined service area boundary. For each service area, the minimum acceptable signal level at the mobile or portable antenna terminals shall be adjusted to the measurement reference point using loss factors associated with that mode of operation. A comparison shall be made between the mean measurement points in the service area and this adjusted minimum level, denoted the adjusted signal threshold. Points that meet or exceed the adjusted threshold value are recorded as passed and those that do not are recorded as failed.

The installed radio system coverage is deemed to meet the coverage requirements if, for each service area in Section 2.3 Radio Coverage Requirements, the ratio of the number of pass points to the total number of points in the service area equals or exceeds the guaranteed percentage.

4. SUPPORT SERVICES

4.1 Documentation

Contractor shall provide complete operational and maintenance documentation. In addition to user and technical manuals for each equipment, contractor shall supply 5 sets of a complete systems manual which will include the following:

System operational overview

System interconnection and block diagrams

System trouble shooting procedures

As built drawings

Contractor shall provide user operational and equipment technical manuals on compact disc.

User Operational Manuals:

RF Control Stations

Mobile Equipment

Portable Equipment

Consoles

Technical Maintenance Manuals:

RF Control Stations

Mobile Equipment

Portable Equipment

Console Equipment

Repeater Equipment

System Management Computer

Wide Area Controller

Generator Equipment

UPS equipment

4.2 Training

The Bidder shall provide a description of and cost for training on the operation and maintenance of all equipment provided with the radio system. In general, the Bidder shall support training as follows:

Overview training of PROJECT 25 trunked system technology and setting user expectations for 2 non-technical personnel.

Management training for 2 administrative and management personnel who will be responsible for defining and maintaining the system's configurable parameters.

User equipment operator training for 2 designated Conway trainers on the operation of portable radios, mobile radios, and control stations. The training will be conducted using a train-the-trainer format.

Console equipment operator training for 25 dispatchers and their supervisors.

Maintenance training for 2 technicians on maintaining and troubleshooting all equipment to the unit, board or component level as applicable.

The Bidder shall provide a description of each course including the material to be covered, number of hours or days of training per course, prerequisites, and location on premises.

4.3 Warranty

The basic system pricing will be based on a 36 month parts and labor warranty from date of system acceptance. Bidder must address the following items:

Identify the entity that will provide warranty response, including location and technician experience/training.

What are their operational hours during the warranty period?

What is the technician response time that is included?

Are spare parts included in the price?

Are there additional technician resources in the immediate area?

Are there other resources available, such as a toll free technical assistance number?

Will replacement radios be provided to the user during repair or replacement of failed radios?

Are radios repaired at the local facility or sent to a depot? What is the location of the depot?

4.4 Software Updates

Bidder shall quote pricing for Software Updates which shall extend the life of the system beyond today's technology. Software Updates shall be released on a regular basis after system acceptance by the Bidder for the licensed software programs contained within their proposed system and shall include the following:

Enhancements and/or corrections to existing features for all designated system backbone components and/or radios;

New features implemented via the system components already contained within the system; and

Software for product migrations where a new generation of software is developed for the designated system component, rather than the older generation of software being updated.

The Bidder shall offer software service enrollment options and flexible payment plans.

4.5 Spare Parts Option

Bidders shall quote, as an option, a complete recommended spare parts package which will support maintenance by Conway during the first year following system acceptance. Maintenance during this first year will be at the unit or board replacement level with return of units or boards to Bidder's service facilities for repair and return. Spare parts for user

equipment are to be quoted on the basis of supporting a specified quantity of units. Spare parts for the fixed backbone system will be broken down by types of equipment i.e., repeater equipment, console equipment etc.

4.6 Test Equipment Option

Bidder shall quote, as an option, a complete recommended itemized list of test equipment which will be needed for the City of Conway Information Technology Department to provide support maintenance.

4.7 Response Time

Level 1	Critical System Down, 2 hour response time with a 30 minute confirmation
Level 2	Non Critical System running, 12 hours response time with 2 hour confirmation
Level 3	Non Critical Preventative Maintenance, Firmware or Software upgrade 7 day response, 24 hour confirmation

4.8 Maintenance

To more accurately determine the total cost of ownership (TKO), Bidder must quote annual maintenance pricing for a period of two years following warranty (a total of five years), and seven years following warranty (a total of ten years). All costs that are mandatory by the vendor for maintenance support, such as software updates or technology refreshment costs, must be included.

It is desired that the Bidder provide prices for at least two maintenance options:

- (1) Preventative Maintenance to supplement Conway's maintenance
- (2) Full Maintenance.

For the Preventative Maintenance option, the Bidder must provide an optional cost for on demand services. For the Full Maintenance option, the Bidder must address the following items:

Identify the entity that will provide maintenance service, including location and technician experience/training.

- What are their operational hours during the maintenance period?
- What is the technician response time that is included?
- Are spare parts included in the price?
- Are there additional technician resources in the immediate area?
- Are there other resources available, such as a toll free technical assistance number?
- Will replacement radios be provided to the user during repair or replacement of failed radios?
- Are radios repaired at the local facility or sent to a depot? What is the location of the depot?

5. Communications Tower & Shelter

As part of this project the city wishes to obtain proposals from qualified vendors to provide, a communication shelter and the construction of a 200' free standing communications tower with a certified tower load study, engineered and stamped foundation plans and provide and mount all equipment as specified.

5.1 Clearwell Road Communications Tower Specifics

The vendor will provide the following:

1. Permits and Fees.
2. Excavation of site.
3. 200' steel freestanding communications tower.
4. Engineered and stamped tower foundation plan.
5. Certified tower load study to 2009 TIA/EIA 222 Rev. G Section 3 (Public Safety) loading requirements.
6. Concrete for foundation.
7. Tower erection.
8. Motorola R56 grounding for tower, building, and generator.
9. Site cleanup when work is completed.

5.2 Tower Load Study

The vendor will provide a certified tower load study based on the antenna, cable, and mounting information provided below. The proposed study will be completed using all current and anticipated antenna loading as provided below:

200'	1 9 dB Omni Antenna 24' i.e. DB812KE-XT
174'	1 9dB Omni Antenna 16' i.e. DB810KE-XT
150'	1 6' Microwave Dish Antenna i.e. VHLP6-18/A
140'	1 6' Microwave Dish Antenna i.e. VHLP6-18/A
120'	3 Telwave Omni Antenna 5' i.e. ANT150F2
105''	3 Telwave Omni Antenna 5' i.e. ANT150F2
	1 Andrew Omni Antenna 10' i.e. DB636,
40'	1 Andrew Parabolic Antenna 2' i.e. PX2F-25

5.3 Tower Construction

The vendor will provide all necessary parts, materials and labor to erect a 200' freestanding communications tower in the following manner:

1. Provide all necessary registrations to meet FCC and FAA guidelines.
2. Excavate for the foundation.
3. Pour concrete for foundation in accordance with specification for a 200' freestanding communications tower.
4. Assemble and erect a 200' freestanding communications tower.

5.4 Grounding Requirements

The vendor will provide the following grounding. Including:

The tower, tower structure and, generator and all of its components will be grounding to Motorola R56 standards.

5.5 Communications Shelter

The vendor will provide the following:

5.4.1 The shelter shall be concrete and shall be large enough to accommodate a minimum of 6 racks/cabinets and any other equipment as required (Typically building sizes are about 10' x 12'). The building shall be placed and anchored on a 6" concrete slab that encompasses the building with a 3' apron at the front side of the building. Any equipment outside the building such as generators, fuel tanks (LP Gas), AC units will be placed on a 6" concrete slab as well. Fuel tanks will be anchored to the slab to prevent movement. All utilities will be underground including fuel lines from the tank to the generator.

5.4.2 HVAC – Both unit's primary and backup units will be appropriately sized for the building.

5.4.3 UPS - The Bidder will conduct a study to determine the correct UPS size needed with an external by-pass switch. The UPS must at least be a KVA/8.4KW to meet AWIN standards. The UPS should be large enough to handle a 30% growth for future needs. Liebert system is preferred.

5.6 Warranty

All equipment must have a full warranty against any failures for a minimum of one (1) year from the date the acceptance test procedure is signed. The successful vendor must agree to allow city of Conway employees to provide first level maintenance on all of the proposed equipment.

Priced as an option, an extended warranty covering years three (3), and five (5) must be provided.

6. Subcontractors Qualifications

Bidders will provide information on subcontractors to be used for installation and local maintenance services. Information will include qualifications in terms of years in business, experience, size of facilities and number of technicians and their average years of experience in maintenance of communications equipment and systems.

7. State of Compliance

The Bidder shall include in his proposal a statement of compliance which clearly indicates compliance, non-compliance, or partial compliance with clarification for each requirement in this RFP.

8. Performance Bond

The successful Bidder must furnish a performance bond and a separate payment bond upon the forms provided herein in the amount of one hundred percent (100%) of the contract price from an approved surety company holding a permit from the State of Arkansas to act as surety, or other surety or sureties acceptable to the Owner. (Performance Bond Form included)

PERFORMANCE-PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT WE, _____

as Principal, hereinafter called Principal, and _____

_____ of _____

State of _____, as Surety, hereinafter called the Surety, are held and firmly bound unto City of Conway Arkansas, as Obligee, hereinafter called Owner, in the amount

of _____

Dollars(\$ _____) in lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly, severally, and firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

WHEREAS, The Principal entered into a Contract with the Owner by written Agreement dated the _____ day of _____, 2015, a copy of which is attached hereto and made a part hereof, hereinafter referred to as the Contract, for the

CITY OF CONWAY
PROJECT 25
PHASE II TRUNKED RADIO SYSTEM

NOW THEREFORE, if the Principal shall well and truly perform and complete in good, sufficient, and workmanlike manner all of the work required by said Contract and within the time called for thereby to the satisfaction of the Owner, and shall pay all persons for labor, materials, equipment, and supplies furnished by said Principal in accordance with said Contract (failing which such persons shall have a direct right to action against the Principal and Surety under this obligation, but subject to the Owner's priority) and shall hold and save harmless the Owner from any and all claims, loss, and expense of every kind and nature arising because of or resulting from the Principal's operation under said Contract, except payments to the Principal rightly due the Principal for work under said Contract, then this obligation shall be null and void; otherwise to remain in full force and effect.

Any alterations which may be made in the terms of the Contract, or in the work to be done under it, or the giving by the Owner of an extension of time for the performance of the Contract, or any other forbearance on the part either of the Owner or Principal to the other shall not release in any way the Principal and Surety, or either of them, their heirs, personal representatives, successors, or assigns from their liability hereunder, notice to the Surety of any alteration, extension, or forbearance hereby being waived.

In no event shall the aggregate liability of the Surety exceed the sum set herein.

PERFORMANCE-PAYMENT BOND

No suit, action, or proceeding shall be brought on this bond outside the State of Arkansas. No suit, action, or proceeding shall be brought on this bond, except by the Owner, after six (6) months from the date on which final payment to the Contractor falls due. No suit, action, or proceeding shall be brought by the Owner after two (2) years from the date on which final payment to the Contractor falls due.

This bond is executed pursuant to the terms of Arkansas Statute 51-637.

Executed on this _____ day of _____, 2015.

SEAL

(Principal)

By _____

Title _____

SEAL

(Surety)

By _____

(Attorney-in-Fact)

NOTES:

- 1. This bond form is mandatory. No other forms will be acceptable.
- 2. The date of the Bond must not be prior to the date of the Contract.
- 3. Any surety executing this Bond must appear on the U.S. Treasury Department's most current list (Circular 570, as amended) and be authorized to transact business in the State of Arkansas.
- 4. Attach Power of Attorney.