WAUKESHA COUNTY, WISCONSIN

REQUEST FOR PROPOSAL #1332
TRUNKED RADIO SYSTEM

CONTACT INFORMATION	
Buyer	*Cindy Greco, CPPB, Principal Buyer*
E-mail	*cgreco@waukeshacounty.gov*
Fax	*262-548-7668*
Mailing Address	*Waukesha County Purchasing Division* *515 W. Moreland Blvd, Rm AC310* *Waukesha, WI 53188*

SCHEDULE OF EVENTS	
The following dates are provided for your information and planning purposes. Although every effort will be made to follow this schedule, we reserve the right to modify the dates as necessary.	
RFP released:	**4/12/13**
Preliminary Questions Due:	**Monday, 4/22/13 at 10:00 a.m. CST/CDT**
Pre-Proposal Conference and site visits:	**4/23, 24, ~~and~~ 25, and 26 – Detailed information will be provided to those who RSVP**
Pre-Proposal Conference Location:	**TBD**
Final Questions Due:	**~~Monday, 4/29/13 @ 10:00 a.m. CST/CDT~~** **Tuesday, 4/30/13 @ 4:30 p.m. CST/CDT**
Amendment Issued:	**By COB on Wednesday, 5/1/13**
Proposals Due:	**Tuesday, 7/9/13 @ 2:00 p.m. CST/CDT**
Notice of Interviews/Demos:	**By COB on Friday, 8/9/13**
Interviews/Demos:	**Week of August 12th ~~19~~th, Exact Day/Time by Invite**
All Approvals Completed:	**By September 20, 2013**
Contract executed:	**Anticipated to be by end of September 2013**

REQUEST FOR PROPOSAL

PREPARATION, SUBMISSION, PROCESS AND AWARD

1. COMMUNICATION

This RFP is issued by the Waukesha County Purchasing Division on behalf of Waukesha County and Milwaukee County (County or Counties) as a joint procurement effort. The Buyer assigned to this RFP, along with contact information, is noted on Page 1. The Buyer is the sole point of contact during this process and no information provided by any other personnel will be considered binding.

The Counties prohibits communication initiated by the respondent to any County official, employee or representative evaluating or considering the proposals, prior to the time an award has been made.

All respondents should use this written document, its attachments and any amendments as the sole basis for responding.

2. ACCESS TO COUNTY BUILDINGS

Controlled access screening is mandatory for all vendors seeking access to the Waukesha County Courthouse and Administration Building. Vendors who will be visiting either building are to enter and exit the facilities through the main Courthouse public entrance (Door #2), 515 W. Moreland Blvd. Screening will take place in the lobby of the Courthouse. A corridor near the Courthouse lobby connects both buildings together.

Click on the following link for more detailed information regarding the screening process: http://www.waukeshacounty.gov/defaultwc.aspx?id=37689. A map of the Government Center campus identifying public access points and parking areas is also included on the bottom of the page.

Allow sufficient time to get through the screening process if you are hand delivering your responses or attending a meeting.

3. CLARIFICATIONS/AMENDMENTS

If you discover any significant ambiguity, error, omission or other deficiency in the RFP, immediately notify the Buyer in writing. All other questions, clarifications or exceptions regarding the RFP document must be raised prior to the submission of the proposal. We encourage you to submit preliminary questions prior to the pre-proposal conference (if applicable). Please note the due dates and times noted on Page 1 for both preliminary and final questions. All questions must be submitted to the buyer in writing, via fax or email, with the RFP Number and Description clearly identified.

If it becomes necessary to clarify or revise any part of this RFP, amendments will be posted to the Waukesha County website; https://purchasing.waukeshacounty.gov, in accordance with the schedule on Page 1. It is the responsibility of prospective vendors to check the website for any amendments prior to the opening date. All amendments must be acknowledged on the RFP Signature Page in the area provided. **Failure to do so may result in your response being rejected.**

4. PRE-PROPOSAL CONFERENCE

Vendors **MUST** attend the mandatory pre-proposal conference and walk-throughs related to this RFP. Please review the time, date and location on Page 1. It is anticipated that review of the Milwaukee County sites will take 2 days, Waukesha County will take 1 day and then the final day will be the pre-proposal conference. The conference will most likely be only ½ day. **Specific information regarding exact times, locations, etc. will be provided only to those that RSVP.**

5. CONTENTS OF PROPOSAL

All attachments, additional pages, addenda or explanations supplied by the vendor with their proposal will be considered as part of the proposal response.

6. NONCONFORMING TERMS AND CONDITIONS

A response that includes contractual terms and conditions that do not conform to the contractual terms and conditions in the RFP document are **subject to rejection as nonresponsive**. Waukesha County reserves the right to permit the respondent to withdraw nonconforming terms and conditions from its response or negotiate changes to the contractual requirements prior to making a determination of responsiveness.

7. AMENDMENT/WITHDRAWAL OF PROPOSALS BY VENDOR

After receipt by the Purchasing Division, vendor proposals may only be amended by submitting a later dated proposal that specifically states that it is amending an earlier proposal. No proposal may be amended after the opening date unless requested by the Purchasing Division.

Proposals may be withdrawn only in total, and only by a written request to the Purchasing Division prior to the time and date scheduled for opening of proposals.

8. PROPOSAL FORMAT & SUBMISSION

A. Format

Proposal Response documents may be submitted hard copy OR electronically; **do not submit both or your response may be rejected**.

In order for the committee to adequately compare proposals and evaluate them uniformly and objectively, firms must complete only the Proposal Response and Pricing documents provided by the County regardless of whether you are submitting hard copy or electronically; i.e. do not submit the Proposal Response document and a response in another form/format. The Proposal Response document is posted on Waukesha County's website along with this RFP.

Failure to use the Proposal Response document may result in your response being rejected. If both our Proposal Response document and another submittal format are received, only the Proposal Response document will be evaluated.

Although additional documents/attachments may be submitted as supplements to either your hard copy or electronic response, they should not be excessively long or in an elaborate format. They are not to be used in place of responding to the questions in the Proposal Response document; i.e. do not respond with "Reference Attachment". Unnecessary attachments beyond those sufficient to present a complete, comprehensive and effective response should not be included.

B. Proposal Response Submission – HARD COPY:

Respondent shall be required to mail one (1) original and twelve (12) copies of the Proposal Response document in a sealed package, box or envelope to arrive no later than 2:00 P.M. CST on

Each hard copy should be double-sided and bound, with the exception of the original, which should be double-sided but not bound. The copies should be bound by staple, binder clip or in a three-ring binder. Spiral, wire or comb bound copies are not acceptable.

Responses should be identified in the lower left corner as follows:

PROPOSAL RESPONSE, RFP #1332 – Trunked Radio System - OPENING DATE: 7/9/13

IMPORTANT SUBMISSION INFORMATION REGARDING HARD COPY SUBMISSION

If you are submitting your documents hard copy, you must include the number of copies described above and either a CD or a Flash Drive containing an electronic copy of your Pricing Document, Proposal Response Document and Requirements Workbook inclusive of any other attachments referenced or requested. The Pricing Document and Requirements Workbook must be in Excel format; not PDF. All other documents may be submitted PDF.

All documents should be submitted in a consolidated format; i.e. do not provide individual multiple files. Files should be submitted as follows:

-One file containing your completed EXCEL Pricing Document
-One file containing your completed EXCEL Requirements Workbook
-One file containing your completed Proposal Response Document, inclusive of any attachments referenced or requested. Typically this is done by scanning a complete copy of your entire response to create a PDF file.

C. Pricing Document/RFP Signature Page Submission – HARD COPY:
Pricing must be submitted on the forms provided. Failure to do so may result in your proposal being rejected.

The RFP Signature Page should be printed, completed in its entirety (with the exception of the tracking ID field; which is only required for electronic submissions), and signed. Note: Be sure to acknowledge any amendments issued, if applicable, in the box located above the signature area.

The RFP Signature Page along with one (1) original clearly marked and identified as such, and one (1) copy of the Pricing Document should be mailed to arrive no later than 2:00 P.M. CST on

The Pricing Document and RFP Signature Page should be in a sealed envelope separate from the Proposal Response documents and identified in the lower left corner as follows:

PRICING DOCUMENT, **RFP #1332 – Trunked Radio System - OPENING DATE: 7/9/13**

D. Mailing Address
All hard copy submissions are to be mailed to:

Waukesha County Purchasing Division
Administration Center, Room 310
515 W. Moreland Boulevard
Waukesha, WI 53188

E. Hand Delivery
If you are delivering your response in person, you must enter through the main courthouse public entrance, 515 W. Moreland Blvd. and deliver it to the Department of Administration receptionist in Room 310 of the Administration Center to be time-stamped no later than 2:00 p.m. on the opening date.

F. Response Submission - ELECTRONIC SUBMISSION:
In lieu of a hard copy response, respondents may create an electronic response using the Purchasing website and following the directions contained therein (https://purchasing.waukeshacounty.gov). **Fax or email responses are not considered electronic submissions.**

The following documents will need to be downloaded and saved to your computer to provide an electronic response:

- ✓ Proposal Response Document
- ✓ Requirements Workbook
- ✓ Pricing Document

NOTE: OUR WEBSITE CAN ONLY ACCEPT DOCUMENTS THAT ARE 8 MG OR LESS; THEREFORE, YOU MAY HAVE TO SUBMIT HARD COPY.

Once you have made your response final, you must print out the RFP Signature Page. If the page has the Tracking ID field populated, you have correctly finalized your document correctly.

Note: Be sure to acknowledge any amendments issued, if applicable, in the box located above the signature area. The RFP Signature Page must be submitted to the Purchasing Division prior to the opening date and time.

Complete all fields; acknowledge amendments if applicable, manually or digitally sign (no stamped signatures allowed) and:

- ✓ Fax to 262-548-7668 (**You may only fax your signature page; not your entire response)**
  or
- ✓ Save the signature page to your computer and use the "Add a Document" feature on the website to upload the document

G. Response Receipt/Opening:
Responses received after the due date and time will be rejected.

Proposals will be opened and the name of the respondents read; however, details of each proposal, including proposed fees, will not be announced at the time of opening. Such information shall be made public after an award has been made and all negotiations are completed.

All proposals received in response to this request will become the property of the County and will not be returned to the respondents.

9. INTERVIEWS/DEMONSTRATIONS
Interviews and demonstrations **will be required of selected finalists at their expense**.

The selected finalists will be notified of the date and time of the interview process in accordance with the schedule on Page 1. **Vendors selected must be available on the days noted – no exceptions.** It is anticipated that we will have one vendor per day

Proposers not selected will be notified that their proposal will no longer be considered unless the evaluation committee finds, after the completion of interviews, that additional proposers should be interviewed.

10. EVALUATION & AWARD
Proposals will be evaluated in accordance with the criteria listed below. Award will be made to the responsive, responsible vendor who complies with the requirements and scores the highest total on the evaluation criteria as it pertains to the overall needs of Waukesha and Milwaukee Counties.

Firm's experience, qualifications, and demonstrated ability to provide the services requested	5%
Experience and qualifications of project team including the project manager, implementation personnel, support personnel and any others critical to the provision of service whether subcontracted or not.	15%
Thoroughness and overall quality of your Proposal Response Document as it relates to the needs of the Counties This includes the project plan, implementation issues, ongoing support, etc.	15%
Response to the Requirements Workbook: This includes the ability to meet the requirements, responding completely and accurately and the thoroughness of your response comments where required. .	40%
Cost	25%

Note: The Counties reserves the right to use additional scoring methodologies to assure that award is made to the firm submitting the most favorable proposal from both a cost and technical standpoint.

11. OTHER CONSIDERATIONS
Factors which include, but are not limited to, quantity involved, time of completion, purpose for which required, competency and financial capacity of vendor, ability to render satisfactory service and past performance will be considered in determining status as a responsible vendor. The County reserves the right to request additional information as may reasonably be required to make this determination and to further investigate the qualifications of the respondent as deemed appropriate.

12. RESERVATIONS
This RFP does not commit the County to pay any costs incurred in the preparation of a response to this request or to procure or contract for services or supplies. The Purchasing Division reserves the right to accept or reject any or all proposals, in part or in whole, received as a result of this request, request additional information, waive minor irregularities in the procedure, negotiate with any qualified source, or to cancel this RFP in part or in its entirety.

13. NON-INTEREST OF COUNTY EMPLOYEES AND OFFICIALS
No County official, employee or representative on the evaluation committee shall have any financial interest, either direct or indirect, in the proposal or contract or shall exercise any undue influence in the awarding of the contract.

Milwaukee County Specific Requirements; No person(s) with a personal financial interest in the approval or denial of a contract or proposal being considered by a county department or with an agency funded and regulated by a county department, shall make a campaign contribution to any county elected official who has approval authority over that contract or proposal during its consideration. Contract or proposal consideration shall begin when a contract or proposal is submitted directly to a county department or to an agency funded or regulated by a county department until the contract or proposal has reached final disposition, including adoption, county executive action, proceedings on veto (if necessary) or departmental approval.

14. CONTRACT DOCUMENTS

The successful vendor will be required to execute the following contract document (s) as applicable:

Yes/No	Description of Contract
Yes	Waukesha County's Service Contract
No	HIPAA Agreement
Yes	Business to Business (B2B) Network Access Agreement

Click on the link below to review the applicable contract documents:

http://www.waukeshacounty.gov/defaultwc.aspx?id=40390

These documents are not to be executed at this time nor returned with your response; they will only be required of the successful vendor.

15. RFP TABULATIONS

RFP tabulations are available to the public after contract execution, approximately 60-90 days from the date of opening. RFP Tabulations can be found at our website (https://purchasing.waukeshacounty.gov). If you are unable to access the Internet, you may contact 262-548-7888 for a hard copy. Copies are 15 cents per page plus postage costs if applicable.

Waukesha County
Request for Proposal (RFP) No. 1332
Trunked Radio System
4/12/2013

I. INTRODUCTION

The Waukesha County Purchasing Division is letting this proposal on behalf of the Waukesha County Department of Emergency Preparedness/Radio Services and Milwaukee County Information Management Services Division ("the Counties"). Milwaukee County's participation is as permitted and restricted by the Milwaukee County Code of General Ordinances, Chapter 32.31, which states: The procurement division is authorized to join with other units of government, and with quasigovernmental agencies funded in whole or in part by the county, in cooperative purchasing plans when in the best interests of the county as determined by the procurement director or his or her designee. Each of the participating units or agencies shall issue its own purchase order and be separately invoiced by the vendors for purchases made under such plans. The County shall not be obligated for purchases other than those required for its own use.
The purpose of this Request for Proposal is to obtain proposals from qualified firms; as defined by "Eligibility", below; to provide and implement a Project 25 (P25) 800 MHz digital trunked radio system (to include a Shared Core and multiple simulcast subsystems) that will serve both Counties. The Counties will require that the radio system have the capacity and scalability to serve other jurisdictions, as well as have the functionality to interface with the Wisconsin Interoperable System for Communication (WISCOM) for occasional interoperability.

For purposes of this RFP, the following definitions will apply:

TERM	DEFINITION
AC	Alternating Current
ACK	Acknowledgement - A message confirming the successful delivery of a previous message
ACP	Adjacent Channel Power
AES	Advanced Encryption Standard
ALGID	The eight BITs which identify the encryption algorithm in systems with multiple encryption algorithms
AMBE+2	Advanced Multiband Excitation (AMBE), AMBE+ and AMBE+2 are based on the multi-band excitation (MBE) method of speech coding
ANSI	American National Standards Institute
APCO	Association of Public Safety Communication Officials
ARQ	Automatic Retry Request (to retry corrupted packets)
ASCII	American Standard Code for Information Interchange - A seven-BIT code that defines 128 characters, including control characters, letters, numbers, and symbols
BER	BIT Error Rate
BER THRESHOLD	The level at which the BIT error rate exceeds the error correction capability and communication fails in a digital system
BIT	Binary digit
BNC	Bayonet Neill–Concelman, a miniature quick connect/disconnect RF connector
BPS	BITs Per Second, a data rate measure
C/I	Carrier to Interference signal ratio
C4FM	A four-level FM transmitter which uses QPSK modulation to work with a CFDD compatible receiver
CAI	Common Air Interface
CAP	Compliance Assessment Program
CATP	Coverage Acceptance Test Plan
CCS	Common channel signaling
CDMA	Code Division Multiple Access
CELP	Code Excited Linear Predictive

TERM	DEFINITION
CM	Circuit Merit
CODEC	A COder-DECoder device (analog to digital voice conversion)
Cold Standby	A method for improving reliability of a system in which a critical component is backed-up by a redundant, equivalent set of hardware and software but in which the backup/redundant version of the component is not continuously processing or receiving transactions or databases from the operational version of the component
Contractor	The proposer whose proposal is selected for award
Counties	Refers to Milwaukee County and Waukesha County together
CQPSK	A QPSK IQ transmitter which uses QPSK-C modulation to work with a CFDD compatible receiver
CRC	Cyclic Redundancy Checksum for data error detection
CSMA/CD	Carrier Sense, Multiple Access with Collision Detection
CTCSS	Continuous Tone Controlled Squelch System
CVSD	Continuously Variable Slope Delta modulation technique
DAQ	Delivered Audio Quality – A measurement of the quality of audio delivered across a radio system in which the following levels have the following meanings: • DAQ3.0: Speech understandable with slight effort. Occasional repetition required due to noise distortion. • DAQ 3.4 Speech understandable with repetition only rarely required. Some noise/distortion
dB	Decibel
DCPSK	Differential Coherent Phase Shift Keying
DES	Digital Encryption Standard
DNR	Department of Natural Resources
DPSK	Differential Phase Shift Keying
DQPSK	Differential Quadrature Phase Shift Keying
DRT	Diagnostic Rhyme Test
DS0	64 kBPS telephone service
DS1	1544 MBPS telephone service
DSP	Digital Signal Processor
DTMF	Dual-Tone Multi-Frequency’
DVP	Digital Voice Protection
ECC	Error Correction Code
EIA	Electronic Industries Alliance
EMS	Emergency Medical Service
ES	Encryption Synchronization
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDMA	Frequency Division Multiple Access
FSK	Frequency Shift Keying
GMIA	General Mitchell International Airport
GOLAY	Name of a standard error correction code
GPS	Global Positioning System
GSM™	Group Specialized Mobile radio service
GUI	Graphical User Interface
HEX BIT	6 BITs grouped together to represent a Reed-Solomon code symbol
HoC	House of Corrections

TERM	DEFINITION
Hot Standby	A method for improving reliability of a system in which a critical component is backed-up by a redundant, equivalent set of hardware and software and in which the backup/redundant version of the component is both continuously processing the same transactions as the operational version of the component and in which the two have identical databases
I/O	Input and/or Output
IEEE	Institute of Electrical and Electronics Engineers, Inc.
ILS	Input buffer Limiting Scheme
IMBE™	Improved Multi-Band Excitation vocoder, providing 4400 bits/s of digitized voice
IMSD	Information Management Services Division (Milwaukee County)
Infrastructure	The master/prime site controllers and repeaters that constitute the fixed-end of the radio system, subscribers communicate through the infrastructure when operating on the system
IP	Internetwork Protocol
IPR	Intellectual Property Rights
ISO	International Standards Organization
ISSI	Inter-RF Subsystem Interface
KEY	The parameter defining an encryption code or method
KID	A sixteen BIT Key Identifier which identifies the encryption key in systems with multiple encryption keys
LAN	Local Area Network
LMR	Land Mobile Radio
mA	Milliamps
MCSO	Milwaukee County Sheriff Office
MCTS	Milwaukee County Transit System
MDT	Mobile Data Terminal
MI	Message Indicator to initialize encryption
MIB	Management Information BITs
MIL-STD	Military Standard
MODEM	MOdulator/DEModulator
MODULATION	A controlled variation of any property of a carrier wave for the purpose of transferring information
mph	miles per hour
mS or ms	millisecond
MSK	Minimum Shift Keying
NAC	Network Access Code
NACK	Negative Acknowledgement - A message designating the unsuccessful delivery of a previous message
NCS	National Communications Systems group
NEPA	National Environmental Policy Act
NID	Network Identifier
NIST	National Institute of Standards and Technology
NMS	Network Management Systems
NOC	Network Operations Center
NPSPAC	National Public Safety Planning Advisory Committee
NSA	The US Federal Government National Security Agency
NTIA	National Telecommunications and Information Administration
OSI	Open Systems Interconnection
OTAC	Over-The-Air-Control

TERM	DEFINITION
OTAP	Over-The-Air Programming
OTAR	Over-The-Air Rekeying
P25	see Project 25
PBX	Private Branch Exchange
PC	Personal Computer
PCM	Pulse Coded Modulation
POTS	Plain Old Telephone Service
PROJECT 25 (P25 OR APCO-25)	A suite of standards for digital radio communications for use by federal, state/province and local public safety agencies in North America to enable them to communicate with other agencies and mutual aid response teams in emergencies
PROJECT 25 PHASE I	The backwards compatible migration path to full Project 25 specification that specifies a 125 kHz bandwidth using C4FM modulation
PROJECT 25 PHASE II	The backwards compatible migration path to full Project 25 specification that specifies a 625 kHz bandwidth using CQPSK modulation
Proposer/Respondent	A qualified firm that submits a response to this RFP
PSAP	Public Safety Answering Point
PSDN	Public Switched Data Network
PSK	Phase Shift Keying
PSTN	Public Switched Telephone Network
PTT	Push-to-Talk
QAM	Quadrature Amplitude Modulation
QoS	Quality of Service
QPSK	Quadrature Phase Shift Keying
QPSK-C	Compatible Quadrature Phase Shift Keying (Family of modulations)
REFERENCE VOCODER	The particular implementation of the APCO Project Vocoder available from Digital Voice Systems Incorporated as Model VC-20-PRJ25 This is the agreed upon reference implementation of the APCO Project 25 Vocoder
Respondent	A qualified firm that submits a response to this RFP
RF	Radio Frequency
RFP	Request for Proposal
RF-SUBSYSTEM	The RF infrastructure which is bounded by the five open APCO Project 25 interfaces and three standard computer network gateway interfaces It is the RF equipment and related non-standard peripheral equipment which provides a standardized RF communication channel One of the APCO Project 25 interfaces is the Common Air Interface (CAI)
RX	Receiver
SDOC	Supplier's Declaration of Conformity
SHPO	State Historic Preservation Office
SINAD	Signal plus Noise And Distortion to noise and distortion ratio
SMA	Speaker Microphone with Antenna ("Public Safety Microphone")
SME	Subject Matter Expert
SMRS	Specialized Mobile Radio Service
Subscriber	A mobile or portable radio unit, the radio unit used by field personnel to communicate through the infrastructure
T1	see T1 System
T1 SYSTEM	A digital communication system designed to handle 24 voice channels at 64 kBPS each Digital transmission media to support 1544 Mbps transmission speed
TCP	Transmission Control Protocol
TDM	Time Division Multiplexing

TERM	DEFINITION
TDMA	Time Division Multiple Access
TETRA	Terrestrial Trunked Radio
TGID	Talk-Group Identifier A twelve BIT field identifying talk-group of the radio message
TIA	Telecommunications Industry Association
TIME-OUT-TIMER	A function that limits the transmission period to a pre-defined time The user will automatically stop transmitting when the timer goes off after the pre-defined time
TPDU	Transport Protocol Data Unit
TRELLIS CODE	Type of error correcting code for digital modulation
TRIBIT	3 BITs grouped together into a symbol for a trellis code
TRS	Technical Requirements Specification
TSB	Telecommunications System Bulletin
TSP	Telecommunications Service Priority
TX	Transmitter
TYPE III ENCRYPTION	Type of encryption used for non-classified communications
TYPE IV ENCRYPTION	Type of encryption used for export
UL	Universal Laboratories
ULP	Upper Layer Protocol
UM INTERFACE	The label given to the Common Air Interface reference point in the General System Model
UPS	Uninterruptable Power Supply
VDC	Volts Direct Current
Vendor/Respondent	A qualified firm that submits a response to this RFP
VHF	Very High Frequency
VOCODER	Voice-Coder
VOIP	Voice over Internet Protocol
VSELP	Vector Sum code Excited Linear Predictive
VWSR	Voltage Standing Wave Ratio
W	Watts
WAN	Wide Area Network
Warm Standby	A method for improving reliability of a system in which a critical component is backed-up by a redundant, equivalent set of hardware and software and in which the backup/redundant version of the component is not continuously processing the same transactions as the operational version of the component but in which the two version are periodically sharing databases
WCC	Waukesha County Communications (Waukesha County's Consolidated PSAP)
WCRS	Waukesha County Radio Services (refers to the organization and the site)
WISCOM	Wisconsin Interoperable System for Communications (the State of Wisconsin's statewide radio system)

II. ELIGIBILITY

To be considered eligible for selection, proposers must meet the following minimum requirements:

a. Radio Equipment Manufacturer: Proposers must be original manufacturers of radio infrastructure equipment (master/prime site controllers, repeaters).
b. Attendance at Pre-Proposal Meeting and Site Walks: Employee of proposers (not subcontractor, not agent) shall attend mandatory pre-proposal meeting and site walks.

Proposals received from proposers that do not meet these eligibility requirements will not be considered for evaluation.

III. BACKGROUND

It is important to note that although the existing Waukesha and Milwaukee County systems are of the same technology and general vintage; the two systems use different radio channels and are separate and distinct from each other.

Waukesha County's Current Radio System

Waukesha County currently operates a Motorola Smartnet II+ 7-site 13 800MHz-NPSPAC-channel analog (Project 16) simulcast countywide trunked radio system. The Waukesha County trunked system serves the agencies that provide Law Enforcement, Fire, EMS, Public Works, Highway, Parks/Land Use, and Government Administration services in the County. System site backhaul is currently via private, licensed microwave links. The County also is licensed for three 800 MHz mobile-only simplex channels for at-scene and other non-trunked intensive communications.

The total set of 800MHz frequencies currently licensed to, and in use by, Waukesha County is included in the following FCC call signs:

- WPNW886
- WPWY443
- WPNZ291 (mobile-only simplex channels)

The radio sites currently in use by Waukesha County are:

Site Name	Latitude	Longitude	Current RX Antenna Tower Height (Bottom of Antenna)	Current TX Antenna Tower Height (Bottom of Antenna)
City of Waukesha (WCRS Site)	43-01-30.0 N	88-11-12.3 W	242 ft	242 ft
New Berlin	42-56-34.0 N	88-09-39.3 W	175 ft	175 ft
Eagle (Water tower)	42 52 53 N	88-28-28.4 W	120 ft	120 ft
Nashotah	43-06-12.0 N	88-24-43.3 W	194 ft	194 ft
Menomonee Falls	43-09-42.0 N	88-09-49.0 W	100 ft	100 ft
Delafield	43-01-41.0 N	88-23-32.3 W	280 ft	280 ft
Brookfield (Water tower)	43-04-26 N	88-04-52 W	176 ft	176 ft

Waukesha County is also planning the construction of two new radio sites, complete with new shelter and new radio tower, at the following locations:

Site Name	Latitude	Longitude	Possible RX Antenna Tower Height (Bottom of Antenna)	Possible TX Antenna Tower Height (Bottom of Antenna)
Vernon Town Hall	42-52-59.0 N	88-14-51.0 W	250 ft	250 ft
Lisbon Fire Department, Good Hope Station	43-08-57N	88-14-34W	250 ft	250 ft

The City of Waukesha/WCRS Site is the prime site for the existing Waukesha County radio system.

Waukesha County requires that at a minimum, the design incorporates the use of all of these existing sites and planned sites in the new trunked radio system.

Existing subscriber equipment is from both Motorola and E.F. Johnson.

Waukesha County operates 15 Motorola Centracom Gold Elite wireline console positions at its countywide dispatch center, the Waukesha County Communications (WCC) center. Backhaul to the Public Safety Answering Point (PSAP) is on privately-operated fiber which has T1 backup lines. Six other independent PSAPs (City of Waukesha, Muskego, City of Oconomowoc, Elm Grove, Menomonee Falls and Mukwonago) operate on the

Waukesha County trunked system, all of which uses wireless (control base) and not wireline connections into the system.

Waukesha County currently utilizes digital microwave links in a star configuration radiating from the prime site at the WCRS location and with hot-standby equipment for each path. The microwave links are in the 6 and 11 GHz range with equipment from Ceragon Networks, Inc. All paths have a total available bandwidth of 45 Mbps and although they are not currently configured for such operation, they can be subdivided into two separate networks. Each path can carry up to 8 T1 circuits however only one or two of the T1's are used to each site. One T1 is used to sites that have only 800MHz equipment (Delafield and Menomonee Falls) and two T1's are used to sites that have both 800MHz and VHF (siren alerting, etc.) equipment (Brookfield, New Berlin, Eagle, and Nashotah).

Waukesha County will be responsible for extending this microwave network, with the same specifications as listed above, to any new sites that are built to accommodate their radio subsystem as part of this project.

Waukesha County's existing backhaul has sufficient bandwidth to accommodate the migration to a replacement Project 25 trunked simulcast radio system. Proposers may assume that the existing Waukesha County microwave system will provide less than 50 mS of round-trip latency between a prime site and a remote radio site and packet loss of less than 1%.

New links will need to be deployed to connect any new sites and the existing channel banks (Motorola TENSr) would need to be retained in order to support the VHF systems. Such new links will be deployed by Waukesha County; however, new time standards are needed for the existing channel banks due to continued failures of the existing Efratom equipment (which currently supply the time standard).

Maintenance is mainly provided by WCRS; however, some agencies obtain service for their subscriber radios from a private radio shop.

Milwaukee County's Current Radio System

Milwaukee County currently operates a Motorola Smartnet II+ 9-site 14 800MHz-NPSPAC-channel analog (Project 16) simulcast countywide trunked radio system. (Note: Two of the 9 sites in the system operate as receive-only sites.) The Milwaukee County trunked system serves Law Enforcement, Fire, EMS, Public Works, Public Health, Medical Facilities, and Transit, plus other special applications such as Airport operations (at General Mitchell International Airport). System site backhaul is currently via leased T1 circuits, though the County is in the planning stages of converting to private licensed digital microwave.

The total set of 800MHz frequencies currently licensed to, and in use by, Milwaukee County is included in the following FCC call signs:

- WNWI428
- WPUD932
- WPUE217
- WQQI881

The radio sites currently in use by Milwaukee County are:

Site Name	Latitude	Longitude	Current RX Antenna Tower Height (Bottom of Antenna)	Current TX Antenna Tower Height (Bottom of Antenna)
US Bank	43-02-18.0 N	87-54-05.0 W	600 ft	600 ft
County HoC	42-52-48.1 N	88-00-10.3 W	195 ft	195 ft
Muirdale	43-02-41.0 N	88-02-30.3 W	210 ft	210 ft
Brown Deer Park	43-09-43.0 N	87-57-33.3 W	195 ft	195 ft
Channel 58	43-06-42.0 N	87-55-50.0 W	500 ft	500 ft
Channel 49	42-51-20.0 N	87-50-41.0W	200 ft	200 ft
Engine 38/Donna Drive	43-10-20.0 N	88-02-23.0 W	125 ft	125 ft (See Note 2, below)
Greenfield Police Department	42-57-39.2 N	87-58-51.2 W	220 ft	220 ft
Lakeshore Towers	42-55-50.0 N	87-50-52.2 W	142 ft	142 ft (See Note 2, below)

The Muirdale site is the prime site for the existing Milwaukee County radio system.

NOTES:

- Note 1: Milwaukee County previously operated a radio site at the location of 88th and Waterford, however, that site is not currently used and new designs should not include it.
- Note 2: The sites at Lakeshore Towers and Engine 38/Donna Drive are currently configured for receive-only operations but proposers may consider them for use as full transmit-and-receive sites with transmit capabilities .

Milwaukee County requires that at a minimum, the design incorporates the use of all of these existing sites in the new trunked radio system.

Existing subscriber equipment is from both Motorola and E.F. Johnson.

Milwaukee County operates a Motorola Embassy switch that is used to connect several dispatch centers to the existing radio system. This Embassy switch is located at the Milwaukee County Sheriff's Office (MCSO) dispatch center and the Milwaukee dispatch centers that connect through it are:

- The Milwaukee County Sheriff's Office (MCSO) dispatch center which operates 10 Motorola Centracom Gold Elite console positions,
- The Milwaukee County Jail Facility (MCJF) at 949 N 9th St, Milwaukee, WI which operates 2 Motorola Centracom Gold Elite console positions as remote positions from the MCSO dispatch center
- The Milwaukee County Emergency Medical Services MCEMS dispatch center which operates 4 Motorola Centracom Gold Elite console positions

The Milwaukee County Transit System (MCTS) dispatch center, which operates 4 Motorola Centracom Gold Elite console positions, connects directly to the prime site equipment at Muirdale.

The Milwaukee County Correctional Facility South (MCCFS) operates a dispatch station with control bases and the Milwaukee County Highway Division (MCHD) operates a control base from its location on the Milwaukee County grounds.

The General Mitchell International Airport (GMIA) dispatch center operates with 4 existing dispatch positions (Motorola MCC7500). These currently use wireless (radio) links to connect to the existing Milwaukee County radio system.

The dispatch positions at MCSO, MCJF, MCEMS, MCTS, MCCFS, MCHD, and GMIA are the responsibility of Milwaukee County IMDS and they will be directly addressed in this RFP.

Other dispatch positions are the responsibility of local municipalities and they include eight other dispatch centers (Bayside Communications Center, Cudahy, Franklin, Greendale, Oak Creek, South Milwaukee, St. Francis, and Wauwatosa) that operate Motorola Centracom Gold Elite consoles on the trunked system and which interconnect to the system via the Motorola Embassy switch at MCSO. In addition to its Centracom dispatch consoles, the Bayside Communications Center also operates 8 existing dispatch positions (Motorola MCC7500), however, these currently use wireless (radio) links to connect to the existing Milwaukee County radio system. Likewise, West Allis operates 5 existing dispatch positions (Motorola MCC7500) and they also currently use wireless (radio) links to connect them to the existing Milwaukee County radio system. Two other municipalities, West Milwaukee and Hales Corners, also use wireless (radio) links for their dispatch consoles.

The dispatch positions of these local municipalities are the responsibility of those municipalities and it is expected that the vendor shall accept purchases from them for replacement wireline and/or wireless dispatch console position at the pricing established in the contract resulting from this RFP.

Milwaukee County currently utilizes leased T1 circuits to interconnect its radio sites to the prime site at Muirdale. Respondents are to include in their proposals equipment and services to connect the prime and radio sites included in the Milwaukee County Radio Subsystem, as well as the Milwaukee County Radio Subsystem to the Shared Core, via new digital microwave network.

Maintenance of the Milwaukee County system is currently via a combination of contract personnel and a private radio shop.

It should be noted that Milwaukee County has an existing pilot P25 system (a Motorola "K-Core" system), however, its use will be discontinued during the implementation of this project and vendors should not attempt to use it in lieu of new equipment in their designs and proposals.

IV. PROJECT GOALS

Through their age and outdated designs, the Waukesha and Milwaukee County radio systems have both become difficult and expensive to maintain. They also do not provide the necessary levels of service required by users. Users of the two systems have noted areas of problematic coverage and the staff that maintains them has described insufficient control and security over system operation and subscriber provisioning. Additionally, the technologies of the two systems do not allow them to interconnect to each other nor to other important external systems such as the State of Wisconsin WISCOM system and the OpenSky® radio system used by the City of Milwaukee for its Police and Fire Departments.

The goal of this RFP is to procure a Project 25 trunked radio system, comprised of multiple 800MHz simulcast subsystems, to be used by public safety, public service, and other departments of local government. The new trunked radio system is to:

1. Provide the overall most cost effective solution including both capital and ongoing cost.
2. Enhance interoperability by providing users with a single system in which 800 MHz radios can roam and communicate system-wide.
3. Improve reliability by encouraging redundancy and simplifying maintenance.
4. Expand subscriber native system geographic coverage.
5. Reduce current costs related to maintenance, administration and operation while maintaining exclusive user control through economies of scale and reduced reliance on private-sector services.
6. Represent a proven-technology solution. The Counties do not wish to become early adopters of new technology, product offerings or configurations. The system design shall reflect this, and represent a proven solution with a demonstrable track record of identical hardware and configuration successfully deployed and operated elsewhere within the continental United States. Solutions with limited or no record of successful U.S. public-safety deployment is unacceptable.
7. Simplify the subscriber-unit programming process and provide the Counties with direct and exclusive control over deployment, system priority and utilization of their talk groups, thus precluding the possibility that others could program non-owned talk groups without formal written talk group owner authorization.
8. Provide the Counties with direct and exclusive control over deployment of trunked radio system hardware and firmware upgrades and enhancements, establishment of talk group and user priorities, system and backhaul configuration, changes and enhancements, and other system parameters.
9. Provide the Counties with direct and exclusive control over subscriber unit type, acceptance, deployment, priority, and feature permissions.
10. Provide the Counties with direct and exclusive control over selection of global system roaming parameters and interoperability capabilities related to individual talk groups.
11. Provide the Counties' subscriber agencies with input over the control over users admitted to the system, subscriber radio counts, talk group usage, and system loading.
12. Provide the Counties' subscriber agencies with input over the direct and exclusive control over the administration, maintenance, and emergency and routine service activities regarding their individual subscriber units
13. Permit Milwaukee County to directly and exclusively control its multiyear phased transition to digital technology, during which channels are gradually converted on a planned and organized basis from analog to digital operation. During the transition process, both systems shall interoperate on a fully-trunked basis, seamlessly and transparently from the user point of view.
14. Provide for an effective and graceful transition to P25 Phase II TDMA operation at a future date without replacing infrastructure hardware.
15. Include a P25 ISSI gateway at the system level to permit interoperability with users of other ISSI-compatible systems such as the WISCOM system.
16. Provide the Counties with a robust and scalable solution that may be leveraged to include other counties or agencies.
17. Be deployed on time (per the contracted schedule) and to budget (per the original contracted purchase amount). Change orders that are requested by the selected vendor in order to meet the requirements of this RFP will not be accepted. The Counties do not expect to issue change orders unless: i) a change in scope is specifically requested by the Counties, ii) the change is to the advantage of the County (i.e., a cost savings or a schedule improvement) or iii) the change is a result of something that could not have been known at the time of submission.

V. SOLUTION ARCHITECTURE OVERVIEW / PHASING

A. Trunked Radio System:

This RFP covers six distinct areas of the trunked radio system:

1) A Shared Core
2) A Radio Subsystem for Waukesha County
3) A Radio Subsystem for Milwaukee County
4) New wireline dispatch consoles for the Waukesha County Communications (WCC) center
5) Subscriber radios (which can be purchased by either County as well as by agencies from either County)
6) Wireline and wireless dispatch consoles for locations other than WCC, MCSO, MCTS and Milwaukee County EMS (which can be purchased by either County as well as by agencies from either County)

The Shared Core will contain one shared Master Site Controller with Inter RF Subsystem (ISSI) capabilities, optional Over-The-Air-Rekeying and Over-The-Air-Programming (OTAR and OTAP) capabilities (the system shall support OTAR and OTAP but shall not be equipped with OTAR and/or OTAP servers unless optionally added by the Counties or a County), network management capabilities, and the implementation and support services associated with Shared Core equipment.

Each County radio subsystem will contain: prime site controllers (local radio subsystem/simulcast controllers), radio site equipment (repeaters, antenna systems and site networking equipment), dispatch consoles, and the implementation and support services associated with radio subsystem equipment.

The new wireline dispatch consoles for WCC will include a total of 17 wireline dispatch consoles and the implementation and support services associated with wireline dispatch equipment.

Proposer shall provide volume pricing for new portable and mobile subscriber radios. Proposer shall also provide volume pricing for software upgrades to allow existing subscriber radios, where capable, to operate on the new system.

The Counties seek a “turnkey” solution with the Contractor providing all necessary project management, design, installation, programming/ optimization, testing, cutover, training services and ongoing system and product support services according to Sections VI.N through VI.R of this RFP. Site remediation (limited to improving existing sites) services shall be provided on a site-by-site basis as defined below. The Contractor shall be responsible for acquisition of all necessary permits for any/all site work they are to perform.

B. Project Phasing

Waukesha County intends to procure the Shared Core and the Waukesha County Radio Subsystem for deployment in an all-at-once fashion and with the most expedient implementation schedule possible.

Milwaukee County intends to procure the Milwaukee County Radio Subsystem in four major phases (by year) depending on County Board and County Executive appropriation of funds.

- Phase 1 – Purchase and deploy Milwaukee County’s portion of the Shared Core, purchase and deploy the legacy radio system and legacy dispatch console interfaces, begin site remediation, and begin implementation of the microwave network. Sufficient funds are currently appropriated for Phase I.
- Phase 2 – Upgrade wireline dispatch consoles (for MCSO, MCTS, and MCEMS), complete remediation of radio sites, purchase initial deployment of radio subsystem for Milwaukee County (to include 4 trunked radio channels operating at all sites selected by proposer) , and complete microwave deployment
- Phase 3 – Purchase and implement an additional infrastructure to include 7 trunked channels operating at all sites selected by proposer
- Phase 4 – Purchase and implement final deployment of radio subsystem for Milwaukee County to include an additional 7 trunked radio channels, for a total of 18, operating at all sites selected by proposer

Note: The recommended approach as listed above will be contingent upon not only vetting and approval of Contractor’s plans, but also the County’s annual appropriation of funds.

Waukesha County will be responsible for purchasing the Shared Core; however, its cost will be shared by both Counties and Milwaukee County shall reimburse Waukesha County for 50% of the Shared Core’s cost.

Waukesha County and Milwaukee County will each be responsible for purchasing their respective Radio Subsystems. The Waukesha County Communications (WCC) center will be responsible for purchasing its dispatch consoles and Milwaukee County will be responsible for purchasing the dispatch consoles for the Milwaukee County Sheriff, the Milwaukee County Transit System (MCTS), and the Milwaukee County Emergency Medical Services (EMS) telecommunicators.

As noted above, acceptance of the Shared Core, the Waukesha County Radio Subsystem, and the WCC dispatch consoles shall occur on a one-time basis following successful completion of their respective Acceptance Test Plans and the resolution of all open punch-list items to the County's satisfaction, as well as any other conditions for acceptance set forth.

Acceptance of the Milwaukee County Radio Subsystem shall occur on a Phase-by-Phase basis and each Phase shall have its own independent set of Acceptance Test Plans. Acceptance for a Phase shall be based on successful completion of a Phase's Acceptance Test Plans and the resolution of all open punch-list items to the County's satisfaction, as well as any other conditions for acceptance set.

Attachment A to this RFP includes a list of those agencies that currently use the radio systems in Waukesha and Milwaukee Counties on a primary (daily use) or secondary (interoperability) basis. These and other agencies from within the Counties (and from other participating state, local, or federal agencies) are expected to use the new trunked radio system sought in this RFP. Individual agencies from within the Counties (and other participating agencies) will be responsible for procuring their own subscriber radios and dispatch consoles using the volume pricing proposed. **The Contractor must be willing to accept individual purchase orders from all involved Counties and agencies at the pricing established in the resulting contract.** The quantities of portable and mobile subscriber radios included in the Pricing Document are estimates and are given for bidding purposes only. They are no guarantee as to the final purchases. Final quantities for each type and configuration of subscriber radio will be confirmed with the selected vendor.

VI. SCOPE OF SERVICES

The requirements for the products and services to be proposed are included in the following subsections of this RFP:

A. Technical Requirements: Shared Core
B. Technical Requirements: Waukesha County Radio Subsystem
C. Technical Requirements: WCC Dispatch Center
D. Technical Requirements: Milwaukee County Radio Subsystem
E. Technical Requirements: Radio Subsystem Repeaters
F. Technical Requirements: Radio Subsystem Dispatch Consoles
G. Technical Requirements: Portable Subscriber Radios
H. Technical Requirements: Mobile Subscriber Radios
I. Technical Requirements: Spare Equipment
J. Technical Requirements: Test Equipment
K. Product Availability and Lifecycle Support Requirements
L. Site Power Requirements
M. Equipment Rack Requirements
N. Site Remediation Requirements for Waukesha County sites
O. Site Remediation Requirements for Milwaukee County sites
P. Site Workmanship Requirements
Q. Project Deployment Requirements
R. System Support and Maintenance Requirements

Subsections B, C, and D reference Subsections E and F such that all repeaters and dispatch consoles to be included in the Waukesha County Radio Subsystem, at WCC, and in the Milwaukee County Radio Subsystem must meet the requirements of the Technical Requirements for Radio Subsystem Repeaters and Radio Subsystem Dispatch Consoles. The Product Availability and Lifecycle Support Requirements of Section K apply to all products described in Sections A through J. The Site Workmanship Requirements of Section P apply to the services to be provided in Sections N, O, Q, and R.

A. Technical Requirements: Shared Core

1. Definition of Shared Core Components

The Shared Core shall include the following components:

- Trunking and audio core to provide trunking control and audio routing capabilities
  - Call assignment
  - Call routing (audio distribution)
  - Subscriber-to-system affiliation (subscriber location tracking)
  - Subscriber registration
  - Subscriber authentication (for subscribers that are so equipped)
  - Interface to wireline consoles
  - Primary interface to network management components
- Network management to provide the ability to monitor, control, manage, and report on system operations
- An ISSI gateway to interconnect to other P25 systems
- OTAR/OTAP capabilities to support over the air rekeying and reprogramming (optional - the system shall support OTAR and OTAP but shall not be equipped with OTAR or OTAP servers unless optionally added by the Counties or a County)
- One wireline dispatch console (for test purposes)
- Networking / backhaul equipment to support interconnection to the other system components via the microwave subsystems to be provided by the Counties

2. Location of Shared Core

The Shared Core shall be located at the WCRS site.

3. Compliance to P25 Specifications

Shared Core shall provide features per specifications of APCO Project 25, Phase I standards as defined by the TIA-102 suite of documents. All applicable proposed equipment shall be capable of being successfully tested to meet the requirements of TIA-102.CAEC, TSB-102.CBBH, TSB-102.CBBJ-B, and TSB-102.CBAF.

4. P25 Trunking Feature Requirements

The Shared Core of the Trunked Radio System shall provide the following features. For each feature, a Project 25 technical specification, a P25 testing specification, and a functional specification are listed. Proposers shall describe if the Shared Core meets the listed APCO Project 25, Phase I standards for the feature, if the Shared Core complies with the P25 testing specification (i.e., if it can successfully pass the identified test section), and if the Shared Core provides the functional specification (i.e., delivers the functionality) as described.

a) Group Voice Calls and Broadcast Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.2

iii) Functional Requirement: Subscribers shall be capable of operating on more than one talkgroup. A subscriber that is in-range of a radio subsystem shall initiate a group call with a selected talkgroup by selecting that talkgroup and pushing the push-to-talk switch. Other users in the talkgroup, including dispatchers and subscribers on other sites, shall receive the call if they have selected that talkgroup and if channel and backhaul resources are available. All parties in the group shall be able to respond, one at a time, and all parties shall hear the speaker. The system infrastructure shall support this functionality in both message-trunking style (in which the repeaters have zero hang time and in which they are made available for other voice calls immediately after the initiating subscriber's transmission) and transmission-trunking style (in which the repeaters have a definable hang time and in which they are reserved for a response from other subscribers after the initiating subscriber's transmission).

b) Emergency Alarm

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.7

iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate an emergency alarm by pressing a dedicated emergency button. Dispatcher positions that are so programmed shall be notified of the emergency alarm and they shall be able to acknowledge and clear the alarm. The initiating subscriber shall be the only party capable of cancelling the alarm. The Shared Core shall process emergency alarms as the highest priority in order to allow the

emergency alarm to be transmitted upon availability of an unused channel. The system shall allow this feature to be enabled or disabled on a system-wide basis.

c) Emergency Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.8

iii) Functional Requirement: A subscriber that is in-range of the system can initiate an emergency group call on a selected talkgroup by either: pressing the push-to-talk switch after pressing the emergency button or by selecting a pre-defined emergency talkgroup and pushing the push-to-talk switch. Other users in the talkgroup, including dispatchers and subscribers on other sites, will receive the call and will have notification that it is an emergency call if they have selected that talkgroup and if channel and backhaul resources are available. The Shared Core shall process emergency group calls as the highest priority in order to allow the emergency alarm to be transmitted upon availability of an unused channel. The system shall allow this feature to be enabled or disabled on a system-wide basis.

d) Individual Voice Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.3

iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate a call to one specific other subscriber by selecting that subscriber's ID and pushing the push-to-talk switch. The other specific subscriber, even it if is on another site, shall receive notification of an individual call request if channel and backhaul resources are available. If the other specific subscriber accepts the request but pushing the push-to-talk switch within a specified time, the parties shall communicate with each other and no other parties will participate. The Shared Core shall be capable processing individual voice calls.

e) Announcement Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.6

iii) Functional Requirement: An announcement group shall be a one-to-many association of talkgroups. A talkgroup shall be able to be associated with an announcement group such than any call to the announcement group shall be heard on all associated talkgroups. A subscriber that is in-range of a radio subsystem shall initiate an announcement group call by selecting that announcement group and pushing the push-to-talk switch. Other users in the announcement group (i.e., that have their selected talkgroup associated with the selected announcement group), including dispatchers and subscribers on other sites, shall receive the call if channel and backhaul resources are available. Upon completion of the initiating radio's transmission, channel resources shall be released (i.e., announcement group calls shall occur with transmission trunking). The Shared Core shall be capable processing announcement calls.

f) All Call / System Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.14

iii) Functional Requirement: A system call shall be a one-to-all (all registered and in-rage subscribers) call that shall be initiated only by the system infrastructure (dispatchers). When initiated, a system call shall terminate all non-emergency calls that are in progress and it shall prevent new non-emergency calls from being initiated for the duration of the system call. Upon completion of the system call, channel resources shall be released (i.e., system group calls shall occur with transmission trunking). The Shared Core shall be capable processing system calls.

g) Radio Check

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.21
iii) Functional Requirement: The system infrastructure (management terminals) shall be able to initiate a message to a subscriber to determine if it is registered and in range. A subscriber that receives a radio check message shall acknowledge it and that acknowledgement shall be returned to the infrastructure component that initiated the check. The Shared Core shall be capable of processing radio checks including the delivery of checks to individual subscribers and the return of received acknowledgements to the initiating party.

h) Call Alert

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.15
iii) Functional Requirement: A subscriber (including a dispatcher) shall be able to send a non-voice alert to another subscriber. The receiving subscriber shall provide an indication that it has been alerted and the alert shall contain the ID of the subscriber that initiated the alert. The initiating subscriber shall receive an indication that the receiving subscriber received the alert. The Shared Core shall be capable of processing call alerts.

i) Radio Unit Inhibit/Uninhibit

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.20
iii) Functional Requirement: The system infrastructure (dispatchers or managers) shall be able to disable (inhibit) a subscriber from operation on the radio system and shall be able to enable (uninhibit) its operation again. The Shared Core shall be capable of processing radio inhibit/uninhibit instructions. The system shall require and process (displays to the initiator) a subscriber radio's positive acknowledgement (ACK) or negative acknowledgement (NACK) to inhibit or uninhibit command. A subscriber radio that has been inhibited shall only be uninhibited by a proper uninhibit command sent from the system infrastructure.

j) Radio Unit Monitoring

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.19
iii) Functional Requirement: The system infrastructure (dispatchers or managers) shall be able to initiate a group or individual call from a specific subscriber for a specified amount of time. The initiation of the group or individual call shall include instructions that define: i) the duration of the call, ii) if the call is to be silent or non-silent, and iii) if the call is to be encrypted or not. The Shared Core shall be capable of processing radio unit monitoring instructions.

k) Short Message

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.16
iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate a short message (up to 256 characters in length) for delivery to another subscriber or a dispatcher by selecting the recipient's ID and then either entering a short message from the subscriber keypad (if equipped) or selecting a short message from a pre-defined list. The receiving subscriber shall provide an indication that it has received a short message that shall contain the ID of the subscriber that initiated the message. The initiating subscriber shall receive an indication that the receiving subscriber has received the message. The Shared Core shall be capable of processing short messages.

l) Status Query / Status Update

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.17 and 2.2.18

iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall be capable of initiating a change in a pre-programmed status condition. When a user initiates the change of a status (by selecting a pre-programmed status from a list in a subscriber radio), it shall transmit that change to the management terminal which shall acknowledge the receipt of that transmission and shall display that radio's new/updated status. Also, the management terminal shall be capable of requesting the last-selected status of individual subscriber radios. When this occurs, the management terminal shall send the request to the selected subscriber which shall respond with its last-selected status and the management terminal shall display that radio's last-selected status.

m) AES Encryption

i) P25 Technical Specifications: Shall comply with TIA-102.AAAD
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.10
iii) Functional Requirement: A subscriber that is in-range of the system and that has encryption capabilities shall be able to place a group call to other encryption-capable subscribers and only those subscribers that possess matching encryption keys and that are affiliated to the same talk group are able to understand the message. Radios affiliated to the same talk group that do not possess any encryption keys, or that possess different encryption keys, shall be unable to understand the message. The implemented encryption method shall be Type 3 encryption via the Advanced Encryption Standard (AES) algorithm. Key length for the AES shall be 256 bits. The Shared Core shall be capable of processing calls that are encrypted with AES encryption.

n) Registration/ Roaming

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.11
iii) Functional Requirement: A subscriber that moves from out of range of a system into range of the system or that moves from being in-range of one system to in-range of another system shall register with the new system, provided the system is programmed to allow operation of that subscriber. The Shared Core shall support the definition of 'allowed' and 'prohibited' access for individual radio IDs and shall track the registration status of each radio ID on the system.

o) Affiliation

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.5
iii) Functional Requirement: A subscriber that has registered on a radio subsystem shall select a talkgroup for use and the Shared Core shall positively or negatively acknowledge that the subscriber is allowed operation on that talkgroup and, if positive, shall allow that subscriber to initiate group voice calls on that talkgroup.

p) Over-The-Air-Rekeying (OTAR)

i) P25 Technical Specifications: Shall comply with TIA-102.AACA and TIA-102.AACB
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABB
iii) Functional Requirement: The ability to use the key management system over the P25 Trunked system infrastructure to perform the following functions:
   (1) Warm-Start Command
   (2) Rekey Command and Acknowledgment
   (3) Changeover Command and Response
   (4) Modify Key Command
   (5) Delete Key Command and Response
   (6) Change-RSI Command and Response
   (7) Zeroize Command and Response
   (8) Delayed Acknowledgment
   (9) Negative Acknowledgment

Note: The system shall support OTAR but shall not be equipped with OTAR servers unless optionally added by the Counties or a County.

q) Radio Authentication

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, TIA-102.AABF, and TIA-102.AACE

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.12

iii) Functional Requirement: The Shared Core shall support authentication in two ways. In an "authentication required" mode, a subscriber that is attempting to register on a system shall be allowed operation only if it can successfully share pre-determined keys with the system infrastructure. Successful authentication shall allow registration to proceed for the subscriber unit. Authentication failure shall leave the subscriber unit in an un-registered state. In an "authentication not required" mode, the sharing of pre-determined keys is not required. The Shared Core shall allow each subscriber to be set for either the "authentication required" mode or the "authentication not required" mode.

5. Non-P25 Trunking Feature Requirements

The Shared Core of the Trunked Radio System shall provide the following features that are not defined by the P25 specifications. For each feature, a functional specification is listed.

a) Over-The-Air Reprogramming (OTAP)

i) Functional Requirement: The Shared Core of the Trunked Radio System shall have over-the-air programming to enable the following changes to be made remotely (i.e., over a connected radio subsystem, with no direct/wired connection) to the subscriber units:

(1) Switches and Personality Profile

(2) Service programming the transmitter and receiver parameters and alignment

(3) Software Version Upgrade

(4) Additional Functional Requirements: The OTAP feature shall operate per the following behaviors:

(a) New files or changes to existing files that are downloaded over the air will not be implemented (written) into the subscriber until it is confirmed that the entire new file or the entire set of changes to existing file have been downloaded

(b) A subscriber that has a programming change made to it via OTAP will provide an acknowledgment of the successful programming change and it will do so only once the change is fully and successfully made

(c) The OTAP server will have configuration settings for the degree to which it is persistent in the number of times or a period of duration over which it will attempt to complete a programming change

(d) OTAP messages will be treated with lower priority than all voice calls

(e) OTAP programming instructions can be set to be delivered to one (identified by single ID) or many some (identified by set of IDs) units.

Note: the system shall support OTAP but shall not be equipped with OTAP servers unless optionally added by the Counties or a County.

b) Dynamic Regrouping

i) Functional Requirement: Through the Shared Core, system infrastructure (network managers) shall be able to merge and un-merge individual subscribers and entire talkgroups into a single, dynamically-defined talk group. Dynamic regrouping shall be supported by the Shared Core and the radio subsystems with both of the following sub-features: i) regrouping commands are confirmed (ACK'ed) by the subscriber radios and the confirmation is processed and displayed to the initiator and ii) regroup commands can be batched (directed at a group of radios instead of requiring a regroup to be sent to each individual subscriber radio).

6. P25 Trunking Priorities Requirements

The Shared Core shall support the assignment of 9 levels of priority for each talkgroup. When calls are placed into trunking queue, talkgroups with higher priority levels shall be processed before those of lower priority levels.

7. Shared Core Initial Capacity Requirements

The Shared Core shall support a minimum of a total of 2 distinct radio subsystems (those being the Waukesha County and Milwaukee County Radio Subsystems), 48 total trunked channels, 25 radio sites, 24,000 subscriber radios (distinct subscriber radios IDs) and a minimum of 8,000 talkgroups and announcement groups. (For purposes of this requirement, any simulcast subsystem shall be considered one radio site.)

8. Shared Core Expansion Requirements

The Shared Core shall support the ability to expand in terms of the number of distinct radio subsystems, total trunked channels, radio sites, subscriber radios (distinct subscriber radios IDs) and talkgroups and announcement groups.

The Shared Core shall have all hardware necessary to support the "future envisioned capacity" of a total of 4 distinct radio subsystems, 64 total trunked channels, 40 radio sites, 46,000 subscriber radios (distinct subscriber radios IDs) and a minimum of 15,000 talkgroups and announcement groups.

Proposers shall describe the total number of radio subsystems, channels, sites, radios, and talkgroups that their proposed system can accommodate without the need for additional hardware or software.

Proposers shall describe the process required to apply the software necessary to transition from the minimum-required capacity to the "future envisioned capacity".

Proposers shall describe the maximum number of radio subsystems, channels, sites, radios, and talkgroups that their proposed system can accommodate with the addition of hardware and/or software (i.e., the maximum possible expansion).

(For purposes of this requirement, any simulcast subsystem shall be considered one radio site.)

9. Shared Core Project 25 Phase II Migration Requirements

The Shared Core shall be able to be upgraded to Project 25 Phase II without the replacement of any proposed equipment hardware. Upgrade to Project 25 Phase II may include the addition or reconfiguration of equipment software. Proposers shall describe the software that must be added to or reconfigured in order to upgrade it to meet the requirements of Project 25 Phase II as well as the process required to perform the upgrade. Proposers shall describe the impact (changes, eliminations, expansions) of an upgrade to Project 25 Phase II to any of the P25 Trunking Features listed above.

10. Shared Core Call Processing Requirements

The Shared Core shall support the ability to process up to 250,000 calls over a 24 hour period on any and all radio subsystems that are connected to it.

(For purposes of this requirement, a call shall be considered any Individual Call, Group Call, Broadcast Call, or Emergency Call.)

11. Shared Core "Internal" Interoperability Requirements

The Shared Core shall support the ability for communications to occur between radio subsystems such that: i) users operating on one radio subsystem can talk to users that have selected the same talkgroup but that are operating on another radio subsystem (that is connected to the same Shared Core), ii) users operating on one radio subsystem can roam to another radio subsystem (that is connected to the same Shared Core) without having to change a setting or selection on their radio, and iii) users operating on one radio subsystem can scan the talkgroups of users operating on another radio subsystem (that is connected to the same Shared Core).

12. Shared Core "External" Interoperability Requirements

The Shared Core shall support Inter RF-SubSystem Interface (ISSI) interconnections to at least two, external ISSI-compliant radio systems (namely WISCOM and City of Milwaukee). ISSI support shall be per following P25 requirements:

- TIA-102.BACA-A
- TIA-102.BACA-A-1
- TIA-102.BACA-A-2
- TIA-102.BACA-A-3
- TIA-102.BACD-B
- TIA-102.BACF
- TIA-102.BACA-B (in draft)

~~Proposers shall describe their planned roadmap (including timing) for support of ISSI Scope 2.~~ Proposers shall describe the level to which they are involved with and/or aware of the development of ISSI Scope 2 and they shall described the anticipated time in which they will release an ISSI product that either meets the completed Scope 2's requirements or that includes support for the following issues: full registration and cross-communication of

home talkgroups on foreign systems (removing the requirement to switch talkgroups when roaming to a foreign system), packet data services, console interfaces, and OTAR.

Proposers shall describe the maximum number of ISSI connections that can be supported by proposed configuration before additional hardware or software is required.

Proposers shall describe the maximum number of ISSI connections that can be supported by proposed configuration with all required additional hardware or software.

13. Core Reliability Requirements

The Shared Core shall be designed to include no single point of failure in either the trunking control or audio selection/distribution paths that would cause either: i) the loss across one or more simulcast subsystems of any of the P25 Trunking Features as listed above or ii) the loss of interconnection and processing of user audio between the Shared Core and a simulcast subsystem resulting in loss of 2 or more of trunked talkpath resources system-wide or within a single simulcast subsystem.

Proposers shall consider connections, equipment, and concerns beyond electronics equipment as possible points of failure. Consideration shall be paid to equipment power supplies, electric power cords, etc. The Contractor shall be responsible for eliminating, at their cost, any such single points of failure that are identified by either County during the warranty period of the system.

The components of the Shared Core (including trunking controllers and audio selection/voting and distribution equipment) shall have a product reliability of 99.999% (five nines) meaning that their hardware and software shall be inoperable or unavailable for no more than 5.25 minutes per 365 days.

Reliability for the equipment that provides trunking control and audio distribution shall be provided in one of the following manners (listed in descending order of preference): i) hot-standby via external redundancy (redundant equipment located in different physical housing as the 'main' equipment), ii) hot-standby via internal redundancy (redundant equipment located in the same physical housing as the 'main' equipment), iii) warm-standby via external redundancy (redundant equipment located in different physical housing as the 'main' equipment), and iv) warm-standby via internal redundancy (redundant equipment located in the same physical housing as the 'main' equipment). Cold standby will not be accepted.

Proposer shall describe the levels of reliability included in each proposed component of the Shared Core including the use of co-located (within the same cabinet or rack) and non-co-located (able to be located in separate rooms or at off-site locations) redundant components or subcomponents. Proposer shall also describe the overall system's performance in the event of the failure each component of the proposed Shared Core. For each Shared Core component's failure, proposers shall describe: i) if a proposed redundant configuration operates in 'hot' or 'warm' standby mode: ii) the immediate impact to system performance (from the perspective of a user of a subscriber radio); iii) what notification is presented via the proposed system management equipment; iv) the actions automatically taken by other system components to continue operations (with either normal or limited performance); v) the actions that must be taken by Counties or other personnel to fully restore normal operations; and vi) any potential loss of data or configuration in any system component.

14. Core / Network Management Feature Requirements

The Shared Core shall support the centralized management of the overall radio system including any radio subsystems that connect to it. It shall also allow "county partitioning" so that Waukesha and Milwaukee Counties may have access to, and control over, only their respective radio subsystems, subscriber units, talkgroups, and other subsystem-specific settings. The following management capabilities will be supported:

a) Fault Management

i) View system, component, link, or other faults with identification of the failed item, the time of the failure, and the location of the failure

ii) View, sort, and clear fault alarms (including historical alarms)

iii) Configure alarms (severity levels) and alarm processing routines (send pages, emails, etc.) ~~Monitor, integrate, display, record, and report on alarms from sources associated with the radio system such as site environmental alarms, site door/perimeter alarms, power source (UPS, generator, etc.) alarms.~~

iv) Monitor, integrate, display, record, and report on alarms from the following sources at all radio sites: Generator run; Generator alarm; Entry alarm, Fire Alarm, Surge Suppression Failure, Environmental Alarm (hot or cold), UPS alarm, 48 Volt Fault and Tower Light Fault.

b) Configuration Management

i) Add a new subscriber to the system (including addition of the subscriber ID and association of IP address)
ii) Define an 'alias' for a new subscriber
iii) Create a new talkgroup and assign subscribers to that talkgroup
iv) Assign priorities to both individual subscribers and talkgroups
v) Define and change 'feature profiles' for subscribers (including abilities/inabilities for private calls, encryption, etc.)
vi) Define radio consoles and assign talkgroups and conventional channels as resources to those consoles
vii) Define permissions for subscriber radios that establish the sites on which they are allowed and not allowed to access
viii) Support typical subscriber radio programming features including centralized management of radio programming files

c) Accounting Management

i) View, print, and export reports for following issues and data
    a) Call Activity
        i) When calls occurred
        ii) Which group or individual radio each call targeted
        iii) Total elapsed time each radio was active
    b) Activities by System or by Radio Over Time
        i) See call activity summarized by radio or by system and providing the number and length of:
            (1) Group calls
            (2) Private calls
            (3) Phone calls
        ii) Busy calls are separated by type
        iii) Summarize data by the hour, the day or by any specified time period
    c) Channel Activities
        i) Determine over- or under-utilization of a channel with detailed statistical summaries by hour, day or entire time period
        ii) Statistics include:
            (1) Number and duration of each call type
            (2) Percentage of the total available time that a channel was used
            (3) Any channel malfunctions that were recorded
    d) Group Emergency PTT - Occurrences and trends (times, days, groups) regarding emergency activity
    e) Group PTT - Occurrences and trends (times, days, groups) regarding group and individual PTT call activity
    f) Group Usage by Radio - View group usage summary for each radio ID
    g) Radio Activity
        i) Track commands sent to radios and events received from radios for any radio / talkgroup combinations
        ii) Determine if all commands were acknowledged
    h) Radio Affiliations
        i) Know what zone and site radios are using and when
        ii) Know what talkgroup radios affiliated to and when
        iii) Know how long radios were affiliated and their activity
    i) Radio Commands - View a command's timeline from origination through purge
    j) Radio Events – Track individual events from specific radios or all radios, events include messages, emergencies, and statuses
    k) Radio PTT - Identify which radios have the most activity and when the heaviest and lightest activity occurs
    l) Radio State – Identify the state of individual radios or groups of radios, identify if they are in an active, regrouped, inhibited, or emergency state
    m) Reject Reasons – Identify any/all rejected calls to identify reasons and problems
    n) System Diagnostics – Track hardware failures and alarms including alarm names and times
    o) System Usage – Record and track:
        i) Percentage of channel time used

ii) Unused time per channel
iii) Number and length of calls
iv) Average call lengths
v) Track call counts and times by the hour
vi) View channel use time in seconds
vii) Identify times with the most Busy calls

ii) Export reports to comma-separated-value (text) and Microsoft Excel formats
iii) Maintain all collected data, including 'raw' data and reports, for a period of not less than 365 days

d) Performance Management

i) View all subscribers enabled on the system including their status and their system configuration parameters
ii) Define the operational parameters for emergency call modes (preemption vs 'top of queue')
iii) Develop reports on the utilization levels of network control subsystems and individual radio systems (sites) in order to determine the need for additional resources (additional channels, sites, etc.)
iv) Allow initiation of P25 functions such as Radio Check
v) Dynamically regroup subscribers into new talkgroups including the ability to create, store, activate, and deactivate storm plans that affect many subscribers.

e) Security Management

i) Inhibit subscriber radios from operation on the entire system (all sites) and in such a way that the subscriber radio remains entirely inoperable until/unless it receives a "uninhibit" (allow operation) command from the system
ii) Set authentication keys and other provisioning details regarding authentication and encryption

15. Core / Network Management Architecture Requirements

The Network Management Features listed above shall be available on one set of hardware to be provided by proposer. The network management design shall allow remote access to up to one remote user/workstation per County (two in total) from Windows PCs that are on the same LAN (including virtual or secured network extension) as the proposer-provided hardware. Remote users shall have access to all of the same Network Management Functions listed above.

The Shared Core shall support multiple levels of administrative access to the Network Management Features so that a "root" user may access all of them and may create other user accounts that restrict access to selected features.

The databases used to store information regarding unit registration, system configuration, and other critical programming information shall be capable of being automatically backed-up (either internally or externally to another component on the network) to allow their recovery in case of hardware failure.

To support the Core / Network Management Feature Requirements listed above, the Waukesha County Radio Subsystem and the Milwaukee County Radio Subsystem shall each include all necessary remote terminal unit equipment to monitor radio control, radio repeater, environmental, power source, and other equipment at all radio, microwave, and prime sites. Such remote terminal equipment shall include the necessary hardware and software interfaces to allow the required management/reporting information to be gathered and transported to the Core/Network Management equipment.

16. Shared Core Dispatch Console

The Shared Core shall include one wireline dispatch console for the purposes of: i) testing, and ii) connection to control stations for patches to external radio systems.

Specifications for wireline dispatch consoles are included below.

17. Shared Core Conventional Channel Interfaces

The Waukesha County Radio Subsystem shall also include sufficient Conventional Channel Interfaces to allow connection of the Shared Core Consoles to up to 16 total conventional channels.

18. Shared Core Network Backhaul Requirements

The components of the Shared Core shall be connected via a dedicated local area network (LAN) that shall not be connected to the Waukesha County or Milwaukee County enterprise networks, the public internet, nor to any other external network unless connection to such is: i) explicitly described by proposer, ii) approved by Waukesha and/or Milwaukee Counties, and iii) protected by a secure firewall (to be provided by Proposer).

Connections between the Shared Core and the Waukesha County and Milwaukee County Radio Subsystems shall be made via the respective microwave networks of Waukesha and Milwaukee County. The microwave network of Waukesha County exists and will be expanded by Waukesha County as needed by this project. If proposer is unable to use the Waukesha County microwave networks to connect the Shared Core to the Waukesha County Radio Subsystem, proposer shall: i) describe the technical issues that prevent their use of the Counties' microwave systems and ii) include in their design and cost proposals the necessary equipment and services to provide the required connections from the Shared Core to the radio subsystems. The microwave network of Milwaukee County is to be included in proposer's designs and proposals.

B. Technical Requirements: Waukesha County Radio Subsystem

1. Definition of Waukesha County Radio Subsystem Components

The Waukesha County Radio Subsystem shall include the following components:

- Radio subsystem trunking and simulcast control equipment to route and manage audio between the Shared Core and all radio sites in the Waukesha County Radio Subsystem
- Radio sites that house local site control equipment, radio repeaters, antenna/ multicoupler/ combiner systems, simulcast stability, site networking, and backhaul interconnection equipment.
- A two-channel, conventional, 800MHz analog, simulcast system to be used to carry tone-based analog signals

Except where explicitly stated, all equipment included in Proposers design for inclusion in the Waukesha County Radio Subsystem shall be new and unused.

2. Waukesha County Radio Subsystem Prime Site Location

The Waukesha County Radio subsystem Prime Site (the site that houses the trunking and simulcast control equipment to route and manage audio between the Shared Core and all radio sites in the Waukesha County Radio Subsystem) shall be located at the WCRS site.

3. Waukesha County Radio Subsystem Feature (P25 and non-P25) Requirements

The Waukesha County Radio Subsystem shall provide all features listed as Shared Core Trunking Features Requirements, P25 and Non-P25, in Sections VI.A.4 and VI.A.5, above.

4. Waukesha County Radio Subsystem Coverage Requirements

There are two service areas for the Waukesha County Radio System as follows:

i) The service area for the "15db building area" shall be the political boundaries of Waukesha County excluding the following "Adopted WI DNR Project Boundaries" areas:
   1. Vernon Wildlife Area
   2. Kettle Moraine State Forest, Lapham Peak Unit
   3. Kettle Moraine State Forest, Southern Unit
   4. Lulu Lake State Natural Area (the designated area near Eagle Springs Lake, to the extent it is within Waukesha County)

ii) The service area for the "6db building area" shall be exclusively limited to the following "Adopted WI DNR Project Boundaries" areas:
   1. Vernon Wildlife Area
   2. Kettle Moraine State Forest, Lapham Peak Unit
   3. Kettle Moraine State Forest, Southern Unit
   4. Lulu Lake State Natural Area (the designated area near Eagle Springs Lake, to the extent it is within Waukesha County)

The boundaries for these four "Adopted WI DNR Project Boundaries" can be viewed and exported by visiting http://www.waukeshacounty.gov/defaultwc.aspx?id=39458, entering the mapping tool, and by selecting only the following layer: "Park and Open Space", "Adopted WI DNR Project Boundaries".

For the “15db building area”, the Waukesha County Radio Subsystem shall provide 95% talk-in and talk-out service area coverage reliability at a delivered audio quality (DAQ) level of 3.4 for a portable radio with a public safety microphone (SMA) used at shoulder level in 15 dB density buildings.

For the “6db building area”, the Waukesha County Radio Subsystem shall provide 95% talk-in and talk-out service area coverage reliability at a delivered audio quality (DAQ) level of 3.4 for a portable radio with a public safety microphone (SMA) used at shoulder level in 6 dB density buildings.

5. Waukesha County Radio Subsystem Coverage – Radio Sites

See Section II for information about sites that are currently being used and that are being planned for future use by Waukesha County. Proposers shall include in their design all of the current and planned sites listed in Section II.

Should the use of these current and planned sites not suffice to meet the requirements of Section VI.B.4 of this RFP, proposers shall in their proposal notify Counties of degree to which all current and planned sites can meet those coverage requirements (i.e., proposers shall state the percentage of service area reliability that can be achieved from their design using all current and planned sites).

While Waukesha County is confident the current and planned sites will allow respondents to meet the coverage requirements, proposers who feel additional sites are required shall also suggest but not include in their design or price proposal the number and location(s) of additional sites required to meet the full coverage requirements listed above. In doing this, proposers shall consider suggestions for additional sites with the following order of preference (most preferred listed first):

1. Existing sites operated by state or other local governmental agencies
2. Undeveloped sites on County owned land

Waukesha County will not consider leased sites. Proposer must provide sufficient documentation showing the analysis used to determine why additional sites are required to meet the coverage requirements and why the use of current and planned sites provided will not.

Waukesha County requires that a maximum of three (3) new 800MHz antennas be deployed on any Waukesha County site towers as part of this project. A total of more than three 800MHz antennas may be allowed to be housed on Waukesha County site towers during the implementation and transition period associated with the deployment of the new system but no more than three 800MHz antennas may remain on any Waukesha County site tower after the existing system is decommissioned.

6. Waukesha County Radio Subsystem Coverage Guarantee and Maps

Proposers shall state their guarantee of their ability to meet the coverage requirements listed above. If the use of current and planned sites does not suffice to meet the requirements for 95% service area coverage as described above, Proposers shall state the level of service area coverage they are able to guarantee.

The percentage of coverage is highly weighted in the evaluation. Proposers who meet or exceed the coverage requirements will receive a higher rating than those that do not. The evaluation team will determine the score based on the percentage of coverage that the Proposer is willing to guarantee, taking into consideration areas of "dead" spots, etc.

To demonstrate the ability of the proposed design to meet this requirement, proposers shall provide coverage maps showing:

- 95% Reliability Maps: Proposer shall provide talk-in and talk-out coverage prediction maps showing how their design meets the 95% service area coverage requirements listed above. Proposers shall subtract (not include) any areas that would have sufficient simulcast interference (independent of their signal strength) to prevent them from meeting these requirements. Maps shall show the boundary of the service area, the county's political boundaries (including City, Town, and Village) boundaries, major roads, bodies of water, and other relevant landmarks that help identify locations of predicted coverage.
- Talkout Signal Strength Maps: Proposer shall provide talk-out coverage prediction maps showing the areas over which their design produces signal strength of 40 dBu using the Longley-Rice model and 50% probability for time and location. (These 40 dBu maps shall not include losses for land use and land cover). Maps shall show the county's political boundaries (including City, Town and Village) boundaries, major roads, bodies of water, and other relevant landmarks that help identify locations of predicted coverage.

Proposer shall describe the methods and tools (software) involved in preparing coverage maps for their proposal, including the degree to which it uses the methods prescribed by the Telecommunications Industry's Association's publication Telecommunications System Bulletin number 88-C (TSB-88-C).

Proposer shall also provide full and detailed link budgets that show the losses and gains between the transmitter's effective radiated power and the receiver's effective received sensitivity, including factors such as reliability factors, body loss, free space loss, and others.

Proposers shall use the values from the Table D-5 from TSB-88.1-D, specifically those for 'outside a vehicle', for antenna performance for their coverage predictions

7. Waukesha County Radio Subsystem Coverage Test and Remedies

Proposers shall also include in their proposals the Coverage Acceptance Test Plan (CATP) they shall use to test the system. The CATP shall demonstrate the ability of the proposed design to meet the coverage requirement listed above and it shall use the methods prescribed by TSB-88-C.

Proposers shall confirm in their proposals that if their CATP fails to demonstrate the ability of the proposed design to meet their coverage guarantee that they shall bear all costs (capital and operations/maintenance) for all adjustments to their design (up to and including the addition of sites other than those proposed) that are required to result in successful completion of their CATP.

8. Waukesha County Radio Subsystem Capacity Requirement

The Waukesha County Radio Subsystem shall include a minimum of 15 total channels to include one control channel and 14 talk channels.

Waukesha County believes that this quantity of channels shall produce a Grade of Service of 0.05 (5%) in which 5 of every 100 call requests in a given hour will be queued and that no call will be queued for longer than 5 seconds. Waukesha County's belief is that 15 channels are sufficient to provide this level of service for a load that is 20% higher than the combined loads of the following three factors:

- An "incident peak load" generated by users of the Waukesha County Radio Subsystem equal to the call volume produced on the existing Waukesha County radio system from 12:00:01 to 12:59:59 on October 21, 2012 and
- A "baseline load" generated by users of the Waukesha County Radio Subsystem. This load is based upon the traffic on the busy hour of a typical weekday (December 19, 2012) that was generated on the Waukesha County system.
- A "scan load" of traffic generated by those talkgroups on the Milwaukee County Radio Subsystem that will be carried on the Waukesha County Radio Subsystem for the sake of scanning. This load is based upon the traffic on the busy hour of a typical weekday (December 19, 2012) that was generated on talkgroups that are the primary dispatch talkgroups for law enforcement and fire agencies that are in Milwaukee County but that are on the border of Waukesha and Milwaukee Counties.

In this way, the system shall be sized to accommodate a growth factor of 20% over current normal (baseline) traffic plus special event (incident peak) traffic plus the traffic associated with users that scan selected talkgroups from Milwaukee County (scan traffic).

These loads are shown in the following table:

Waukesha County Incident Peak Load								
Date/Time	# of Available Voice Channels (1)	Unused Time (sec) On All Channels	Used Time (Sec) On All Channels	All Channels Utilization	Total Number of Calls	Average Call Duration (Sec)	# of Busies	Average Busy Duration (Sec)
10/21/2012 12:00:01 to 12:14:59	7	3,748.8	2,551.2	40.50%	621	4.1	0.0	0.0
10/21/2012 12:15:00 to 12:29:59	7	3,821.0	2,479.0	39.35%	603	4.1	0.0	0.0
10/21/2012 12:30:00 to 12:44:59	7	4,073.9	2,226.1	35.33%	574	3.9	0.0	0.0
10/21/2012 12:45:00 to 12:59:59	7	4,075.8	2,224.2	35.30%	517	4.3	0.0	0.0

Baseline Load from Waukesha County								
12/19/2012 15:45:00 to 16:44:59			7,188.4		1.512	4.8		
Scan Load from Milwaukee County								
12/19/2012 16:00:00 to 16:59:59			2,624.5		647	4.1		

(1) The system actually had 5 additional channels operational at this time but those 5 were restricted to DES calls and only 33 total calls placed on those 5 DES-restricted channels during this period.

Proposers shall perform their own independent analysis of this call-volume data and shall describe their analysis methods and the Grade of Service that will result from their design of a 15 channel subsystem given this traffic load. If proposer believes that more than 15 total channels are required to provide the Grade of Service listed above for a load that is 20% more than the combination of the three loads listed above, they shall: i) describe the capacity they feel is required to meet the Waukesha County Radio Subsystem Capacity Requirement and ii) include that capacity (i.e., additional channels) in their design and cost proposals.

9. Waukesha County Radio Subsystem Reliability Requirement

The Waukesha County Radio Subsystem shall be designed to include no single point of failure in either the trunking control or audio selection/distribution paths that would cause either: i) the loss across the Waukesha County Radio Subsystem of any of the P25 Trunking Features as listed above or ii) the loss of interconnection and processing of user audio between the Waukesha County Radio Subsystem and the Shared Core resulting in loss of 2 or more of trunked talkpath resources system-wide or within a single simulcast subsystem.

Proposers shall consider connections, equipment, and concerns beyond electronics equipment as possible points of failure. Consideration shall be paid to equipment power supplies, electric power cords, etc. The Contractor shall be responsible for eliminating, at their cost, any such single points of failure that are identified by the County during the warranty period of the system.

The components of the Waukesha County Radio Subsystem simulcast control equipment shall have a product reliability of 99.999% (five nines) meaning that their hardware and software shall be inoperable or unavailable for no more than 5.25 minutes per 365 days.

Proposer shall describe the levels of reliability included each proposed component of the Waukesha County Radio Subsystem simulcast control equipment including the use of co-located (within the same cabinet or rack) and non-co-located (able to be located in separate rooms or at off-site locations) redundant components or subcomponents.

Reliability for the equipment that provides trunking control and audio distribution shall be provided in one of the following manners (listed in descending order of preference): i) hot-standby via external redundancy (redundant equipment located in different physical housing as the 'main' equipment), ii) hot-standby via internal redundancy (redundant equipment located in the same physical housing as the 'main' equipment), iii) warm-standby via external redundancy (redundant equipment located in different physical housing as the 'main' equipment), and iv) warm-standby via internal redundancy (redundant equipment located in the same physical housing as the 'main' equipment). Cold standby will not be accepted.

Proposer shall describe the overall system's performance in the event of the failure of: i) the components of the simulcast control equipment, ii) the site repeaters, iii) the site networking equipment and iv) the site backhaul links. For each component's/link's failure, proposers shall describe: i) if a proposed redundant configuration operates in 'hot' or 'warm' standby mode: ii) the immediate impact to system performance (from the perspective of a user of a subscriber radio); iii) what notification is presented via the proposed system management equipment; iv) the actions automatically taken by other system components to continue operations (with either normal or limited performance); v) the actions that must be taken by Waukesha County or other personnel to fully restore normal operations; and vi) any potential loss of data or configuration in any system component.

10. Waukesha County Radio Subsystem Expansion Requirements

The Waukesha County Radio Subsystem shall support the ability to expand in terms of the number of distinct radio sites and total trunked channels it can support.

The Waukesha County Radio Subsystem shall have all hardware necessary to support the "future envisioned capacity" of a total of 16 distinct radio sites and 20 total trunked channels (all within the same simulcast system).

Proposers shall describe the process required to apply the software necessary to transition from the minimum-required capacity to the "future envisioned capacity".

Proposers shall describe the total number of radio subsystems, channels, sites, radios, and talkgroups that Waukesha County Radio Subsystem system can accommodate without the need for additional hardware or software.

Proposers shall describe the maximum number of radio subsystems, channels, sites, radios, and talkgroups that their proposed system can accommodate with the addition of hardware and/or software (i.e., the maximum possible expansion).

11. Waukesha County Radio Subsystem Project 25 Phase II Migration Requirements

The Waukesha County Radio Subsystem, including the Repeater and Network Control equipment, shall be able to be upgraded to Project 25 Phase II without the replacement of any proposed repeater or controller equipment hardware. Upgrade to Project 25 Phase II may include the addition or reconfiguration of repeater or controller equipment software. Proposers shall describe the software that must be added to or reconfigured in the repeater or network control equipment in order to upgrade it to meet the requirements of Project 25 Phase II as well as the process required to perform the upgrade. Proposers shall describe the impact (changes, eliminations, expansions) of an upgrade to Project 25 Phase II to any of the P25 Trunking Features listed above.

12. Waukesha County Radio Subsystem Network Backhaul Requirement

The components of the Waukesha County Radio Subsystem Prime Site and of the Radio Sites shall be connected via a dedicated local area network LAN that shall not be connected to the Waukesha County or Milwaukee County enterprise networks, the public internet, nor to any other external network unless connection to such is: i) explicitly described by proposer, ii) approved by Waukesha and/or Milwaukee Counties, and iii) protected by a secure firewall (to be provided by Proposer).

Connections between the Shared Core and the Waukesha County Radio Subsystem (including the Prime and Radio Sites) shall be made via the microwave networks to be provided by Waukesha County, described above. If proposer is unable to use the microwave networks to be provided by the County to connect the Shared Core to the Waukesha County and Radio Subsystem, proposer shall: i) describe the technical issues that prevent their use of the County's microwave systems and ii) include in their design and cost proposals the necessary equipment and services to provide the required connections from the Shared Core to the Radio Subsystem.

13. Waukesha County Radio Subsystem Conventional Analog Simulcast System

The Waukesha County Radio Subsystem shall include a two-channel, nine-site, conventional, repeated, 800MHz analog, simulcast system to be used to carry tone-based analog signals.

Waukesha County intends to use these analog channels to transport tone-based signals that cannot be carried on the P25 digital infrastructures (signals such as siren alerting tones and KnoxBox tones).

Equipment for the conventional analog simulcast system shall be new (i.e., it shall not be reused equipment from the County's existing 800MHz analog trunked (Motorola SMARTNET II+, Project 16) simulcast radio system nor from any other source).

Proposers shall include coverage predictions of this Conventional Analog Simulcast System. Coverage predictions shall show the areas over which this system produces signal strength of 40 dBu using the Longley-Rice model and 50% probability for time and location. (These 40 dBu maps shall not include losses for land use and land cover). Maps shall show the county's political boundaries (including City, Town, and Village) boundaries, major roads, bodies of water, and other relevant landmarks that help identify locations of predicted coverage.

14. Waukesha County Radio Subsystem Timing Standards

The timing standards proposed for the Waukesha County Radio Subsystem shall include the capabilities to support the proposed Project 25 trunked radio system plus the two-channel 800MHZ conventional, analog simulcast system described above plus the following number of other simulcast channels currently in use at the following sites:

- At Waukesha: 1 channel of County Fire Alerting
- At Eagle: 1 channel of County Fire Alerting and 4 channels of VHF interoperability
- At Nashotah: 1 channel of County Fire Alerting and 4 channels of VHF interoperability
- At New Berlin: 1 channel of County Fire Alerting and 4 channels of VHF interoperability
- At Menomonee Falls: 1 channel of County Fire Alerting
- At Brookfield: 1 channel of County Fire Alerting and 4 channels of VHF interoperability
- At Delafield: no additional channels

C. Technical Requirements: WCC Dispatch Center

1. WCC Dispatch Console Requirements

The Waukesha County Radio Subsystem shall include one dispatch center to be located at the Waukesha County Communications Center (WCC) at the Waukesha County Emergency Operations Center that shall be comprised of 17 wireline Dispatch Consoles that meet the requirements for Wireline Dispatch Consoles as included below.

In addition to those requirements, the wireline Dispatch Positions for WCC shall include the ability to, upon manual intervention and following loss of connectivity to Shared Core, switch connectivity to local control stations.

2. WCC Conventional Channel Interface Requirements

The Waukesha County Radio Subsystem shall also include sufficient Conventional Channel Interfaces to allow connection of the WCC Dispatch Consoles to up to 16 total conventional channels.

3. WCC Subsystem Logging Recorder Requirements

Waukesha County has recently put into service a new a logging recorder system: Model ComLog NP192 from CVDS, Inc. This logging recorder is located at the WCC facility. Proposers shall include the ability to interface to this logging recorder to the Waukesha County Radio Subsystem or they shall describe any reasons why their design does not support an interface to it as well as any limitations their design places on its functionality.

D. Technical Requirements: Milwaukee County Radio Subsystem

1. Definition of Milwaukee County Radio Subsystem Components

The Milwaukee County Radio Subsystem shall include the following components:

- Radio subsystem trunking and simulcast control equipment to route and manage audio between the Shared Core and all radio sites in the Milwaukee County Radio Subsystem
- Radio sites that house local site control equipment, radio repeaters, antenna/ multicoupler/ combiner systems, simulcast stability, site networking, and backhaul interconnection equipment.
- Wireline dispatch consoles as described below
- Conventional Channel Interfaces to interconnect talkgroups on the Milwaukee County Radio Subsystem to external trunked or conventional radio systems

Except where explicitly stated, all equipment included in Proposers design for inclusion in the Milwaukee County Radio Subsystem shall be new and unused.

2. Milwaukee County Radio Subsystem Prime Site Location

The Milwaukee County Radio subsystem Prime Site (the site that houses the trunking and simulcast control equipment to route and manage audio between the Shared Core and all radio sites in the Milwaukee County Radio Subsystem) shall be located at the Milwaukee County Muirdale radio site.

3. Milwaukee County Radio Subsystem Feature (P25 and non-P25) Requirements

The Milwaukee County Radio Subsystem shall provide all features listed as Shared Core Trunking Features Requirements, P25 and Non-P25, in Sections VI.A.4 and VI.A.5, above.

4. Milwaukee County Radio Subsystem Coverage Requirements

The service area for the Milwaukee County Radio System shall be the political boundaries of Milwaukee County.

The Milwaukee County Radio Subsystem shall provide 95% talk-in and talk-out service area coverage reliability at a delivered audio quality (DAQ) level of 3.4 for a portable radio on a swivel clip at belt level in 15 dB density buildings across Milwaukee County.

The Milwaukee County Radio Subsystem shall also provide 99% talk-in and talk-out service area coverage reliability at a delivered audio quality (DAQ) level of 3.0 for a mobile radio transmitting with an antenna on the roof of a standard passenger car in outdoor/street-level locations across Milwaukee County.

5. Milwaukee County Radio Subsystem Coverage –Radio Sites

See Section II, above, for information about sites that are currently being used by Milwaukee County. Proposers are required to include in their design all of the current sites listed in Section II.

Should the use of these current sites not suffice to meet the requirements of Section VI.D.4 of this RFP, proposers shall in their proposal notify Counties of degree to which all current sites can meet those coverage

requirements (i.e., proposers shall state the percentage of service area reliability that can be achieved from their design using all current and planned sites).

While Milwaukee County is confident the current sites will allow respondents to meet the coverage requirements, proposers who feel additional sites are required shall also suggest but not include in their design or price proposal the number and location(s) of additional sites required to meet the full coverage requirements listed above. In doing this, proposers shall consider suggestions for additional sites with the following order of preference (most preferred listed first):

1. Existing sites operated by state or other local governmental agencies
2. Undeveloped sites on County owned land
3. Undeveloped sites on other property

Milwaukee County will consider leased sites. Proposer must provide sufficient documentation showing the analysis used to determine why additional sites are required to meet the coverage requirements and why the use of current sites provided will not.

6. Milwaukee County Radio Subsystem Coverage Guarantee and Maps

Proposers shall state their guarantee of their ability to meet the coverage requirements listed above. As noted, if the use of existing sites does not suffice to meet the requirements for 95% service area coverage as described above, Proposers shall state the level of service area coverage they are able to guarantee.

The percentage of coverage is highly weighted in the evaluation. Proposers who meet or exceed the coverage requirements will receive a higher rating than those that do not. The evaluation team will determine the score based on the percentage of coverage that the Proposer is willing to guarantee, taking into consideration areas of "dead" spots, etc.

To demonstrate the ability of the proposed design to meet this requirement, proposers shall provide coverage maps showing:

- 95% Reliability Maps: Proposer shall provide talk-in and talk-out coverage prediction maps showing how their design meets the 95% service area coverage requirements listed above. Proposers shall subtract (not include) any areas that would have sufficient simulcast interference (independent of their signal strength) to prevent them from meeting these requirements. Maps shall show the boundary of the service area, the county's political boundaries (including City, Town, and Village) boundaries, major roads, bodies of water, and other relevant landmarks that help identify locations of predicted coverage.
- Talkout Signal Strength Maps: Proposer shall provide talk-out coverage prediction maps showing the areas over which their design produces signal strength of 40 dBu using the Longley-Rice model and 50% probability for time and location. (These 40 dBu maps shall not include losses for land use and land cover). Maps shall show the county's political boundaries (including City, Town, and Village) boundaries, major roads, bodies of water, and other relevant landmarks that help identify locations of predicted coverage.

Proposer shall describe the methods and tools (software) involved in preparing coverage maps for their proposal, including the degree to which it uses the methods prescribed by the Telecommunications Industry's Association's publication Telecommunications System Bulletin number 88-C (TSB-88-C).

Proposer shall also provide full and detailed link budgets that show the losses and gains between the transmitter's effective radiated power and the receiver's effective received sensitivity, including factors such as reliability factors, body loss, free space loss, and others.

Proposers shall use the values from the Table D-5 from TSB-88.1-D, specifically those for 'outside a vehicle', for antenna performance for their coverage predictions

7. Milwaukee County Radio Subsystem Coverage Test and Remedies

Proposers shall also include in their proposals the Coverage Acceptance Test Plan (CATP) they shall use to test the system. The CATP shall demonstrate the ability of the proposed design to meet the coverage requirement listed above and it shall use the methods prescribed by TSB-88-C.

Proposers shall confirm in their proposals that if their CATP fails to demonstrate the ability of the proposed design to meet their coverage guarantee that they shall bear all costs (capital and operations/maintenance) for all adjustments to their design (up to and including the addition of sites other than those proposed) that are required to result in successful completion of their CATP.

8. Milwaukee County Radio Subsystem Capacity Requirement

The Milwaukee County Radio Subsystem shall include a minimum of 18 total channels to include one control channel and 17 talk channels.

Milwaukee County believes that this quantity of channels shall produce a Grade of Service of 0.05 (5%) in which 5 of every 100 call requests in a given hour will be queued and that no call will be queued for longer than 5 seconds. Milwaukee County's belief is that 18 channels are sufficient to provide this level of service for a load that is 33% higher than the combined loads of the following three factors:

- A peak load generated by users of the Milwaukee County Radio Subsystem equal to the call volume produced on the existing Waukesha County radio system from 13:00:00 to 13:59:59 on August 5, 2012 and
- A "baseline load" generated by users of the Milwaukee County Radio Subsystem. This load is based upon the traffic on the busy hour of a typical weekday (December 19, 2012) that was generated on the Milwaukee County system and
- A typical load of traffic generated by those talkgroups on the Waukesha County Radio Subsystem that will be carried on the Milwaukee County Radio Subsystem for the sake of scanning. (This load was is based upon the traffic on the busy hour of a typical weekday (December 19, 2012) that was generated on talkgroups that are the primary dispatch talkgroups for law enforcement and fire agencies that are in Waukesha County but that are on the border of Waukesha and Milwaukee Counties.)

In this way, the system shall be sized to accommodate a growth factor (33%) over current normal (baseline) traffic plus special event (incident peak) traffic plus the traffic associated with users that scan selected talkgroups from Waukesha County (scan traffic).

These loads are shown in the following table:

Milwaukee County Incident Peak Load								
Date/Time	# of Available Voice Channels	Unused Time (sec) On All Channels	Used Time (Sec) On All Channels	All Channels Utilization	Total Number of Calls	Average Call Duration (Sec)	# of Busies	Average Busy Duration (Sec)
08/05/2012 13:00:00 to 13:14:59	13	7,799.2	3,900.8	33.34%	890	4.4	0.0	0.0
08/05/2012 13:15:00 to 13:29:59	13	7,135.0	4,565.0	39.02%	1,143	4.0	0.0	0.0
08/05/2012 13:30:00 to 13:44:59	13	7,650.8	4,049.2	34.61%	1,039	3.9	0.0	0.0
08/05/2012 13:45:00 13:59:59	13	7,653.4	4,046.6	34.59%	908	4.5	2.0	2.4
Baseline Load from Milwaukee County								
12/19/2012 16:00:00 to 16:59:59			12,816.1		2.833	4.5		
Scan Load from Waukesha County								
12/19/2012 15:45:00 to 16:44:59			4,149.7		982	4.2		

Proposers shall perform their own independent analysis of this call-volume data and shall describe their analysis methods and the Grade of Service that will result from their design of a 18 channel subsystem given this traffic load. If proposer believes that more than 18 total channels are required to provide the Grade of Service listed above for a load that is 33% more than the combination of the three loads listed above, they shall: i) describe the capacity they feel is required to meet the Milwaukee County Radio Subsystem Capacity Requirement and ii) include that capacity (i.e., additional channels) in their design and cost proposals.

9. Milwaukee County Radio Subsystem Reliability Requirement

The Milwaukee County Radio Subsystem shall be designed to include no single point of failure in either the trunking control or audio selection/distribution paths that would cause either: i) the loss across the Milwaukee County Radio Subsystem of any of the P25 Trunking Features as listed above or ii) the loss of interconnection and processing of user audio between the Milwaukee County Radio Subsystem and the Shared Core resulting in loss of 2 or more of trunked talkpath resources system-wide or within a single simulcast subsystem.

Proposers shall consider connections, equipment, and concerns beyond electronics equipment as possible points of failure. Consideration shall be paid to equipment power supplies, electric power cords, etc. The Contractor shall be responsible for eliminating, at their cost, any such single points of failure that are identified by the County during the warranty period of the system.

The components of the Milwaukee County Radio Subsystem simulcast control equipment shall have a product reliability of 99.999% (five nines) meaning that their hardware and software shall be inoperable or unavailable for no more than 5.25 minutes per 365 days.

Proposer shall describe the levels of reliability included each proposed component of the Milwaukee County Radio Subsystem simulcast control equipment including the use of co-located (within the same cabinet or rack) and non-co-located (able to be located in separate rooms or at off-site locations) redundant components or subcomponents.

Reliability for the equipment that provides trunking control and audio distribution shall be provided in one of the following manners (listed in descending order of preference): i) hot-standby via external redundancy (redundant equipment located in different physical housing as the ‘main’ equipment), ii) hot-standby via internal redundancy (redundant equipment located in the same physical housing as the ‘main’ equipment), iii) warm-standby via external redundancy (redundant equipment located in different physical housing as the ‘main’ equipment), and iv) warm-standby via internal redundancy (redundant equipment located in the same physical housing as the ‘main’ equipment). Cold standby will not be accepted.

Proposer shall also describe the overall system’s performance in the event of the failure of: i) the components of the simulcast control equipment, ii) the site repeaters, iii) the site networking equipment, and iv) the site backhaul links. For each component’s/link’s failure, proposers shall describe: i) if a proposed redundant configuration operates in ‘hot’ or ‘warm’ standby mode: ii) the immediate impact to system performance (from the perspective of a user of a subscriber radio); iii) what notification is presented via the proposed system management equipment; iv) the actions automatically taken by other system components to continue operations (with either normal or limited performance); v) the actions that must be taken by Milwaukee County or other personnel to fully restore normal operations; and vi) any potential loss of data or configuration in any system component.

10. Milwaukee County Radio Subsystem Expansion Requirements

The Milwaukee County Radio Subsystem shall support the ability to expand in terms of the number of distinct radio sites and total trunked channels it can support.

The Shared Core and the control/management electronics of the Milwaukee County Radio Subsystem shall have all hardware necessary to support the “future envisioned capacity” of a total of 16 distinct radio sites and 24 total trunked channels.

The radio-antenna design of the Milwaukee County Radio Subsystem shall accommodate future growth to no fewer than 28 total trunked radio channels and proposers shall ensure that all radio site antenna equipment (including combiners and multicouplers) be sized accordingly.

Proposers shall describe the process required to apply the software necessary to transition from the minimum-required capacity to the “future envisioned capacity”.

Proposers shall describe the total number of radio subsystems, channels, sites, radios, and talkgroups that Milwaukee County Radio Subsystem system can accommodate without the need for additional hardware or software.

Proposers shall describe the maximum number of radio subsystems, channels, sites, radios, and talkgroups that their proposed system can accommodate with the addition of hardware and/or software (i.e., the maximum possible expansion).

11. Milwaukee County Radio Subsystem Project 25 Phase II Migration Requirements

The Milwaukee County Radio Subsystem, including the Repeater and Network Control equipment, shall be able to be upgraded to Project 25 Phase II without the replacement of any proposed repeater or controller equipment hardware. Upgrade to Project 25 Phase II may include the addition or reconfiguration of repeater or controller equipment software. Proposers shall describe the software that must be added to or reconfigured in the repeater or network control equipment in order to upgrade it to meet the requirements of Project 25 Phase II as well as the process required to perform the upgrade. Proposers shall describe the impact (changes, eliminations, expansions) of an upgrade to Project 25 Phase II to any of the P25 Trunking Features listed above.

12. Milwaukee County Radio Subsystem Legacy Radio System Interface

Because of Milwaukee County's phased implementation plan, it will be necessary for Milwaukee County to continue to operate its existing County SmartNet II+ trunked radio system (in whole or in part) for a period of years while the Shared Core, the Waukesha County Radio Subsystem, and portions of the Milwaukee County Radio Subsystem are being, or have been, implemented.

To the degree allowed by their design, proposers shall include a legacy radio system interface to facility interoperability between the Shared Core, the Waukesha County Radio Subsystem, the Milwaukee County Radio Subsystem, and the existing County SmartNet II+ trunked radio system.

One technical approach for such a legacy radio system interface would allow the existing Milwaukee County SmartNet II+ trunked radio system to connect to the Shared Core and to operate with the Shared Core in the same manner as would another Project 25 Radio Subsystem. Other technical approaches may exist.

Such a legacy radio system interface should accommodate the specifics of the existing Milwaukee County SmartNet II+ trunked radio system (the number of channels, the number of users, etc.).

Proposers that include such a legacy radio system interface shall thoroughly describe how it operates, its benefits (the features that can be carried between/across the systems), and its limitations (the features that cannot be carried across/between the systems).

13. Milwaukee County Radio Subsystem Network Backhaul Requirement

The components of the Milwaukee County Radio Subsystem Prime Site and of the Radio Sites shall be connected via a dedicated local area network (LAN) that shall not be connected to the Milwaukee County or Milwaukee County enterprise networks, the public internet, nor to any other external network unless connection to such is: i) explicitly described by proposer, ii) approved by Milwaukee and/or Milwaukee Counties, and iii) protected by a secure firewall (to be provided by Proposer).

Proposers shall include in their proposals new digital microwave links to interconnect the radio sites included in the Milwaukee County Radio Subsystem (including the Prime and Radio Sites) to each other and to the Shared Core.

1. The proposed microwave links shall meet the following specifications:

    a) The new microwave links shall include all necessary interface cards, channel banks, WAN cards, multiplex, radios, antennas, radio and other cabling, and any other equipment to operate the backhaul links and to interconnect the LAN used by the proposer's design for the Milwaukee County Radio Subsystem and the Shared Core
    b) Milwaukee County believes that the most cost effective and maintenance-free installations of microwave involve installing the microwave amplifiers/receivers on the towers in very close proximity of antennas as this arrangement eliminates the need for waveguide and its associated pressurization and dehydration equipment. Milwaukee County prefers this installation arrangement, which includes installation of microwave multiplex equipment in racks inside the radio site shelter, and requests proposers to include it in their proposals. Proposers shall state if they feel such an arrangement is

not cost-advantageous to the County or if their equipment cannot support this installation arrangement.

c) The new microwave links shall utilize true digital transmission and utilize current state-of-the-art modulation technologies
d) The new microwave links shall utilized licensed frequencies (only equipment operating on assigned frequencies in the frequency range of 5 GHZ to 12 GHZ will be considered) and shall include only FCC licensed equipment will be considered.
e) The new microwave links shall provide at least 99.999% path reliability with a minimum of 30 dB or more fade margin
f) The new microwave links shall provide a capacity of at least 45 Mbps with the capacity to transport a minimum of 8 T-1 connections
g) The new microwave links shall provide a latency consistent with the requirements of their proposed design for the Milwaukee County Radio Subsystem with a value not to exceed 10 mS.
h) The new microwave links shall support simultaneous use of T1 or E1 lines with Ethernet, including both IPV4 and IPV6
i) The new microwave links shall include antennas that are appropriate for the operating frequency and path and shall be fully enclosed in a radome
j) The new microwave links and equipment shall be accessible via software for purpose of troubleshooting and maintenance from any point in the microwave system
k) The new microwave links and equipment shall be accessible for troubleshooting and maintenance via standard dial up modem connection. The ability to connect to a LAN with a TCP/IP address will also be considered
l) The new microwave links shall support simultaneous monitoring from Milwaukee county and Waukesha County
m) The new microwave links shall internally maintain records of all equipment alarms (at a minimum, each equipment must maintain a record of the most recent 512 alarms and alarm records must be accessible and remain even if power is lost to the equipment)

2. The following sites shall be connected with an architecture that includes hot-standby equipment and a redundant loop system topology:
   a) All radio sites included in the Proposer's design
   b) The Milwaukee County Sheriff's Office dispatch center at 821 West State Street, Milwaukee WI (43-02-33.5 N, 87-55-20.5 W)
   c) The existing Milwaukee County radio site at 3855 McKinley St, Milwaukee WI (43-02-47.0 N, 87-57-41.3 W)
   d) The WCRS site at 2120 Davidson Road, Waukesha, WI (43-01-30.0 N 88-11-12.3 W)
   ~~c)~~e) The MC EMS location at Froedtert Hospital between the East Atrium of Froedtert Hospital and Children's Memorial Hospital (43-2-30.11 N, 88-1-24.23 W)

3. The following sites may be connected with an architecture that includes warm-standby equipment and as spurs from the most convenient site on the microwave loop topology:
   a) The Milwaukee County Transit System Headquarters facility at 1942 North 17th Street, Milwaukee WI (43-03-19.3 N, 87-~~05~~55-59.6 W)
   b) The General Mitchel International Airport dispatch center at 5300 S Howell Ave, Milwaukee WI (42-56-49.9 N, 87-54-08.6 W) – this spur is required only if the Proposer's design includes integrating the dispatch consoles at this site via a wireline interface.
   c) The Milwaukee County Emergency Government location at 8885 S. 68th Street, Franklin WI (42-52-42.5 N, 88-00-01.7 W)
   d) The Milwaukee County Information Management Services Division location at 2711 W Wells Street, Milwaukee WI (43-02-23.7 N, 87-56-54.1 W)

14. Milwaukee County Radio Subsystem Dispatch Console Requirements

The Milwaukee County Radio Subsystem shall include: i) one dispatch center to be located at the Milwaukee County Sheriff's Dispatch Center at the Milwaukee County Courthouse that shall be comprised of 13 wireline Dispatch Consoles (MCSO Base Models), ii) one dispatch center to be located at the Milwaukee County Transit System Headquarters that shall be comprised of 5 wireline Dispatch Consoles (WCC/Standard Base Models), and iii) one dispatch center to be located at the Milwaukee County Emergency Medical Services Dispatch Center located at Froedtert Hospital that shall be comprised of 4 wireline Dispatch Consoles (WCC/Standard Base Models).

Note: One of the 13 wireline Dispatch Consoles to be located at the Milwaukee County Sheriff's Dispatch Center shall be located away from the dispatch positions in a nearby equipment room. This thirteenth Console shall be used for the purposes of testing and for creating patches. Additionally, two of the 13 wireline Dispatch Consoles to be located at the Milwaukee County Sheriff's Dispatch Center shall be operated as remote positions and located at the MCJF at the nearby location of 949 N 9th St, Milwaukee, WI. Milwaukee County shall provide the connections from the MCJF to the MCSO dispatch center. The remaining 10 wireline Dispatch Consoles shall be used at dispatch positions at the MSCO dispatch center.

The Milwaukee County Radio Subsystem shall also include the following wireless Dispatch Consoles: i) one for MCCFS and ii) one for MCHD.

Proposers shall include in their proposals the equipment and resources required to integrate General Mitchell International Airport's existing 4 dispatch positions (Motorola MCC7500) into the Milwaukee County Radio Subsystem. Milwaukee County prefers that the consoles be integrated via a wireline interface; however, wireless interfaces will be accepted.
~~Proposers shall include in their proposals the equipment and resources required to integrate General Mitchell International Airport's existing 4 dispatch positions (Motorola MCC7500) into the Milwaukee County Radio Subsystem~~

Nothing about the design of the Milwaukee County Radio Subsystem or of the Shared Core shall prevent the connection of wireline or wireless consoles from local municipalities (Bayside Communications Center, Cudahy, Franklin, Greendale, Oak Creek, South Milwaukee, St. Francis, Wauwatosa, West Allis, West Milwaukee, and Hales Corners) that are purchased from the contract resulting from this RFP from interfacing and delivering the functionality called for in Section VI.F of this RFP.

The wireline Dispatch Positions shall include the ability to, upon manual intervention and following loss of connectivity to Shared Core, switch connectivity to local control stations.

The Milwaukee County Radio Subsystem shall also include sufficient Conventional Channel Interfaces to allow connection of the Milwaukee County Sheriff's Office dispatch center to up to 16 total conventional channels.

The Dispatch Consoles at MCSO, MC EMS and MCTS, and shall, upon manual intervention following loss of connectivity to the Shared Core, switch connectivity to local control stations and integrated through conventional interfaces. To accomplish this, the following quantities of control stations shall be provided for each Milwaukee County wireline dispatch center: 5 for MCSO, 2 for GMIA, 3 for MC EMS, and 0 for any/all others. (These quantities have been included in the REVISED Price Sheet).

The wireless Dispatch Console at MCCFS shall be connected to the radio system via a single control station that is directly controlled by the dispatch interface." Additionally, the third paragraph of Section VI.D.14 shall be amended to read as follows: "The Milwaukee County Radio Subsystem shall also include one wireless Dispatch Console for MCCFS. A dispatch console is not required for MCHD.

The wireless Dispatch Consoles at MC EMS shall support interfacing to and controlling 6 auxiliary inputs/outputs (Aux I/O's). Proposers shall include all equipment and services to move these Aux I/O's from their current location (the "CEB cage") to the 7th floor RF Room or other location to be approved by Milwaukee County.

The wireless Dispatch Consoles at MC EMS shall support interface to the following the following existing control stations (8) and consolettes (3): EMS B, MFD Fire Scan, NS Fire Scan, Wauwatosa Fire Scan, MFD Fire Ops, 162.400 (weather), Hear (w/ DTMF), 129.475 (air), 123.05 (air). Connection between these control stations and consolettes does not currently exist and all equipment and services to provide it must be included in Proposer's design and proposal. The Contractor must work with Froedtert and Children's Memorial Hospitals to implement the connection.

The dispatch consoles at MCTS must be equipped with the necessary software to interface to the existing ORBICAD (Orbicom CAD) system.

15. Milwaukee County Radio Subsystem Logging Recorder Requirements

Milwaukee County Sheriff's Office has recently put into service a new a logging recorder system: model NRX Inform manufactured by NICE Systems. This logging recorder is located at the Milwaukee County Sheriff Office's dispatch center.

Milwaukee County Transit System (MCTS) operates the following logging recorder system: model ComLogNP manufactured by company CVDS, Inc. This logging recorder is located at the Milwaukee County Transit System's dispatch center at the MCTS headquarters facility.

Milwaukee County Emergency Medical Services operates the following logging recorder system: model ComLogNP manufactured by CVDS, Inc. This logging recorder is located at the Milwaukee County EMS' dispatch center near the Emergency Department at Froedert Hospital.

Proposers shall include the ability to interface to these three existing logging recorders to the Milwaukee County Radio Subsystem or they shall describe any reasons why their design does not support an interface to them as well as any limitations their design places on their functionality.

16. Milwaukee County Radio Subsystem Legacy Dispatch Console Interface

Because of Milwaukee County's phased implementation plan, it will be necessary for Milwaukee County to continue to operate its existing CentraCom Gold Elite dispatch consoles, which are connected via an Embassy Switch, for a period of years while the Shared Core, the Waukesha County Radio Subsystem, and portions of the Milwaukee County Radio Subsystem are being, and have been, implemented.

To the degree allowed by their design, proposer shall include a legacy dispatch console interface to facility interoperability between the Shared Core, the Waukesha County Radio Subsystem, the Milwaukee County Radio Subsystem, and the existing Embassy Switch and the existing CentraCom Gold Elite dispatch consoles.

Such a legacy dispatch console interface should accommodate the specifics of the existing Milwaukee County Embassy Switch and CentraCom Gold Elite dispatch consoles (the number of positions, number of audio paths, etc.). Proposers shall include in their design and pricing any upgrades to all of the dispatch consoles that currently interface to the existing Milwaukee County Embassy Switch, plus the dispatch consoles used by Milwaukee County Transit System, to allow them to operate with and through the proposed legacy dispatch console interface.

Proposers that include such a legacy dispatch console interface shall thoroughly describe how it operates, its benefits (the features that can be carried between/across the systems), and its limitations (the features that cannot be carried across/between the systems).

E. Technical Requirements: Radio Subsystem Repeaters

All radio repeaters included in the Waukesha County Radio Subsystem and Milwaukee County Radio Subsystem, both described above, shall meet the specifications of this Section of the RFP.

1. Radio Repeater SDOC Requirements

Repeaters shall have completed certification in the Project 25 Compliance Assessment Program (CAP). Proposers shall provide SDOC (Supplier's Declaration of Conformity) reports for all repeater products included in proposer's design.

2. Radio Repeater – Radio Parametric Requirements

All Radio Repeaters included in the Waukesha County Radio Subsystem and the Milwaukee County Radio Subsystem shall meet or exceed the following radio parametric performance specifications:

a) Frequency Band
- i) Transmit: 851-869 MHz
- ii) Receive: 806-824 MHz

b) Channel Capacity and Spacing
- i) Channel Capacity: One (1) transmit and one (1) receive
- ii) Channel Spacing: 12.5 kHz, 20kHz, and 25 kHz

c) Frequency Generation
- i) Frequency Generation shall be by and internal synthesizer and/or embedded microprocessor technology

d) Transmitter: Power
- i) Carrier Output Power Rating: 50-80W minimum, 100 W maximum (before combiner) continuous duty, constant @ +/- 10% rated power with <1 dB power variation over the range of input power

e) Transmitter: Frequency Deviation
- i) High level deviation between 2544 Hz & 3111 Hz
- ii) Low level deviation between 848 Hz & 1037 Hz

f) Transmitter: Modulation Fidelity
- i) < 5% per TIA TSB102.CAAA Transceiver Measurement Methods, clause 2.2.16.2

g) Transmitter: Conducted Spurious Emissions
- i) -70 dB (25 kHz)

h) Transmitter: Carrier Attack Time
- i) Carrier Attack Time: <150 ms

i) Transmitter: Time Out Timer
- i) Limits the duration of the station transmission
- ii) Transmission Duration: 1 to 4 minutes minimum, programmable in 1 minute increments

j) Transmitter/Receiver: Output-Input Impedance
- i) Output-Input Impedance: 50 ohms

k) Transmitter/Receiver: Signaling Digital Mode
- i) Signaling Digital Mode: Generate/decode all P25 Network Access Codes (NAC) listed in TIA/EIA-102

l) Transmitter/Receiver: Carrier Frequency Stability
- i) 809-824MZ, 854-869MHz: 1.5PPM
- ii) 806-809MHz: 1.0PPM

m) Receiver: Reference Sensitivity
- i) Digital Mode (5% BER): -116 dBm

n) Receiver: Adjacent Channel Rejection
i) 60 dB per TIA-102.CAAB-b, 3.1.7.1

o) Receiver: Spurious and Image Response Rejection
i) 90 dB TIA.102-CAAB-b, 3,1,10

p) Receiver: Co-Channel Rejection
i) < 9dB Per TIA-102. CAAB-b, 2.1.8 (ref TIA-102.CAAB-b, 3.1.8)

q) Receiver: Intermodulation Rejection
i) 80 dB (12.5 / 25 kHz)

3. Radio Repeater – Repeater Indicator Requirements

Repeater shall be equipped with the following indicators mounted on the front panel:

- Transmit
- Primary Power On/Off
- Fault (alarm)

4. Radio Repeater – Repeater Electrical Power Requirements

Repeater shall operate per the following electrical requirements:

a) Power Consumption
i) Repeater Power Source: 48 VDC or 110 VAC
ii) Transmit Current Drain: 12 A max
iii) Standby Current Drain: 600 mA max at 13VDC

b) Surge Protection
i) Fuses or other current limiting devices shall be contained within the repeater

5. Radio Repeater – Repeater Programming Requirements

Proposers shall provide a total of six (6) total sets of equipment, cables, and software required to program and maintain the repeaters, including their encryption capabilities (i.e,. key fill devices and authentication key devices), as described in this RFP. Three sets will be dedicated for Waukesha County and three for Milwaukee County. (If site licenses are available, pricing shall be based on one site license for Waukesha County and one for Milwaukee County.) Equipment shall be exclusive of the computers used to operate the programming software. Programming software shall be compatible with Windows based PCs operating Windows XP or Windows 7.

F. Technical Requirements: Radio Subsystem Dispatch Consoles

Dispatch Consoles shall be available in two connectivity options: i) wireline connection in which each console connects to the Shared Core via a IP-based wired network connection and ii) wireless connection in which each console uses local control stations radios to broadcast and receive audio on voice radio talkgroups and channels.

Unless specifically noted, the requirements for Dispatch Consoles shall apply equally for those with wireline and wireless connectivity.

1. Dispatch Console Components – Standard/WCC Base Model

Each Standard/WCC Dispatch Console shall include a computer, a flat-panel display (21" minimum), mouse (with one button to be used for push-to-talk), foot switch, audio jack to accept two distinct 6-wire wired headsets (each with PTT switch, both operate in parallel, see note below), two external speakers (one for "select" audio, one for all other "unselect" audio), power supplies, all necessary software to meet the requirements of this RFP, and all necessary cabling and hardware to allow installation on a standard desk.

NOTE: The Dispatch Consoles that shall be supplied for WCC shall be cable of supporting the operations of WCC's existing six-wire headsets (various models are used but all use a standard six-wire interface).

WIRELINE ONLY: Each Dispatch Console shall include all necessary switches, routers, cabling, and other hardware or software as required for interfacing to a microwave network.

2. Dispatch Console Components – MCSO Base Model

Each Milwaukee County Sheriff Office's Dispatch Console shall include a computer, a flat-panel display (21" minimum), trackball (with one button to be used for push-to-talk foot switch, audio jack to accept two distinct 4-wire wired headsets (each with PTT switch, both operate in parallel, see note below), four external speakers (one for "select" audio, three for all other "unselect" audio), power supplies, all necessary software to meet the requirements of this RFP, and all necessary cabling and hardware to allow installation on a standard desk.

NOTE: Each MCSO Dispatch Console shall include two new 4-wire Plantronics wired headsets.

WIRELINE ONLY: Each Dispatch Console shall include all necessary switches, routers, cabling, and other hardware or software as required for interfacing to a microwave network.

3. Dispatch Console Components – Options

Each Dispatch Console shall be cable of supporting touch-screen operations through its flat-panel display but touch capabilities shall not be included unless added as an option.

Each Standard/WCC Dispatch Console shall be supplied with one 6-wire wired headset (with PTT switch) only if added as an option.

Each Dispatch Console shall support a desk microphone (with two buttons, one for push-to-talk) which shall not be included unless added as an option.

Each Dispatch Console shall support one wireless headset which shall not be included unless added as an option.

4. Dispatch Console Display / Audio Capabilities

Each Dispatch Console shall be capable of displaying up to 8 pages of radio modules with each page being able to contain up to 16 modules.

WIRELINE ONLY: Each Dispatch Console shall be capable of processing up to 60 simultaneous audio sessions.

Each radio module shall be associated with one trunked talkgroup or with a conventional channel that is interfaced via a Conventional Channel Interface. Each radio module shall display a distinct name for the module and the select/unselect status of the module.

WIRELINE ONLY: Each radio module shall also display the identification number or alias of the trunked subscriber radio that last transmitted on that module

Each module shall support independent volume control and shall display the volume associated with the module.

Each Dispatch Console shall support either the IMBE (Baseline) Project 25 vocoder or the Project 25 Enhanced Full Rate Vocoder (AMBE + 2), however, the latter is preferred.

Each Dispatch Console shall support both clear (unencrypted) and AES-encrypted radio transmissions.

5. Dispatch Console Push-to-Talk Capabilities

Each Dispatch Console shall be capable of supporting the following methods of Push-to-Talk (PTT):

- PTT button on wired headset
- PTT button on wireless headset (optional)
- PTT button on desk mic (optional)
- PTT on touch screen (optional)
- PTT on foot switch
- PTT on mouse

6. Dispatch Console Operational Features

Each Dispatch Console shall be capable of supporting the following operational features:

a) Initiate and participate in talkgroup calls and announcement calls
b) Initiate and participate in individual calls
c) WIRELINE ONLY: Initiate system calls (all-calls)
d) WIRELINE ONLY: Display of subscriber unit ID or alias of the unit that last participated in a talkgroup call

e) WIRELINE ONLY: Simultaneously hear an inbound transmission on a talkgroup while transmitting to other subscribers and interrupting the in-progress transmissions of an active subscriber radio (also known as 'dispatch priority')
f) Create up to 12 patches (dynamic and temporary links between up to 20 talkgroups and/or conventional channels) per console, including efficient use of channel resources
g) Transmit from the console to multiple modules at once, including efficient use of channel resources and including the ability to store up to 3 "multi-select" groups (each up to 16 modules)
h) Receive notification of emergency alerts and emergency voice calls, display the emergency status including the ID of the radio that initiated the alert or call, and provide the ability to acknowledge and clear (but not cancel) the emergency condition
i) WIRELINE ONLY: Initiate a radio unit monitoring instruction to a subscriber radio and to allow a operator to hear the audio from the monitored subscriber and designate in each monitoring instruction duration, notification, and encryption parameters
j) WIRELINE ONLY: Display the of loss of wireline connectivity to Shared Core
k) Requirement Removed ~~WIRELINE ONLY: Upon manual intervention following loss of connectivity to Shared Core, switch connectivity to local control stations~~
l) Generate alert tones on a selected radio module (up to three distinct tones or tone sequences that are generated for duration of user selection)
m) Generate a channel-marker tone on a selected radio module (a tone or tone sequence that, when enabled, is periodically repeated until it is disabled)
n) WIRELINE ONLY: Allow intercom communications with users of other Dispatch Consoles at the same location that does not include transmissions over the radio subsystems

7. Dispatch Console – Convention Channel Interface

WIRELINE ONLY: Dispatch Consoles shall support connection to Conventional Channel Interfaces (to be priced separately).

Each Conventional Channel Interface shall support analog conventional channels via 4-wire connection to individual control station radios. The quantity of conventional channels to be supported by the Conventional Channel Interfaces is stated in other sections of this RFP.

8. Dispatch Console – Console Programming Requirements

Proposers shall provide a total of six (6) total sets of equipment, cables, and software required to program and maintain the consoles, including their encryption capabilities (i.e,. key fill devices and authentication key devices), as described in this RFP. Three sets will be dedicated for Waukesha County and three for Milwaukee County. (If site licenses are available, pricing shall be based on one site license for Waukesha County and one for Milwaukee County.) Equipment shall be exclusive of the computers used to operate the programming software. Programming software shall be compatible with Windows based PCs operating Windows XP or Windows 7.

G. Technical Requirements: Portable Subscriber Radios

All portable subscriber radios repeaters included in the proposer's design shall meet the specifications of this Section of the RFP. (Note that various models ("tiers") have specific and different requirements.)

1. Portable Subscriber Radio SDOC Requirements

Portable subscriber radios shall have completed certification in the Project 25 Compliance Assessment Program (CAP). Proposers shall provide SDOC (Supplier's Declaration of Conformity) reports for all portable subscriber radios included in proposer's design.

2. Portable Subscriber Radio Mode of Operation Requirements

Portable subscriber radios shall support Project 25 trunked operations. Portable subscriber radios shall also support direct, unit-to-unit, conventional communications on simplex channels in both Project 25 and analog modes of operation.

3. Portable Subscriber Radio Vocoder Requirements

All proposed subscriber radios shall support either the IMBE (Baseline) Project 25 vocoder or the Project 25 Enhanced Full Rate Vocoder (AMBE + 2), however, the latter is preferred.

4. Portable Subscriber Radio P25 Trunking Feature Requirements

The portable subscriber radios shall provide the following features. For each feature, a Project 25 technical specification, a P25 testing specification, and a functional specification are listed. Proposers shall describe if the portable subscriber radios meet the listed APCO Project 25, Phase I standards for the feature, if the portable

subscriber radios comply with the P25 testing specification (i.e., if it can successfully pass the identified test section), and if the portable subscriber radios provide the functional specification (i.e., delivers the functionality) as described.

a) Group Voice Calls and Broadcast Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.2

iii) Functional Requirement: Subscribers shall be capable of operating on more than one talkgroup. A subscriber that is in-range of a radio subsystem shall initiate a group call with a selected talkgroup by selecting that talkgroup and pushing the push-to-talk switch. Other users in the talkgroup, including dispatchers and subscribers on other sites, shall receive the call if they have selected that talkgroup and if channel and backhaul resources are available. All parties in the group shall be able to respond, one at a time, and all parties shall hear the speaker.

b) Emergency Alarm

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.7

iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate an emergency alarm by pressing a dedicated emergency button. Dispatcher positions that are so programmed shall be notified of the emergency alarm and they shall be able to acknowledge and clear the alarm. The initiating subscriber shall be the only party capable of cancelling the alarm. . The portable subscriber radio shall provide the ability to enable or disable emergency alarm on a unit-by-unit basis and shall offer ability to configure emergency alarm for silent (no user notification) or user-notification operation upon activation of the emergency button. Additionally, the portable subscriber radio shall offer the ability to configure the length of time it takes for a user to depress the emergency button to generate an emergency alarm.

c) Emergency Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.8

iii) Functional Requirement: A subscriber that is in-range of the system can initiate an emergency group call on a selected talkgroup by either: pressing the push-to-talk switch after pressing the emergency button or by selecting a pre-defined emergency talkgroup and pushing the push-to-talk switch. Other users in the talkgroup, including dispatchers and subscribers on other sites, will receive the call and will have notification that it is an emergency call if they have selected that talkgroup and if channel and backhaul resources are available. Portable subscriber radios shall be capable of initiating and receiving emergency group calls. The portable subscriber radio shall provide the ability to enable or disable emergency group call on a unit-by-unit basis, shall offer ability to configure emergency group call for silent (no user notification) or user-notification operation upon activation of the emergency button, and shall offer ability to configure the microphone to be active/not active upon activation of the emergency button.

d) Individual Voice Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.3

iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate a call to one specific other subscriber by selecting that subscriber's ID and pushing the push-to-talk switch. The other specific subscriber, even it if is on another site, shall receive notification of an individual call request if channel and backhaul resources are available. If the other specific subscriber accepts the request but pushing the push-to-talk switch within a specified time, the parties shall communicate with each other and no other parties will participate. Portable subscriber radios shall be capable of initiating and receiving individual voice calls.

e) Announcement Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.6

iii) Functional Requirement: An announcement group shall be a one-to-many association of talkgroups. A talkgroup shall be able to be associated with an announcement group such than any call to the announcement group shall be heard on all associated talkgroups. A subscriber that is in-range of a radio subsystem shall initiate an announcement group call by selecting that announcement group and pushing the push-to-talk switch. Other users in the announcement group (i.e., that have their selected talkgroup associated with the selected announcement group), including dispatchers and subscribers on other sites, shall receive the call if channel and backhaul resources are available. Upon completion of the initiating radio's transmission, channel resources shall be released (i.e., announcement group calls shall occur with transmission trunking). Portable subscriber radios shall be capable of initiating and receiving announcement calls.

f) All Call / System Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.14
iii) Functional Requirement: A system call shall be a one-to-all (all registered and in-rage subscribers) call that shall be initiated only by the system infrastructure (dispatchers). When initiated, a system call shall terminate all non-emergency calls that are in progress and it shall prevent new non-emergency calls from being initiated for the duration of the system call. Upon completion of the system call, channel resources shall be released (i.e., system group calls shall occur with transmission trunking). Portable subscriber radios shall be capable of receiving announcement calls.

g) Radio Check

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.21
iii) Functional Requirement: The system infrastructure (management terminals) shall be able to initiate a message to a subscriber to determine if it is registered and in range. A portable subscriber radio that receives a radio check message shall acknowledge it and that acknowledgement shall be returned to the infrastructure component that initiated the check.

h) Call Alert

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.15
iii) Functional Requirement: A subscriber (including a dispatcher) shall be able to send a non-voice alert to another subscriber. The receiving subscriber shall provide an indication that it has been alerted and the alert shall contain the ID of the subscriber that initiated the alert. The initiating subscriber shall receive an indication that the receiving subscriber received the alert. Portable subscriber radios shall be capable of processing call alerts.

i) Radio Unit Inhibit/Uninhibit

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.20
iii) Functional Requirement: The system infrastructure (dispatchers or managers) shall be able to disable (inhibit) a subscriber from operation on the radio system and shall be able to enable (uninhibit) its operation again. While inhibited, the subscriber's display shall be blanked and the subscriber shall not be able to participate in any calls other than the receipt of an uninhibit command. When inhibited, the portable shall generate a positive acknowledgement (ACK) or negative acknowledgement (NACK) to an inhibit or uninhibit command, and the portable shall not transmit or receive radio signals, and the portable shall not allow any active use of any user controls, and the portable shall not produce any tone or indicators. A portable subscriber radio that has been inhibited shall only be uninhibited by a proper uninhibit command sent from the system infrastructure.

j) Radio Unit Monitoring

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.19
iii) Functional Requirement: The system infrastructure (dispatchers or managers) shall be able to initiate a group or individual call from a specific subscriber for a specified amount of time. The initiation of the group or individual call shall include instructions that define: i) the duration of the call, ii) if the call is to be silent or non-silent, and iii) if the call is to be encrypted or not. Subscriber radios, upon receipt of a radio unit monitoring message, shall initiate a group or individual call according to the specific instructions.

k) Short Message

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.16
iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate a short message (up to 256 characters in length) for delivery to another subscriber or a dispatcher by selecting the recipient's ID and then either entering a short message from the subscriber keypad (if equipped) or selecting a short message from a pre-defined list. The receiving subscriber shall provide an indication that it has received a short message that shall contain the ID of the subscriber that initiated the message. The initiating subscriber shall receive an indication that the receiving subscriber has received the message.

l) Status Query / Status Update

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.17 and 2.2.18
iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall be capable of initiating a change in a pre-programmed status condition. When a user initiates the change of a status (by selecting a pre-programmed status from a list in a subscriber radio), it shall transmit that change to the management terminal which shall acknowledge the receipt of that transmission and shall display that radio's new/updated status. Also, the management terminal shall be capable of requesting the last-selected status of individual subscriber radios. When this occurs, the management terminal shall send the request to the selected subscriber which shall respond with its last-selected status and the management terminal shall display that radio's last-selected status.

m) AES Encryption

i) P25 Technical Specifications: Shall comply with TIA-102.AAAD
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.10
iii) Functional Requirement: A subscriber that is in-range of the system and that has encryption capabilities shall be able to place a group call to other encryption-capable subscribers and only those subscribers that possess matching encryption keys and that are affiliated to the same talk group are able to understand the message. Radios affiliated to the same talk group that do not possess any encryption keys, or that possess different encryption keys, shall be unable to understand the message. The implemented encryption method shall be Type 3 encryption via the Advanced Encryption Standard (AES) algorithm. Key length for the AES shall be 256 bits. The portable subscriber radios shall be capable of processing calls that are encrypted with AES encryption.

Note: Portable subscriber radio shall support AES encryption but shall not be equipped with AES capabilities unless optionally added by the Counties or a County.

n) Registration/ Roaming

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.11
iii) Functional Requirement: A subscriber that moves from out of range of a system into range of the system or that moves from being in-range of one system to in-range of another system shall register with the new system, provided the system is programmed to allow operation of that subscriber. Portable subscriber radios shall generate registration messages and shall respond appropriately to registration approvals or disapprovals.

o) Affiliation

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.5

iii) Functional Requirement: A subscriber that has registered on a radio subsystem shall select a talkgroup for use and the Shared Core shall positively or negatively acknowledge that the subscriber is allowed operation on that talkgroup and, if positive, shall allow that subscriber to initiate group voice calls on that talkgroup. Portable subscriber radios shall allow use of the selected talkgroup if permitted by the system.

p) Over-The-Air-Rekeying (OTAR)

i) P25 Technical Specifications: Shall comply with TIA-102.AACA and TIA-102.AACB

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABB

iii) Functional Requirement: The portable subscriber radios shall support ability to use the key management system over the P25 Trunked system infrastructure to perform the following functions:

(1) Warm-Start Command
(2) Rekey Command and Acknowledgment
(3) Changeover Command and Response
(4) Modify Key Command
(5) Delete Key Command and Response
(6) Change-RSI Command and Response
(7) Zeroize Command and Response
(8) Delayed Acknowledgment
(9) Negative Acknowledgment

Note: Portable subscriber radio shall support OTAR but shall not be equipped with OTAR capabilities unless optionally added by the Counties or a County.

q) Radio Authentication

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, TIA-102.AABF, and TIA-102.AACE

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.12

iii) Functional Requirement: If required by the configuration of the system, A subscriber that is attempting to register on a radio subsystem shall be allowed operation only if it can successfully share pre-determined keys with the system infrastructure. Successful authentication shall allow registration to proceed for the subscriber unit. Authentication failure shall leave the subscriber unit in an un-registered state. Portable subscriber radios shall be capable of supporting the necessary authentication keys and authentication processing to allow this functionality. Portable subscriber radio shall support authentication to multiple systems. Portable subscriber radio shall store authentication keys in non-volatile memory.

5. Non-P25 Trunking Feature Requirements

The portable subscriber radios shall provide the following features that are not defined by the P25 specifications. For each feature, a functional specification is listed.

a) Over-The-Air Reprogramming (OTAP)

i) Functional Requirement: Portable subscriber radios shall support over-the-air programming to enable the following changes to be made remotely (i.e., over a connected radio subsystem, with no direct/wired connection) from the radio infrastructure:

(1) Switches and Personality Profile
(2) Service programming the transmitter and receiver parameters and alignment
(3) Software Version Upgrade
(4) Additional Functional Requirements: The OTAP feature shall operate per the following behaviors:
(a) New files or changes to existing files that are downloaded over the air will not be implemented (written) into the subscriber until it is confirmed that the entire new file or the entire set of changes to existing file have been downloaded
(b) A subscriber that has a programming change made to it via OTAP will provide an acknowledgment of the successful programming change and it will do so only once the change is fully and successfully made

(c) The OTAP server will have configuration settings for the degree to which it is persistent in the number of times or a period of duration over which it will attempt to complete a programming change
(d) OTAP messages will be treated with lower priority than all voice calls
(e) OTAP programming instructions can be set to be delivered to one (identified by single ID) or many some (identified by set of IDs) units.

Note: Portable subscriber radio shall support OTAP but shall not be equipped with OTAP capabilities unless optionally added by the Counties or a County.

b) Dynamic Regrouping

i) Functional Requirement: Portable subscriber radios, at the direction of the system infrastructure (dispatchers or managers), shall be able to be merged and un-merged into a single, dynamically-defined talk groups. Dynamic regrouping shall be supported by the portable subscriber radios and regrouping commands shall be confirmed (ACK'ed) by the portable subscriber radios.

6. Portable Subscriber Radio Scan Mode Requirements

Portable subscriber radios shall support the scanning of trunked talkgroups and conventional channels within a selected operating group per the following requirements:

- Groups of talkgroups or channels: Each group shall be programmable.
- Talkgroups or channels per group: 16 minimum
- Scan activation: The portable subscriber shall include operator controls to enable or disable scan
- Priority scan: The portable subscriber shall support scanning of and to groups based on their assigned scan priority
- Power Off operation: The scan mode programming (enabled/disabled) shall not be affected by the operation of the primary power on/off switch.

Portable subscriber radios shall also support the ability for users to configure or alter scan operations including the definition of a scan list.

7. Portable Subscriber Radio – Radio Parametric Requirements

All Portable subscriber radios included in the Waukesha County Radio Subsystem and the Milwaukee County Radio Subsystem shall meet or exceed the following radio parametric performance specifications:

a) Frequency Band

i) Transmit:
(1) 764-776 MHz
(2) 794-806 MHz
(3) 806-824 MHz
(4) 851-869 MHz

ii) Receive:
(1) 764-776 MHz
(2) 851-869 MHz

b) Channel Spacing

i) 12.5 kHz, 20 kHz, and 25 kHz

c) Frequency Generation

i) Frequency Generation shall be by and internal synthesizer and/or embedded microprocessor technology

d) Transmitter: Power

i) Carrier Output Power Rating: 2.5W minimum, adjustable on a per-channel/mode basis

e) Transmitter: Modulation Limiting

i) 2.5 kHz (12.5 kHz)
ii) 4 kHz (NPSPAC)
iii) 5 kHz (25 kHz)

f) Transmitter: Audio Frequency Response
i) +1,-3 dB; 300-3000Hz; 6dB /octave
ii) Complies with TIA/EIA-603 Section 4.2.6

g) Transmitter: Audio Distortion
i) 3% maximum

h) Transmitter: FM Hum and Noise Ratio
i) 34/40 dB (12.5/25 kHz)

i) Transmitter: Conducted Spurious Emissions
i) -70/-70 dB (12.5/25 kHz)

j) Transmitter: Time Out Timer
i) Limits the duration of the subscriber's transmission
ii) Transmission Duration: 0.5 to 3.5 minutes with automatic reset within 100 milliseconds after interruption of the transmitter keying circuit

k) Transmitter/Receiver: Signaling Digital Mode
i) Signaling Digital Mode: Generate/decode all P25 Network Access Codes (NAC) listed in TIA/EIA-102

l) Receiver: Reference Sensitivity
i) Analog Mode (EIA 12 dB SINAD): -118 dBm
ii) Digital Mode (5% BER): -118 dBm

m) Receiver: Adjacent Channel Rejection
i) -60/-72 dB (12.5/25 kHz)

n) Receiver: Spurious Response Rejection
i) -70/-70 dB (12.5/25 kHz)

o) Receiver: Intermodulation Rejection
i) -70/-70 dB (12.5/25 kHz)

p) Receiver: Audio Frequency Response
i) +1,-3 dB; 300-3000Hz; 6dB /octave;
ii) Complies with TIA/EIA-603B Section 4.1.10

q) Receiver: Audio Distortion
i) 3% maximum

r) Receiver: Audio Output
i) 500 mW

s) Receiver: Squelch Tail Elimination
i) Eliminate the noise burst heard in the receiver at the conclusion of receiving a signal

8. Portable Subscriber Radio Programming Capacity Requirements

The Full-Keypad and Limited-Keypad portable subscriber radios shall be capable of supporting the following quantities of CAI Digital User Group Addresses and Channels:

- Conventional Addresses: 65,000 minimum
- Trunking Addresses: 4,000 minimum
- Number of Programmable Channels: 650 minimum

The Public Service portable subscriber radios shall be capable of supporting operations on a Project 25 trunking system and conventional channels with the following capacity for programmable channels:

- 96 channels

9. Portable Subscriber Radio Connector Requirements

The portable subscriber radios shall offer the following connectors:

- Flexible, covered antenna:
  - Readily removable utilizing a screw-in connector
  - BNC connectors are not acceptable
- Batteries shall connect securely to portable subscriber radios and shall not require the use of tools to attach or remove.
- Internal speaker/ microphone:
  - Connection of an external speaker/ microphone shall mute the internal speaker/ microphone
  - Connection of an external earpiece shall mute the internal speaker
- Provide universal or individual connectors for:
  - Microphone and earpiece connections must be capable of supporting the following types of microphone/earpiece devices (including types used in surveillance):
  - External speaker/ microphone
  - Earpiece
  - Programming interface

10. Portable Subscriber Radio – Models to be Proposed

Proposers shall propose, describe and price at least three models ("tiers") of radios to include: i) Full Keypad, ii) Limited Keypad, and iii) Public Service. Proposers shall bid a minimum of these three models ("tiers") of portable radios, however, they are encouraged to propose more than three so long as they meet or exceed the following requirements.

11. Portable Subscriber Radio – Full Keypad Model Requirements

The Full Keypad portable subscriber radios shall provide the following capabilities for user controls and displays:

- Push-to-talk switch
- On-Off/Volume knob, mounted on top
- 2 soft keys
- Minimum 3 navigation keys
- 4 x 3 alphanumeric keypad
- Emergency button, mounted on top with easy access
- Top-mounted rotary switches allow use of 3 "banks" of channels/talkgroups, each bank consisting of 16 channels/talkgroups
- Front display with 2 lines of text (minimum 12 characters per line) and status icons for battery status and in-range indicator
- Display shall be readable in all conditions from direct sunlight to total darkness
- Display backlighting shall be user-adjustable
- Indicators shall be capable of being disabled in surveillance mode:
  - Transmit
  - Receive
  - Battery Status
  - Encryption Status

12. Portable Subscriber Radio –Limited Keypad Model Requirements

The Limited Keypad portable subscriber radios shall provide the following capabilities for user controls and displays:

- Push-to-talk switch
- On-Off/Volume knob, mounted on top
- 2 soft keys
- Minimum 3 navigation keys
- Emergency button, mounted on top with easy access
- Top-mounted rotary switches allow use of 3 "banks" of channels/talkgroups, each bank consisting of 16 channels/talkgroups
- Front Display with 2 lines of text (minimum 12 characters per line) and status icons for battery status and in-range indicator
- Display shall be readable in all conditions from direct sunlight to total darkness
- Display backlighting shall be user-adjustable
- Indicators shall be capable of being disabled in surveillance mode:
  - Transmit
  - Receive

- Battery Status
- Encryption Status

13. Portable Subscriber Radio – Public Service Model Requirements

The Public Service portable subscriber radios shall provide the following capabilities for user controls and displays:

- Push-to-talk switch
- On-Off/Volume knob, mounted on top
- Emergency button, mounted on top with easy access
- Top-mounted rotary switches allow use of 3 “banks” of channels/talkgroups, each bank consisting of 16 channels/talkgroups
- Display with 1 lines of text (minimum 12 characters per line) and status icons for battery status and in-range indicator
- Display shall be readable in all conditions from direct sunlight to total darkness

14. Portable Subscriber Radio – Environmental Requirements (applies to all tiers)

All Portable subscriber radios included in the Waukesha County Radio Subsystem and the Milwaukee County Radio Subsystem shall meet or exceed the following environmental specifications per MIL-STD-810E (or equivalent items in 810 F):

a) Operating Temperature: -30 c to +60 C
b) Low Pressure Operation: 500.3 Procedure II
c) High Temperature, Storage / Operation: 501.3 Procedure I / II
d) Low Temperature, Storage / Operation: 502.3 Procedure I / II
e) Temperature Shock: 503.3 Procedure I
f) Solar Radiation: 505.3 Procedure I
g) Humidity: 507.3 Procedure II
h) Dust, Blowing: 510.3 Procedure I
i) Vibration: 514.4 Procedure I
j) Shock, Functional: 516.4 Procedure I
k) Rain, Blowing / Dripping Water (for metal case): 506.3 Procedure I / II
l) Salt Fog (for metal case): 509.3 Procedure I

15. Portable Subscriber Radio Battery Charging Requirements (applies to all tiers)

The portable subscriber radios shall be equipped with standard-capacity batteries that, when starting with a full charge, allow operations for 10 hours at a duty cycle of 5% transmit, 5% receive, and 90% idle.

The portable subscriber radios shall be optionally equipped with high-capacity batteries that, when starting with a full charge, allow operations for 16 hours at a duty cycle of 5% transmit, 5% receive, and 90% idle.

The portable subscriber radios shall be equipped with batteries that have a typical time to charge or recondition from fully drained to fully-charged of 8 hours or less.

16. Portable Subscriber Radio Battery Charger Unit Requirements (applies to all tiers)

Both single and multiple-unit chargers shall be available for the portable subscriber units and both shall operate from 110VAC sources. Both shall support a rapid-charge of batteries (complete charge in 1 to 2 hours).

A keypad (full or limited) portable radio multiple-unit charger shall support up to 6 units which shall include the standard-capacity and/or high-capacity batteries (connected to their radios or not) for the full-keypad or limited-keypad portable radios.

A public-service portable radio multiple-unit charger shall support up to 6 units which shall include the standard-capacity and/or high-capacity batteries (connected to their radios or not) for the public service portable subscriber radios. Single unit chargers for the full keypad, limited keypad, or public service portable subscriber radios shall include internal power supplies (i.e., the power supplies shall not be in the AC wall plug).

Portable subscriber radio single and multi-unit chargers shall also be available in models or configurations that operate from 12 VDC sources (for use in command vehicles, etc.).

17. Portable Subscriber Radio – Hip-Worn Configuration

A hip-worn portable subscriber radio package shall include the following: radio, battery (capable of meeting the above-listed requirements), remote speaker-microphone (heavy-duty, palm-type with push-to-talk switch and self-retracting coil cord), radio antenna (half-wave flexible dipole), and holster (with swivel clip).

18. Portable Subscriber Radio – Shoulder Public Safety Mic Configuration

A shoulder Public Safety Mic portable subscriber radio package shall include the following: radio, battery (capable of meeting the above-listed requirements), remote speaker-microphone-antenna (SMA; heavy-duty, palm-type with push-to-talk switch and cord), radio antenna (half-wave flexible dipole), and holster (with swivel clip).

19. Portable Subscriber Radio – Programming Security

Full provisioning and programming of subscriber radios must include the use of a software program and a hardware-based advanced or enhanced system key. Users that attempt to program a subscriber radio without the hardware-based system key may have access to viewing the subscriber's code plug but they will not have the ability to enter critical information such as talkgroups, system IDs, and individual radio IDs.

Advanced/enhanced system keys shall be available in a "parent" configuration which shall operate as described above and which shall allow the creation of "child" configuration. Keys in the "child" configuration shall be initially available in a blank format and the "parent" keys shall be used to configure them with some or all of the same capabilities of the "parent" including restricted and allowed sets of features and ranges of talkgroups and radio unit IDs (i.e., the "parent" key shall be able to create a "child" key that has all or its capabilities or that has restrictions on some of its capabilities). A "child" key may also be configured with an expiration date (after which it provides no functionality and cannot be used to program radios).

An alternate method to the advanced/enhanced system key and 'parent/child' configuration may be proposed so long as one single authority within each County be able to define the rights allowed and restrictions placed on all other agencies/organizations that will perform subscriber radio programming and that those definitions of rights and restrictions be assigned on a case-by-case basis and carried in a secure hardware device that cannot be copied or whose timing information (date of activation and/or inactivation) cannot be altered.

Proposers shall describe how they will ensure that access to system key shall be restricted only to users authorized by the Counties of Waukesha and Milwaukee. Proposers shall describe other options for system key deployment and management (example: parent-keys and child-keys, restricted-ID-range keys, etc.).

The programming software shall also include a codeplug management feature that allows the subscriber radio codeplugs to be created and stored in a centralized database that also includes a description of the codeplug and designators of the subscriber radios of radios to which it is to be applied (programmed). This feature shall allow a remote user to access a codeplug that were created by the programming software and stored on the database (and that are specifically designated for their radios by the radio alias) and to program them into those specifically-identified radios.

Also, the programming of encryption and authentication keys into subscriber radios shall be accomplished via a key management tool ("key fill device") that complies with TIA-102.AACD. The key management tool shall be used to view, change, erase, and activate keys individually or in groups. The key management tools shall be configured to be either "controlling" or "compliant" such that a "controlling" key management tool can dictate the encryption keys that the "compliant" key management tool can use and the "compliant" key management tool can use only those keys that it receives from the "controlling" key management tool. Both the "controlling" and "compliant" key management tools shall be capable of programming into subscriber radios the keys that they contain.

20. Portable Subscriber Radio Programming Requirements

Proposers shall provide a total of six (6) total sets of equipment, cables, and software required to program and maintain the portable subscriber radios, including their encryption capabilities (i.e,. key fill devices and authentication key devices), as described in this RFP. Three sets will be dedicated for Waukesha County and three for Milwaukee County. (If site licenses are available, pricing shall be based on one site for Waukesha County and one for Milwaukee County.) Equipment shall be exclusive of the computers used to operate the programming software. Programming software shall be compatible with Windows based PCs operating Windows XP or Windows 7.

21. Portable Subscriber Radio Project 25 Phase II Migration Requirements

Portable subscriber radios shall be able to be upgraded to Project 25 Phase II without the replacement of any proposed portable subscriber radio hardware. Upgrade to Project 25 Phase II may include the addition or reconfiguration of portable subscriber software. Proposers shall describe the software that must be added to or reconfigured in the portable subscriber radio in order to upgrade it to meet the requirements of Project 25 Phase II as well as the process required to perform the upgrade. Proposers shall describe the impact (changes, eliminations, expansions) of an upgrade to Project 25 Phase II to any of the Portable Subscriber P25 Trunking Features listed above.

22. Portable Subscriber Radio – Requirements for Upgrades to Existing Portable Radios

A significant number of existing portable radios that are currently operating on the existing Waukesha County and Milwaukee County SmartNet II+ trunked radio systems can be reconfigured by software ("flashed") to support P25 capabilities.

It is currently estimated that 1,300 portable radios operating on the existing Waukesha County radio system and 500 portable radios operating on the existing Milwaukee County radio system have this capability and that none (0) of these 1,300 portable radios currently contain the limited capabilities of the Motorola "RB" ("rebanding") version of software.

Portable radio models that have this capability include Motorola XTS-series and APX-series portable subscriber radios.

Proposers shall describe their ability to perform software upgrades to these radios to enable their use on their proposed Project 25 radio system. Proposers shall describe, if any, of the "P25 Trunking Feature Requirements" and "Non-P25 Trunking Feature Requirements" listed in Sections VI.F.4 and VI.F.5, respectively and above, shall be supported by such a radio that has been reconfigured by software to support P25 capabilities.

For pricing purposes, proposers shall assume that all 1,800 portable radios (1,300 for Waukesha County and 500 for Milwaukee County) currently have no capabilities for SmartZone/Omni-Link, Project 25, or authentication (i.e., all 1800 portable radios would require software/flash upgrades that include a "full flash bundle" of SmartZone/Omni-Link, Project 25, and authentication). Proposers shall also provide the cost saving from the "full flash bundle" price if SmartZone/Omni-Link, Project 25, or authentication is not required (i.e., vendors shall state, for informational purposes, that a radio upgrade is "$x.00" less than the quoted amount for the "full flash bundle" if, for example, the radio is already equipped with Project 25 capabilities.)

H. Technical Requirements: Mobile Subscriber Radios

All mobile subscriber radios repeaters included in the proposer's design shall meet the specifications of this Section of the RFP.

1. Mobile Subscriber Radio SDOC Requirements

Mobile subscriber radios shall have completed certification in the Project 25 Compliance Assessment Program (CAP). Proposers shall provide SDOC (Supplier's Declaration of Conformity) reports for all mobile subscriber radios included in proposer's design.

2. Mobile Subscriber Radio Mode of Operation Requirements

Mobile subscriber radios shall support Project 25 trunked operations. Mobile subscriber radios shall also support direct, unit-to-unit, conventional communications on simplex channels in both Project 25 and analog modes of operation.

3. Mobile Subscriber Radio Vocoder Requirements

All proposed subscriber radios shall support either the IMBE (Baseline) Project 25 vocoder or the Project 25 Enhanced Full Rate Vocoder (AMBE + 2), however, the latter is preferred.

4. Mobile Subscriber Radio P25 Trunking Feature Requirements

The mobile subscriber radios shall provide the following features. For each feature, a Project 25 technical specification, a P25 testing specification, and a functional specification are listed. Proposers shall describe if the mobile subscriber radios meet the listed APCO Project 25, Phase I standards for the feature, if the mobile subscriber radios comply with the P25 testing specification (i.e., if it can successfully pass the identified test section), and if the mobile subscriber radios provide the functional specification (i.e., delivers the functionality) as described.

a) Group Voice Calls and Broadcast Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.2
iii) Functional Requirement: Subscribers shall be capable of operating on more than one talkgroup. A subscriber that is in-range of a radio subsystem shall initiate a group call with a selected talkgroup by selecting that talkgroup and pushing the push-to-talk switch. Other users in the talkgroup, including dispatchers and subscribers on other sites, shall receive the call if they have selected that talkgroup and if channel and backhaul resources are available. All parties in the group shall be able to respond, one at a time, and all parties shall hear the speaker.

b) Emergency Alarm

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.7
iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate an emergency alarm by pressing a dedicated emergency button. Dispatcher positions that are so programmed shall be notified of the emergency alarm and they shall be able to acknowledge and clear the alarm. The initiating subscriber shall be the only party capable of cancelling the alarm. . The mobile subscriber radio shall provide the ability to enable or disable emergency alarm on a unit-by-unit basis and shall offer ability to configure emergency alarm for silent (no user notification) or user-notification operation upon activation of the emergency button. Additionally, the mobile subscriber radio shall offer the ability to configure the length of time it takes for a user to depress the emergency button to generate an emergency alarm.

c) Emergency Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.8
iii) Functional Requirement: A subscriber that is in-range of the system can initiate an emergency group call on a selected talkgroup by either: pressing the push-to-talk switch after pressing the emergency button or by selecting a pre-defined emergency talkgroup and pushing the push-to-talk switch. Other users in the talkgroup, including dispatchers and subscribers on other sites, will receive the call and will have notification that it is an emergency call if they have selected that talkgroup and if channel and backhaul resources are available. Mobile subscriber radios shall be capable of initiating and receiving emergency group calls. The mobile subscriber radio shall provide the ability to enable or disable emergency group call on a unit-by-unit basis, shall offer ability to configure emergency group call for silent (no user notification) or user-notification operation upon activation of the emergency button, and shall offer ability to configure the microphone to be active/not active upon activation of the emergency button.

d) Individual Voice Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.3
iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate a call to one specific other subscriber by selecting that subscriber's ID and pushing the push-to-talk switch. The other specific subscriber, even it if is on another site, shall receive notification of an individual call request if channel and backhaul resources are available. If the other specific subscriber accepts the request but pushing the push-to-talk switch within a specified time, the parties shall communicate with each other and no other parties will participate. Mobile subscriber radios shall be capable of initiating and receiving individual voice calls.

e) Announcement Group Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.6
iii) Functional Requirement: An announcement group shall be a one-to-many association of talkgroups. A talkgroup shall be able to be associated with an announcement group such than any call to the announcement group shall be heard on all associated talkgroups. A subscriber that is in-range of a radio subsystem shall initiate an announcement group call by selecting that announcement group and pushing the push-to-talk switch. Other users in the announcement

group (i.e., that have their selected talkgroup associated with the selected announcement group), including dispatchers and subscribers on other sites, shall receive the call if channel and backhaul resources are available. Upon completion of the initiating radio's transmission, channel resources shall be released (i.e., announcement group calls shall occur with transmission trunking). Mobile subscriber radios shall be capable of initiating and receiving announcement calls.

f) All Call / System Call

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.14
iii) Functional Requirement: A system call shall be a one-to-all (all registered and in-rage subscribers) call that shall be initiated only by the system infrastructure (dispatchers). When initiated, a system call shall terminate all non-emergency calls that are in progress and it shall prevent new non-emergency calls from being initiated for the duration of the system call. Upon completion of the system call, channel resources shall be released (i.e., system group calls shall occur with transmission trunking). Mobile subscriber radios shall be capable of receiving announcement calls.

g) Radio Check

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.21
iii) Functional Requirement: The system infrastructure (management terminals) shall be able to initiate a message to a subscriber to determine if it is registered and in range. A mobile subscriber radio that receives a radio check message shall acknowledge it and that acknowledgement shall be returned to the infrastructure component that initiated the check.

h) Call Alert

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.15
iii) Functional Requirement: A subscriber (including a dispatcher) shall be able to send a non-voice alert to another subscriber. The receiving subscriber shall provide an indication that it has been alerted and the alert shall contain the ID of the subscriber that initiated the alert. The initiating subscriber shall receive an indication that the receiving subscriber received the alert. Mobile subscriber radios shall be capable of processing call alerts.

i) Radio Unit Inhibit/Uninhibit

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.20
iii) Functional Requirement: The system infrastructure (dispatchers or managers) shall be able to disable (inhibit) a subscriber from operation on the radio system and shall be able to enable (uninhibit) its operation again. While inhibited, the subscriber's display shall be blanked and the subscriber shall not be able to participate in any calls other than the receipt of an uninhibit command. When inhibited, the mobile shall generate a positive acknowledgement (ACK) or negative acknowledgement (NACK) to an inhibit or uninhibit command, and the mobile shall not transmit or receive radio signals, and the mobile shall not allow any active use of any user controls, and the mobile shall not produce any tone or indicators. A mobile subscriber radio that has been inhibited shall only be uninhibited by a proper uninhibit command sent from the system infrastructure.

j) Radio Unit Monitoring

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.19
iii) Functional Requirement: The system infrastructure (dispatchers or managers) shall be able to initiate a group or individual call from a specific subscriber for a specified amount of time. The initiation of the group or individual call shall include instructions that define: i) the duration of the call, ii) if the call is to be silent or non-silent, and iii) if the call is to be encrypted or not.

Subscriber radios, upon receipt of a radio unit monitoring message, shall initiate a group or individual call according to the specific instructions.

k) Short Message

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.16

iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall initiate a short message (up to 256 characters in length) for delivery to another subscriber or a dispatcher by selecting the recipient's ID and then either entering a short message from the subscriber keypad (if equipped) or selecting a short message from a pre-defined list. The receiving subscriber shall provide an indication that it has received a short message that shall contain the ID of the subscriber that initiated the message. The initiating subscriber shall receive an indication that the receiving subscriber has received the message.

l) Status Query / Status Update

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.17 and 2.2.18

iii) Functional Requirement: A subscriber that is in-range of a radio subsystem shall be capable of initiating a change in a pre-programmed status condition. When a user initiates the change of a status (by selecting a pre-programmed status from a list in a subscriber radio), it shall transmit that change to the management terminal which shall acknowledge the receipt of that transmission and shall display that radio's new/updated status. Also, the management terminal shall be capable of requesting the last-selected status of individual subscriber radios. When this occurs, the management terminal shall send the request to the selected subscriber which shall respond with its last-selected status and the management terminal shall display that radio's last-selected status.

m) AES Encryption

i) P25 Technical Specifications: Shall comply with TIA-102.AAAD

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.10

iii) Functional Requirement: A subscriber that is in-range of the system and that has encryption capabilities shall be able to place a group call to other encryption-capable subscribers and only those subscribers that possess matching encryption keys and that are affiliated to the same talk group are able to understand the message. Radios affiliated to the same talk group that do not possess any encryption keys, or that possess different encryption keys, shall be unable to understand the message. The implemented encryption method shall be Type 3 encryption via the Advanced Encryption Standard (AES) algorithm. Key length for the AES shall be 256 bits. The mobile subscriber radios shall be capable of processing calls that are encrypted with AES encryption.

Note: Mobile subscribers shall support AES encryption but shall not be equipped with AES capabilities unless optionally added by the Counties or a County.

n) Registration/ Roaming

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.11

iii) Functional Requirement: A subscriber that moves from out of range of a system into range of the system or that moves from being in-range of one system to in-range of another system shall register with the new system, provided the system is programmed to allow operation of that subscriber. Mobile subscriber radios shall generate registration messages and shall respond appropriately to registration approvals or disapprovals.

o) Affiliation

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, and TIA-102.AABF

ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.5

iii) Functional Requirement: A subscriber that has registered on a radio subsystem shall select a talkgroup for use and the Shared Core shall positively or negatively acknowledge that the subscriber is allowed operation on that talkgroup and, if positive, shall allow that subscriber to initiate group voice calls on that talkgroup. Mobile subscriber radios shall allow use of the selected talkgroup if permitted by the system.

p) Over-The-Air-Rekeying (OTAR)

i) P25 Technical Specifications: Shall comply with TIA-102.AACA and TIA-102.AACB
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABB
iii) Functional Requirement: The mobile subscriber radios shall support ability to use the key management system over the P25 Trunked system infrastructure to perform the following functions:
(1) Warm-Start Command
(2) Rekey Command and Acknowledgment
(3) Changeover Command and Response
(4) Modify Key Command
(5) Delete Key Command and Response
(6) Change-RSI Command and Response
(7) Zeroize Command and Response
(8) Delayed Acknowledgment
(9) Negative Acknowledgment

Note: Mobile subscribers shall support OTAR but shall not be equipped with OTAR capabilities unless optionally added by the Counties or a County.

q) Radio Authentication

i) P25 Technical Specifications: Shall comply with TIA-102.AABC, TIA-102.AABD-A, TIA-102.AABF, and TIA-102.AACE
ii) P25 Testing Specifications: Shall comply with applicable parts of TIA-102.CABC-B Sect 2.2.12
iii) Functional Requirement: A subscriber that is attempting to register on a system shall be allowed operation only if it can successfully share pre-determined keys with the system infrastructure. Successful authentication shall allow registration to proceed for the subscriber unit. Authentication failure shall leave the subscriber unit in an un-registered state. Mobile subscriber radios shall be capable of supporting the necessary authentication keys and authentication processing to allow this functionality. Mobile subscribers shall support authentication to multiple systems. Mobile subscribers shall store authentication keys in non-volatile memory.

5. Non-P25 Trunking Feature Requirements

The mobile subscriber radios shall provide the following features that are not defined by the P25 specifications. For each feature, a functional specification is listed.

a) Over-The-Air Reprogramming (OTAP)

i) Functional Requirement: Mobile subscriber radios shall support over-the-air programming to enable the following changes to be made remotely (i.e., over a connected radio subsystem, with no direct/wired connection) from the radio infrastructure:
(1) Switches and Personality Profile
(2) Service programming the transmitter and receiver parameters and alignment
(3) Software Version Upgrade
(4) Additional Functional Requirements: The OTAP feature shall operate per the following behaviors:
(a) New files or changes to existing files that are downloaded over the air will not be implemented (written) into the subscriber until it is confirmed that the entire new file or the entire set of changes to existing file have been downloaded
(b) A subscriber that has a programming change made to it via OTAP will provide an acknowledgment of the successful programming change and it will do so only once the change is fully and successfully made
(c) The OTAP server will have configuration settings for the degree to which it is persistent in the number of times or a period of duration over which it will attempt to complete a programming change

(d) OTAP messages will be treated with lower priority than all voice calls
(e) OTAP programming instructions can be set to be delivered to one (identified by single ID) or many some (identified by set of IDs) units.

Note: Mobile subscribers shall support OTAP but shall not be equipped with OTAP capabilities unless optionally added by the Counties or a County.

b) Dynamic Regrouping

i) Functional Requirement: Mobile subscriber radios, at the direction of the system infrastructure (dispatchers or managers), shall be able to be merged and un-merged into a single, dynamically-defined talk groups. Dynamic regrouping shall be supported by the mobile subscriber radios and regrouping commands are confirmed (ACK'ed) by the mobile subscriber radios.

6. Mobile Subscriber Radio Scan Mode Requirements

Mobile subscriber radios shall support the scanning of trunked talkgroups and conventional channels within a selected operating group per the following requirements:

- Groups of talkgroups or channels: Each group shall be programmable.
- Talkgroups or channels per group: 16 minimum
- Scan activation: The mobile subscriber shall include operator controls to enable or disable scan
- Priority scan: The mobile subscriber shall support scanning of and to groups based on their assigned scan priority
- Power Off operation: The scan mode programming (enabled/disabled) shall not be affected by the operation of the primary power on/off switch.

Mobile subscriber radios shall also support the ability for users to configure or alter scan operations including the definition of a scan list.

7. Mobile Subscriber Radio – Radio Parametric Requirements

All Mobile subscriber radios included in the Waukesha County Radio Subsystem and the Milwaukee County Radio Subsystem shall meet or exceed the following radio parametric performance specifications:

a) Frequency Band

i) Transmit:
(1) 764-776 MHz
(2) 794-806 MHz
(3) 806-824 MHz
(4) 851-869 MHz

ii) Receive:
(1) 764-776 MHz
(2) 851-869 MHz

b) Channel Spacing

i) 12.5 kHz, 20 kHz, and 25 kHz

c) Frequency Generation

i) Frequency Generation shall be by and internal synthesizer and/or embedded microprocessor technology

d) Transmitter: Power

i) Carrier Output Power Rating: 30W minimum, adjustable on a per-channel/mode basis

e) Transmitter: Modulation Limiting

i) 2.5 kHz (12.5 kHz)
ii) 4 kHz (NPSPAC)
iii) 5 kHz (25 kHz)

f) Transmitter: Audio Frequency Response

i) +1,-3 dB; 300-3000Hz; 6dB /octave
ii) Complies with TIA/EIA-603 Section 4.2.6

g) Transmitter: Audio Distortion
i) 3% maximum

h) Transmitter: FM Hum and Noise Ratio
i) 34/40 dB (12.5/25 kHz)

i) Transmitter: Conducted Spurious Emissions
i) -70/-70 dB (12.5/25 kHz)

j) Transmitter: Time Out Timer
i) Limits the duration of the subscriber's transmission
ii) Transmission Duration: 0.5 to 3.5 minutes with automatic reset within 100 milliseconds after interruption of the transmitter keying circuit

k) Transmitter/Receiver: Signaling Digital Mode
i) Signaling Digital Mode: Generate/decode all P25 Network Access Codes (NAC) listed in TIA/EIA-102

l) Receiver: Reference Sensitivity
i) Analog Mode (EIA 12 dB SINAD): -119 dBm
ii) Digital Mode (5% BER): -119 dBm

m) Receiver: Adjacent Channel Rejection
i) -60/-75 dB (12.5/25 kHz)

n) Receiver: Spurious Response Rejection
i) -75/-75 dB (12.5/25 kHz)

o) Receiver: Intermodulation Rejection
i) -70/-70 dB (12.5/25 kHz)

p) Receiver: Audio Frequency Response
i) +1,-3 dB; 300-3000Hz; 6dB /octave;
ii) Complies with TIA/EIA-603B Section 4.1.10

q) Receiver: Audio Distortion
i) 3% maximum

r) Receiver: Audio Output
i) 500 mW

s) Receiver: Squelch Tail Elimination
i) Eliminate the noise burst heard in the receiver at the conclusion of receiving a signal

8. Mobile Subscriber Radio Programming Capacity Requirements

The Public-Safety Mobile subscriber radios (the five models ("tiers") listed below) shall be capable of supporting the following quantities of CAI Digital User Group Addresses and Channels:

- Conventional Addresses: 65,000 minimum
- Trunking Addresses: 4,000 minimum
- Number of Programmable Channels – 650 minimum

The Public-Service mobile subscriber radios shall be capable of supporting operations on a Project 25 trunking system and conventional channels with the following capacity for programmable channels:

- 48 channels

9. Mobile Subscriber Radio Connector Requirements

The mobile subscriber radios shall offer the following connectors:

- Antenna connector that provides a easily removable utilizing a screw-in connector
  - BNC connectors are not acceptable
- Speaker
- Microphone

- Power (with ignition sense)

10. Mobile Subscriber Radio Physical Construction Requirements

The Mobile subscriber radios shall be constructed with the following distinct components:

- A chassis that is configured for mounting in the trunk of a vehicle or other similar compartment
- A control head that is configured for remote mounting (e.g. trunk) or in the console or dash in the front of a vehicle with a cable length of 17 feet minimum and a round-type cable with single protective outer sheath enclosing all other conductors
- A microphone with a self-retracting coil cord that shall be 4 feet long (minimum) when extended
- An external speaker
- An antenna appropriate for mounting on a vehicle (non-mag mount)
- Installation brackets and interface cables for all above components

11. Mobile Subscriber Radio – Models to be Proposed

Proposers shall propose, describe and price at least six models ("tiers") of radios to include: i) public safety standard control for vehicle, ii) public safety standard control for motorcycle, iii) public safety standard control for extreme (fire external) conditions, iv) public safety expanded control, v) public safety microphone (handheld) control, and vi) public service.

Proposers shall bid a minimum of these six models ("tiers") of radios, however, they are encouraged to propose more than six so long as they meet or exceed the following requirements.

12. Mobile Subscriber Radio – Public-Safety Standard Control for Vehicle Requirements

The Public-Safety Standard Control for Vehicle mobile subscriber radios shall provide the following capabilities for user controls and displays:

- Push-to-talk switch on microphone
- On-Off button
- Volume knob
- Rotary knob for mode or zone selection, each bank consisting of 16 channels/talkgroups
- 5 soft keys
- Emergency button
- Display with 2 lines of text (minimum 12 characters per line) plus 1 line of icons and 1 line of menus
- Display shall be readable in all conditions from direct sunlight to total darkness
- Display backlighting shall be user-adjustable

13. Mobile Subscriber Radio – Public-Safety Standard Control for Motorcycle Requirements

The Public-Safety Standard Control for Motorcycle mobile subscriber radios shall provide the same capabilities as Public-Safety Standard Control for Vehicle mobile subscriber radios however it shall contain:

- A water resistant palm microphone (instead of a standard palm microphone)
- A water resistant speaker (instead of a standard speaker)
- Motorcycle power and radio interface cables
- A motorcycle enclosure (to protect an externally-mounted radio)
- An antenna that is appropriate for mounting on a motorcycle

14. Mobile Subscriber Radio – Public-Safety Standard Control for Extreme (Fire External) Conditions

The Public-Safety Standard Control for Extreme (Fire External) Conditions mobile subscriber radios shall provide

- Push-to-talk switch on microphone
- On-Off button
- Volume knob
- Rotary knob for mode or zone selection, each bank consisting of 16 channels/talkgroups
- 4 soft keys
- Emergency button
- Display with 2 lines of text (minimum 12 characters per line) plus 1 line of icons and 1 line of menus
- Display shall be readable in all conditions from direct sunlight to total darkness
- Display backlighting shall be user-adjustable

Above-and-beyond the capabilities of the Public-Safety Standard Control for Vehicle mobile subscriber, the Public-Safety Standard Control for Extreme (Fire External) Conditions mobile subscriber shall include:

- A ruggedized and water resistant control head

- A water resistant palm microphone (instead of a standard palm microphone)
- An internal speaker (internal to the control head)
- An antenna that is appropriate for mounting on a fire apparatus

15. Mobile Subscriber Radio – Public-Safety Expanded Control Requirements

The Public-Safety Expanded Control mobile subscriber radios shall provide the following capabilities for user controls and displays:

- Push-to-talk switch on microphone
- On-Off button
- Volume knob
- Rotary knob for mode or zone selection, each bank consisting of 16 channels/talkgroups
- 5 soft keys
- Full-size DTMF keypad
- Siren control buttons
- Emergency button
- Display with 2 lines of text (minimum 12 characters per line) plus 1 line of icons and 1 line of menus
- Display shall be readable in all conditions from direct sunlight to total darkness
- Display backlighting shall be user-adjustable

16. Mobile Subscriber Radio – Public-Safety Microphone (or Handheld) Control Requirements

The Public-Safety Public Safety Microphone Control mobile subscriber radios shall provide the following capabilities for user controls and displays on the microphone included with the radio:

- One microphone that integrates all of the following functions:
- Push-to-talk switch
- On-Off button
- Volume controls
- Buttons for mode or zone selection, each bank consisting of 16 channels/talkgroups
- 3 soft keys
- Emergency button
- Display with 2 lines of text (minimum 12 characters per line) plus 1 line of icons and 1 line of menus
- Display shall be readable in all conditions from direct sunlight to total darkness
- Display backlighting shall be user-adjustable

For this model, the radio chassis may have no controls or displays on it.

17. Mobile Subscriber Radio –Public-Service Model Requirements

The Public-Service mobile subscriber radios shall provide the following capabilities for user controls and displays:

- Push-to-talk switch on microphone
- On-Off button
- Volume knob
- Rotary knob for mode or zone selection, each bank consisting of 16 channels/talkgroups
- 3 soft keys
- Emergency button
- Display with 1 line of text (minimum 8 characters per line) plus 1 line of icons and 1 line of menus
- Display shall be readable in all conditions from direct sunlight to total darkness

18. Mobile Subscriber Radio – Environmental Requirements

All Mobile subscriber radios included in the Waukesha County Radio Subsystem and the Milwaukee County Radio Subsystem shall meet or exceed the following environmental specifications per MIL-STD-810E (or equivalent items in 810 F):

a) Operating Temperature: -30 c to +60 C
b) Low Pressure Operation: 500.3 Procedure II
c) High Temperature, Storage / Operation: 501.3 Procedure I / II
d) Low Temperature, Storage / Operation: 502.3 Procedure I / II
e) Temperature Shock: 503.3 Procedure I
f) Solar Radiation: 505.3 Procedure I
g) Humidity: 507.3 Procedure II

h) Dust, Blowing: 510.3 Procedure I
i) Vibration: 514.4 Procedure I
j) Shock, Functional: 516.4 Procedure I
k) Rain, Blowing / Dripping Water (for metal case): 506.3 Procedure I / II
l) Salt Fog (for metal case): 509.3 Procedure I

19. Mobile Subscriber Radio – Programming Security

Full provisioning and programming of subscriber radios must include the use of a software program and a hardware-based advanced or enhanced system key. Users that attempt to program a subscriber radio without the hardware-based system key may have access to viewing the subscriber's code plug but they will not have the ability to enter critical information such as talkgroups, system IDs, and individual radio IDs. Proposers shall describe how they will ensure that access to system key shall be restricted only to users authorized by the Counties of Waukesha and Milwaukee. Proposers shall describe other options for system key deployment and management (example: master-keys and sub-keys, restricted-ID-range keys, etc.).

Advanced/enhanced system keys shall be available in a "parent" configuration which shall operate as described above and which shall allow the creation of "child" configuration. Keys in the "child" configuration shall be initially available in a blank format and the "parent" keys shall be used to configure them with some or all of the same capabilities of the "parent" including restricted and allowed sets of features and ranges of talkgroups and radio unit IDs (i.e., the "parent" key shall be able to create a "child" key that has all or its capabilities or that has restrictions on some of its capabilities). A "child" key may also be configured with an expiration date (after which it provides no functionality and cannot be used to program radios).

An alternate method to the advanced/enhanced system key and 'parent/child' configuration may be proposed so long as one single authority within each County be able to define the rights allowed and restrictions placed on all other agencies/organizations that will perform subscriber radio programming and that those definitions of rights and restrictions be assigned on a case-by-case basis and carried in a secure hardware device that cannot be copied or whose timing information (date of activation and/or inactivation) cannot be altered.

Proposers shall describe how they will ensure that access to system key shall be restricted only to users authorized by the Counties of Waukesha and Milwaukee. Proposers shall describe other options for system key deployment and management (example: parent-keys and child-keys, restricted-ID-range keys, etc.).

The programming software shall also include a codeplug management feature that allows the subscriber radio codeplugs to be created and stored in a centralized database that also includes a description of the codeplug and designators of the subscriber radios of radios to which it is to be applied (programmed). This feature shall allow a remote user to access a codeplug that were created by the programming software and stored on the database (and that are specifically designated for their radios by the radio alias) and to program them into those specifically-identified radios.

Also, the programming of encryption and authentication keys into subscriber radios shall be accomplished via a key management tool ("key fill device") that complies with TIA-102.AACD. The key management tool shall be used to view, change, erase, and activate keys individually or in groups. The key management tools shall be configured to be either "controlling" or "compliant" such that a "controlling" key management tool can dictate the encryption keys that the "compliant" key management tool can use and the "compliant" key management tool can use only those keys that it receives from the "controlling" key management tool. Both the "controlling" and "compliant" key management tools shall be capable of programming into subscriber radios the keys that they contain.

20. Mobile Subscriber Radio Programming Requirements

Proposers shall provide a total of six (6) total sets of equipment, cables, and software required to program and maintain the mobile subscriber radios, including their encryption capabilities (i.e,. key fill devices and authentication key devices), as described in this RFP. Three sets will be dedicated for Waukesha County and three for Milwaukee County. (If site licenses are available, pricing shall be based on one site for Waukesha County and one for Milwaukee County.) Equipment shall be exclusive of the computers used to operate the programming software. Programming software shall be compatible with Windows based PCs operating Windows XP or Windows 7.

21. Mobile Subscriber Radio Project 25 Phase II Migration Requirements

Mobile subscriber radios shall be able to be upgraded to Project 25 Phase II without the replacement of any proposed mobile subscriber radio hardware. Upgrade to Project 25 Phase II may include the addition or

reconfiguration of mobile subscriber software. Proposers shall describe the software that must be added to or reconfigured in the mobile subscriber radio in order to upgrade it to meet the requirements of Project 25 Phase II as well as the process required to perform the upgrade. Proposers shall describe the impact (changes, eliminations, expansions) of an upgrade to Project 25 Phase II to any of the Portable Subscriber P25 Trunking Features listed above.

22. Mobile Subscriber Radio – Requirements for Upgrades to Existing Mobile subscriber radios

A significant number of existing mobile subscriber radios that are currently operating on the existing Waukesha County and Milwaukee County SmartNet II+ trunked radio systems can be reconfigured by software ("flashed") to support P25 capabilities.

It is currently estimated that 1,400 mobile subscriber radios operating on the existing Waukesha County radio system and 500 mobile subscriber radios operating on the existing Milwaukee County radio system have this capability and that of this quantity 750 mobile subscriber radios (all on the existing Waukesha County radio system) currently contain the limited capabilities of the Motorola "RB" ("rebanding") version of software.

Mobile radio models that have this capability include Motorola XTL-series and APX-series mobile subscriber radios.

Proposers shall describe their ability to perform software upgrades to these radios to enable their use on their proposed Project 25 radio system. Proposers shall describe, if any, of the "P25 Trunking Feature Requirements" and "Non-P25 Trunking Feature Requirements" listed in Sections VI.F.4 and VI.F.5, respectively and above, shall be supported by such a radio that has been reconfigured by software to support P25 capabilities.

For pricing purposes, proposers shall assume that all 1,900 mobile subscriber radios (1,400 for Waukesha County and 500 for Milwaukee County) currently have no capabilities for SmartZone/Omni-Link, Project 25, or authentication (i.e., all 2,700 radios would require software/flash upgrades that include a "full flash bundle" of SmartZone/Omni-Link, Project 25, and authentication). Proposers shall also assume in their pricing that 750 of Waukesha County's existing mobile subscriber radios require a flash upgrade from the "RB" version of software to the full, non-rebanding, non-limited version of software. Proposers shall also provide the cost savings from the "full flash bundle" price if SmartZone/Omni-Link, Project 25, or authentication is not required (i.e., vendors shall state, for informational purposes, that a radio upgrade is "$x.00" less than the quoted amount for the "full flash bundle" if, for example, the radio is already equipped with Project 25 capabilities.)

23. Mobile Control Station and Consolette Radio Requirements

The Mobile Subscriber Radio: Public-Safety Standard Control shall be offered in two desktop configurations: mobile control station and consolette. Each desktop configuration shall have the same basic performance characteristics the Mobile Subscriber Radio – Public-Safety Standard Control for Vehicle, as listed above with the exceptions of i) the control station configuration shall be configured/equipped as a two-piece unit with an external power supply and a mounting-tray (for use on a desk or other surface) as well as with desktop, "paddle" style microphone and with the substitution of a mag-mount antenna for the vehicle-mount antenna and ii) the consolette radio configuration shall be configured/equipped as an integrated (enclosed) unit with internal power supply that is capable of being desk-mounted as well as with desktop, "paddle" style microphone and with the substitution of a mag-mount antenna for the vehicle-mount antenna.

I. Technical Requirements: Spare Equipment

Proposers shall provide comprehensive sets of spare parts (to be used for maintenance and repairs) for proposed equipment in the following categories:

- One set of spares for the Shared Core
- One set of spares for control equipment for the Waukesha County Radio Subsystem
- One set of spares for radio equipment for the Waukesha County Radio Subsystem
- One set of spares for dispatch console equipment for the WCC wireline dispatch consoles
- One set of spares for control equipment for the Milwaukee County Radio Subsystem
- One set of spares for radio equipment for the Milwaukee County Radio Subsystem
- One set of spares for dispatch console equipment for the wireline dispatch consoles for Milwaukee County users (one set to service all locations)
- One set of spares for microwave equipment for Milwaukee County

Proposers shall provide a detailed list of the spares (by equipment type and by location (prime site, remote/radio site)), including quantities, included in their proposal.

J. Technical Requirements: Test Equipment

Proposers shall provide two comprehensive sets of test equipment (one each for Waukesha and Milwaukee Counties) for the repair, maintenance, and alignment of infrastructure and subscriber equipment. Each set shall include, at a minimum, the following:

- A service monitor
- Extender cards
- Test fixtures
- Service cables
- Adapters
- Microwave equipment (for Milwaukee County, only)

Proposers shall provide a detailed list of the test spares included in their proposal.

K. Product Availability and Lifecycle Support Requirements

1. Product Shipping Status Requirements

Proposers shall not include in their design any of the following products in their proposed configuration that are either: i) not currently (at time of submission of proposal) ready for shipment to customers or ii) slated (formally announced) for cancellation with an announced date for last orders that is within 12 months of the date of submission of proposals with the exception of any equipment required to interface any part of the proposed system to legacy, analog equipment used in either of the Counties' existing systems including those specifically called for in Sections VI.D.12 and VI.D.16.

- Centralized network trunked system control equipment
- Local (at a radio site) trunked system control equipment
- Key network (LAN/WAN) components including those that connect controllers, audio processors, dispatch consoles, interoperability equipment, and radio sites
- Dispatch consoles
- Repeater at a site
- System management equipment
- Portable subscriber radios
- Mobile subscriber radios

2. Product Availability Requirements

Pricing for the following products or functional equivalents at no additional cost*, in the configurations proposed for this project, should remain firm for two (2) years from contract execution. Thereafter, pricing may only be increased once per year up to the maximum percentage quoted on the pricing form. It is important to note the percentage quoted is a not to exceed percentage, however, it is not to be assumed you will automatically get the full percentage quoted. You must provide sufficient documentation supporting the actual percentage of increase required for purchases beyond the initial two year period. The not to exceed percentage of increase will be considered when evaluating the life cycle cost. Note: It is expected that any decreases in pricing would be passed on to the purchasing agency. (* - "No additional cost" means that the cost of a functional equivalent and the costs for any associated upgrades/replacements to functionally-associated, in-use equipment that is required by the introduction of the functional equivalent shall be no greater than the cost of the product as proposed.)

- Centralized network trunked system control equipment
- Local (at a radio site) trunked system control equipment
- Key network (LAN/WAN) components including those that connect controllers, audio processors, dispatch consoles, interoperability equipment, and radio sites
- Dispatch consoles
- Repeater at a site
- System management equipment
- Portable subscriber radios
- Mobile subscriber radios

Proposers shall state their compliance with these requirements.

3. Product Lifecycle Support Requirements

Parts and technical service (phone support) shall be available for 7 years after notice of discontinuation of all of the following products:

- Network control subsystem equipment
- Local (at a radio site) trunked system control equipment
- Key network (LAN/WAN) components including those that connect controllers, audio processors, dispatch consoles, interoperability equipment, and radio sites
- Dispatch consoles
- Repeaters
- System management equipment
- Portable subscriber radios
- Mobile subscriber radios

L. Site Power Requirements

1. Site Power Requirements for Shared Core Equipment

The equipment that comprises the Shared Core shall operate off of 110VAC or 208VAC power circuits. Waukesha County shall supply a Universal Power Supply for this equipment.

2. Site Power Requirements for Waukesha County Radio Subsystem Sites

The radio equipment that is to be located at radio sites in the Waukesha County Radio Subsystem which includes radio repeaters and base stations shall operate off of 48VDC power circuits. Proposers shall include such capabilities in their proposals including sufficient batteries (sized to accommodate the load required by their proposed radio equipment plus 20%) and rectifiers (to be powered by 208/220VAC power circuits to be supplied by Waukesha County). All other, non-radio equipment (controllers, LAN components, etc.) shall operate off of 110 VAC power circuits. Proposers shall include in their proposals Universal Power Supplies (UPS') to power such equipment for a minimum of 10 minutes.

Waukesha County shall supply generators and transfer switches for their radio sites.

The Waukesha County Radio Subsystem sites have (or are presumed to have for sites that are being planned) the following power service:

- Waukesha (WCRS) site: 120/208 VAC 3-phase
- Eagle site: 120/240 VAC single phase
- Nashotah site: 120/240 VAC single phase
- New Berlin site: 120/240 VAC single phase
- Menomonee Falls site: 120/240 VAC single phase
- Delafield site: 120/208 VAC 3-phase
- Brookfield site: 120/240 VAC single phase
- Vernon site: presumed to be 120/240 VAC single phase
- Lisbon site: presumed to be 120/240 VAC single phase

3. Site Power Requirements for Milwaukee County Radio Subsystem Sites

The radio equipment that is to be located at radio sites in the Milwaukee County Radio Subsystem which includes radio repeaters and base stations shall operate off of 110VAC power circuits. Equipment shall be operated off of Universal Power Supplies (UPS') that shall provide such 110VAC power. Proposers shall include such UPS' in their proposals and they shall be sized to accommodate the load required by their proposed radio equipment plus 20%.

Milwaukee County shall supply generators and transfer switches at all radio sites with the exception of the site at Channel 58. ~~Milwaukee County shall supply generators and transfer switches at all radio sites with the exception of the sites at Lake Shore Towers and Channel 58~~. If either of these sites is included in their design, proposers shall include a generator and transfer switch for the included site(s) and it/they shall be sized to accommodate the load required by their proposed radio equipment plus 20%.

The Milwaukee County Radio Subsystem sites have the following power service:

- US Bank site: 208 VAC 3-phase
- County HoC site: 208 VAC 3-phase
- Muirdale site: 208 VAC 3-phase
- Brown Deer Park site 208 VAC 3-phase
- Channel 58 site 220 VAC 1-phase

- Channel 49 site: 220 VAC 1-phase
- Engine 38/Donna Drive site: ~~220~~ 208 VAC ~~3~~1-phase
- Lakeshore Towers site: 110 VAC 1-phase
- Greenfield Police Department site: 220 VAC 1-phase

Proposers shall also include a new UPS at the McKinley site.

UPS equipment at all sites shall be sited to power site equipment for a duration of 20 minutes with the exception of US Bank which must be sized to power site equipment for a duration of 3 hours. UPS equipment for Milwaukee County shall be Emerson Liebert equipment.

M. Equipment Rack Requirements

1. Rack Requirements for Equipment to be Housed at Waukesha County Sites

Rackable equipment to be housed at Waukesha County Sites, including the Shared Core equipment, equipment for the Waukesha County Radio Subsystem, and any applicable equipment for the WCC Dispatch Consoles shall make use of new racks to be supplied by Waukesha County.

Waukesha County has recently purchased a quantity sixty (60) Cooper B-Line SBJJ6084XUFB model racks for radio equipment and a quantity of four (4) Cooper B-Line 7 foot four-post racks for servers. Waukesha County will deliver these to the Contractor's staging location.

The Contractor shall provide and include Peg-Racks (or equivalent) for cavities/filters to be located at radio sites other than the WCRS site. Nineteen-inch racks (see model directly above) shall be used for cavities/filters to be located at the WCRS site.

2. Rack Requirements for Equipment to be Housed at Milwaukee County Sites

Rackable radio and microwave equipment to be housed at Milwaukee County Sites, including equipment for the Milwaukee County Radio Subsystem and any applicable equipment for the Milwaukee County Dispatch Consoles, shall be housed in nineteen-inch, 6 foot, open, 2-rail racks to be provided by the Contractor's. Server equipment to be housed at Milwaukee County Sites shall be housed in 6 foot, 4-post racks to be provided by the Contractor.

The Contractor shall provide and include Peg-Racks for cavities/filters to be located at radio sites.

N. Site Remediation: Work Being Planned by Waukesha County, Work Required From Contractor

As is described in Section II, above, Waukesha County currently operates, or is planning to operate, the sites to be used in this new system. In preparation for this new system, Waukesha County is already planning to complete (at its own cost and on their own initiative) the following changes to these current and planned sites:

- Waukesha County plans to build a new shelter at the Menomonee Falls Park site. Details on it are not finalized but proposers shall assume will be of sufficient size to house the equipment anticipated for this project. It is expected that it will be placed immediately south of the perimeter fence that surrounds the shelter currently used by Waukesha County at this site.
- Waukesha County plans to develop and construct new shelter and towers at the sites of Vernon Town Hall and Lisbon Fire Department (Good Hope Station). Details on these new shelters and towers are not finalized but proposers shall assume the shelters will be of sufficient size to house the equipment anticipated for this project and that they will be located within typical distances of the new towers. Proposers shall assume that the locations and elevations of antenna availability for these new towers shall be as listed in Section II, above.

No services are required from the Contractor for Waukesha County's efforts to complete the above-listed construction efforts other than to provide information on rack space requirements, heating/cooling requirements, etc.

The Contractor shall be required to complete other site remediation work at these and all sites used in their design to the extent it is needed to meet the Site Workmanship Requirements listed below.

O. Site Remediation: Work Required for Milwaukee County

As is described in Section II, above, Milwaukee County currently operates the sites to be used in this new system. In preparation for this new system, Milwaukee County requires the proposers to include in their proposal all necessary equipment and services to complete site remediation at all sites included in their design. Proposers should include the necessary site remediation work at all sites in accordance with the Site Workmanship Requirements listed below. Proposers should also include the necessary site remediation work for the following specific efforts:

- The remediation of the towers at Brown Deer Park and Engine 38/Donna Drive in order to ensure they comply with the specifications of TIA-222-G. This may include reinforcement or replacement of the existing towers, whichever is less costly. No adjustments will be made to their locations or the elevations of antenna availability on them.
- The remediation of the building-top site at Lakeshore Tower so that it's power is tied into the existing generator at this site and with antenna masts capable of supporting up to 5 total typical 800MHz antennas. This shall require the addition of a transfer switch and the connection of it to the generator and all other applicable power equipment. Proposers shall include in their design any/all improvements to the HVAC system to ensure proper cooling of their proposed equipment. ~~The remediation of the building-top site at Lakeshore Tower so that it is equipped with a functional generator (capable of carrying the expected electrical load anticipated for this project) and with antenna masts capable of supporting up to 5 total typical 800MHz antennas. The generator shall operate on diesel or other appropriate fuel, shall have a 500 gallon tank, and shall include the necessary transfer switch to interface it to the equipment power circuits.~~
- The remediation of the site at Greenfield Police Department in order to provide either temporary or permanent shelter; including proper grounding as well as main and backup power supplies; for the equipment to be deployed for the Milwaukee County radio subsystem. This site does currently house equipment that is used in the existing system but the facility in which that equipment is housed is severely limited in available space and it cannot accommodate the equipment that will be deployed as part of the new Milwaukee County radio subsystem.
- The remediation of the site at Muirdale in order to provide a fire suppression system that best fits the construction of the facility but the suppression material that is dispersed may not be harmful to the electronics housed at that site (i.e., it may not be a water-based suppression system).

For all such site remediation work for sites to be included in the Milwaukee County Radio Subsystem, proposers shall be responsible for working to meet the needs of the specific site owners which are:

- For Brown Deer Park: Milwaukee County Parks Department
- For Engine 38/Donna Drive: Milwaukee Fire Department (City of Milwaukee)
- For Lake Shore Towers: Bieck Management Inc.
- Greenfield Police Department: The City of Greenfield

P. Site Workmanship Requirements

The Contractor shall complete all work at dispatch and radio sites (including remediation, installation, optimization, and other work) according to the requirements of this Section.

1. Damages

Contractor shall be responsible for all damage to any property within the confines of either County's property as a result of an act or omission of the Contractor, its employees and/or subcontractors. This includes, but is not limited, to equipment shelters, shelter grounds, shelter fencing, radio towers, radio and microwave equipment, power supplies and outlets, generators, transfer switches, fire suppression systems and alarm monitoring equipment. The applicable County will repair/replace or contract for repair/replacement services to return to original condition and all costs will borne by the Contractor.

2. Acceptable Standards

Proposers shall perform all work on sites, shelters and towers according to standards accepted by the industry. Examples of standards for sites and shelters are:

- Motorola R56 Standards & Guidelines for Communications Sites
- Harris Corporation Site Grounding and Lightning Protection Guidelines

Other standards for how site work is to be performed may be submitted for evaluation but at this time only those listed immediately above have been accepted by the Counties.

The Vendor shall timely notify the appropriate governmental agency of the need for the construction and installation of such facilities. The costs of the Civil Work for said facilities shall not be included in the proposer's submitted proposal.

3. General Grounding and Cabling Requirements

All sites shall be equipped with electrical and grounding systems as needed under this project, to the level approved for operation of the current generation of computer-controlled radio systems. Current best practices will be followed, using either of the standards listed above in this Section.

All cabling shall attach to consoles and to racks in the electronic equipment room of each location through appropriate cable connectors to facilitate ease of removal for maintenance. All cables, other than those carrying digital signaling, between the electronic equipment racks and consoles, radio system and all other equipment, shall be routed through punch blocks mounted on an sheet of fire resistant plywood to be provided by the individual County. The Proposer shall furnish all cables between the consoles and the electronic equipment room punch blocks and between the electronic equipment racks and the punch blocks. Plenum rated cable shall be provided and installed where required.

4. Punch Block Requirements

The Proposer shall provide and install all cables between the punch blocks that are installed and the terminations for the radio system. The Proposer shall provide and install all of the punch blocks required for the installation as described in the above paragraphs.

Proposer shall provide and install wall punch blocks in the spaces where the radio equipment is to be installed. All inter-equipment connections, including alarm contact wiring, shall be made through these blocks. The punch blocks shall be mounted on appropriately sized fire retardant plywood. The radio equipment installers shall provide and install all wiring between radio equipment racks and the punch blocks as well as all wiring between those punch blocks and punch blocks installed by other Proposers when intersystem interfacing is required.

5. Cable Labeling Requirements

All console wiring and cabling must conform to the cabling coloring and labeling standards of the owner of the dispatch center or radio site. All cables must be identified by machine-printed permanent adhesive labels at each end of the cable. Identification shall be printed in a color contrasting with the cable and must indicate self-evident cable use and routing, without the need to refer to a separate index. Handwritten labels are unacceptable. Color code and labeling specifications for cables will be provided to the successful Proposer after contract signing.

At sites with multiple antennas, each antenna cable shall be identified with laminated or steel tags which show operating frequency(s) of the connected station(s) and elevation of the antenna on the support structure. Tags shall appear at no fewer places than the base of the antenna supporting structure and the vicinity of the duplexer/radio/combiner/multicoupler equipment, and the base of the antennas.

6. Cable Routing Requirements

Antennas shall be mounted according to antenna mount designs approved by the site owner. Coaxial cable shall be anchored according to the designs approved by the site owner, or otherwise shall be anchored to support structures at no more than the maximum distance recommended by the manufacturer, however, in any case, at no more than five feet spacing with suitable clamps.

Transmission line cable may be attached across a face of the support structure except that no part of any guide or line shall be within two inches of any other guide or line.

Each run of cable shall be one continuous piece from antenna to radio, multicoupler, combiner, duplexer, or lightning arrestor, without a splice or connectors, except that a jumper may be used at the equipment end.

Proposer shall determine the length of cable required in the field before cable is ordered.

Antenna cable ground kits shall be installed on each transmission line nearest the connection to the antenna and at a point near where the line leaves the support structure at the bottom, and to the grounding bulkhead or other suitable ground where the transmission line enters the equipment shelter.

Cable runs from the building to the support structure of more than two feet shall be supported using a manufacturer's recommended support and clamps at no more than the maximum spacing recommended by the

transmission line manufacturer, however, in any case, at no more than five foot intervals. All cable runs inside the building shall be supported on cable ladders supported from above. Transmission line cable on the cable ladders shall be installed in parallel in a neat and professional manner. Where not already provided, a cable ladder shall be supplied and installed. The Contractor may need to install cable ladder in some existing equipment shelter buildings or equipment rooms.

All cable bundles must be "combed out," containing only neatly-routed parallel cables.

All cables in a bundle must be tied as a unit, i.e., one fastener around the entire bundle. Cables or sub-bundles taking the same path may not be attached to an existing bundle, but must be incorporated into the original bundle.

Cables must be cut to length plus a small allowance for slack. Similarly-routed cables must have equal-length slack loops. Excessive extra cable is unacceptable, as are techniques to "use up" excessive cable, such as zigzag bundles.

Nylon cable ties are unacceptable for network or soft-shield cables which may be deformed due to fastener tension; Velcro wraps must be used in these applications. Where nylon cable ties are used, a flush-cut automatic tensioning tool, properly set according to the cable tie specifications, shall be employed. Only black nylon cable ties or (Velcro hook-and-loop wraps, as appropriate) are to be used. Natural (white) nylon ties shall not be employed as they degrade with time and ultraviolet exposure.

Any RF cable run between a shelter and a tower/monopole that is over 5 feet in length must be covered by an ice bridge. In addition, an ice bridge shall be supplied at WCRS to facilitate routing feed lines from the North to the Southwest leg (to cover those lines that shall be rerouted from the existing to the new radio equipment room).

7. Lightening Suppression Requirements

Protection against lightning-caused electrical surges shall be provided, connected, and installed on all electrical lines and antenna transmission lines that enter any cabinet.

Each coax cable transmission line shall be equipped with an appropriate lightning arrestor that is mounted to a properly grounded bulkhead panel or other suitable ground where it enters the equipment shelter building.

8. Rack Access and Grounding Requirements

All fixed location radio equipment racks and cabinets shall ideally have at least three feet of access space to perform repairs. Cases where this cannot be accomplished in existing facilities should be noted and discussed in the Proposal.

If equipment racks are mounted away from a wall, power cords and other cables shall be protected so that people in the equipment space will not step on, trip over, or accidentally pull out power plugs or damage the cables. The Proposer shall arrange for power outlets on the finished ceiling or cable ladder above the equipment racks.

Equipment rack cabinets shall be bonded together with copper conductors no smaller than AWG #6 and connected to a suitable ground.

The ground conductor shall have no sharp bends and as few bends as possible. Ground connections shall not feed through cabinets. Cabinet ground connections as well as connections to the grounding system shall be made to bare metal on the exterior of the cabinet using a suitable UL listed connection and mechanically secured with nuts, bolts, and star type washers.

Any new racks installed at the Channel 58 site in Milwaukee County should be installed with the bottom 18" (approximately) left as unoccupied.

9. Initiation and Completion of Work Requirements

Final system configuration shall be documented via as-built diagrams containing block diagrams, cabling and interconnection, and all hardware on a per-site and system-wide basis.

Upon completion of the installation of any/all antenna or waveguide lines, those lines shall be analyzed ("swept") to ensure proper installation and the absence of kinks, obtrusions, or other issues that would cause an unacceptable voltage standing wave ratio (VSWR).

The installers shall remove all packing material, excess wire and material required for installation prior to beginning the acceptance testing. The floor areas are to be vacuumed or swept and shall represent a clean and orderly work area.

The outdoor areas of each site shall be clear of all scrap material, packing and packaging material, etc., so as to be clean and orderly.

Failure to comply with these requirements will result in the owner contracting a separate party to have the inside and/or outside cleanup work performed, and the cost of the cleanup will be deducted from the amount paid to the Contractor.

For Waukesha County, the Contractor shall place all items for removal to a designated area at the project site and Waukesha County will take the responsibility for removing it during normal business hours. However, the Contractor will need to provide at least one business day advance notice when equipment will need to be removed.

For Milwaukee County, the Contractor will be responsible for removing and transporting all items that are being replaced to the McKinley site for disposal or rework. However, the Contractor will need to provide at least one business day advance notice prior to taking items to McKinley.

Q. Project Deployment Requirements for Services

All necessary and incidental equipment needed in order to meet the requirements for a complete and operating system, even if not specifically mentioned herein, shall be supplied by the Contractor without claim for additional payment. Proposers are responsible for verifying the completeness of any parts lists, the correctness of any type numbers and the overall suitability of the equipment to meet the main purpose of the RFP and its requirements.

1. Background: Existing Services Capabilities

WCRS has sufficient staffing, training, experience, and capabilities to perform the maintenance, management, operation, repair, and service of and on the existing Waukesha County radio system. WCRS is also capable of installing, configuring, and optimizing new radio infrastructure equipment and systems if provided sufficient training and documentation. Finally, WCRS currently provides installation, support, repair, and programming/reprogramming services for portable subscriber radios and mobile subscriber radios to users of the existing Waukesha County radio system. Because WCRS has these “in-house” capabilities, this Section and the following Section of this RFP describe the services that WCRS will provide for Project Deployment and Project Support and Maintenance as these services relate to Waukesha County.

The maintenance, management, operation, repair, and service of and on the existing Milwaukee County radio system, as well as the portable subscriber radios and mobile subscriber radios that operate on it, are performed by a combination of contract personnel and private radio shops. Therefore, the proposer shall not assume Milwaukee County staff will provide any of the services that WCRS has agreed to perform.

2. Project Management Services

Proposers shall include in their offering the necessary staff and other resources to provide the following Project Management Services:

- Assign and maintain a Project Manager to coordinate the activities of proposer’s staff and subcontractors and to manage and control the project’s performance, budget, schedule, and quality
- Conduct regular project status meetings and prepare and submit regular project status reports to inform the Department of the project’s status
- Complete a Contract Design Review in which a final design will be presented, discussed, and confirmed

3. Licensing Support Services

Proposers shall include in their offering the necessary staff and other resources to provide the following Licensing Support Services:

- Provide technical assistance regarding the design and answer questions as necessary for the completion of licensing forms
- Provide coverage propagation maps as necessary for the completion of licensing forms

For backhaul links, Waukesha County will provide the licensing services for any and all new microwave links to be provided by the County as required by this project. The Contractor shall provide the licensing services for any and all new microwave links to be provided by that vendor as required by this project for Milwaukee County.

4. Frequency Planning Services

Proposers shall include in their offering the necessary staff and other resources to develop and implement a preliminary and final frequency plan showing which channels are to be used throughout the system for each individual subsystem. The Counties strongly prefer the use of 800MHz channels due to: i) the capabilities of existing subscriber radios and ii) the anticipated narrowbanding of the 700MHz channels.

5. Tower Analysis and Services

For the purposes of this RFP, proposers shall assume that all existing towers, with the exception of the towers at Brown Deer Park and Engine 38/Donna Drive in Milwaukee County, meet current structural requirements, however, if needed for licensing or construction, the Contractor shall perform the following tower analyses:

- Towers shall be analyzed with all proposed appurtenances and associated feedlines
- Towers shall be analyzed according to ANSI/TIA/EIA-222-G
- Minimum Basic Wind Speed shall be 90 mph and the Minimum Basic Wind Speed With Ice (0.75 inches) shall be 40 mph

If the tower/monopole for a given site is determined to be failing with the addition of new equipment, proposer shall gather quotes for reinforcing and replacing that tower/monopole so that a decision can be made by the appropriate County on how to correct the situation.

6. Site Preparation Services

Proposers shall include in their offering the necessary staff and other resources to complete the following site preparation services:

- Permits:
  - For work on Waukesha County locations: vendor shall support Waukesha County's efforts to obtain site access and site work permits by providing drawings and other relevant information
  - For work on Milwaukee County locations: vendor shall obtain all necessary site access and site work permits
- Replacement of existing radio antennas on tower or monopole structures with new antennas from the proposed system design per County-approved site drawings.
- Replacement of existing feed-lines pertaining to each radio antenna that is to be replaced with new feed-lines from the proposed system design per County-approved site drawings
- Removal and disposal of all existing radio antennas and associated feed-lines that are to be replaced
- Replacement of existing rack systems, radios, combiners, and filters in shelters with new rack systems, combiners, and filters per system design per County-approved site drawings
- Removal and disposal of all existing rack systems, radios, combiners, and filters that are to be replaced
- Replacement of existing cabinet and existing cabinet foundation with new shelter and foundation per County-approved site drawings
- Removal and disposal of existing cabinet and foundation
- Replacement of existing generator shelter and existing generator shelter foundation with new generator shelter and foundation per the County-approved drawings
- If necessary, replacement of existing tower/monopole and existing tower/monopole foundation with new tower/monopole and foundation per County-approved site drawings
- If necessary, removal and disposal of existing tower/monopole and foundation
- If necessary, tower modifications to existing towers.

7. System Cutover Services and Cutover Plan

Proposers are reminded that the current two-way radio system being supported at the existing sites and operation on the currently-licensed frequencies must remain in continuous operation (as a total system, recognizing that individual component parts may be disabled for periods of time during construction) throughout the project.

Proposers shall include in their offering the necessary staff and other resources to complete system cutover-planning and cutover-implementation services.

The selected proposer shall, prior to initiation of the System Cutover, develop with each County a Cutover Procedure that provides a mechanism to deploy the new system with minimal impact to that County's operations. Such a cutover procedure shall provide a detailed schedule, a listing of actions to be performed by the selected proposer and by the County, and a description of the impact to operations for tasks such as:

- System infrastructure installation, optimization, and connection to existing systems (backhaul, etc.
- Testing
- Installation and programming of dispatch consoles
- Preparation and delivery of training, as described below
- Installation and programming of mobile and portable radios, as described below
- Distribution of radios to users
- Decommissioning of existing systems

Proposers shall include in their proposals their cutover strategy that describes how users and dispatchers of the Waukesha and Milwaukee County radio subsystems will be able to talk to: i) users on the other County's radio subsystem, ii) dispatchers on their radio subsystem, iii) and dispatchers on the other County's radio subsystem. This cutover strategy must describe how these intercommunications will occur for all phases of deployment including the periods during with the Waukesha County radio subsystem is fully deployed and in which the Milwaukee County radio system is comprised of: a) partial build-out of its new P25 simulcast system, b) its existing SmartNet II+ radio system that is interconnected with the proposed Legacy Radio System Interface, iii) a mix of new dispatch consoles procured as part of this project and existing dispatch consoles that are interconnect with the proposed Legacy Dispatch Console Interface.

8. Fleet Mapping Services

For the Milwaukee County Radio Subsystem, Proposers shall include in their offering the necessary staff and other resources to complete the following fleet mapping services:

- Prepare and conduct workshops to discuss County operations and translation of those operational discussions into fleet map that includes a listing of talkgroups and scan groups to be implemented per operational group.
- Prepare programming/ configuration templates for all infrastructure equipment, portable subscriber radio, mobile subscribers, and wireless control stations.
- Prepare programming templates for trunked system control equipment and for subscriber units.

The staff of WCRS will complete these same tasks for the Waukesha County Radio Subsystem. (The staff of WCRS will also participate in the fleet mapping efforts of the Milwaukee County Radio Subsystem, to ensure continuity of fleet maps and proper development of interoperability talkgroups.)

9. Staging Services

Selected proposer shall stage systems in a proposer's location within the continental United States.

Staging services shall include:

- Set up and rack the system equipment on a site-by-site basis, as it will be configured in the field at each of the transmitter/receiver sites
- Cut and label cables according to the approved County requirements
- Label the cables with to/from information to specify interconnection for field installation and future servicing needs
- Complete the cabling/connecting of the subsystems to each other ("connectorization" of the subsystems)
- Assemble required subsystems to assure system functionality
- Power up, program, and test all staged equipment
- Confirm system configuration and software compatibility to the existing system
- Load application parameters on all equipment according to input from Counties
- Complete programming of the Fixed Network Equipment
- Program the approved templates into a radio-programming template tool
- Complete programming of sample Subscriber units
- Inventory the equipment with serial numbers and installation references
- Complete system documentation
- Deliver a full equipment list of all items to be delivered to the Counties sites including equipment make, model, quantity, serial number(s), destination (by site and by rack number)

- Staging shall conclude with the execution of a Factory Acceptance Test Plan which is to be agreed to by all parties prior to its initiation and which is to be based on the functionality described in this RFP and in proposer's proposal. The Factory Acceptance Test Plan shall include failure mode analysis tests to demonstrate and confirm the performance of the system as various key components are removed from service.

10. Field Implementation & Optimization Services – Excluding Wireless Dispatch Positions

Proposers shall include in their offering the necessary staff and other resources to complete the following field implementation and optimization services for all system infrastructure equipment except the wireless dispatch positions:

- Install system equipment as specified by the Equipment List, System Description, and System Drawings
- Power and Ground all equipment
- Program all equipment
- Verify that all equipment is operating properly and that all electrical and signal levels are set accurately
- Verify that all audio and data levels are at factory settings
- Check forward and reflected power for all radio equipment, after connection to the antenna systems, to verify that power is within tolerances
- Check audio and data levels to verify factory settings
- Verify communication interfaces between devices for proper operation
- Test features and functionality are in accordance with manufacturers' specifications and that they comply with the final configuration established during system staging
- Perform test to verify site link performance, prior to the interconnection of the system equipment to the link equipment

WCRS has the levels of staffing and skills necessary to participate in these implementation and optimization services. For the purposes of improving their knowledge and understanding of their new radio system, the WCRS will contribute two of their staff to participate in the conduct of these services. Proposers are encouraged to adjust their prices for such services to take advantage of this availability of Waukesha County staff as the Contractor will be required to utilize these two staff in the conduct of these services. (Proposers may assume that these two Waukesha County staff shall participate only in the implementation and optimization services of the Shared Core and of the Waukesha County Radio Subsystem, and not of the Milwaukee County Radio Subsystem.)

11. Field Implementation & Optimization Services – Wireless Dispatch Positions

Proposers shall include in their offering the necessary staff and other resources to complete the following field implementation and optimization services for the wireless dispatch positions:

- Create installation plan
- Assist in determining the locations of control stations for each site
- Install RF local control stations identified in the equipment list
- Install line (not greater than 100 feet in length) and antenna system (connectors, coax grounding kit, antenna, and surge protection)
- Protect the cabling by providing and installing a bulkhead lightning surge protector
- Properly connectorize and ground the cabling, which will be run to the outdoor antenna location using the least obtrusive method
- Connect to the County-supplied ground point
- Program all control stations

12. System Testing and Acceptance Services

As noted above, acceptance of the Shared Core, the Waukesha County Radio Subsystem, and the WCC dispatch consoles shall occur on a one-time basis following successful completion of their respective Acceptance Test Plans and the resolution of all open punch-list items to the County's satisfaction (as well as any other conditions for acceptance set forth the purchase agreement). Acceptance of the Milwaukee County Radio Subsystem shall occur on a Phase-by-Phase basis and each Phase shall have its own independent set of Acceptance Test Plans. Acceptance for a Phase shall be based on successful completion of a Phase's Acceptance Test Plans and the resolution of all open punch-list items to the County's satisfaction (as well as any other conditions for acceptance set forth the purchase agreement). Acceptance of any one phase shall not constitute acceptance of any subsequent phase or final system acceptance.

Prior to initiating any Field Performance/Functionality Acceptance tests, the Contractor shall update all equipment in the system with the then-current versions of software (i.e., if new versions have become available since Staging, they shall be applied before Field Performance/Functionality Acceptance tests).

Proposer shall develop for approval by the Counties detailed plans to demonstrate the performance, features, coverage, and reliability of the individual subsystems and the entire system. Each test shall have individual procedures and each procedure shall identify the goal, the method, the criteria for pass-failure, and the remedy that shall be taken should failure occur. Plans shall be included for Field Performance/Functionality Acceptance and Coverage Performance Acceptance. Field Performance/Functionality Acceptance tests shall test all functionalities and performance aspects called for as requirements in this RFP. Field Performance/Functionality Acceptance tests shall include failure more analysis tests to demonstrate and confirm the performance of the system as various key components are removed from service. Coverage testing plans shall adhere to the TIA/EIA TSB88-C guidelines.

Proposer shall execute the Counties-approved tests which shall be witnessed and approved or deemed to be failed, per the criteria for pass-failure. Proposer shall remedy any causes of failures and shall repeat the test which shall be witnessed and approved or deemed to be failed, per the criteria for pass-failure.

Proposers shall include in their offerings their preliminary Factory (Staging) Acceptance, Field Performance/Functionality Acceptance, and Coverage Performance Acceptance Test Plans.

13. Portable Subscriber Radio Implementation Services

Implementation of portable subscriber radios may be completed by the Contractor, by WCRS, or by local radio shops.

Proposers shall provide unit-level pricing for the necessary staff and other resources to complete the following portable subscriber radio implementation services:

- Program a portable based upon the approved programming templates and fleet map
- Deliver the unit to authorized personnel and inventory upon receipt

14. Mobile Subscriber Radio Implementation Services

Implementation of mobile subscriber radios may be completed by the Contractor, by WCRS, or by local radio shops.

Proposers shall provide unit-level pricing for the necessary staff and other resources to complete the following mobile subscriber radio implementation services at a remote location (on-site at a user agency's location):

- Program the mobile, as identified in the equipment list, in accordance with the approved programming templates and fleet map
- Install the mobile in a standard police vehicle or fire apparatus, and according to an approved installation procedure

Mobile subscriber radio installation shall be conducted according to the following guidelines:

- Installations utilize mobile mounting hardware appropriate for the type of vehicle
- Obtain main power from the leads from a voltage source identified by the agency
- Permanently mount the antennas on each vehicle according to the approved installation procedure, appropriate for the vehicle type.
- Install new antennas close to the same location as any existing antennas, where practical, in vehicles that already have antennas installed. Install the antennas on the roof, where practical, on any new antenna installations.
- Plug any old antenna hole with an appropriate rubber plug, if the antenna requires a new location on the vehicle.
- Remove the existing mobiles from the vehicles at the time of installation of new radios.

15. Training Services

Proposers shall include in their offering the necessary staff and other resources to prepare and deliver the following training services for Waukesha County:

- Mobile and portable subscriber radio usage classes (train-the-trainer format): five classes at one location for up to 10 trainers per class, to be conducted over several, non-concurrent days to be held at one location in Waukesha County or location of Contractor (whichever is less costly).
- Dispatch console usage classes - train-the-trainer format: one class for up to 8 trainers at WCC.
- User radio template-building and programming and usage class: for three attendees at one location in Waukesha County or at location of Contractor (whichever is less costly to the County)
- System management class: shall cover all Shared Core and Waukesha County Radio Subsystem equipment: one or multiple classes for two attendees (one at a time) to be held at one location (may be at Contractor location)
- System infrastructure maintenance and repair: shall cover all Shared Core and Waukesha County Radio Subsystem equipment: one or multiple classes for three attendees (one at a time) to be held at one location in Waukesha County or location of Contractor (whichever is less costly).

Proposers shall include in their offering the necessary staff and other resources to prepare and deliver the following training services for Milwaukee County:

- Mobile and portable subscriber radio usage classes (train-the-trainer format): five classes at one location for up to 10 trainers per class, to be conducted over several, non-concurrent days to be held at one location in Milwaukee County or location of Contractor (whichever is less costly)
- Dispatch console usage classes (train-the-user format): up to 12 classes at four different locations in Milwaukee County
- User radio template-building and programming and usage class: for three attendees at one location in Milwaukee County
- System management class: shall cover all Shared Core and Milwaukee County Radio Subsystem equipment: one or multiple classes for two attendees (one at a time) to be held at one location (may be at Contractor location)
- Microwave administration and usage class: shall cover microwave system equipment, maintenance, troubleshooting, operational and software training for four (4) technicians at one location in Milwaukee County or location of Contractor (whichever is less costly).

Prior to initiation of training, the Contractor shall develop and confirm with the Counties all training curricula.

Training classes will include the preparation and distribution of all materials at the expense of the Contractor.

For the subscriber radio and dispatch console usage classes, proposers shall include a “customer training package” that shall include editable (non-PDF) electronic copies of all training materials so that the Counties can use that material in the development of work aids, usage guides, and other such documents for on-going usage and continued training of new staff.

16. Documentation Services

For all major components included in their final design, Contractor shall agree to supply the following documentation:

- Service Manual: Contents of manual shall include maintenance procedures and schedules, product schematics, trouble shooting and repair guides
- Operator Manual: Contents of manual shall include location of all switches, controls and indicators; Step-by-step instructions to operate all equipment features.
- Technical data: Proposer shall submit technical product literature demonstrating that the proposed equipment fully complies with all technical provisions of this solicitation.

Contractor shall provide 2 bound paper copies and one electronic copy of each manual.

Any documentation that is developed specifically for Waukesha County or Milwaukee County (including diagrams or written descriptions of the system) shall be provided as editable electronic documents in the most current version of Word (for written documents) and AutoCad (for drawing documents). The Counties reserve the right to duplicate materials for internal purposes only.

17. Services – Project Management Plan

Proposers shall include in their proposals a Project Management Plan that includes the following sections:

a) Staffing Plan

A description (including full resumes) of backgrounds and relevant skills, experience, and education for, at a minimum, the following project staff:

1. Account Manager
2. Project Manager
3. Radio Systems Engineer
4. Lead Radio Tech (Site Manager)
5. Service Manager

The staffing plan shall also address the following questions:

1. How is the proposer's team organized?
2. Who is the proposer's single point of contact (name and contact information)?
3. Who is a point of escalation should an issue be unable to be addressed by the proposer's single point of contact (name and contact information)?

b) Implementation Plan

A description of the tasks involved in the successful completion of the project including the goals, activities, outcomes/deliverables, and assumptions regarding system design, frequency acquisition/licensing, system manufacturing, site preparation (for each site), system staging, system installation, system configuration, system optimization, system testing (performance, coverage, and reliability), cutover preparation, training, cutover implementation, conditional acceptance, final acceptance, warranty/support, and any other relevant activities. The roles and responsibilities of the proposer, the individual Counties, and other relevant third parties shall be described for each activity.

c) Project Schedule

A Gantt chart that graphically depicts the start date, end date, duration, and precedence-relationship of the activities and sub-activities listed above.

d) Testing Plans

Provide detailed plans to demonstrate the performance, features, coverage, and reliability of the individual subsystems and the entire system. Each test shall have individual procedures and each procedure shall identify the goal, the method, the criteria for pass-failure, and the remedy that shall be taken should failure occur. Plans shall be included for Factory (Staging) Performance Acceptance, Factory (Staging), Reliability (Failure Mode Analysis) Acceptance, Field Performance Acceptance, and Coverage Performance Acceptance. Coverage testing plans shall adhere to the TIA/EIA TSB88-C guidelines.

e) Project Reporting Plan

Include a description of how and when the proposer proposes to manage, report, and control project issues and risks. This shall describe the contents/agendas for and frequencies of regular report and status meetings throughout the project. It shall also detail the proposer's processes for identifying, reporting, discussing, agreeing, and approving resolutions to project issues and risks. The Counties will have the sole discretion as to when and how issues and risks are to be added to and removed from the project reporting plan.

f) Project Risk Plan

Include a detailed listing of both general and specific risks to the project, and descriptions of proposer's plans to mitigate each risk.

g) Project Change Management Plan

One goal of this project is that the system be deployed on time (per the contracted schedule) and to budget (per the original contracted purchase amount). Change orders that are requested by the selected vendor in order to meet the requirements of this RFP will not be accepted. The Counties do not expect to issue change orders unless: i) a change in scope is specifically requested by the Counties, ii) the change is to the advantage of the County (i.e., a cost savings or a schedule improvement), or iii) the change is a result of something that could not have been known at the time of submission. Proposers shall include in their proposals their Change Management Plan which shall describe the situations in which they anticipate issuing a Change Order as well as the process used to request, review, approve, and enact (implement) a change to the project scope, schedule, or cost.

R. System Support and Maintenance Requirements for Services

Proposer shall include in their offering the following services to support and maintain the radio system described in this RFP:

1. System Warranty

The Contractor will warrant the overall performance of the system, including all system and component hardware and software, for 12 months, following Final System Acceptance as a whole for Waukesha County and by phase for Milwaukee County; which shall be considered as the successful completion of all acceptance test plans and the resolution of all open punch-list items to the County's satisfaction. As noted above, acceptance of the Shared Core, the Waukesha County Radio Subsystem, and the WCC dispatch consoles shall occur on a one-time basis. Acceptance of the Milwaukee County Radio Subsystem shall occur Phase-by-Phase.

2. Infrastructure Support & Maintenance General Requirements

Respondents must include pricing for support/maintenance on a 7 x 24, basis; inclusive of all upgrades and enhancements aimed at achieving efficient operation of the system and providing safe and adequate services at all times.

Support services shall include a toll-free number for service issues, a support email address, a support website and remote diagnostic capability. The County plans to utilize the Contractor's established support center to answer technical systems, related questions and address problems. Guidance and assistance will be needed from the Contractor in the use of their web site. If any of these services are not included in the support/maintenance agreement, it should be noted in the area provided in the Vendor Response document.

Acknowledgement of support/maintenance calls must be within two hours after receipt. The County's standard for problem resolution is noted below. Vendors will note in the Proposal Document how their service levels differ.

- Priority 1 – Entire system is inoperative. Commands the highest level of priority and fastest repair, but no later than 4 hours after acknowledgement of call.
- Priority 2 – System disabled; major function inoperative or component failure. Repair needed ASAP, but no later than one business day after acknowledgement of call.
- Priority 3 – Minor system issue or redundant component failure. Routine but repaired as quickly as practical but no later than two business days after acknowledgement of call.

First year of paid support will not commence until after warranty expiration. Pricing for support must be fixed for the first year of service. Thereafter, pricing may not increase by more than 3% for the prior one-year period or the Employment Cost Index, Private Industry Wages and Salaries, 12 month percent change, not seasonally adjusted for the Midwest Area, whichever is less.

3. Infrastructure Support & Maintenance Requirements – Required Services

Proposers shall include in their offering the necessary staff and other resources to provide the following required infrastructure support and maintenance services for a period of not less than five (5) years from system acceptance:

a) Technical Support Service: in accordance with the General Requirements noted in Item 2.
b) System Software and Hardware Update Program: in which the Contractor will provide upgrades to the software included in system infrastructure components in accordance with the General Requirements noted in Item 2, and updates to the hardware included in the system to the degree that hardware updates are required by the software upgrades (e.g., if a software upgrade to one component requires the replacement of a router with a newer model, then the pricing shall cover both); Proposer's responsibility shall be to provide all necessary software and hardware and a detailed upgrade/implementation plan; Proposers shall assume that each County will implement a system software/hardware upgrade two times over this period of five years.
c) Microwave Support: The services included in this section shall be included for the microwave equipment included in the Milwaukee County Radio Subsystem

4. Infrastructure Support & Maintenance Requirements – Optional Services for Milwaukee County

Proposers shall include optional pricing for Milwaukee County for the necessary staff and other resources to provide the following optional infrastructure support and maintenance services (including for microwave equipment) for a period of not less than five (5) years from system acceptance:

a) Product Maintenance Program: in which the Contractor will maintain the new system products (including equipment & interfaces) to be furnished by Contractor for five (5) years following Final System Acceptance
b) Dispatch Service and to arrange for other on-site infrastructure repair services should they be required
c) Infrastructure Repair with Advanced Replacement: in which the Contractor will coordinate for the replacement of failed equipment not manufactured by Contractor
d) On-Site Infrastructure Response with Local Dispatch: in which the Contractor will provide on-site technician response by a local service shop to diagnose, repair, or replace failed infrastructure equipment
e) Network Preventative Maintenance (System Survey and Analysis): in which the Contractor will regularly attend to and align infrastructure components to continue their performance to original specifications, to the degree possible by use and age

5. Subscriber Radio Software Update Requirements

Proposers shall include in their offering Subscriber Software Update Program in accordance with the General Requirements noted in Item 2. Following system acceptance, Contractor will regularly provide upgrades to the software included in subscriber radios. Proposer's responsibility shall be to provide all necessary software and a detailed upgrade/implementation plan for all types of subscribers sold to users of the Waukesha and Milwaukee County Radio Subsystems. Proposers shall assume that each County will implement subscriber software upgrades at their convenience; however, proposers shall describe any conditions in which upgrades to subscribers must be performed including the expected timing and/or frequency for any such mandatory subscriber updates.

6. Subscriber Support & Maintenance Requirements – Waukesha County Radio Services Self-Maintained / Authorized Radio Shop Pricing

WCRS has the staffing and capabilities to provide much of the support and maintenance services required by users of the Waukesha County radio system. The local presence and local knowledge of WCRS allows the Division to be the radio shop of preference for many radio users in Waukesha County and the Division would like to continue offering these services to local users at a competitive price during and after the deployment of this replacement radio system. To support this, proposers shall state the level of discount they shall provide to WCRS for the proposer's: i) subscriber radio repair parts and ii) depot repair service plans. Proposers shall assume that WCRS shall purchase these parts and plans to support only users of this system and not users of other systems not associated with Waukesha or Milwaukee County.

This/these level/s of discount shall be stated in the proposer's price proposal, however, no absolute prices for any items shall be included.

7. Subscriber Support & Maintenance Requirements – Milwaukee County Requirements

Proposers shall provide a per-unit price to provide depot subscriber maintenance (with inventory management) in which the selected proposer will receive subscribers in need of maintenance or repair from the County, provide maintenance or repair services, return the maintained/repaired unit to the County, and provide the County with real-time and periodic-reporting information (location, status, expected return time, average repair turn time, etc.) about each unit and all units sent for repair.

VII. OTHER

1. All partners or subcontractors must be identified in your proposal response. If partners or subcontractors are used, the Counties will consider the proposing vendor to be the Prime Contractor and to be solely responsible in all contractual matters, including payment of any and all charges resulting from such subcontractor arrangements.

   The Prime Contractor will be fully responsible for the acts, errors, and omissions of the Sub-Contractor. The Contractor shall cause appropriate provisions of its proposal to be inserted in all subcontracts ensuing to ensure fulfillment of all contractual provisions by subcontractors.

VIII. FIRM/EMPLOYEES

1. Compliance with Federal Immigration Laws and Regulations: Waukesha County supports the Immigration and Nationality Act (INA), which includes provisions addressing employment eligibility, employment verification, and non-discrimination. The filing of a proposal in response to this RFP is considered certification that the proposer is in compliance with the INA and has established appropriate procedures and controls so that no services under this contract will be performed by a worker who is not legally eligible to perform such services.

2. Background Checks: Contractor shall complete background checks at Contractor's expense on all personnel prior to starting any activity for the Counties. Contractor shall confirm in writing to the Counties as applicable that they have successfully conducted the background checks prior to the commencement of work and that Contractor will not use any personnel for whom background checks have revealed factors that make them unsuitable for the activity to be undertaken for the County. This includes replacement personnel.

   At a minimum, resources to be checked should include, but are not limited to, civil (http://wcca.wicourts.gov/index.xsl) and criminal records (http://wi-recordcheck.org/index.html), Department of Transportation motor vehicle/licensing records (http://www.dmv.org/wi-wisconsin/department-motor-vehicles.php). In order to do so, Contractor must obtain certain information for each of the Contractor's employees expected to be performing work for Waukesha County. At a minimum, the information shall include full name (including middle initial), date of birth and social security information.

   Additional information that is helpful in completing background checks includes maiden name, sex, race, driver's license number, and issuing state and places of residence for the last three years. NOTE: If the individual has resided outside of the State of Wisconsin within the last three (3) years, you will have to do similar research within the state they resided in.

   All costs associated with the background checks are to be borne by the Contractor. All records received as a result of background checks are to be retained by the Contractor for a period of three (3) years after contract expiration.

   The Counties reserves the right to request the results of the background checks and/or to do additional background checks on their own.

3. All personnel working on-site shall be required to wear an ID badge, dress appropriately and maintain proper hygiene. Failure to do so can be cause for removal of the individual from Waukesha County's and/or Milwaukee County's account.

4. The County shall be entitled to request the removal of individuals working on any project for any of the following grounds, provided that such request be in writing and shall specify the reasons for the County's dissatisfaction: (i) unsatisfactory performance that causes negative operational impact at the County or causes the County to commit additional resources to avoid operational impact; (ii) dishonesty or belligerent conduct; (iii) lack of compatibility with County staff; or (iv) violation of County rules or policies. Upon such written request, the County and CONTRACTOR shall decide on a course of action to cure any such problems, provided that there shall be no cure opportunity required for problems involving categories (ii) or (iv) in the preceding sentence.

   In the event CONTRACTOR does not cure the problem within (7) days from the date of notice, CONTRACTOR shall remove such person and shall promptly provide a qualified replacement. The County will be liable for payment of services only up to the time of removal and provided then only if services rendered meet the minimum requirements of the County. If the removal occurs within a two (2) week period after commencement, there will be no cost incurred by the County.

   The Contractor is responsible for ensuring that any substitute personnel have comparable skills and experience. Resumes must be submitted for approval by Waukesha County and/or Milwaukee County as applicable for substitute personnel. The County reserves the right to interview substitute personnel prior to commencement of activity on the project.

IX. ASSUMPTIONS

Assumptions associated with the proposed work plan are as follows:

1. Each County will have designated project managers; one for each County.
2. Access to sites shall be granted to the Contractor by each individual County.

X. FINANCIAL STABILITY

The Contractor, including any subcontractors, must have the financial capability to undertake the requirement. In order to demonstrate its financial capability, the Counties **may require** the submission of some or all of the financial information detailed below by both the Contractor and subcontractor if applicable. The requested information must be provided within five (5) working days of Waukesha County's written request.

A) Audited Financial Statements for the Respondent's last three (3) fiscal years or for the years that the Respondent has been in business if this is less then three (3) years, including as a minimum the Balance Sheet, Statement of Retained Earnings, Income Statement and any notes to the statements.
B) If the date of the Financial Statements provided in A) above is more than three (3) months from the date on which the County requests this information, the Respondent must also provide Interim Financial Statements consisting of a Balance Sheet and year to date Income Statement), as of two (2) months prior to the date of the County's request.
C) Evidence by certification from the Chief Financial Officer or an authorized signing officer of the Respondent, regarding the accuracy of any financial information provided.
D) Formal certification on proposer's stationary signed by the owner or authorized officer of the company indicating the proposing firm has not filed for bankruptcy in any form, nor are there any current intentions of filing any type of bankruptcy proceedings. In the event a proposer has or is considering filing bankruptcy of any type, formal certification will take on the form of a written explanation of such filing, complete with history and current status.
E) A confirmation letter from the Respondent's financial institution(s) outlining the total of lines of credit granted and the amount of credit that remains available and not drawn upon as of one month prior to the date of the County's request.
F) If any proposal is submitted by a joint venture, then the specific financial information requested may be required from each member of the joint venture depending on the magnitude and impact of their role in the joint venture.
G) If the Contractor or subcontractor is a subsidiary of another company, then the specific financial information requested is also required from the parent company.

In an effort to reduce risk, the Counties desire a money back guarantee, a Letter of Credit or a Performance Bond at their discretion. The Contractor is required to include, as part of their response, their policy regarding a money back guarantee for failed implementations or language that supports evidence of your firm's ability to provide a Letter of Credit (LOC) or Performance Bond in the event of an unsuccessful implementation.

The required Contractor's LOC or Performance Bond will be an amount equal to the total cost of the solution. The amount of the LOC will be reviewed on a yearly basis to reflect the status of the project (in terms of the amount completed and accepted).

The LOC or Performance Bond shall be maintained through system acceptance. Regardless of which is used, it must be received prior to Contract execution.

This requirement may be waived by the County, in the event the Contractor can demonstrate strong financial stability/condition and a history of successful implementations.

XI. INSURANCE

The successful contractor shall agree that it will, at all times during the term of the agreement, keep in force and effect insurance policies required by the contract as noted below. Insurance certificates must be issued by a company or companies authorized to do business in the State of Wisconsin and that are satisfactory to the County. Such insurance shall be primary. Prior to execution of the written contract, the successful contractor shall furnish the County with a Certificate of Insurance issued and upon request, certified copies of the required insurance policies. The Certificate shall reference the contract and provide for thirty (30) days advance notice of cancellation or non-renewal during the term of the agreement.

Failure to submit or maintain the insurance requirements can make the contract void at the County's discretion. Minimum requirements are as follows:

Worker's Compensation and Employer' Liability Insurance – Statutory worker's compensation benefits and employers' liability insurance with a limit of liability not less than $100,000 each accident. Contractor shall require subcontractors not protected under its insurance to take out and maintain such insurance.

Commercial General Liability Insurance **(including errors and omissions)** – Policy shall provide coverage for premises and operations, products and completed operations, personal injury and blanket contractual coverage. Errors and omissions shall not be excluded or a separate policy covering such exposure shall be maintained. Limits of liability are not less than $1,000,000 per occurrence and aggregate.

Waukesha County, Milwaukee County and their boards, commissions, agencies, officers, employees and representatives must be named as additional insured with respects to the General Liability and so stated on the certificate of insurance.

Automobile Liability Insurance – Business automobile policy covering all owned, hired and non-owned private passenger autos and commercial vehicles. Limit of liability not less than $500,000 combined single limit.

XII. CONTRACT TERM, PRICING AND PAYMENT

Term

Both Counties desire to begin the project as soon after contract execution as possible. The term of each contract will in accordance with the phases identified in Section V.5.

Pricing – PLEASE READ CAREFULLY

All pricing is to be submitted on the pricing document posted with this solicitation. This is a multi-tabbed workbook with sections for all requested pricing – **BE SURE TO READ THE INSTRUCTION TAB FIRST – FAILURE TO FOLLOW THE PRICING INSTRUCTIONS MAY RESULT IN REMOVING YOUR RESPONSE FROM CONSIDERATION**. All pricing is to include installation and delivery FOB destination where applicable.

Each price noted must be a not to exceed fee and be all inclusive; i.e. items which are normally referred to as **reimbursable expenses** and overtime work requiring higher than regular rate for which no additional compensation will be due must be included in the line item pricing.

Pricing for equipment as identified in Section K. 2 or functional equivalents at no additional cost* shall remain firm for two (2) years from contract execution. Thereafter, pricing may only be increased once per year up to the maximum percentage quoted on the pricing form. It is important to note the percentage quoted is a not to exceed percentage, however, it is not to be assumed you will automatically get the full percentage quoted. You must provide sufficient documentation supporting the actual percentage of increase required for purchases beyond the initial two year period. The not to exceed percentage of increase will be considered when evaluating the life cycle cost. Note: It is expected that any decreases in pricing would be passed on to the purchasing agency. * "No additional cost" means that the cost of a functional equivalent and the costs for any associated upgrades/replacements to functionally-associated, in-use equipment that is required by the introduction of the functional equivalent shall be no greater than the cost of the product as proposed.

Please do not leave spaces blank. If there is no cost or the item is not applicable to your solution, be sure to clearly note "Included" or "N/A to our Solution".

Contractor is to provide hourly rates in the "Hourly Rates" tab should additional services such as integration, interface, or other services be required after implementation is complete. The rates quoted will be firm for a period of one-year from contract execution. Thereafter, hourly rates may be adjusted in accordance with the Employment Cost Index, Private Industry Wages and Salaries, Management, Business and Financial (excluding incentive paid) based on the percentage of change from the contract year to the year the services are required but in no event may the increase exceed 3%. The County also reserves the right to negotiate fixed fees for any additional services required based on the hourly rates provided.

The Counties intends on keeping the system for its product life; however, for purposes of cost evaluation, cost will be based on a five-year life cycle including all of the mandatory items and services included on the pricing document.

Note: The Counties reserve the right to request a Best and Final Offer of all finalists.

Payment

Payment terms will be tied to specific deliverables; however, the Counties will hold back payments until final system acceptance.

Waukesha County's preference is to pay for goods/services on a P-Card. Indicate in the pricing document whether you will accept MasterCard for payment purchases. Vendor should note how many days after receipt and acceptance of good or receipt of invoice (whichever is later), payment must be processed to accept the credit. Please keep in mind that we will not process payment until/unless compliance with the requirements is confirmed and that Waukesha County requires a minimum of two days to process p-card payments.

If you are unable to accept credit card, payment will be made within thirty days after acceptance and receipt of a properly documented invoice. Note: Invoice must be sent to the location specified on the purchase order to avoid delays in payment. Vendors who wish to quote a discount for early payment against a purchase order may do so (reference the payment terms of the Pricing Document). For example, 1%/10 days. Discounts will be taken into consideration when evaluating costs.

END OF DOCUMENT