



Request for Proposals For UHF Simulcast Radio Communications Network

September 12, 2017

Table of Contents

	RFP Cover Sheet and Procedures.....	4
	State Corporation Commission Form.....	5
	Contract.....	6
1.	Project Overview.....	7
1.1	Introduction.....	7
1.2	Project Summary.....	7
1.3	Proposals Desired.....	8
1.4	Alternate Proposals.....	8
1.5	Quality Assurance and Coordination.....	8
1.5.1	General	8
1.5.2	Standards.....	8
1.5.3	Excavation of Work.....	9
1.5.4	FCC	9
1.6	Project Submittals.....	9
2.	Instructions to Proposers.....	11
2.1	Overview.....	11
2.2	Pre-Proposal Conference.....	11
2.3	Proposal Format.....	11
2.4	Evaluation.....	12
3.	Radio Communications, Network Requirements.....	13
3.1	Overview.....	13
3.2	System Configuration.....	13
3.2.1	Site Selection.....	13
3.2.2	Coverage.....	14
3.2.2.1	Coverage Maps.....	15
3.2.2.2	Map Criteria.....	15
3.2.2.3	Coverage Model.....	16
3.2.2.4	TIA TSB-88 Annex E User Choices.....	16
3.3	Site Equipment.....	17
3.3.1	Overview	17
3.3.2	Base Station Equipment.....	17
3.3.3	Site to Site Networking.....	18
3.4	Infrastructure Development	19
3.4.1	General	19
3.4.2	Equipment Shelters.....	19
3.4.2.1	Shelter Type.....	19
3.4.2.2	Size.....	19
3.4.2.3	Foundation.....	19
3.4.2.4	Heating, Ventilation, and Air Conditioning (HVAC).....	19
3.4.3	Generators.....	20
3.4.4	UPS.....	20
3.5	Grounding, Bonding, and Transient Voltage Surge Suppression.....	21
3.6	Site Alarms and Monitoring Equipment.....	22
3.6.1	General Requirements and Features.....	22
3.6.2	System Alarms.....	22

3.6.3	Site Alarms.....	22
3.7	Subscriber Equipment	23
3.7.1	Overview.....	23
3.7.2	Requirements	23
3.8	Training.....	24
3.9	Spare Equipment.....	24
3.10	Warranty Period.....	24
3.11	Maintenance Standards.....	25
3.12	System Implementation, Test and Acceptance.....	25
3.12.1	General.....	25
3.12.2	Staging.....	26
3.12.3	System Installation.....	26
3.12.4	Coverage Testing.....	27
3.12.5	Final Acceptance Testing.....	28
3.12.6	As-built Documentation.....	29
3.12.7	System Acceptance.....	29
4.	Financing Options.....	29

RFP COVER SHEET AND PROCEDURES

COUNTY OF BRUNSWICK
Request for Proposals For UHF Simulcast Radio Communications Network

By my signature on this solicitation, I certify that this firm/individual and subcontractor is properly licensed for providing the goods/services specified. Execution of this Cover Sheet required.

Note of Clarification:

All References to **BID** contained within this Invitation should be referred to as **PROPOSAL**.

_____ NAME OF ORGANIZATION	_____ TELEPHONE NUMBER
_____ STREET ADDRESS	_____ FAX NUMBER
_____ CITY, STATE, ZIP CODE	_____ EMAIL ADDRESS
_____ SIGNATURE	_____ DATE
_____ STATE CORPORATION COMMISSION ID#	_____ IRS TAX ID#

This public body does not discriminate against faith-based organizations in accordance with Virginia Code §2.2.-4343.1 or against a bidder or offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination of employment.

Request for Proposals For UHF Simulcast Radio Communications Network

State Corporation Commission Form – Execution by proposer required

Virginia State Corporation Commission (“SCC”) registration information:

The undersigned Offeror:

- is a corporation or other business entity with the following SCC identification number:

_____ **-OR-**

- is not a corporation, limited liability company, limited partnership, registered limited liability partnership, or business trust **-OR-**

is an out-of-state business entity that does not regularly and continuously maintain as part of its ordinary and customary business any employees, agents, offices, facilities, or inventories in Virginia (not counting any employees or agents in Virginia who merely solicit orders that require acceptance outside Virginia before they become contracts, and not counting any incidental presence of the Offeror in Virginia that is needed in order to assemble, maintain, and repair goods in accordance with the contracts by which such goods were sold and shipped into Virginia from bidder’s out- of-state location) **-OR-**

- is an out-of-state business entity that is including with this bid an opinion of legal counsel which accurately and completely discloses the undersigned Offeror’s current contacts with Virginia and describes why those contacts do not constitute the transaction of business in Virginia within the meaning of § 13.1-757 or other similar provisions in Titles 13.1 or 50 of the Code of Virginia.

****NOTE**** >> Check the following box if you have not completed any of the foregoing options but currently have pending before the SCC an application for authority to transact business in the Commonwealth of Virginia and wish to be considered for a waiver to allow you to submit the SCC identification number after the due date for proposals (the City reserves the right to determine in its sole discretion whether to allow such waiver): •

Signature: _____

Date: _____

Name: _____

Print

Title: _____

Name of Firm: _____

CONTRACT

A. AWARD OF CONTRACT: The selection process shall be in accordance with *Virginia Code* § 2.2-4302.2 for the procurement of goods and non-professional services. Selection shall be made of two or more offerors deemed to be fully qualified and best suited among all the offerors on the basis of the evaluation criteria, including price. Negotiations shall then be conducted with each of the offerors so selected. Price shall be considered but need not be the sole determining factor. After negotiations have been conducted with each offeror so selected, the County shall select the offeror which in its opinion has made the best proposal and provides the best value, and shall award the contract to that offeror. Should the County determine in writing and in its sole discretion that only one offeror is fully qualified, or that one offeror is clearly more highly qualified than the others under consideration, a contract may be negotiated and awarded to that offeror.

B. CONTRACT TERMS

The County reserves the right to negotiate contract terms with the successful offeror/bidder for items/services identified but not specifically described in this RFP in the best interest of the County and agreed to by the contractor. Additional work of reasonable scale shall be priced consistent with proposal to allow for additions and future expansions of a similar nature. The final contract for services is expected to incorporate the General Terms and Conditions attached hereto as Attachment A.

1. Project Overview

1.1 *Introduction*

Brunswick County, Virginia, solicits proposals for a radio communications network that will support mission critical communications for first responders within the County. The County desires a “turnkey” solution from a single vendor to furnish all equipment and services required for installation and optimization of a fully operational system. This Request for Proposal (RFP) describes requirements for several components, including, but not limited to, the installation of repeater sites, a digital microwave backhaul network, dispatch equipment, subscriber equipment, and network monitor and control equipment.

The County desires a radio network consisting of three conventional UHF analog simulcast channels. The proposed system shall provide RF coverage throughout 95% of the bounded area of the County; UHF portable talk out/in (portable located at head level). The County has identified five communications sites to be used in the proposed system; Respondents shall consider these sites preferred by the County. If the Respondent cannot meet the coverage requirement using these sites, additional or alternative sites shall be considered.

The selected vendor shall be responsible for the following:

1. Furnishing and installing system equipment and ancillary facilities
2. Engineering and system design
3. Project management
4. Software installation and programming
5. Training
6. Acceptance testing, including coverage testing
7. Cutover plan and execution
8. Warranty and maintenance

The selected vendor shall be responsible for furnishing a complete and fully functional radio communications network, including the guarantee of radio coverage.

1.2 *Project Summary*

1. Work shall be conducted with no interruption of service to existing critical systems.
2. This project includes several components, including:
 - a. UHF simulcast radio network
 - b. Integration and utilization of radio dispatch consoles
 - c. Point to point digital microwave backhaul network/or fiber connectivity
 - d. Shelters
 - e. Generators (relocation of existing generators)
 - f. UPS/power surge protection system
3. Proposals shall completely describe the equipment and methods that will be used to implement the system. The intent of this document is to allow respondents to use the best equipment, technology, and methods available to provide a public safety communication system of the highest quality and performance.
 - a. All equipment shall be provided in new condition and be covered by a full factory and/or manufacturer’s warranty of next less than three years.

- b. Vendors that plan on discontinuing development and/or distribution of a product line within the next four years shall be considered “end of lifecycle” product lines. Proposals shall not be accepted that include systems or equipment at the end of their respective lifecycles.

1.3 *Proposals Desired*

The County desires, but does not require, a complete, turnkey solution addressing all project components.

1. Proposal Options: Some requirements in this RFP are described as an “OPTION” or “OPTIONAL”. These items are not at the option of the respondent, but refer to features or equipment which may or may not be purchased by the County, or items whose quantities are not determined yet. Respondents are required to address all items listed as an OPTION or OPTIONAL, to the greatest extent possible.

1.4 *Alternate Proposals*

In the event a respondent has a technological solution that does not exactly meet the requirements in this RFP, respondents may offer more than one proposal as long as each proposal fully addresses the intent of the requirements set forth in this RFP.

1.5 *Quality Assurance and Coordination*

1.5.1 General

The County shall examine the ability of the respondent to furnish the required equipment and services. All respondents shall provide information describing experience and qualifications with similar projects in this proposal, or upon request from the County.

1.5.2 Standards

The selected vendor shall comply with the following standards, rules, regulations, and industry guidelines:

1. American National Standards Institute (ANSI)
2. National Electric Manufacturers Association (NEMA)
3. Electronics Industry Association (EIA)
4. Telecommunications Industry Association (TIA)
5. Telecommunications Distribution Methods Manual (TDMM)
6. National Electric Code (NEC)
7. Institute of Electrical and Electronics Engineer (IEEE)
8. Federal Communications Commission (FCC)
9. Underwriters Laboratories, Inc. (UL)
10. American Society of Testing Materials (ASTM)
11. NFPA1221

Governing Codes and Conflicts: If the requirements of this RFP conflict with those of the governing codes and regulations, then the more stringent of the two shall become applicable.

1.5.3 Excavation Work

Prior to any excavations, the contractor shall follow appropriate procedures outlined at the following website: www.call811.com.

1.5.4 FCC

The County shall be responsible for obtaining land mobile radio FCC frequency licenses for the proposal radio communications network. The respondent shall coordinate with the County for details regarding frequency licensing. The County shall be responsible for coordination and licensing fees, if applicable.

The respondent shall be responsible for licensing and coordination of microwave FCC frequency licenses. The selected vendor shall research and prepare any FCC forms and submittals needed to provide same the County for signature and submittal.

1.6 *Project Submittals*

Key project deliverables and submittals are outlined below:

1. All project submittals shall be subject to review and approval by the County.
2. All submittals shall be provided in hard copy, properly bound, and in electronic format.
3. All submittals shall include a cover letter or transmittal sheet, signed, dated, and fully describing the contents of the submittal.
4. Proposal:
 - a. A detailed description of the proposed system(s) and services to be provided.
 - b. Preliminary detailed project schedule.
 - c. System design including complete description, block diagrams, equipment layouts, and equipment lists shall be included to provide a complete and comprehensive description.
 - d. Detailed equipment specification sheets for all proposed equipment.
 - e. System and subsystem warranty information.
 - f. Training programs
 - g. Itemized pricing information.
5. Preliminary Design: The selected vendor shall submit the Preliminary Design package thirty (30) days after contract award.
 - a. Detailed project schedule
 - b. System block diagrams
 - c. Patching schedules and termination details for all horizontal cables necessary for a complete record of the installation

- d. Radio and microwave channel plans
 - e. Microwave path engineering report/fiber connectivity study
 - f. Equipment shelter overview drawings
 - g. Equipment Rack/Cabinet elevation drawings
 - h. Tower profile drawings indicating antenna mounting locations
 - i. Detailed list of materials for each site
 - j. Coverage acceptance test plan (CATP)
6. Final Design: The selected vendor shall submit the final design package sixty (60) days after contract award.
- a. Any updates to previously submitted design information
 - b. System operation and maintenance manuals for all equipment
 - c. Factory test data
 - d. Site installation drawings

7. System Staging, Delivery and Installation

The selected vendor shall submit a detailed Staging Acceptance Test Plan (SATP), outlining a comprehensive series of tests that will demonstrate proof of performance and readiness for shipment. The SATP shall be submitted no later than 15 business days before the testing starts, and shall be approved no later than 5 business days before the testing starts.

The selected vendor shall submit a Bill of Materials/packing list with two copies with each shipment of equipment to the County. The packing list must include at least the following information: Manufacturer Model, Serial Number, and unique identification of the package containing the item.

8. System Acceptance

The selected vendor shall submit a detailed Final Acceptance Test Plan (FATP), outlining a comprehensive series of tests that will demonstrate proof of performance and readiness for final acceptance by Owner. The FATP shall be submitted no later than 15 business days before the testing starts, and shall be approved no later than 5 business days before the testing starts.

The selected vendor shall submit three final and complete sets of as-built documentation, including the following:

- Documentation index
- List of deliverables
- Field test reports
- Coverage testing reports
- Warranty documentation

- Detailed list of materials for each site
- As-built system block diagrams
- As-built site drawings

2. Instructions to Proposers

2.1 *Overview*

Proposals must be received by Monday, October 16, 2017 at 3:00 p.m. EST. Proposals received after this time will not be considered.

Respondents shall submit an original and six bound copies of the proposal to the County. Each package shall also include a copy of the proposal in electronic format. The front of the package should be marked "RFP for UHF Simulcast Radio Communications Network". Proposals shall be addressed to:

Attn: Dr. Charlette T. Woolridge
Brunswick County Administrator
228 N. Main Street, Suite 300
Lawrenceville, Virginia 23868

2.2 *Pre-Proposal Conference*

A pre-proposal conference will be held on Monday, September 25, 2017 at 10:00 a.m. EST. The conference will be held in the Brunswick County Government Building (Board Room) located at 228 N. Main Street, Lawrenceville, Virginia 23868.

Respondents may submit questions to the County at least 2 days prior to the pre-proposal conference in either written or electronic format (email). During the conference, the County will provide answers to any questions received and hold an open discussion regarding the project. Oral responses shall not be binding on the County during the conference.

County Contact for technical questions:

Sheriff Brian Roberts
P.O. Box 705
Lawrenceville, Va. 23868
broberts@brunswickso.org
434-848-3133

Following the conference, all attendees will be provided with a copy of the sign-in sheet, questions, and responses.

2.3 *Proposal Format*

Respondents shall adhere to proposal format provided below:

1. Cover letter
2. Table of Contents
3. Executive Summary
4. Qualifications
 - ✓ Description of the respondents qualifications

- ✓ Resumes of key personnel
 - ✓ Supplementary information
 - ✓ A list of three systems of similar size and complexity, including:
 - a. Name of the system
 - b. Location
 - c. Contact person
 - d. Contact telephone number
5. Description of system, including equipment, software, design, and services to be provided.
- a. Radio communications network
 - b. Microwave backhaul connectivity/fiber connectivity
 - c. Radio dispatch console integration
 - d. Subscriber equipment
 - e. Site infrastructure
 - f. Additional subsystems
6. RF Coverage Predictions
7. Preliminary Schedule
8. Additional information
9. Point-by-point compliance
- a. Respondents shall provide compliance statements for each HEADER of this RFP. Compliance statements are limited to the following three choices:
 - COMPLY – the proposal meets or exceeds the specified requirement
 - COMPLY WITH CLARIFICATION – the proposal does not meet the exact stated requirement, however, meets a substantial portion of or meets the intent of the requirement. Respondent must provide a detailed explanation when using this statement
 - EXCEPTION – the proposal does not meet the specified requirements. Respondent must provide a detailed explanation when using this statement.
10. Pricing

2.4 *Evaluation*

The County shall evaluate proposals based on a number of criteria, including:

- a. RFP Compliance
- b. Coverage guarantee
- c. Vendor experience
- d. Cost of system
- e. Lifecycle costs
- f. Unit costs of subscriber equipment
- g. Capability, features, and functionality of the system
- h. Feasibility of design
- i. Warranty, maintenance, and support

3. Radio Communications, Network Requirements

3.1 *Overview*

Brunswick County, Virginia seeks proposals for a UHF conventional, analog simulcast radio communications network. The system will support mission critical communications and is expected to have a robust and fault tolerant network infrastructure.

3.2 *System Configuration*

The system shall provide countywide voice communications for mission critical operations. The overall system configuration shall include the following:

1. Voice radio communications network to include:
 - a. Three UHF conventional analog simulcast radio channels
 - b. The system shall be designed for narrowband (12.5 KHz channel spacing)
2. System infrastructure including towers, shelters, etc.
3. Backhaul network
4. Dispatch console equipment
5. User subscriber equipment
6. Alarm and monitor network

3.2.1 Site Selection

The County is in the process of developing five radio communications sites for use in the system. The selected vendor is responsible for providing the required coverage using the five sites described below:

1. Edgerton (Mid-Atlantic Tower)
19142 Governor Harrison Parkway, Freeman, Virginia 23856
 - a. Latitude: 36 46 04.50
 - b. Longitude: 077 43 37.90
 - c. Ground Elevation: 260'
 - d. Structure Elevation: 430'
 - e. Overall Height AMSL: 690'
 - f. FAA Study Number 00-AEA-2238-OE
 - g. FCC Structure Reg. Number - 1206340
2. Warfield (Mid-Atlantic Tower)
432 Poorhouse Road, Dolphin, Virginia 23843
 - a. Latitude: 36 52 34.0
 - b. Longitude: 077 49 29.6
 - c. Ground Elevation: 301'
 - d. Structure Elevation: 250'
 - e. Overall Height AMSL: 551'
 - f. FAA Study Number 01-AEA-5177-OE
 - g. FCC Structure Reg. Number - 1233486

3. Dixie Bridge (Mid-Atlantic)
21441 Highway One, Brodnax, Virginia 23920
 - a. Latitude: 36 46 17.20
 - b. Longitude: 078 02 10.70
 - c. Ground Elevation: 280'
 - d. Structure Elevation: 320'
 - e. Overall Height AMSL: 600'
 - f. FAA Study Number 00-AEA-3327-OE
 - g. FCC Structure Reg. Number - 1230112

4. Gasburg (Mid-Atlantic)
3778 Huckstep Road, Brodnax, Virginia 23920
 - a. Latitude: 36 36 03.62
 - b. Longitude: 077 53 28.7
 - c. Ground Elevation: 306'
 - d. Structure Elevation: 275'
 - e. Overall Height AMSL: 581'
 - f. FAA Study Number 2003-AEA-3862-OE
 - g. FCC Structure Reg. Number - 1238336

5. Lawrenceville (MBC)
298 Sharp Street, Lawrenceville, Virginia 23868
 - a. Latitude: 36 45 29.29
 - b. Longitude: 077 50 57.84
 - c. Ground Elevation: 266'
 - d. Structure Elevation: 190'
 - e. Overall Height AMSL: 456'

The sites described above are not owned by the County and will be shared with other tenants. Additional antenna mounting heights may be available for each tower upon coordination with the County. The selected vendor shall provide a structural loading analysis for each site prior to acceptance of final design.

Regardless of the sites proposed, respondents shall retain complete responsibility for system performance and coverage. If the sites listed above are not sufficient to provide the desired coverage, respondent shall thoroughly describe the expected coverage in the proposal and provide alternatives for the County.

3.2.2 Coverage

The radio system shall be designed for portable voice coverage throughout the geographical boundaries of Brunswick County. The minimum covered area reliability is 95% voice radio coverage. Therefore, the system shall meet or exceed the CPC throughout 95% of the defined geographical areas for the UHF radio channels only.

Channel Performance Criteria (CPC)

1. Analog Channel: RF coverage is defined as the analog signal level that provides a minimum DAQ of 3.4, 20 dB SINAD equivalent intelligibility, to the operator as defined in TIA TSB-88-B for both talk-out and talk-back.

The selected vendor will be required to guarantee the proposed system coverage based on the submitted coverage maps and the testing methodology described herein. Any subsequent design changes based on mutual agreement between the owner and the vendor that impact coverage will require revision of the coverage grid maps and guarantee based on the coverage maps.

3.2.2.1 Coverage Maps

Respondents shall submit both talk-out and talk-in coverage maps for the proposed network configurations:

1. UHF
 - a. Portable radios in the street
 - b. Mobile radios
 - c. Tone and voice pager in the street

Maps shall be provided in 8.5" x 11" color hardcopy. Coverage maps for portable radios using shoulder mic antennas are not acceptable.

3.2.2.2 Map Criteria

All maps shall include a background layer suitable for County reference (e.g. topographic map, roads, rivers, etc.). The following minimum information must be clearly defined, relating to each map and each site:

1. Base station/repeater RF power output
2. Antenna gain
3. Antenna down tilt (if applicable)
4. Transmit ERP
5. Receiver sensitivity
6. Antenna height
7. Mobile and portable antenna height for talk-out and talk-in
8. Mobile and portable RF output power
9. The configuration of field units (for example – talk-out to portable inside 20dB lost buildings)
10. Simulcast interference timing parameters.

All maps must clearly delineate the difference between areas predicted to be greater than DAQ 3.4 equivalent coverage and areas that do not meet required coverage requirements. Respondents shall include the effects of simulcast interference in all coverage maps.

3.2.2.3 Coverage Model

A description of how the respondent calculated the coverage must be included in each respondents proposal. List the coverage model(s) used (for example – Okumura, etc.).

3.2.2.4 TIA TSB-88 – Annex E User Choices

1. [E.1] User Choices
 - a. Coverage predictions, design and proof of performance testing must be conducted in accordance with TIA TSB-88 latest revision, to the greatest extent possible. The following criterion is provided in accordance with TIA TSB-88, Annex E.
2. [E.2] Service Area
 - a. The service area is defined as Brunswick County.
 - b. The target device, usage and location are:
 - i. Mobile radios – standard dash or trunk mount with antenna mounted on the roof
 - ii. Portable radios – standard portable radio
 - Talk-out to portable radio on hip with swivel belt clip
 - Talk-back from portable radio at head level
 - iii. Basic network coverage shall be designed to accommodate vehicles traveling at speeds up to 85 mph.
- 3.[E.3] Channel Performance Criterion (CPC)
 - a. Minimum CPC shall be DAQ 3.4
4. [E.4] Reliability Design Targets
 - a. The CPC Reliability Design Target is a service area probability of 95%.
5. [E.5] Terrain Profile Extraction Method
 - a. Either the Bilinear Interpolation or the Snap to Grid Method of terrain profile extraction is acceptable.
- 6.[E.6] Interference Calculation Method
 - a. Either the Equivalent Interferer or the Monte Carlo Simulation Method of interference calculation is acceptable.
7. [E.7] Metaphors to Describe the Plane of the Service Area
 - a. The Tiled Method is preferred
 - b. Grid Mapped from Radial Method is also acceptable
8. [E.8] Required Service Area Reliability

- a. The CPC is required for 95% of the service area
9. [E.9] Willingness to Accept a Lower Area Reliability in Order to Obtain a Frequency
 - a. The County is not willing to accept lower area reliability in order to obtain a frequency
 10. [E.10] Adjacent Channel Drift Confidence Factor
 - a. Adjacent Channel Drift Confidence Factor shall be 95%
 11. [E.11] Conformance Test Confidence Level
 - a. A conformance test confidence level of 99% is required
 12. [E.12] Sampling Error Allowance
 - a. A sampling error allowance of $\pm 1\%$ is required
 13. [E.13] Pass/Fail Criterion
 - a. The "Greater Than" test is required
 14. [E.14] Treatment of Inaccessible Grids
 - a. All inaccessible grids will be eliminated from the calculation

3.3 **Site Equipment**

3.3.1 Overview

All site equipment shall be of high quality and designed to provide high reliability to support mission critical communications. The site equipment, or RF infrastructure, consists of the following components:

1. Transmitters
2. Receivers
3. Combiners/Multicouplers
4. Antenna systems
5. Simulcast Equipment
6. Timing/Receiver Voting

3.3.2 Base Station Equipment

1. The transmitter, receiver, and combiner shall be housed in the same equipment rack/cabinet.
2. Prior to implementation, the selected vendor shall perform the following studies at each site:
 - a. Intermodulation analysis
 - b. Maximum Permissible Exposure (MPE) study (per latest revision of OET bulletin 65)

3. Base station transmitters:
 - a. Shall comply with Part 90 of the FCC Rules and Regulations, as well as appropriate EIA and similar agency standards and be FCC type accepted for UHF frequency bands.
4. Base station receivers:
 - a. Shall comply with Part 90 of the FCC Rules and Regulations, as well as appropriate EIA and similar agency standards and be FCC type accepted for UHF frequency bands.
5. Respondent shall include detailed specification sheets with detailed equipment specifications.

3.3.3 Site to Site Networking

As part of this project, and as part of the system integration to allow for simulcast operations, Brunswick County is requiring the design, licensing, implementation, and integration of a backhaul digital network to allow for system connectivity.

The respondent will propose a networking solution to provide connectivity between the 911 center and the five proposed tower sites utilizing microwave only, fiber only, and a hybrid of microwave and hybrid for the proposed solution. Several of the selected tower sites currently have fiber availability on site.

Two-way full duplex availability for the proposed solution shall be five 9's (99.999%) reliability. The throughput requirements for these links will be sufficient for the proposed communications system, the system monitoring, and allowing for a 100% subscriber use increase.

It is desired that the sites be connected in a "ringed" configuration, allowing for unimpeded system usage even with a single path interruption. If this is not achievable due to terrain or extensive costs to achieve this, it is desired that the respondent provide a list of backup solutions with proposed costs to maintain basic system operations in the event of a pathway interruption.

Any proposed microwave solutions must be an FCC licensed solution. FCC microwave licensing for any microwave link shall be prepared and filed by the awarded vendor and the cost of this process shall be the responsibility of the vendor.

The network shall consist of digital, monitored hot standby (MHSB) point to point links, utilizing either fiber or Licensed Microwave hops. Respondent will provide the Mean Time Between Failures (MTBF) for all proposed MHSB equipment.

Respondent shall conduct the physical path surveys to assure all Microwave paths meet proper clearance criteria.

Along with equipment and installation costs, respondent will provide a detailed list of the equipment to be utilized, the methodology for equipping each site, and the connections to be utilized between networking and the radio repeater equipment.

3.4 *Infrastructure Development*

3.4.1 General

Although the County is procuring tower sites independent of this RFP, respondent shall perform due diligence in surveying all proposed sites for adequacy in the proposed radio network. Respondent shall propose installation of antennas and transmission lines on tower structures. Respondent shall identify and propose any additional work necessary, including but not limited to:

- a. Site clearing
- b. Fencing
- c. Ice bridge
- d. Shelters
- e. Backup power

3.4.2 Equipment Shelters

3.4.2.1 Shelter Type

1. The shelter shall be a prefabricated preassembled shelter/equipment housing. Manufacturer shall provide all specifications including design drawings for the shelter.
2. Manufacturing of the prefabricated shelter/equipment housing shall occur inside an enclosed plant building in a controlled environment.
3. Locks are to be constructed of non-corroding materials and shelter locks shall be keyed the same for all shelters.

3.4.2.2 Size

Nominal shelter dimensions shall be sufficient to house up to four repeaters with applicable equipment to allow for future expansion.

3.4.2.3 Foundation

1. The foundation shall consist of a poured concrete slab constructed by the contractor to properly support and secure the shelter.
2. Foundation drawings recommended by the shelter manufacturer shall be the criteria by which the foundation is constructed.

3.4.2.4 Heating, Ventilation, and Air Conditioning (HVAC)

1. Respondent shall provide an HVAC system for each shelter proposed. The HVAC system shall be sized to provide 100% of the required building heating and cooling.
2. Respondent shall perform BTU analysis (heat load calculations) for all shelter equipment during preliminary design to verify HVAC system size. All calculations shall include a 50% expansion factor, and all assumptions regarding power consumption, duty factor, and heat loading shall be thoroughly explained.
3. The HVAC system shall be controlled by a wall mounted thermostat. The heating and cooling equipment shall be capable of maintaining an inside ambient temperature range between 65 and 85 degrees F.

4. The thermostat shall turn the heater on when the temperature inside the shelter drops to 65 degrees F and off when it rises to 68 degrees F. It shall turn on the air conditioner when the interior temperature reaches 78 degrees F and off when the temperature drops below 75 degrees F. Thermostat control shall be adjustable within the range of 45 to 85 degrees F.

3.4.3 Generators

County shall provide an emergency generator system at each radio communications site for backup power, including the following components:

- a. Emergency generator-engine system
- b. Automatic transfer switch
- c. Engine cooling system
- d. Fuel supply system
- e. Engine exhaust system
- f. Batteries and charger
- g. Weatherproof enclosure

Respondent shall perform electrical loading analysis for shelter equipment, including HVAC subsystems, during preliminary design to verify generator size and fuel tank capacity. All electrical loading calculations shall include a 50% expansion factor, and all assumptions regarding power consumption and duty factor shall be thoroughly explained. Respondent is responsible for all setup, hookup and connection of generators.

For the purpose of the proposal, respondent shall assume the following:

- a. Single phase
- b. 60 Hertz
- c. 0.8 Power Factor
- d. Propane fuel
- e. Minimum 72 hour runtime

In the event of commercial power outage, emergency generator shall provide power to the entire shelter without system outage.

3.4.4 UPS

1. Respondent shall provide single phase, online, double conversion, static type, uninterruptible power supply (UPS) at each shelter with the following features:

- a. Surge suppression
- b. Input harmonics reduction
- c. Rectifier/charger
- d. Inverter
- e. Static bypass transfer switch
- f. Battery and battery disconnect device

- g. Internal maintenance bypass/isolation switch
 - h. Output isolation transformer
 - i. Remote UPS monitoring provisions
 - j. Battery monitoring
 - k. Remote monitoring
2. Respondent shall perform electrical loading analysis for shelter equipment, excluding HVAC subsystems, during preliminary design to verify UPS size required. All electrical loading calculations shall include a 50% expansion factor, and all assumptions regarding power consumption and duty factor shall be thoroughly explained.
3. For the purpose of the proposal, respondent shall assume the following:
- a. 10kVA output
 - b. Single phase
 - c. 60 Hz
 - d. 0.8 Power Factor
 - e. Minimum 5 minute runtime

3.5 ***Grounding, Bonding, and Transient Voltage Surge Suppression (TVSS)***

- 1. Respondent shall comply with industry best practices for grounding, bonding and transient voltage suppression (TVSS):
 - a. Motorola R-56 – Standards and Guidelines for Communication Sites
 - b. M/A-COM Site Grounding and Lightning Protection Guidelines (AE/LZT – 123 4618/1 – latest revision)
- 2. If respondent cannot meet either of the guidelines listed above for grounding and bonding practices, any and all deviations shall be detailed and approved by the County prior to installation.
- 3. Grounding, bonding, and TVSS guidelines shall apply to the following systems at a minimum:
 - a. Site exterior grounding system
 - b. Shelter/equipment room interior grounding system
 - c. Antenna system grounding
 - d. Transmission line grounding and TVSS
 - e. Equipment grounding
 - f. Metallic object grounding (e.g. equipment racks, generator, etc.)

3.6 *Site Alarms and Monitoring Equipment*

3.6.1 General Requirements and Features

The system proposed will be utilized for public safety. It is imperative that any condition that may impair the performance of the radio system be relayed to proper person in a timely manner. The radio sites will be in remote locations not normally visited by county personnel in their day to day operations of public safety duties. These remote locations shall be monitored for any changes in state or intrusion from unauthorized personnel. A complete list of alarms shall be provided with proposal.

The Alarm and Monitoring system will be used to provide monitoring information for local and remote site facilities and equipment. The central reporting location for alarm and monitoring will be the County's dispatch center. System status and alarm conditions shall be displayed on the dispatcher's position or a Systems Manager terminal. The system shall provide the ability to remotely access the system to check the operational status of the system and view alarms. Alarm descriptions will include, but not be limited to: System Alarms and Site Alarms.

3.6.2 System Alarms

Any infrastructure equipment that may fail or be less than 100% operational shall be cause for an alarm to be displayed on the Alarm/Status display. All infrastructure components will be monitored and display an alarm if they fail or performance is degraded. Equipment monitored shall include, but not be limited to the following:

- Base radios/repeaters
- Microwave radios
- Antenna equipment
- Voting equipment
- Simulcast equipment

3.6.3 Site Alarms

Any change in state of site equipment shall induce an alarmed state. Equipment monitored shall include, but not be limited to the following:

- Surge Arrestors
- Transfer Switch (normal or bypass state)
- Power fail
- Smoke detector
- Intrusion detection
- High temperature
- Low temperature
- High humidity
- UPS fail
- UPS state (normal or bypass)
- Generator (including generator run)

In an effort to reduce false alarms, all alarm contacts shall be normally closed when no alarm is present.

3.7 **Subscriber Equipment**

3.7.1 Overview

Subscriber equipment includes all non-fixed user equipment, such as:

1. Portable radios
2. Mobile radios
3. Control stations
4. Pagers

Respondent shall provide user subscriber equipment in the UHF frequency band.

3.7.2 Requirements

1. All subscriber equipment is expected to be of high quality and intended to provide high reliability under heavy use in severe environments. Equipment must be FCC type accepted in accordance with FCC Part 90 rules and regulations.
2. All subscriber equipment must be software programmable.
3. All subscriber equipment shall be compatible with standard conventional analog FM radio systems operating in simplex or repeated mode. The equipment shall be programmed for proposed channels.
4. Portable radios
 - a. Respondent shall provide unit pricing for portable radio equipment with a total of 252 portables.
 - b. Respondent shall provide detailed equipment specifications, including the following information:
 - Radio dimensions
 - Radio weight with battery
 - Battery type
 - Battery life and recharge time
 - Antenna type
 - Frequency channel capacity
 - General features, transmit/receive parameters, and mechanical specs
 - c. Respondent shall provide pricing for all optional accessories including a speaker/microphone both with and without an antenna.
5. Mobile Radios
 - a. Respondent shall provide unit pricing for mobile radio equipment with a total of 91 mobiles.
 - b. Mobile radios will be quoted as dash mounted units and remote mounted units.
 - c. Mobile radios shall be supplied complete with microphone, external speaker, cables, fusing, mounting hardware, coaxial cable and antennas to provide for a complete installation.

- d. Respondent shall provide detailed equipment specifications.
 - e. Respondent shall provide pricing for all optional accessories.
6. Control Station Radios
- a. Respondent shall provide unit pricing for control station radio equipment with a total of 11 stations.
 - b. Control station radios shall be supplied complete with desk microphone, speaker, cables, coaxial cable and antennas to provide for a complete working package.
 - c. Respondent shall provide detailed equipment specifications.
 - d. Respondent shall provide pricing for all optional accessories.
7. Pagers
- a. Respondent shall provide unit pricing for narrowband UHF tone and voice pagers, MinitorVI, Apollo, Swiss or equivalent with a total of 180 pagers.

3.8 *Training*

The selected vendor shall develop and conduct training programs to allow county personnel to become knowledgeable with the system, subsystems, and individual equipment.

1. Respondent shall fully describe all proposed training programs, including but not limited to:
 - a. User subscriber equipment operation
 - b. Radio dispatch console operation
 - c. Microwave radio network management
 - d. Alarm, monitor and control system management
2. All training shall be conducted at the County EOC located in the Brunswick County Sheriff's Office. The selected vendor shall coordinate with the Owner regarding number of attendees and schedule.

3.9 *Spare Equipment*

Respondent shall propose recommended spare parts for system, subsystems, and individual equipment to the County as an OPTION.

3.10 *Warranty Period*

The proposed communications system shall have a one-year warranty period. The County further requests pricing for two and three year warranty extensions. The two and three year warranty periods shall commence upon Final Acceptance and after 30 consecutive days without a critical system failure. A critical system failure shall be defined as any failure of infrastructure equipment requiring maintenance personnel to be onsite or loss of system wide communications for any amount of time.

The local facility shall provide a single telephone number that answers 24 hours a day for service request. The warranty period will contain, but not be limited to the following:

1. Warranty Maintenance shall be performed 24 hours a day with no additional charges for work on critical infrastructure outside the normal 8:00 a.m. to 5:00 p.m. business hours.
2. The local facility shall provide prompt repair service, onsite within two (2) hours, return to service within four (4) hours.
3. The respondent shall state in the proposal the name, address and capabilities of the service station(s) providing warranty service.
4. The County shall be provided written documentation indicating that all testing was completed and that all irregularities were corrected.
5. For all equipment needing factory repairs, a comprehensive tracking system will be in place to track units to and from the factory.
6. There shall be a direct exchange and/or loaner option available for defective equipment.
7. The local repair shop will have access to all county owned spares.
8. During the installation and warranty periods, the vendor shall provide, at no additional cost, commercially available upgrades of any and all software and firmware sold to the County.
 - a. This covers only upgrades by the Vendor or Original Equipment Manufacturer or Original Software Vendor that are:
 - 1) Patches for defective software
 - 2) New releases that are corrective revisions for earlier versions and/or no-cost enhancements to earlier releases.
 - b. New software releases that contain enhancements (i.e. new features and capabilities) will be purchased at agreed upon prices.

The vendor shall make every effort to separate corrective revisions from enhancements. If the vendor is unable to do so, and new releases are necessary to correct problems, then the entire release (including enhancements) shall be provided to the County at no additional expense.

3.11 *Maintenance Standards*

If fixed equipment or a fixed equipment module fails more than twice during the acceptance test or twice during the first year, the vendor shall meet with the County to discuss and explain such failures. If, in the opinion of the County, these failures indicate that the equipment is potentially prone to continuing failures, the vendor shall replace it at no cost to the County.

3.12 *System Implementation, Test, and Acceptance*

3.12.1 General

1. The selected vendor shall attend monthly project and construction meetings as deemed necessary by the County prior to and during installation. Additional meetings may be scheduled at the discretion of the County.
2. If any changes in the overall timeline occur, the selected Vendor shall update the project schedule for discussion during these project meetings.
3. The selected vendor shall provide written minutes of all meetings no later than five business days after the meeting.

3.12.2 Staging

1. Each individual assembly or equipment unit shall undergo factory testing prior to shipment.
2. Standard factory test documentation, documenting the tests performed and indicating successful completion of testing shall be submitted to the County.
3. System Staging:
 - a. The complete system shall be staged and tested in the factory to the greatest extent practical. The intent of the staging tests is to demonstrate to the County that the system is ready for shipment and installation.
 - b. The selected vendor shall provide all necessary technical personnel, and test equipment to conduct staging tests. All deviations, anomalies, and test failures shall be resolved at the vendor's expense.
 - c. The selected vendor shall use an approved Staging Acceptance Test Plan (SATP). It is expected that the SATP has been performed and all tests have been successful before the County witnesses the official SATP. The SATP shall be signed and dated by the vendor and County representatives following completion of all tests. All tests in the SATP shall be marked as either pass, fail or pass qualify.
 - d. Failed tests shall be documented, corrected, and retested. All defective components shall be replaced and retested. Defective components that cannot be corrected shall be replaced at the expense of the vendor.
 - e. Retest of individual failed SATP tests or the entire plan shall be at the County's direction.
 - f. The fully executed and completed SATP document shall be provided to the County.

3.12.3 System Installation

1. Installation shall include a complete, tested, system to include placement of associated cabling, appropriate system layout and terminal connections. The vendor shall provide associated power supplies and any other hardware, adapters and or connections to deliver a complete operable system to the County at the time of acceptance.
2. All installations shall be performed by factory authorized or vendor affiliated service shops. Other shops or installers may be used upon mutual agreement between the County and the selected vendor. Qualified, adequately trained personnel familiar with this type of work shall perform all installations. Vendors shall provide the names of the service shops, a summary of their experience and a list of three (3) references (minimum) for each proposed shop.

3. Prior to the start of the system installation the vendor shall participate in a mandatory project site survey with the County or County's representatives to confirm actual equipment location within each space. At that time the exact equipment locations will be determined and documented by the vendor.
4. The installation Contractor shall coordinate with others, as appropriate, to confirm that any prep work that affects the installation of the base station equipment, such as tower work, coring, bracing, conduit, electrical, etc., is complete before final inspection.
5. The selected vendor shall provide and pay for all materials necessary for the execution and completion of all work. Unless otherwise specified, all materials incorporated into the permanent work shall be new and shall meet the requirements of this RFP. All materials furnished and work completed shall be subject to inspection by the County.
6. Equipment supplied as spare equipment may not be used for installation of the proposed system. All spare equipment must be supplied in an unused condition.
7. All equipment and devices shall be cleaned internally and externally, and all damaged finishes shall be repaired.
8. Worksites shall be left neat and broom swept upon completion of work each day. All shelter floors will be thoroughly cleaned and all scuff marks and abrasions will be removed prior to acceptance. All trash shall be removed weekly.
9. Inspection:
 - a. The County shall conduct an inspection of the installations upon substantial completion. Any deficiencies shall be documented on a single punch list and provided to the Contractor for resolution.
 - b. Final acceptance testing shall not commence until all punch list items are resolved.

3.12.4 Coverage Testing

1. Respondent shall submit a preliminary Coverage Acceptance Test Plan (CATP) with the Proposal. The final CATP shall be submitted during the Final Design state of the project.
2. CATP:
 - a. The CATP shall be consistent with the procedures and guidelines outlined in TSB-88 latest revision.
 - b. Coverage testing shall commence only after the radio network is fully tested and aligned. Significant changes to the network will require retesting of coverage at the County's discretion.
 - c. The selected vendor shall perform two types of coverage testing:
 - i. Automated objective mobile drive testing

ii. Non-automated subjective DAQ testing (intelligibility testing)

d. Automated and intelligibility testing shall be complementary and serve to fully verify that coverage requirements are met both technically and operationally.

e. Test Configurations

i. Testing configurations for automated and intelligibility testing shall represent typical operating configurations to the greatest extent possible, using portable and mobile radio equipment to be used with the system.

ii. Automated Objective Mobile Drive Testing

1. The selected vendor shall test both the signal level and BER, as applicable, at a statistically significant number of test locations throughout the County utilizing automated test equipment such as an STI-9400 or equivalent.
2. For testing purposes, the County shall be divided into $\frac{1}{4}$ square mile bins (%-mile x %-mile). Contractor may subdivide grids if necessary.
3. Inaccessible grids shall not count in the statistical analysis.
4. Any failed grids shall be corrected and retested.

iii. Non-automated Subjective DAQ Testing

1. Non-automated subjective DAQ coverage testing shall be conducted using typical portable radios supplied with the system.
2. Talk-out and talk-in performance shall be documented.
3. The selected vendor shall provide a standardized test form for testing.
4. The selected vendor shall coordinate with the County to establish pass/fail criteria as well as correlation between the subjective and objective test results.

3.12.5 Final Acceptance Testing

1. Prior to Final acceptance testing, the selected vendor shall verify and document that all equipment, hardware, and software are upgraded to the latest factory revision. Multiple revision levels among similar equipment are not accessible. The County shall be given two weeks written notice that the system is ready for final acceptance testing.

2. Final Acceptance Test Plan (FATP):

- The selected vendor shall use the completed and approved Final Acceptance Test Plan (FATP). It is expected that the FATP has been performed and all tests have been successful before the County witnesses the official FATP. The FATP shall be signed and dated by the vendor and County representatives following completion of all tests. All tests in the FATP shall be marked as either pass, fail or pass qualify.
- The selected vendor shall provide all necessary technical personnel, and test equipment to conduct FATP tests. All deviations, anomalies, and test failures shall be resolved at the vendor's expense.

- Failed tests shall be documented, corrected, and retested. All defective components shall be replaced and retested. Defective components that cannot be corrected shall be replaced at the expense of the vendor.
- Retest of individual failed FATP tests or the entire plan shall be at the County's discretion.
- The fully executed and completed FATP document shall be provided to the County.

3.12.6 As-built Documentation

1. The Contractor shall provide complete as-built documentation as outlined below:
 - a. Equipment provided
 - b. Plan and elevation drawings of all equipment including antennas on towers
 - c. Cabling and terminations
 - d. Block and level diagrams
 - e. Programming
 - f. Setup and alignment information
 - g. Successfully completed, signed, and dated SATP.

3.12.7 System Acceptance

The County shall deem the system ready for final acceptance following the successful completion and approval of the following:

1. Preliminary Design submittals
2. Staging Acceptance Test Plan (SATP)
3. System installation
4. Final inspection and punch list resolution
5. As-built documentation
6. Final Acceptance Test Plan (FATP), including Coverage Acceptance Test Plan (CATP)
7. Training

4. *Financing Options*

Brunswick County anticipates financing this project over a multi-year period. The respondent shall include an outline of financing options in the proposal to include, but not limited to: lease, lease-purchase, and/or outright purchase.