Chenango County

Radio System RFP

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1 Introduction

1.1 Overview

Chenango County (the County) has issued this specification as part of its project to establish a new public safety radio system. The County has been using a radio system that has components that date back 12 years. The County has embarked upon this project for the purpose of updating the radio system with a modern radio system. Because of the numerous items surrounding the determination of the radio system, the County intent is to review the cost and benefits of the various systems proposed to determine the best direction for the County. The County intends to build a public safety grade, two zone, three channel P25 compliant Phase 2 UHF voice radio system with an analog UHF paging system and a microwave backhaul system. The County will also be integrating portions of its current system, which will be continued to be used during the transition and in the future.

1.2 Terms and Definitions

TABLE 1 - TERMS AND DEFINITIONS

TERMS AND DEFINITIONS	
County	The County of Chenango, NY
Project Director	County official(s) charged with overseeing the project to its successful completion and to whom all related correspondence shall be directed. This person will address all problems and issue such directives required to successfully manage this project. This individual has the right and authority to accept or reject equipment and work provided by the vendor.
Fixed Site	A location having any combination of base stations, satellite (auxiliary) receivers, control consoles and/or having antenna systems permanently attached to a tower, building, or water tank.
Proposal	Synonymous terms for a formal offering made by a prospective Vendor to the County, the acceptance of which by the County will result in a binding contract between the County and the successful Vendor.
RFP	Request for Proposal
Subscriber Unit	Mobile, Portable, desktop radio or control station used by system participants. Also referred to as “subscriber”.

Specifications, Request for Proposal	This detailed description of goods and services to be provided, installed and made operational into a complete integrated radio system includes all drawings, appendices, addenda and other material provided as a part or supplement hereto.
Successful Vendor, the Vendor	Vendor who has won award of a contract to provide equipment and/or do work in accord with the specification.
User	One who operates the various radio equipment
Vendor Project Manager	Vendor's representative responsible for coordination with County personnel and other contractors and individual as may be required by the County for the purpose of properly fulfilling the contractual obligations of the successful Vendor.

2 Instructions to Offerors

A pre-proposal conference and site visit will be held at the Chenango County Sheriff's Office, 279 County Road 46, Norwich, NY 13815 on August 30, 31 and September 1, 2022, at 9am, prevailing time. Attendance is recommended. The County shall not be liable for, nor shall it review proposed change orders, contract amendments, etc. for inadequate pricing, labor, materials, time, or similar issues in Vendor's contract resulting from Vendor's failure to attend and obtain information provided at the pre-proposal conference, site visit and/or any addenda issued afterward.

Offerors are responsible for reporting in writing any errors, omissions or ambiguities found in this RFP. All such reports, requests for information, questions, etc. shall be either faxed to Chenango County Office of Emergency Services, 607-334-2003 or mailed to Chenango County Office of Emergency Services, 279 County Road 46, Norwich, NY 13815. Additionally, questions may be emailed to MBeck301@roadrunner.com. **No questions will be entertained by any other means.** All **questions for the first phase** of questions must be **received by August 25, 2022, 4pm**, prevailing time. All **questions for the second phase** of question must be **received by September 14, 2022, 4pm**, prevailing time. Questions received after this time may not be addressed. Please be patient, questions will be answered in an Addendum/Addenda to be shared with all interested Offerors. Questions will not be responded to individually.

Unless otherwise specified herein, all proposals shall be made upon forms furnished in this RFP, if any and as may be modified by addenda, contained in sealed envelopes marked: **RADIO SYSTEM PROPOSAL, RFP-00000-22,** addressed to **Chenango County Clerk of the Board, Attn: RC Woodford. 5 Court Street, Norwich, NY 13815**. and received up to and including **October 28, 2022, at 3pm**, prevailing time. It is the Offeror's responsibility to clearly mark the outside of their mailing envelopes. Faxed/Emailed proposals are not permitted.

Five (5) sets of all proposals shall be submitted, one set of which **MUST CONTAIN ORIGINAL SIGNATURES** including completed copies of any forms or certifications required in this RFP. Forms, if any, included in this RFP shall be completely filled in, in ink or by typing, on the original form. Failure to respond to the RFP on any official form(s) included in this RFP, may result in disqualification of a proposal as non-responsive. No proposal form will be accepted which contains any modification to the template, additional information not specifically requested, omissions or erasures. Each proposal form shall be signed by a duly authorized individual on behalf of the Offeror. Illegible and unsigned proposals will be rejected as non-responsive.

Basis of Award provisions vary with each RFP, please read that section carefully. Some RFPs may be awarded to more than one entity. The County reserves the right to waive any informality, reject any and all proposals, or, if noted in the Basis of Award section of this RFP, accept any proposal in whole or in part, if deemed to be in the best interest of the County.

Any award shall be subject to the execution of a contract (and, if applicable, license or other agreements) between the Offeror and the County. The County's contract obligation is contingent upon execution of the contract between the County and selected Vendor and the availability of appropriated funds for this contract. No legal liability on the part of the County for payment of any money shall arise unless and until a contract is executed by both parties, funds are appropriated and made available in each year of the term of the contract and all performance requirements for each payment are met. The County shall have no responsibility or liability for any of Offeror's costs related to preparation of proposals, attendance at interviews, etc.; all such costs are solely at Offeror's risk and expense.

3 Scope and Specifications

Unless otherwise stated, the use of manufacturers' names and product numbers in the Specifications are only for descriptive purposes and establishing general quality levels. They are not intended to be restrictive. Vendors are required to state exactly what they intend to furnish, otherwise it is fully understood that they shall furnish all items as stated. Detailed specifications, circulars, manufacturers or other warranties and all necessary data on services or items proposed to be furnished must be included with each proposal. This information must clearly show that the item offered meets all detailed specifications herein. The County reserves the right to reject any proposal as non-responsive if compliance with the specifications is not clearly evident.

All equipment proposed must be new equipment of the model specified or an approved equal in current production. Manufacturers' warranties should be included with the proposal. All supplies, equipment, vehicles, and materials must meet the provisions of the Occupational Safety and Health Act (OSHA) and all other applicable state and federal laws and regulations.

Vendor shall supply a current MSDS with each product shipment, when applicable.

4 Term

The initial term of the contract resulting from this solicitation shall cover the initial equipping of the remote sites. The County anticipates that the initial term of this contract will be for approximately three (3) years commencing upon execution of the contract resulting from this solicitation. Thereafter, The County reserves the right to extend the contract for up to five (5) additional periods of one (1) year each, at the sole option of the County and under the terms and conditions of the original RFP, unless alternate terms are specified in this RFP and/or the contract for renewals/extensions. The renewal periods shall cover the period during which the County (and authorized users) may purchase subscriber units and related equipment, which is five (5) years from the date of execution of the original contract resulting from this solicitation. Spare parts shall be provided under the contract resulting from this solicitation for the initial term and each renewal term hereunder. The County, at its sole option, and under the terms and conditions of the original RFP, may further extend the contract resulting from this solicitation for five (5) additional periods of one (1) year each for preventative maintenance services and repair services.

Upon expiration of the original term or any renewal thereof, if any, the contract resulting from this solicitation may be extended unilaterally by the County for an additional period of up to two (2) months on written notice to the Vendor on the same terms and conditions as the original contract including, but not limited to, quantities (prorated for such extension), prices, and delivery requirements. With the concurrence of the Vendor, the extension may be for a period of up to three (3) months in lieu of the County's option to unilaterally extend up to two (2) additional months.

5 Pricing

The proposed scope and specifications are not a guarantee, were developed based on past or anticipated needs, and are as accurate as the County can ascertain at the time of issuance of this RFP. When an anticipated volume of services or other quantities are listed, the County has listed these either based upon a history of usage over a previous period or anticipated need. The County in no way guarantees that the actual volume or quantities listed will be necessary or ordered, although every attempt is made to provide accurate information. When volume or quantities are listed, the Offeror should understand that the actual volume or quantities may be more or less, depending on the actual needs of the County. The Offeror shall hold the County harmless against any damages because of estimated volume or quantities. In the event quantities exceed the estimate, the County shall receive the price as listed in the proposal or, if a better price is available at that time, that price shall be passed on to the County.

The prices submitted shall be exclusive of federal and state sales taxes (or other taxes inapplicable to government entities) and must not include any tax for which the Offeror may claim exemption because

of doing business with the County. Unless otherwise indicated in this RFP, prices shall be net, including any applicable transportation and delivery charges fully prepaid by the successful Vendor to the destination indicated in the proposal. No freight and/or handling and/or fuel surcharges will be accepted, unless otherwise agreed to in the contract. For contracts involving provision of goods, equipment, or technology, at no time shall any change to price or product specification for those items be permitted, except in the case where an item has been replaced by another item due to obsolescence. In this instance, the County must approve a change of product in a written change order for it to be valid. In the event a product substitution is approved, no change in price will be permitted except when the price will be equal to or lower than the originally awarded price.

Pricing for the Radio System shall be provided in Attachment 1 to this RFP. Pricing for the Microwave System shall be provided in Attachment 2 to this RFP. Pricing for subscriber units shall be provided in Attachment 3 to this RFP.

6 Payment

Within sixty (60) calendar days following receipt of invoice, the County will pay Vendor for the satisfactory performance of services and/or receipt of conforming goods as follows:

TABLE 2 - MICROWAVE BACKHAUL SYSTEM MILESTONE PAYMENT PLAN

MICROWAVE BACKHAUL SYSTEM	
Milestone	Payment Percentage
Contract Finalized and Signed	5%
Customary Detailed Design	5%
Staging - Phase 1 Complete	30%
Field Installation - Phase 2 Complete	30%
Acceptance Testing Complete	20%
Final Acceptance, Warranty Begins	10%

TABLE 3 - RADIO SYSTEM MILESTONE PAYMENT PLAN

RADIO SYSTEM	
Milestone	Payment Percentage
Contract Finalized and Signed	5%
Customary Detailed Design	5%
Staging - Phase 1 Complete	20%
Field Installation Console - Phase 2 Complete	10%
Field Installation of RF System - Phase 3 Complete	20%
Subscriber Testing / System Burn in Period - Phase 4 Complete	10%
Coverage and System Acceptance Testing Complete	15%
Subscriber Deployment - Complete	10%
Final Acceptance, Warranty Begins	5%

The Vendor will be permitted to bill for work completed or conforming goods delivered, upon the satisfactory completion of deliverables only. Following receipt of a demand for payment for the satisfactory completion of services performed, for which is there is no good faith dispute between the parties, the County Project Manager will render final determination as to the satisfactory completion of deliverables and pay for such work earned by Vendor less ten percent (10%) retainage, which retainage will be paid to Contractor net sixty (60) calendar days following the date of final acceptance of the radio system by the County.

Subscriber units will be paid net sixty (60) calendar days following delivery.

7 Submission of Proposals

7.1 Intent

a. Vendors submitting a response to this specification imply they have read, understand, and comply with the provisions of the specification. Vendors further understand the County desires a full and complete system that is fully operational. It is the Vendor's responsibility to propose a full, complete, and operational system. No Vendor shall knowingly omit any component, part, device, software package, function or installation procedure that will not allow the system to be fully functional for the price offered.

b. It is the intent of the County to receive written responses from Vendors pursuant to this specification. All responses from the Vendor will be used as part of the final contract. The County will review and evaluate the written responses. If appropriate, the County will ask Vendors to make a presentation of their response to a select group of County representatives, who will, likely, be made up of project management staff, consultants, user group representatives and possibly even elected officials.

7.2 Format

a. This RFP is structured as a performance specification. As such, the Vendor is responsible for the specific processes to be used to accomplish the whole of this work.

a. The Vendor is required, using its resources and products, to develop a response that fully meets these specification performance requirements.

b. The Vendor shall provide the response to the specification in the following manner.

   i. Section A – System Description

   ii. Section B – Point by Point Specification Response

   iii. Section C – Price Worksheet

7.3 Specification Response

a. The specification provides several requirements set forth by the County. The Vendor must respond to each of the requirements. Additional information that further explains the Vendor's response shall be included with the response. Vendors must respond to all questions and technical assumptions made by the County for their response to be considered compliant. The Vendor is encouraged to provide the response that is input into the RFP document provided. Also, any item or a capability that is not included with the proposed and priced system shall be provided in red text. All optional proposed items should be indicated in red text.

b. Descriptive responses to any specification shall be full and complete at the time of proposal. Unless required by other sections of this specification, no additional writings, comments, reservations, etc. will be part of the binding submission, regardless of how referenced or presented.

c. The Vendor shall state "Compliant" for any specification that the Vendor understands and will comply with all specifications without exception or reservations.

d. The Vendor shall state "Not compliant" for any specification that the Vendor does not fully understand and/or will not fully comply with all specifications without exception or reservations. In each such case of non-compliance, the Vendor must detail the degree of non-compliance and state any alternatives offered as an option. Such alternatives will be weighed by the County and will be accepted or rejected as it determines to be in its best interests.

e. For any alternative radio system options, the Vendor must provide a complete SEPARATE response to the specification.

7.4 Submittal

a. Vendors must submit a signed original and five (5) hard copies of their specification and supporting documentation.

b. Label each as Original, Copy 1, Copy 2, etc., and the cover page and spine of the document shall be labeled as follows:

   i. Line 1 – "Radio Communications – Request for Proposal"

   ii. Line 2 – "Book # of #"

   iii. Line 2 – "Chenango County, NY"

   iv. Line 3 – "Vendor's Name"

c. Include all documentation and responses in a digital format with the original and each copy.

d. All submissions shall be indexed and contained in three ring binders.

8 Additional Information, Interviews & Site Visits

The County may require any or all Offerors to present additional evidence of experience, ability, and financial standing as well as a statement as to the materials, equipment, or personnel which the Offeror will have available for the performance of this contract. The County reserves the right to interview, any or all Offerors and/or visit any or all Offeror's sites during the evaluation of proposals. If applicable, the County shall contact Offerors to arrange an interview (which County may require to be held at The Chenango County Sheriff's Office, 279 County Road 46, Norwich NY 13815) and/or a site visit of Offeror's facilities at any time during the evaluation process. Offerors are reminded to include their best technical and price terms in their initial offer and not to automatically assume that they will have an opportunity to participate in interviews, site visits or be asked to submit a best and final offer. The County may award the contract without interviews and/or site visits for any or all Offerors, if deemed to be within the best interests of the County.

9 Basis of Award

Offerors are advised that the selection of a proposal for contract award is to be made after careful evaluation of the proposals received by the Evaluation Committee. The Evaluation Committee will consist of representatives from the County's Office of Emergency Services and / or representatives from other County departments as deemed appropriate. Award of a contract from this RFP shall be made to the responsible Vendor whose proposal is determined to be in the best interest of the County, taking into consideration the following factors, each of approximately equal weight:

a. System Design – System features and functions, guaranteed radio coverage and system capacity, reliability, fault tolerance, redundancy and fallback modes of operation, interoperability capabilities and compliance to standards.

b. Vendor Experience – Vendors qualifications, experience, ability, and track record on providing similar systems.

c. Product Management and Support – Installation management, maintenance, and support.

d. Pricing – Cost of equipment and services.

Quality of performance (comprised of system design and performance capability factors based on experience), quality of goods or equipment provided, price and any other factors shall be given approximately equal weight in evaluation. As quality scores and relative advantages and disadvantages become less distinct between proposals, differences in price between proposals may be of increased importance in determining the most advantageous proposal. Conversely, as differences in price become less distinct, differences in relative advantages and disadvantages between quality factors may be of increased importance to the determination

The submission of a proposal implies the Vendor's acceptance of the evaluation criteria and Vendor's acknowledgment that subjective judgments must be made by the evaluation committee. Award of any contract may be made to the responsible Vendor, whose proposal is determined to be in the best interest of the County. The County reserves the right to accept other than the lowest priced offer, waive any informality, or reject any or all proposals, with or without advertising for new proposals, if in the best interest of the County.

This RFP may be awarded by the County in three lots as reflected in the attached pricing sheets.

- Lot #1 – Radio system, infrastructure, and consoles.
- Lot #2 – Backhaul System
- Lot #3 – Subscriber Units

10 Anticipated RFP Timeline

All dates except for the “Proposals Due” date are approximate and subject to change, unless otherwise noted. Any change in the Proposals Due date will be made by an RFP Addendum issued by the County.

Publication of RFP: 8/4/2022
First round of Questions Due: 8/25/2022
Addendum(s) issued on or about: 9/8/2022
Bidders Conference / Site Visits: 8/30-9/1/2022
Second Round of Questions Due: 9/14/2022
Addendum(s) issued on or about: 9/28/2022
Proposals Due: 10/28/2022
Contract Award: 2/20/2023
Contract Execution on or about: 4/17/2023

11 Questions

All questions regarding this RFP must be either faxed to Chenango County Office of Emergency Services, 607-334-2003, mailed to Chenango County Office of Emergency Services, 279 County Road 46, Norwich NY, 13815 or emailed to Matt Beckwith, MBeck301@roadrunner.com by the time and date specified in the instructions to Offerors. Each question must identify the section and page number of the RFP to which it refers. If it is believed that the question relates to an omitted provision, then the offeror shall so state that in its question.

12 Standard Provisions

The parties to the attached contract, license, lease, amendment, or other agreement of any kind (hereinafter "the Contract" or "this Contract") further agree to be bound by the following, which is hereby made a part of the Contract. The term "COUNTY" wherever used herein shall be deemed to mean the COUNTY of Chenango. The term "VENDOR" wherever used herein shall be deemed to mean the entity contracting with the COUNTY:

1. NONDISCRIMINATION REQUIREMENTS. In accordance with Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional nondiscrimination provisions, neither party shall discriminate against any employee or applicant for employment because of race, creed, color, sex, national origin, age, disability, or marital status.

1. INDEPENDENT VENDOR. The relationship of the COUNTY to VENDOR shall be that of independent contract. The VENDOR in accordance with its status as an independent VENDOR, covenants and agrees that it will conduct itself in accordance with such status, that it will neither hold itself out as, nor claim to be an officer, employee or agent of the COUNTY by reason hereof, make any claim, demand or application to or for any right or privilege applicable to an officer, employee or agent of the COUNTY including but not limited to Workers' Compensation coverage, unemployment insurance benefits, social security coverage or retirement membership or credits, or unemployment insurance benefits.
2. INDEMNIFICATION. The VENDOR shall indemnify, save and hold harmless the COUNTY from any and all liability for anything and everything whatsoever arising from loss or damage from performance by the VENDOR.
3. NON-ASSIGNMENT. The VENDOR shall not assign or transfer the Contract, nor subcontract, any part thereof, or any interest therein without first receiving written approval from the COUNTY.
4. RECORD KEEPING REQUIREMENTS. The VENDOR shall keep and maintain efficient, complete and books and records concerning any and all costs incurred in the performance of this Contract. Such books and records shall be kept available for examination by qualified personnel of the COUNTY at all reasonable times and places during the period of execution of the Contract and for six (6) years from the date of final payment hereunder.
5. EXECUTORY CLAUSE. The COUNTY shall have no liability under this contract to the VENDOR or to anyone else beyond funds appropriated and available for this Contract at the time when one or more payments is due hereunder.
6. ENTIRE AGREEMENT. It is understood that this Contract, including this Appendix, represents the entire Contract of the parties hereto; that all previous understandings are merged herein; and that no modifications hereof shall be valid unless written evidence thereof shall be executed by both parties hereto; provided, however, that each and every provision of law and clauses required by law to be inserted in this Contract shall be deemed to have been inserted herein, and if through mistake or otherwise, such provision is not inserted, then upon the application of either party, this Contract shall be amended forthwith to make such insertion.
7. SUCCESSOR AND ASSIGNS. All the terms, covenants and agreements herein contained shall be binding upon and shall inure to the benefit of the successors and assigns of the respective parties hereto.
8. NO ARBITRATION. Disputes involving this contract, including the breach or alleged breach thereof, may not be submitted to binding arbitration (except where statutorily mandated) but must, instead, be heard in a court of competent jurisdiction of the State of New York, with venue in Chenango COUNTY.
9. WORKERS' COMPENSATION BENEFIT. This Contract shall be void and of no force and effect unless the VENDOR shall provide and maintain coverage during the life of this Contract for the benefit of such employees as are required to be covered by the provisions of the Workers' Compensation Law.

10. CONFLICTING TERMS. In the event of a conflict between the terms of the Contract (including any and all attachments thereto and amendments thereof) and the terms of this Appendix A, the terms of this Appendix A shall control.

11. GOVERNING LAW; SEVERABILITY. This Contract shall be governed by and construed in accordance with the laws of the State of New York. This Contract shall be construed without the aid of any presumption or other rule of law regarding construction against the party drafting this Contract or any part of it. In case any one or more of the provisions of this Contract shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision hereof and this Contract shall be construed as if such provisions had never been contained herein.

12. COMPLIANCE. The VENDOR shall comply with all existing and future federal, state, and municipal laws, ordinances and regulations pertaining to the subject matter hereof. The VENDOR represents to the COUNTY that the VENDOR has obtained all approvals required by law for its execution and performance of this Contract, and that this Contract is a binding obligation of the VENDOR, enforceable in accordance with its terms.

13. INSURANCE COVERAGE. The VENDOR shall secure and maintain in force during the term of this agreement, Workers' Compensation Insurance Coverage on its employees, including Employer's Liability Coverage as required by New York State law; Comprehensive or General Liability Insurance with a combined single limit of not less than $1,000,000.00.

14. TAX IDENTIFICATION NUMBERS: All invoices or Chenango County standard vouchers submitted for payment under this Contract must include the payee's Federal Tax Identification Number or, if an individual, a Social Security Number. Failure to include the same may delay or prohibit payment as the same is required by the Internal Revenue Service under its backup withholding provisions.

15. LABOR LAW COMPLIANCE. If this is a public work contract covered by Article 8 of the Labor Law neither Vendor’s employees nor the employees of its subcontractor’s, if any, may be required or permitted to work more than the number of hours or days stated in applicable statutes, except as provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the State Labor Department. Furthermore, Vendor and its subcontractors, if any, must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates or overtime pay, as determined by the State Labor Department in accordance with the Labor Law.

13 General Requirements

13.1 System Completeness

The Vendor must do all work as specified herein and provide all documentation and finish all site / system work as required. The Vendor shall engineer, supply, deliver, install, and make operational all the equipment defined in this specification. This equipment shall create a complete, engineered system, which is fully operational and provide all the features and functional capabilities called for throughout this document. All descriptions and representations shall be considered part of the specifications for any piece of equipment to which they relate or refer in any manner.

Failure of the Vendor to read and/or understand each of the requirements, or the Vendor's failure to include any feature, device, operational capability, or services required to meet the intent of this specification, whether specifically called for or not herein, or regardless of where they appear herein, shall not reduce the Vendor's responsibility to provide them for the base price proposed. No extras or other compensation shall be allowed in case of such omissions.

Omission of any switch, feature, function, module, connector, indicator or other component or device from this text or the vendors proposed schematic representations, drawings, charts, lists, etc., that is required to make the system complete and acceptably operational in accord with the intent of this procurement, shall not exempt the Vendor from including, providing, and installing the same for the base price quoted as if it were specifically called out.

13.2 First Quality

Unless otherwise stipulated in writing by the County, all radio units, consoles, encoders, decoders, voters, modems, boards of all types, processors, controllers, racks, cabinets, stands, monitors, computer mice and trackballs, cables of all types, connectors (electrical and mechanical), hardware of any description, wire of every type, all mounting devices, antennas (fixed and mobile), lightning arrestors, lamps, UPS units, circuit boxes, conduit, electrical fixtures of all types, tie wraps, tape, fasteners, mounting boards and platforms, and all other items used in the assembly and installation of this system, shall be new, of first class quality, and free of all defects and damage.

Equipment is considered new even if materials used in its packaging, shipping, installation, or documentation have been recycled or returned from a previous shipment. If, when inspected by County representatives or any other governing or licensing agency, any item intended for use in this project is rejected as not compliant with these requirements, after having been delivered to the site, shall be immediately repaired to the satisfaction of the Project Director, or removed from the property by the Vendor.

If the Vendor fails to repair or remove such rejected materials and/or equipment items promptly, the County will cause same to be removed by others at the expense of the Vendor. The County reserves the right to withhold payment for such material, etc.

13.3 Standards Compliance

13.3.1 FCC Requirements

All equipment proposed must meet or exceed all applicable FCC requirements and the system requirements set forth herein. Where a conflict appears between these standards the more stringent requirement shall be the minimum acceptable.

13.3.2 National and Other Applicable Standards

All wiring and installation services must conform to applicable standards including, but not limited to OSHA, ADA, NEC, NFPA and BOCA.

13.3.3 P25, Phase 1 and 2 Compliance

All portions of the proposed P25 radio system including but not limited to the system, base station, and subscribers shall comply with the ANSI/TIA 102 Series Digital P25 suite of standards adopted as of the date of release specification.

The Vendor shall provide a list of all elements that are compliant to the currently approved P25 suite of standards, distinguishing between Phase 1 and Phase 2. If partially compliant, the vendor shall list the elements of the Vendor's equipment that are not compliant. The vendor shall fully describe the technical and operational aspects of this capability in the proposed system.

13.3.4 New York State Standards

The following standards can be found at the NYSDHSES OIEC Plans, Policies, and Guidelines website.

https://www.dhses.ny.gov/plans-policies-and-guidelines

13.3.4.1 New York Statewide Communications Interoperability Plan (SCIP)

13.3.4.2 NYS 700MHz Public Safety National Interoperability Channel Plan Guideline

13.3.4.3 NYS Name and Use of 155.370MHz in New York State (NYLAW1) Guideline

13.3.4.4 NYS Name and Use of Common EMS VHF Radio Channels in New York Guideline

13.3.4.5 Land Mobile Radio Encryption

13.3.4.6 Base Station Implementation of Interoperability and Common Channels in New York State

13.3.4.7 Guidelines for Network IP Addressing

13.4 Mechanical

The equipment shall not have any sharp edges, etc. that could be hazardous to the user, installer, or repair person. Assemblies, welds, screws, rivets, etc. shall be secure.

All equipment must fit in standard racks or cabinets that do not exceed 24” width x 28” depth x 84” height.

The Vendor shall provide the minimum spacing/setback between radio equipment racks or cabinets. The Vendor will also provide any spacing/setback requirements for any equipment that will not be mounted in a standard rack such as batteries or UPS equipment.

The Vendor shall locate and install all equipment at mutually agreed to locations within the communications building locations. These locations will be determined and documented prior to installation. All equipment cabinets or racks shall be secured directly to the floor to prevent accidental shift in location or tipping. The Vendor shall provide front plan views of the proposed rack layout for each of the sites.

The Vendor shall provide all necessary interfaces with base repeaters, peripheral computer hardware such as consoles, microwave, PSTN or legacy conventional equipment. Interfaces shall include cabling and modems, all of which shall be identified by the functional diagrams of the proposed system.

The Vendor must provide and install all necessary cabling between equipment and interface devices. The Vendor shall supply a cable ladder plan prior to starting the installation that will show the areas of the cable ladder in which the cable will be installed. All cabling shall be labeled with pre-printed adhesive wire labels. The labels shall be every 3 feet and at ends adjacent to the connectors. All cables shall be secured every 3 feet with tie wraps. All openings for cables entering cabinets or racks shall be protected by rubber grommets. No splicing of cables will be allowed.

13.5 Environmental

The radio equipment will be installed in typical communications shelters and locations. All the buildings will contain substantial amounts of communications equipment and will be designed for expansion beyond the upgraded radio system. The Vendor shall provide equipment that is designed to fully operate without degraded performance in the communications buildings under normal operating and failure conditions that exist such as power or HVAC failure, as defined below.

13.5.1 Non-Dispatch Locations

All outside RF equipment shall be designed to operate continuous duty with a temperature range of -22º F to +110º F with a non-condensing humidity level of 95%.

All inside equipment shall be designed to operate continuous duty with a temperature range of 32º F to +113º F with a non-condensing humidity level of 95%.

Equipment shall be properly designed and shielded to prevent any degraded operation in high RF environments associated with communications facilities.

13.5.2 Dispatch Locations

All equipment shall remain operational at room temperatures of 40°F to 95°F. in a range of 20% to 80% relative humidity, non-condensing.

All equipment shall be storable in a range of 32°F to 120°F in a range of 10% to 90% relative humidity, non-condensing.

13.5.3 Plenum Rating

All wiring and/or cables installed above ceilings or under floors shall be plenum rated.

13.5.4 Electrical Equipment

Equipment shall meet all the requirements, e.g., function normally in the presence of, or after subjection to, those electrical environmental conditions or stresses that are designated as normal. The equipment shall be protected and isolated from transients, surges, sags, noise, brownouts, harmonic distortion, induction, power line faults, etc.

13.5.5 Static Discharge

Electronics shall withstand electrostatic discharge (ESD) potentials of up to 8,000 volts from a human body on any exposed surface with no effect on normal operation.

13.5.6 Audible Noise Emission

Equipment noise emission shall not subject any personnel to sound levels greater than those allowed in Occupational Safety and Health Acts (OSHA) regulation 1910.95, considering exposure time and place of installation. It is desirable that the noise level of the equipment is limited to 50 dB continuously, or 75 dBA intermittently (less than a 10 percent duty cycle), at normal distances as measured on the “A” scale of a standard sound level meter at slow response.

13.6 Grounding

13.6.1 Site Grounding

The County has provided electrical grounding and lightning grounding at the communications sites. The Vendor will be responsible for completing an audit and recommendations when requested by the County for providing the grounding beyond the County-supplied grounding required for safety and proper operation/protection of the Vendor-supplied equipment.

13.6.2 Equipment Grounding

The Vendor shall provide detailed specifications for the grounding of its equipment to safeguard personnel from electrical shock hazard, to prevent equipment damage and service interruption, and to

provide a reliable zero voltage reference for equipment operation. Each frame/chassis ground shall be electrically isolated from the common equipment to eliminate ground loops due to ground potential differences.

13.6.3 Power Line, Data, and Control Surge Devices

Power line transient and surge protection shall be provided for any common electronics equipment and each operator position in the system. The minimum discharge current rating for each line surge protector shall be 10,000 amperes. Describe protection system and specifications.

Transient and surge protection shall be provided for each radio tie line (RTL) in the system, having a minimum discharge current rating of 5,000 amperes. Describe protection system and specifications.

When data, signal and/or telecommunications connections are made using copper conductors, it is required that TVSS devices shall be used on these lines to provide the appropriate level of protection. Even when gas tube or carbon-block primary protectors exist, secondary TVSS protection shall be provided.

13.7 Power Requirements

13.7.1 Commercial and Backup Generator Power

All the County sites will operate with commercial power under normal conditions. However, all sites will have backup generators that will provide backup power to the sites. The Vendor shall provide the appropriate power conditioning to ensure protection to the equipment during conditions that might occur with the transfer of power between commercial and generator power. All equipment shall run from 120/208-volt, 60 Hz AC power directly or via a battery powered system which shall run from 120/208-volt, 60 Hz AC power.

The Vendor shall state the power requirements of each rack of equipment, as well as the total power requirements of the site.

13.7.2 DC or UPS Backup Power

The Vendor shall supply all equipment (including but not limited to site controllers, audio routing equipment, system management, base stations, repeaters, and transmission equipment) with a minimum of 4 hours of backup power either via 48-volt DC power, AC inverter, or UPS at all sites. The Vendor shall provide preferred voltage levels and the preferred method to provide backup power. Break out the equipment by the type and voltage level of the power required. Describe how the system will be powered and the source of backup power that will be used.

When considering backup calculations, all RF equipment should be calculated to be operating at 75% duty cycle at maximum licensable repeater power. In addition, other equipment items essential to proper operation, such as tower-top and receiver multi-couplers shall have backup power provided. The backup 48-volt DC option assumes the RF equipment is operating from DC power under normal conditions. The County desires N+1 redundancy in the power system. The Vendor shall describe how the redundant power system protects against single device failures.

For the communications center, the Vendor shall check compatibility with any existing UPS equipment and check for load sizing. Vendor shall make recommendations about the use of existing UPS equipment and propose additional or replacement equipment as necessary. Vendor shall state UPS power requirements of any common electronics, and each console position.

The Vendor shall provide specifications sheets for all equipment provided.

13.8 Software Requirements

13.8.1 GUI Interface

All man-machine interfaces shall use graphical user interfaces (GUI).

13.8.2 Configuration Files

All configuration information shall be exportable to a file that may be stored to an independent location. The exportable file shall be directly importable via the GUI interface in a defined and documented process.

13.8.3 Report Files

All reports including but not limited to system administration reports and system activity reports shall be exportable in an Excel file format or a defined delimited file that can be imported without modification to an Excel file.

13.8.4 Backup Data

The system shall have the ability to collect and backup at least three months of activity data generated by the system. The system shall notify the system manager when the data reaches at least 80% of the capacity and shall continue to notify the system manager until the data capacity issue is acknowledged. If the issue is not resolved within 48 hours after the acknowledgement, the system shall send another warning to the system manager.

13.8.5 System Security

The system shall provide a mechanism to prevent outside contamination, along with descriptions of the system protections. The system shall be hardened to protect against outside software breaches and against failure due to software issues such as viruses, worms, and other forms of destructive interaction with outside software elements.

13.9 Labeling

All infrastructure items comprising the system shall be labeled with a non-removable label that is water and fade resistant. The label shall indicate the name of the piece of equipment, and the operating frequency if the equipment is frequency specific. The labeling shall be consistent with both the functional system drawing and the rack layout.

Note to vendor: the County will label subscriber units; no labeling is required by the vendor for subscriber units.

14 Interface Requirements

14.1 Legacy Radio Frequency Equipment

The County currently has numerous legacy frequencies and associated RF equipment that will be upgraded through this radio project (listed in Appendix A). There will be potentially numerous conventional simplex and/or repeated base stations, receivers, and interoperability channels.

Describe how the legacy equipment listed in Appendix A will be integrated into the radio system and/or console system and maintain its functional capability.

Describe the expansion capabilities of the system to provide additional interfaces for conventional stations.

Describe any legacy signaling such as MDC or G-Star signaling that can be supported in the system and provide the signaling to other subscribers and consoles operating on the system.

14.2 Microwave System Site Interface

The Vendor shall provide the ability to interface with a microwave system with Ethernet interfaces and MPLS routers. The demarcation for the radio system to the microwave system shall be the Ethernet port on the microwave radio.

Describe the demarcation, signaling and channels requirement required for each site. Describe how to determine the size of the bandwidth required as related to trunked channels and conventional channels.

15 System Management

15.1 General

The County shall manage system and subscriber resources from a central location. The County will locate system manager at the Primary Dispatch Center as defined in Appendix D. The system shall have the ability to have two additional remotely located system manager terminals. There will be potentially a total of three system manager terminals.

All system managers must have the ability to operate simultaneously. All hardware, software, licenses, and equipment required to simultaneously run the system management terminals shall be included.

Describe how security management shall control access to system resources so that information cannot be obtained without authorization by limiting access to system resources providing notification of security breaches and attempts.

The system shall provide a mechanism to prevent outside contamination of the system, along with descriptions of the system protections. The system shall be hardened to protect against outside software breaches and against failure due to software issues such as cyber-attacks, viruses, worms, and other forms of destructive interaction with outside software elements.

Describe how the management of the system can be partitioned by components and by functionality. Include the total number of managers that can be set up on the system and that can operate simultaneously.

Describe the required connectivity for a remotely located system manager terminal.

Describe the type of software used to interface the system manager functions and the ability to interface, import, and export information.

Describe the expansion capability of the number of system manager's terminals.

Describe the amount of storage capacity for the various management functions and how that relates to the amount of data that can be collected prior to removing/backing up information.

15.2 Fault Management

Fault management shall provide facilities that allow system managers to discover faults in managed devices, the system and system operation, to determine their cause and to take remedial action. To enable this, fault management provides mechanisms to report the occurrence of faults, log reports, perform diagnostic tests and correct faults (possibly automatically). The Vendor is responsible for installing and testing all alarms to ensure that all elements that can have an operational impact on the system are alarmed as part of the system.

The County will provide demarcated alarms points for the shelter, generator, tower and potentially microwave alarms. There will be as many as 40 external non-radio system alarms per site. The Vendor is responsible for interconnecting these other alarms including cabling and demarcation. The vendor supplied equipment shall be capable of handling at least 32 discrete i/o alarms and8 analog alarms.

Describe the fault management system that is used by the LMR and Microwave system. The description should include the capabilities to monitor alarms noting specific system and site component alarms as well as the notification mechanism used by the system for alarm notifications.

15.2.1 Alarms

All alarms that use dry contact closures into the radio system alarms must provide a clear and identifiable demarcation. All alarm outputs generated by this equipment are to be extended by the Vendor to Type 66 punch blocks located in the shelter for alarm terminations. These activations are caused by the closure of normally open dry contacts. Such terminations are to be clearly identified at each end with identification codes approved by the County.

The alarms shall include at a minimum the alarms found in table 4. A list of county-supplied alarms is found in table 5.

TABLE 4 - RADIO SYSTEM ALARMS

System Equipment Alarms	Radio Equipment Alarms	Dispatch Center Alarms	Microwave System Alarms
Component/Controller/ Computer Major Alarms	Low Forward Power	Component/Controller/ Computer Major Alarms	Microwave Major Alarm
Component/Controller/ Computer Minor Alarms	High Reflected Power	Component/Controller/ Computer Minor Alarms	Microwave Minor Alarm
Power Failure Alarm	Tower Top Receiver Pre-Amp Failure	Power Failure Alarm	Router Major Alarm
Connectivity Failure	interference on Voice Channel	Connectivity Failure	Router Minor Alarm
Timing Device/Clock Alarm	TX/RX Failure	Surge Protection Alarm	Rectifier Major Alarm
Surge Protection Alarm	TX/RX Disabled	UPS/Battery Power Systems	Rectifier Minor Alarm
UPS/Battery Power Systems	Component/Controller/ Computer Major Alarm	Low Battery Voltage	
Low Battery Voltage	Component/Controller/ Computer Minor Alarm	High Battery Voltage	
High Battery Voltage	Power Failure Alarm	Automatic Bypass Operation	
Automatic Bypass Operation	Connectivity Failure	Emergency Operation (UPS on Battery)	
Emergency Operation (UPS on Battery)	Surge Protection Alarm	Rectifier/Inverter Failure	
Rectifier/Inverter Failure	UPS/Battery Power Systems		
	Low Battery Voltage		
	High Battery Voltage		
	Automatic Bypass Operation		
	Emergency Operations (UPS on Battery)		
	Rectifier/Inverter Failure		

TABLE 5 - POTENTIAL NON-RADIO SYSTEM ALARMS

Generator Alarms	Building/Tower Alarms
Generator - Automatic Position	Door Alarm
Generator Running	Fire/Smoke Detector
Generator Fail	High Temperature Alarm
Generator - Minor Alarm	Low Temperature Alarm
Generator - Major Alarm	Loss of Utility Power
Fuel - Low Fuel / Fuel Level	Tower Light Failure
Surge Protection Alarm	Surge Protection Alarm

15.3 Configuration Management

Configuration management is the means to monitor system configuration and subscriber information so that the effects of specific hardware and software can be managed and tracked. It may provide the ability to initialize, reconfigure, operate, and shut down managed system components and subscriber equipment.

The vendor shall provide an overall description of the configuration management capabilities of the system and subscribers and describe the method the configuration information is stored.

The vendor shall provide a list of all manageable items within the system manager and the items that are configurable and controlled (actions that are activated for a special condition) for each of the items.

15.4 Performance Management

Performance management measures various aspects of system and subscriber performance including the gathering and analysis of statistical data about the system so that it may be maintained at an acceptable level. Performance management provides the ability to obtain the utilization and error rates of system devices and provide a consistent level of performance by ensuring that devices have a sufficient capacity.

The vendor shall provide a list of available reports and how those reports can be exported for post processing or are used by the system to pre-identify problem areas.

16 Project Management

Strong project management is the key to the successful deployment of the proposed radio system. Vendor shall submit its proposal to include a detailed description of the project management approach that will be applied to the project.

Project staffing shall be managed by the selected Vendor based on workload and the level of effort throughout the implementation / installation process; however, the vendor positions identified below shall be staffed throughout the duration of the project and shall not be changed without prior approval of the County.

16.1 Project Director

The County will appoint a project director (“County Project Director”). The County Project Director shall have the authority to make all project decision on behalf of the County in accordance with the contract.

This shall include intervening into and resolving disputes between companies, persons, contractors, installers, and any other individuals which have a bearing on this contract, make determinations in the best interest of the County, and issue instructions.

The County Project Director may name other persons to assist him/her and assign such levels of authority, as he or she deems appropriate. Notice of such assignments shall be given to the Vendor, in writing, prior to the assignments becoming effective.

16.2 Project Manager

The Vendor shall appoint a project manager subject to the approval of the County ("Vendor Project Manager"). The County reserves the right to direct the Vendor to replace the Vendor Project Manager at any time without disclosing a specific reason.

The Vendor Project Manager shall serve as foreman or supervisor of the Vendor's work related to this project.

The Vendor Project Manager shall be the County's single point of contact with the Vendor for the resolution of all problems and obtaining related information. As such the Vendor Project Manager or his/her designee must be immediately available at a location in the County any time his/her personnel, including sub-contractors, are performing any work on the project.

The Vendor Project Manager shall be named at the time of execution of the contract resulting from this solicitation. The Vendor Project Manager shall be identified by name and his or her business address and telephone number(s) identified in the contract resulting from this solicitation. No work may be started until this requirement is satisfied.

16.3 Project Engineer

The Vendor's Project Engineer shall have the primary responsibility for managing the system design and ensuring that the system is installed in accordance with the approved system design. The Vendor's Project Engineer shall also be the technical point of contact for any technical questions that arise during the project.

Any deviation from the system design shall be subject to project change control procedures and will not be undertaken until approved by the County.

The Vendor's Project Engineer shall ensure the development of block diagrams, system level diagrams and rack diagrams to assist the installation team in completing the system installation.

The Vendor's Project Engineer shall also supervise the development and execution of the Acceptance Test Plan, the Coverage Acceptance Test Plan and guide the project team through the processes and

procedures necessary to prove that the system performs as specified in the contract. No test plan will be executed until approved by the County.

16.4 Project Plan

Vendor shall draft and utilize a project plan that is based on the statement of work and contract for the proposed radio system. The project plan shall include a work breakdown structure that aligns with the project approach described in the Implementation Section (Section 18 of the General Requirements) of this RFP. The project plan shall describe, in detail, the approach to be followed for the successful execution of the project.

16.5 Project Schedule

The Vendor shall provide a Project schedule in Microsoft Project mpp format. Vendor shall draft and provide a project schedule that aligns with the work breakdown structure utilized in the project plan, and the project approach described in Implementation Section of this RFP.

The Vendor shall develop and maintain a project schedule including tasks, milestones, start and end dates, task prerequisites, and task owners based on an approved WBS.

The project schedule shall include, at a minimum, the following components:

- WBS Numbering scheme
- Tasks to be completed
- Duration of each task
- Start date and completion date for each task
- Predecessors for each task
- Key project milestones

The Vendor shall provide the updated schedule as an agenda item for all project status meetings between the County and the Vendor.

16.6 Project Status Meetings

Project status meetings shall be scheduled by the Vendor's Project Manager at increments no less often than monthly; provided that the County reserves the right to adjust the frequency of such meetings as it deems necessary and prudent.

Vendor shall describe how these meetings will be conducted, agenda items to be addressed, and the method of capturing, and distributing meeting minutes. A meeting agenda shall be provided to the

Project Team with reasonable and sufficient time prior to the scheduled meeting, agreed upon by the County for review.

A project kickoff meeting shall be scheduled prior to the beginning of the project. Periodic project status meetings shall be scheduled following contract award and the initial kickoff meeting.

The Vendor shall be responsible for scheduling the meetings as well as preparing meeting agendas and minutes. The meeting agenda items shall include, as a minimum, the following items:

- Schedule review
- Status of deliverables
- Risk items
- Changes
- Plans for the next period
- Action item assignments
- Punch list review

16.7 Change Management

Vendor shall describe how changes to the project scope, duration, and/or cost will be managed.

16.8 Risk Management

Vendor shall propose the method of identifying and managing risks to the project

16.9 Project Issues List

A list of project issues shall be kept and managed by the Vendor's Project Manager. The project issues list shall be reviewed and updated during project status meetings. The project issued list shall include, at minimum:

- Date issue was identified
- Description of issue
- Due date
- Ball in court (who owns the issue)
- Summary of progress, obstacles
- Status (open, closed, on hold, etc.)

16.10 QA / QC Program

The Vendor shall include a Quality Assurance / Quality Control (QA/QC) plan for the project. The QA/QC plan shall be submitted for review during preliminary design as described in this section. The plan shall address all stages of the project, including, but not limited to:

- Procurement
- System design
- Installation
- Implementation
- Testing
- Cutover

The QA/QC plan shall specifically describe the plans and procedures that ensure the proposed system is designed in accordance with the standards and requirements described in this RFP.

The QA/QC plan shall be included as part of the Project Plan developed by the Vendor Project Manager. The QA/QC plan shall be an integral part of the project and include County personnel as part of the review and approval process for all deliverables and submittals and will address the following tasks at a minimum:

- Design analysis and verification
- RF coverage analysis and verification
- Design changes and document control
- Material shipping, receiving and storage
- Site preparation (if required)
- Field installation and inspection
- Equipment inventory and tracking
- System testing and validation
- Software regression testing
- Deficiency reporting and correction
- Implementation and cutover
- Training and certification

17 Installation

17.1 General Requirements

All installation work shall be performed in accordance with all applicable laws, rules, and regulations, including, but not limited to the laws, rules and regulations of the U.S. Department of Labor, the State of New York and Chenango County, New York. The Vendor will provide all the necessary personnel, tools, equipment, supplies and other expenses to provide for the design, installation, training, and optimization of the system defined.

17.2 Site Management

The Vendor shall be responsible for removing and disposing of any debris from his/her work at the end of each day. No materials may be stored, discarded, or dumped in any manner contrary to any local, state, or federal laws, rules, or regulations, nor in any way not approved by the County Project Director. No contractor, may at any time, do anything that could be deemed or construed to be pollution of the environment or damage to any right of way.

If the Vendor, its sub-contractors, or other Vendors engaged by the Vendor fail to clean and maintain any work areas in a manner acceptable to the County, the County Project Director will, after one written warning delivered to the Vendor's Project Manager, have an outside contractor clean any or all the Vendor's work areas. Costs for such services will be paid out of funds set aside for the Vendor and any balance due the Vendor will be reduced by the amount paid for said cleanup.

All damage to any property shall be reported by the Vendor to the property owner and to the County Project Director. All repairs of such damage shall be made immediately by the Vendor at the Vendor's sole cost and expense. Such repairs shall be done in a manner suitable and acceptable to the property owner and the County Project Director.

Where more than one contractor is working at the same time, each shall be responsible for cleaning up his/her own scrap and debris. Cooperation between contractors is required to assure the intent of this section is fully complied with.

If those working concurrently at a site are unable to resolve any differences concerning clean-up chores in an amicable manner, the County Project Director or his representative shall survey the situation, decide of the most prudent resolution and issue instructions binding on all parties involved.

17.3 Coordination of Work

It is possible several contractors, sub-contractors, County personnel, other workers, other contractors, or any combination of these could be scheduled to work concurrently at the same location. It is also possible representatives of different companies may have to work together to accomplish the various requirements established by this specification.

Where either of the above conditions occurs, the contractors shall meet or otherwise communicate ahead of time to schedule the work and coordinate their activities to reduce the possibility of interfering with each other.

If conflicts develop that cannot be resolved by mutual agreement, the County Project Director shall intervene, decide in the best interest of the County and issue instructions that shall be binding on all parties.

17.4 Delivery and Storage of Materials and Equipment

The Vendor needs to provide a secure area to receive equipment which location shall be within 60 minutes driving time to the Public Safety Building in Norwich, NY. The County must have access to the area during normal business hours for inventory and inspection or at other times if prearranged in advance.

The Vendor shall make all arrangements to deliver material and equipment from the secure area to the site where it will be installed and made operable. Title (i.e., risk of loss or damage) to such materials and equipment will remain with the Vendor until it is at the final site install location and determined to be correct and in acceptable condition with no apparent damage.

Delivery and initial inspections shall be in accordance with time frames and schedules agreed to between the Vendor and the County and shown in the timeline chart filed as part of the specification submission.

The Vendor agrees that if County employees or agents acknowledge delivery or receipt of equipment shipped in accordance with this contract they do so, on behalf of the Vendor. Notwithstanding the foregoing, if the Vendor wants County personnel to accept deliveries on its behalf, then the Vendor must establish a written agreement with the County for this purpose.

Liability for any damage or insurance claims resulting from the shipping or receipt of such goods shall be that of the Vendor, not of the County or its representatives. If no agreement is established between the Vendor and County for County personnel to act on its behalf, the Vendor must schedule deliveries of equipment so that an employee of that Vendor is present to receive said equipment.

It is the Vendor's responsibility to document each piece of equipment delivered and to have delivery receipts signed by the County Project Director or his authorized representative and to provide originals

of said receipts to the County for the purpose of verifying said deliveries. If no delivery receipt is available, it is the Vendor's responsibility to create a delivery receipt.

17.5 System Installation

The system shall be installed in accordance with the procedures outlined in this specification and finalized via documentation prepared by the Vendor and approved by the County. Any deviations from the plan must be approved in writing by the County.

The Vendor must install all the equipment it provides, doing the work in a manner acceptable to the County. To meet this requirement, the Vendor shall review the planned methods with the County Project Director before proceeding with any work and receive the director's approval first.

If a Vendor proceeds without prior approval, it shall do so at its own risk. If that work is deemed unacceptable when inspected, the Vendor shall be required to make such revisions, changes, or re-installations, including repairs to buildings and vehicles, as directed by the County Project Director. Such revisions, changes, re-installations, and repairs shall be entirely at the expense of the Vendor.

The Vendor shall always prosecute the work with a force of adequately skilled and experienced persons in numbers sufficient to ensure completion of the work within the time set forth in the approved project plan. At all times the Vendor will enforce strict discipline and good order among its employees and shall not employ or rely on the work any unfit person or anyone not skilled in the work assigned to him or her.

All installation work shall be accomplished without any interruption of the present operational capabilities of the County communications systems unless satisfactory arrangements to the contrary have been made with and been approved by the County Project Director.

17.6 Completion of Work

The whole of this project is anticipated to be completed within 32 months from the date on which the last signatory to the contract awarded hereunder executes the contract. As a result of this agreement, the County will commit to schedules and policies with other contractors and system users. The County will be held harmless against any liquidated damages resulting from unforeseen project delays or scheduling changes and work with the vendor to reach agreeable terms.

17.7 Environmental Concerns and Requirements

Some sites may be located on property not owned by the County. Vendor acknowledges that regardless of site ownership, all environmental issues addressed herein, and the related requirements apply to every site.

Any violation of the environmental conditions stated herein or of any laws or rules of any agency or government is the sole responsibility of the Vendor. Any environmental issues arising at any site shall be brought to the attention of the County's Project Director.

18 Implementation

18.1 Timeline

The system will be contracted in January of 2023 and implemented in phases over an anticipated duration of 32 months. The Vendor's proposed project schedule should reflect the desired timeline. If the Vendor proposes a different project timeline, it must indicate the reason for such a suggestion.

The Vendor shall implement the system in phases after staging the equipment at the Vendor's location. The County plans to fund and implement each of three major components independently and in phases and to test and accept each component at the completion of their last phase.

Microwave Component - Initially, the microwave backhaul system will be implemented in two phases which include staging (Microwave Phase 1) and field installation (Microwave Phase 2).

Radio Infrastructure Component - Following acceptance of the microwave backhaul system, the radio system will be implemented in five phases. Radio System Phase 1 includes the staging and testing of the RF equipment to include the simulcast system, paging solution and consoles. Radio System Phase 2 includes the installation of the console and associated equipment. Radio System Phase 3 will include the installation of all the RF equipment and optimization of the simulcast systems. During Radio System Phase 4, the system will be tested, loaded with a quantity of subscriber units, and following an error free burn in period agreed on by both The County and The Vendor, System and Coverage acceptance testing will be completed. Final acceptance and start of warranty will follow Phase 4.

Subscriber Component - Subscriber Unit Phase 1 will involve the procurement, provisioning, and deployment of subscriber units.

18.2 Change Orders

As with all projects of this size and complexity, there will be changes to the original scope of work. An important part of managing a project is to prevent, track and document changes. The proposal must include the procedures to minimize or stop "scope creep," identify potential problems that can change the schedule or project cost, and track and record changes that are agreed upon by the County and the Vendor. The Vendor will include with the proposal a sample change control document, subject to the review and written approval of the County prior to contract award.

18.3 Live System Outages

Due to the fact the installation will require integration of the current operational system; the Vendor shall take steps to minimize outages to the currently operational system. In addition, the Vendor shall notify the Vendor Project Manager in writing when a system outage is going to occur and the nature of that outage.

18.4 Cutover Plan

The Vendor will include a high-level plan to transition from the existing systems to the new system and the steps required to complete the cutover. During transition, an agency must have minimal and deterministic outages to communications on the existing system. The Vendor must make provision for the temporary use of loaner radios, gateways, RF patches, timing, training and/or any other method to minimize disruptions to operations at the sole cost and expense of the Vendor.

A detailed, final transition and cutover plan will be required from the Vendor sixty (60) calendar days prior to cutover. The cutover plan must also include an exit plan to transition back to the old system if there is a problem during the cutover phase. There shall be a well-defined decision point for the subscriber agencies to determine if the agency and the system are ready for cutover.

18.5 Project Approach

The following is the proposed project approach. The Vendor shall describe how it will meet this approach or make modifications for an alternate approach. The Vendor must provide justification for any change in the approach. Describe and recommend alterations to the approach that will meet the objective of testing a portion of the system before installing most of the system to ensure the system operates as specified in the Vendor's information. This project approach must align with the project plan and project schedule.

18.5.1 Pre-Contract

- Issue Intent to Award/Negotiate
- System Work Design Review
- Contract Finalized and Signed
- Detailed Design Review with Modifications/Finalizing to Specification Response including System Design, Pricing and ATP

18.5.2 Microwave System Phase 1 - Staging

- Stagging of the microwave system
- Testing of the microwave system

- FATP – Complete

18.5.3 Microwave System Phase 2 – Field Installation Microwave

- Microwave – Implementation of the complete microwave system
- Testing
- SATP – Complete system testing
- Training – System manager

18.5.4 Radio System Phase 1 – Staging of Radio and Console Equipment

- Staging of Radio and Console Equipment
- Testing of the Radio System and Console Equipment
- FATP - Complete

18.5.5 Radio System Phase 2 - Field Installation Console

- Console – The integration of all consoles at the Primary Dispatch Center and Backup Dispatch Center.
- Testing
- SATP – Complete system testing of console equipment
- Training -

18.5.6 Radio System Phase 3 - Field Installation RF System

- System – Implementation of the complete RF system
- Testing
- Training – System manager

18.5.7 Radio System Phase 4 - Subscriber Testing / System Burn in Period

- Testing
- System burn in /live testing
- SATP – Complete
- CATP – Complete
- Final acceptance

18.5.8 Subscriber Unit Phase – Subscriber Deployment

- Procurement and provisioning of subscriber units
- Training – Subscriber Train-the-Trainer
- Subscriber Radio Deployment

19 Testing

The Vendor shall propose system testing for the complete System Acceptance Test Plan (SATP) and Coverage Acceptance Test (CATP). The CATP shall be in accordance with the requirements of Appendix C. The testing shall verify that all components of the system operate as described in the specification. The Vendor shall provide all test equipment required for the ATPs, and all such test equipment must be in current calibration with appropriate calibration records.

The SATP and CATP shall include the procedures to be followed, the equipment to be used, and the pass/fail criteria to be utilized to verify system performance. At the time of execution of the contract resulting from this solicitation, a final acceptance test plan shall be submitted for review, and additions and/or deletions and approval shall be done during the detailed design review and prior to signing the contract.

Within thirty (30) calendar days of successful completion of all the areas of testing within a phase of testing, the Vendor shall provide the County with a complete set of test documentation, including the testing procedures utilized, test results, testing dates, testing locations, project participants, weather conditions, a description of testing irregularities or problems encountered, and retest results and details of any corrective action. Any punch-listed items that have not been resolved within the 30-day window shall be listed along with the proposed resolution and timeframe for completion.

The County Project Director will certify and accept the whole of the work when all the components have been installed, are performing in a satisfactory manner for thirty (30) calendar days at the system level, the job is approved as meeting specifications, and all documentation has been provided and approved as specified.

Portions of the system may be accepted at different times at the discretion of the County Project Director at the recommendation of the consulting assistants.

Three (3) complete printed sets of the test documentation shall be provided in three-ring binders along with three (3) complete sets in electronic format (Adobe PDF) on a digital media device.

19.1 System Acceptance Test Plan

The Vendor shall provide a complete, thorough System Acceptance Test Plan (SATP) with its proposal.

19.1.1 Areas of Testing

The testing will be broken down into the following areas. The Vendor shall propose how the following areas shall be tested to ensure the system is operating properly. The Vendor shall provide a complete

Acceptance Test Plan – Test List and a sample of procedure of a test from each area. The SATP – Test List will work as the guideline of requested tests for the various phases of the process.

19.1.1.1 Physical

Reviewing all installation of the equipment to ensure it meets the requirements of how the work and equipment shall be installed.

19.1.1.2 Functional

Testing of all the normal operating features and functions of the system as described in this specification.

19.1.1.3 Fault

Testing of the response to fault conditions by the system to ensure expected reactions to condition.

19.1.1.4 Stress

Testing the response of the system at near capacity levels to ensure expected reactions to condition.

19.1.1.5 Coverage

Testing the RF coverage to ensure the guaranteed coverage level and audio quality conditions are met.

19.1.2 Testing Process

During each phase of the project, the testing shall occur in the following sequence:

1) Physical
2) Functional
3) Fault
4) Stress

The testing will progress to the next area of testing until the current area of testing is completed and signed off on by the County Project Director.

The goal of these areas of testing is to ensure the system is working as defined by this specification. In cases in which definition is not provided, the system is expected to operate in a manner that meets or exceeds industry standards for traditional public-safety operation. The system will be tested against the agreed upon System Acceptance Test Plan (SATP) The test will be considered pass if the system operates as published in the SATP. If the test does not operate as published in the SATP the test will be considered failed. In its sole and absolute discretion, the County will have the ability allow a test to pass that has failed but operates in an acceptable manner. If a test fails, and the County elects to temporarily pass the otherwise failed test, the Vendor shall have thirty (30) calendar days to correct the issue and successfully retest the previously failed test. At the County's discretion, the testing may either proceed to the next area or stop until the issues are corrected. Any punch-listed items that have not been resolved within the 30-day window shall be listed along with the proposed resolution and time frame for completion. The system will not pass final acceptance with failed items not completed. At the County's discretion, the system may pass final acceptance with failed items remaining.

19.2 Coverage Acceptance Test Plan

Coverage testing will be completed only with full foliage on deciduous trees Between June 1 and August 31. The Vendor shall provide a complete Coverage Acceptance Test Plan (CATP) that is in accordance with Appendix C requirements with the proposal.

19.3 Staging

The Vendor shall provide for a staging area at the Vendor's location to facilitate system assembly and testing. The staging area shall be in a secured facility specifically designed for the staging of large-scale public-safety radio communication systems and equipment in a climate- and RF-controlled environment.

Representatives from the County will attend and participate in the staging event. The Vendor will assemble and stage the system. The County and Vendor will arrange a mutually agreeable time for the testing event. The Vendor shall provide transportation, lodging and meals for two (2) County representatives to attend staging testing.

The system staging testing process shall simulate as closely as possible the final configuration of the system. The system layout within the staging area shall, to the extent possible, be laid out geographically as it will be in the field. For example, northwest sites in the County shall be in the northwest corner of the staging area. This will permit the County's representatives to become familiar with the system layout and facilitate testing the appropriate system features while on-site.

When the County has arrived at the staging facility, the first on-site activity of staging will be for the Vendor to provide a presentation describing the staging event and schedule. The presentation will identify what equipment has been staged, and how the testing will occur. The County and the Vendor will then proceed through all the testing in the FATP.

19.4 Field Tests

The Vendor shall facilitate system testing after installation is complete. All tests will be completed with the equipment in the final location. Representatives from the County will attend and participate in all the ATP. The County and Vendor will arrange a mutually agreeable time for the testing event. The system testing process will be with the equipment in the final configuration of the system. The Vendor is to provide a presentation describing the staging event and schedule. The presentation will identify what equipment and functionality is included in the testing and how the testing will occur. The County and the Vendor will then proceed through all the testing in the ATP.

19.5 Acceptance Testing of Subscriber Units

Acceptance testing for mobile radios shall consist of:

- Delivery of required documentation
- Verification of satisfactory installation and operation in the vehicle.
- Verification of performance including operation in accordance with programming templates and ERP levels.

Acceptance testing for portable radios shall consist of:

- Delivery of required documentation
- Verification of performance including operation in accordance with programming templates.
- Verification of delivery of companion chargers and spare batteries.

20 Training

20.1 Overview

The Vendor shall provide the County with comprehensive training on the radio system. Successful training is an important factor in implementing a successful system. All materials used in the training — written material, computer files, and audio/visual material used for training will be furnished to the County to be used solely for training of people operating on the County's system. This shall also include an option for on-line refresher training.

20.2 System Manager Training

The Vendor shall provide an optional comprehensive course that provides training for County designated staff to understand and utilize the radio system features and functions, fault components, resolution and reporting capabilities of all system components and subscribers. The course goal shall be to train system managers to a level to maintain, operate and monitor the system operations. The system manager training shall be divided into two aspects of training. A complete course that includes a full system manager training course must be provided after Radio System Phase 3 is completed. There will be up to two (2) participants in the system manager training course. The Vendor shall describe in detail the course provided to obtain the system manager level training. The description must include a brief outline of the course, duration of the course and the preferred number of participants in each course.

20.3 Console Administrator Training

The Vendor shall provide an optional comprehensive course that provides training for a person to understand and utilize the console system features and functions, fault components, and resolution and reporting capabilities of the console components. The course goal shall be to train console managers to a level to maintain, operate and monitor the console operations. There will be up to **two (2)** participants in the console managers training course. The Vendor shall describe in detail the course provided to obtain the console manager level training. The description must include a brief outline of the course, duration of the course and the preferred number of participants in each course.

20.4 Console Operator Training

The Vendor shall provide a comprehensive course that provides the training required to operate the consoles. The training must provide a comprehensive overview of how to operate the console with significant hands-on time to allow the operator to become familiar with the console and the County's console configuration of the console. All course work must be completed on site utilizing County equipment. There will be up to twenty (20) participants in the console operators training course. The Vendor shall describe in detail the course provided to obtain the console operator level training. The description must include a brief outline of the course, duration of the course and the preferred number of participants in each course.

The Vendor shall provide the option of a comprehensive course that provides the training required to train people to operate the consoles (Train – the- trainer course).

20.5 Subscriber Operator Train the Trainer

The Vendor shall provide a comprehensive course that provides the training required to train people to operate the subscriber equipment. The training shall provide a comprehensive overview of how to operate the subscriber equipment with significant hands-on time to allow the operator to become familiar with the console and the County's subscriber configuration. The subscriber operators training shall be completed in one day. All course work shall be completed on site utilizing County equipment. The Vendor shall describe in detail the course provided to obtain the subscriber operators level training. The description shall include a brief outline of the course, duration of the course and the preferred number of participants in each course.

21 Warranty

21.1 Overview

The County plans to operate the new radio system for the next fifteen (15) years from the date of acceptance. The County's goal is to manage the system, but have the Vendor provide warranty, preventive maintenance, services, repairs, and possibly component upgrades to allow the system to reliably provide the operational features and functions over the life of the system. The County has not historically been a "self-maintained" radio facility. It is expected that this will continue to be the case.

21.2 Warranty Timeline

The Vendor shall own the equipment and take full responsibility for insuring the equipment until final acceptance of the system by the County. Only after final acceptance of the system by the County shall the warranty commence on any of the equipment.

21.3 Equipment Covered

The Vendor shall warranty and maintain all the equipment provided by the Vendor in this specification and observe conditions of other items such as buildings. The equipment shall include but not be limited to system infrastructure (including but not limited to system controller, site controllers and remote site controllers, base repeaters, antenna systems, control stations and communications center equipment, voting receiver equipment, microwave equipment, dispatch console systems, and simulcast control and optimization equipment), mobiles, portable, desktop radios and control stations.

Maintenance, warranty, and upgrade proposals shall clearly identify those items covered under the agreement, and clearly delineate items that are not included or conditions that will invalidate any of the agreements. Items not specifically listed as being excluded shall be covered by default.

21.4 Warranty Conditions

The Vendor will maintain the radio system, antenna systems, consoles and other components provided or installed under this contract in like new operating condition over the life of this warranty period.

21.5 Warranty Period

The Vendor shall explain its warranty service and the period thereof for each covered unit.

21.6 New Equipment Only

The Vendor shall warrant to the County that the equipment to be delivered shall be new, not remanufactured, and that it shall conform to these requirements and be free from defects in materials and workmanship. The Vendor shall warrant capable of satisfactory performance under the County's operating conditions at specified equipment rating and capacity and conformance with this specification, the Vendor response to this specification, or the Vendor's published specifications, whichever is most stringent.

21.7 Schedule and Corrective Maintenance

Warranty scheduled and corrective maintenance shall be provided to the same level as the proposed scheduled and corrective maintenance for ongoing maintenance during the non-warranty period. The Vendor shall maintain the required stock of spare parts in local inventory located within two (2) hours driving distance of the Public Safety Building, located in Norwich and must establish a maintenance staff to ensure the response times during the warranty period are the same as those for additional years during the non-warranty maintenance periods. The Vendor shall supply all equipment and systems at no cost to the County for parts, software costs, labor, and associated maintenance charges for a period of three years from the date of final system acceptance. The Vendor shall be responsible for any shipping costs incurred to send components or equipment to manufacturers for repair or replacement.

21.8 Lemon Rule

If during the Warranty period equipment is found not to meet the warranty specified including repeated failures of the same components or units and nonconformance with the specification, the Vendor shall

correct any defect or replace any unit that exhibits more than three (3) instances of failure. If the repeated failures are the result of a design defect, the Vendor shall replace all involved equipment.

21.9 Software and Hardware Extended Warranty

The Vendor shall also separately include optional pricing for software extended warranty and upgrades for the years 3 thru 10. This will include all required bug fixes, any operating systems changes, and software upgrades to include subscriber unit programming software, revisions, and enhancements. Separate line-item pricing shall be provided for the radio system, and the consoles.

The Vendor shall also provide optional pricing for hardware warranty and upgrades for the years 3 thru 10. This will include any hardware replacements needed for obsolescence or new hardware requirements for software upgrades.

21.10 Subscriber Units

Each mobile, portable and control station unit shall be warranted 100% against any failure for a period of three years from the date it is placed in service. To this end, service for mobile and control station units shall include preliminary testing at the Vendor's service facility and, if needed, removal and reinstallation from and into the vehicle or place of use.

Service for portable units shall require pickup by the approved service shop at a designated location in the County and preliminary testing of microphone, antenna, and battery condition shall be performed. Upon preliminary testing, if microphones, antennas or batteries are found to be defective and the cause of the problem, they will be replaced, and the unit is to be picked up by the user.

Such defective components, unless damaged beyond the warranty limits, shall be replaced in accordance with the system warranty terms. Defective radio units shall be serviced locally by the Vendor's service shop or sent to an approved factory depot service location for repair.

22 Maintenance

22.1 Equipment Covered

The Vendor shall warranty and maintain all the equipment provided by the Vendor in this specification and observe conditions of other items such as buildings. The equipment shall include but not be limited to system infrastructure (including but not limited to system controller, site controllers and remote site controllers, base repeaters, antenna systems, control stations and communications center equipment,

voting receiver equipment, microwave equipment, dispatch console systems, and simulcast control and optimization equipment), mobiles, portable and control stations.

Maintenance, warranty, and upgrade proposals shall clearly identify those items covered under the agreement, and clearly delineate items that are not included or conditions that will invalidate any of the agreements.

22.2 Maintenance and Service Provider

22.2.1 Service Shop Qualifications

The Vendor shall detail the name, location, and capabilities of the service facility, which will provide any or all the installation, warranty, and maintenance. The Vendor shall also include a description of the proposed service facilities, the size and location of the facilities, and a list of customers who operate systems of similar size and complexity for which installation and maintenance services are performed. The Vendor shall specifically identify what experience the facility and its staff have in working on or with the P25 simulcast system that is proposed to the County.

22.2.2 Service Technicians

Within its proposal submitted in response to this solicitation, the Vendor shall list names of all technicians and their FCC class license if any, along with detailed descriptions of the technicians' experience in repairing radio equipment including years of experience, training, special qualifications, and classes required for the proposed system for all such technicians who will service the radio system. If there are no such technicians currently in the area, as a condition of contract award, Vendor shall supply such list prior to the execution of the contract, which list shall be subject to the review and approval of the County. The Vendor shall outline the required courses to maintain the County system and the required refresh period for the training that will be required of the technicians. Failure to provide a list of acceptable technicians shall be cause for cancelling said award of contract.

The County reserves the right to request and be granted the replacement of a technician, if in the opinion of the County, the technician's work is unacceptable. The County may seek to independently verify the experience and training listed for each technician or firm of technicians, in its sole and absolute discretion. The Vendor shall cooperate with the County in providing additional information for independent verification.

22.2.3 Remote Service Resources

The Vendor shall outline the level and timing of the factory support that will be provided to the local service presence. The discussion shall detail how issues are escalated and on what criteria those issues are escalated.

22.2.4 Monthly Service Meetings

The County reserves the right to request a monthly meeting with the Vendor to discuss the implementation of the service contract resulting from this solicitation, discuss specific radio repair issues and to resolve any outstanding radio repair issues with any of the service providers covered by the contract.

22.2.5 Database

The Vendor shall be responsible for maintaining an accurate database of all base stations, control stations, mobile, desktop units, portables, and other associated equipment that is part of the County system. Such a database will be available to the County upon request in both hard copy and electronic format.

22.3 Spare Parts

The Vendor will be responsible for providing a spare parts inventory for the County system. Such spare parts inventory shall be available within two (2) hours driving distance of the Public Safety Building, to facilitate repair and maintenance of the system.

The Vendor shall supply and manage for the County a list of all required spare parts critical to the overall operation of the County system. The Vendor has the sole responsibility for ensuring that all spare parts on the inventory list are available to meet the repair and restoration times, as required by the County and documented in section 22.6 of the General Requirements. The spare inventory shall be refreshed and replenished as parts are used. Such replenishment is the sole responsibility of the Vendor. Quarterly, the Vendor shall submit to the County a status of the spare parts inventory, such as the parts used and the status of replenishment.

The Vendor shall warrant that it will maintain a stock of replacement parts for each item included in this procurement and shall be able to promptly replace these parts as may be required for a period of seven (7) years past the date the County has been notified the component is no longer supported. The Vendor shall notify the County six (6) months prior to a component on the system being discontinued. No component on the system shall be discontinued in the first three (3) years after final acceptance. If the

part is discontinued and spare parts are no longer available during the first ten (10) years, the Vendor will replace the discontinued component and any affected components at no cost to the County.

The Vendor shall provide a recommended list of spare parts that might be purchased by other local governments and districts that wish to perform in-house maintenance. This shall include spares lists for mobile radios, portable radios, base stations, antennas, channel banks, RF control stations, consoles, logging recorders, etc. The Vendor shall also provide prices for all available spare parts. The Vendor understands that not having a spare part for the system does not provide sufficient reason to not meet the required warranty and maintenance times outlined in this specification.

22.4 Scheduled Maintenance

The Vendor shall undertake a preventative scheduled maintenance program for the purpose of inspection and evaluation of the radio system. The preventive maintenance (PM) checks shall be performed annually beginning within the first month of this contract. Results shall be reported to the County within ten (10) calendar days of the last check performed. The results shall be provided in both hard copy and digital format in an organized and understandable fashion. Failure to complete the checks and provide the County with the results shall result in payment being withheld for the monthly contract amount until such time as the results are received.

The PMs will include but not be limited to the following items:

- Facility
  - Tower conditions observed and noted
  - Grounding and lightning protection inspected
  - Building inspection of the shelter/building, e.g., interior lighting working, receptacles working, HVAC, generator, etc.
  - Cleanup – Building and site swept clean and garbage from site and building removed
- System
  - Controller and system equipment operating conditions tested
  - Base stations and repeaters operating parameters tested and verified
  - Antenna and coax lines checked and tested
  - Consoles and logging recorders operating parameters tested and verified.
  - Any individual UPS units supplied with consoles or logging recorders
  - The Vendor will describe the scheduled preventive maintenance for monthly, quarterly, bi-annual, and yearly maintenance.

22.5 Corrective Maintenance

The Vendor shall provide as-needed service. The service requested shall correspond to the level of failure. The Vendor shall describe the various levels of service that will be performed. The Vendor is

also encouraged to provide alternatives to the County's maintenance program after the Vendor has met the County requested plan.

The different levels will be defined as follows in which failure is defined as a condition that degrades the end user's – subscriber and console operator – ability to operate the system.

22.5.1 Level 1 Failure

- Greater than 10% failure of system
- Greater than 20% failure of consoles
- Greater than 25% failure of sites, channels, or system components
- Site environment alarms (smoke, access, temp, AC power)
- This level is meant to represent a major issue that results in an unusable system, sub-system, product, or critical features from the County's perspective. No work-around or immediate solution is available.

22.5.2 Level 2 Failure

- Less than 10% failure of system
- Less than 20% failure of consoles
- Less than 25% failure of sites, channels, or system components
- Critical mobile, portable or control station that requires immediate response as determined by the County
- This level is meant to represent a minor failure in which most of the system is operational, and the portion of the system that is operational is providing no degraded performance for the end users.

22.5.3 Level 3 Failure

- Intermittent system issue that does not affect the end user for a period of greater than 15 minutes collectively over a 24-hour period
- Non-critical mobile, portable or control stations or service work.
- System service work
- Non-contract additional service work, such as install, removal and programming of subscriber radios.
- This level is meant to represent a failure that does not affect the performance of the system but may affect a non-critical end-user component.

22.5.4 Level 4 Failure

- Non-critical, non-system item such as a mobile or portable that can be out of service without affecting public-safety operations

- This level is meant to represent a failure that does not have to be immediately back in service, and cost is an important factor in the corrective maintenance.

22.6 Response Times

The Vendor shall provide the following response times for the different levels of incidents:

22.6.1 Level 1

Service must be always available — 365 calendar days a year, 24 hours per day, 7 calendar days a week — with call-back response of less than 30 minutes and be on-site of failure within two hours.

22.6.2 Level 2

Service must be always available — 365 calendar days, 24 hours per day, 7 calendar days a week — with call-back response of less than 30 minutes and be on-site of failure within four hours.

22.6.3 Level 3

Service must be available during business days and from 8 AM to 5 PM with call-back response of less than four hours and be on-site within 24 hours of request or as agreed by the County.

22.6.4 Level 4

Service must be available during business days and from 8 AM to 5 PM with call-back response of less than one (1) calendar day and be on-site within five (5) calendar days or via shipped service at a Vendor-provided depot service.

At the County's discretion, it may elevate any failure or system condition to a Level 1 failure requiring immediate attention.

22.7 Maintenance Plans

The Vendor shall include maintenance optional pricing for an additional maintenance after warranty. The Vendor shall propose an additional two (2) extensions of five (5) years for a total of ten (10) years of system maintenance based on the required levels of maintenance proposed.

The County may contract for such options on an annual or multi-year plan as it determines in its best interests. The pricing shall remain firm so long as the County makes its commitment to extend the service at least ninety (90) calendar days before the expiration of the current contracted period.

23 Upgrades

23.1 Overview

The County plans to operate this system for up to 15 years or more. It is quite apparent many of the major components have hardware and software lives much shorter than the anticipated life of the system. The Vendor shall describe in detail how the County is to ensure the system is able to operate for the expected 15-year life. Include in this detailed description, the programs for the system to be upgraded. The Vendor shall provide programs to maintain the functional aspects of the system, supportability, and serviceability. The description of the program shall describe conflicts that over time might arise, such as hardware incompatibility or software upgrade program. The program description shall clearly define how those issues are resolved.

23.2 Upgrade Plans

Vendor shall include upgrade plans after the warranty.

24 Documentation

24.1 Vendor Documents

The Vendor shall provide the list of all manuals that will be provided for the system. Additionally, the Vendor shall provide specification sheets for all equipment provided.

The Vendor shall provide, as a response to the specification, current hard copies and, if available, soft copies, of all the manuals for the Vendor's equipment for the portions of the system that the users/operator will interface.

24.2 Customer Design Review

By the completion of the customer design review the following information must be provided in a single comprehensive document.

- Proposal - Updated proposal with all changes input into document to clearly reflect final CDR system
- Location Modifications/Requirements - Comprehensive list of the following items required for proper preparation of the equipment install
  - Rack drawing or other drawings that characterize the equipment to be installed at the County
  - All space requirements including rack drawing and floor plan layout.
  - All electrical needs and a detailed description which affect County location.
  - All grounding changes which affect County location.
  - All antenna and transmission requirements for installation of equipment on the tower, cable ladder, ice bridge and cable entry port.
- A list of any other changes required at any of the County location in preparation of the County install.

24.3 Pre-Commencement

Fifteen (15) calendar days prior to the start of Phase 1, the Vendor shall supply the following documentation. The documentation shall be provided in .pdf and the software native program.

24.3.1 Project Management Information

Any additional drawings, calculations, and certifications required by the County shall be submitted to the County Project Director and approved before the Vendor will be permitted to start the work. The vendor shall also supply the following information:

- Finalized graphic line or work chart indicating the work schedule as affected by the award and contract periods.
- Name, address, telephone number of Vendor's Project Manager

The Vendor will not be authorized to proceed with any work or delivery of any materials until these requirements are met. All documents shall be delivered in a form acceptable to the County Project Director.

24.3.2 Safety Documentation

Documentation that indicates all safety precautions to be taken by personnel employed in the installation, operation, or maintenance of the equipment.

24.3.3 Inventory Information

The Vendor shall provide a County acceptable method for inventorying the equipment as the equipment is delivered to the receiving location as outlined in section 17.4. The Vendor shall provide the contracted list of equipment purchased with an associated list of deliverable items. The list of deliverable items at a minimum shall have a product description, Vendor, make, model, serial number, and bar code information. The goal of the County is too semi-automatically inventory the equipment via a bar code reader when the equipment arrives at the receiving location. The Vendor will provide it recommend method of achieving this goal.

24.3.4 Manuals

Complete and current set of three (3) hard copies, and one (1) electronic copy of operating manuals, installation manuals, service and maintenance manuals and programming manuals for the Vendor's and OEM equipment to be installed on the system.

24.3.5 System Diagram

Comprehensive diagrams of the system which shows all major components of the system and the required interconnection. Each manual or wiring diagram shall fully and clearly detail any modifications done either by the factory or by personnel in the field. Such modifications shall be included in every manual for each piece of equipment on which such changes have any effect.

This will permit the County to update the drawings as system changes occur in the ensuing years.

Manuals shall be bound in sets in loose leaf or other acceptable binders, one manual of each type per set, and shall be clearly indexed.

The County will not recommend acceptance of the system if the Vendor fails to provide the documentation manuals in the specified form and detail. At this point, the Vendor must also provide any other documentation not previously provided but required by the County.

24.4 Pre-Final Acceptance

24.4.1 As-Built Drawings

Thirty (30) calendar days prior to final acceptance, the Vendor shall supply a complete set of "as-built" drawings to the County Project Director. Three (3) copies of the documentation shall be provided in three-ring binders and three copies on digital media in the original software format, including AutoCAD,

Excel and Word for drawings, spreadsheets, and text. At a minimum, the following "as-built" documentation shall be included in each set:

24.4.1.1 System Documentation

- Project-specific system manual that describes the overall system layouts, architecture, and its operating and failure modes.
- System block diagrams
- Documentation of final programming configuration for all software programmable equipment
- A soft copy and printed copy of all equipment programming templates used in the system
- A soft copy and printed copy of all subscriber programming used on the system

24.4.1.2 System Inventory

Provide a complete inventory of all provided equipment and software in printed form and in the latest version of Microsoft Excel.:

- A complete list of the location of the equipment (building, department, vehicle number) and entity operating the piece of equipment
- A complete list of model numbers, serial numbers, and version numbers of infrastructure and subscriber units
- A complete list of all replaceable parts
- A complete list of all recommended spare parts
- A complete list of all recommended maintenance schedules for all system components
- A complete list of the warranty on all system equipment

24.4.1.3 Site Documentation to be Provided

- Site layouts and floor plans of each equipment site, and dispatch facility, to scale
- Rack face drawings, to scale
- Drawings showing location of antenna, transmission line and mounting apparatus on each tower, cable ladder and entrance port
- Drawings showing cable tray location details, to scale
- Interconnect drawing that shows the numbering and labeling of all cabling that connect interconnect equipment
- A log of level settings for all control circuits and the limitations on the setting of the control circuits
- A record of telephone circuits by circuit number and telephone number for service on these circuits

24.4.1.4 Acceptance Test Documentation to be Provided

- Complete copies of all acceptance test data with acceptable tolerances and all recorded measurements
- Radio propagation coverage maps and associated data for each map produced
- Coverage acceptance test documentation

24.4.1.5 User Manuals to be Provided

- Each subscriber unit shall be delivered with a comprehensive user's guide

Appendix A Channel – Agency Matrix

TABLE 6 - CHANNEL AGENCY MATRIX - LAW ENFORCEMENT

				Current State				Future State			Law Enforcement											
Channel name	**Primary User**	**Owner/Operator**	**RF Band**	Conventional Repeated (today)	Simplex (today)	Dispatch only (today)	Monitor only (today)	Expected to migrate to new TRUNKED system	Expected to require an equivalent non-trunked solution	Expected to remain and be used "as is" after migration	Chenango County Sheriff's Office	New York State Police	Norwich Police Department	Sherburne Police Department	New Berlin Police Department	Oxford Police Department	Greene Police Department	Afton Police Department	Bainbridge Police Department	NYS DEC	NYS Forest Rangers	NYS Park Police
MAIN/Dispatch Law	Chenango County Sheriff's Office	County	VHF	X				X			X	X	X	X	X	X	X	X	X	X	X	X
Corrections	Corrections - CC SO	County	VHF		X			X			X											
Tactical 1	Chenango County Sheriff's Office	County	VHF		X				X		X											
Tactical 2	All Agencies	County	VHF		X				X		X	X	X	X	X	X	X	X	X			
Norwich PD	Norwich Police Department	City of Norwich	VHF				X	X			X	X	X	X	X	X	X	X	X	X	X	X
CityWide	Norwich PD/Fire/EMS	City of Norwich	VHF					X					X									

TABLE 7 - CHANNEL AGENCY MATRIX - FIRE/EMS

				Current State				Future State			Fire																EMS			
Channel name	**Primary User**	**Owner/Operator**	**RF Band**	Conventional Repeated (today)	Simplex (today)	Dispatch only (today)	Monitor only (today)	Expected to migrate to new TRUNKED system	Expected to require an equivalent non-trunked solution	Expected to remain and be used "as is" after migration	Afton Fire Dept.	Bainbridge Fire Dept	Coventry Fire Dept.	Greene Fire Dept	Brisben Fire Dept	Oxford Fire Dept.	Smithville Fire Dept	McDonough Fire Dept	Preston Fire Dept	Norwich Fire Dept	Guilford Fire Dept	Mt Upton Fire Dept	South New Berlin Fire Dept	New Berlin Fire Dept	North Norwich Fire Dept	Plymouth Fire Dept	Pharsalia Fire Dept	South Otselic Fire Dept	Smyrna Fire Dept	Sherburne Fire Dept	Earlville Fire Dept	Chenango County OES	AMR	Coventry Emergency Squad	Greene EMS	New Berlin EMS
MAIN/Dispatch Law	Chenango County Sheriff's Office	County	VHF	X				X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Main/Dispatch Fire	Chenango County OES	County	UHF	X				X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Fire Coordinator	Chenango County OES	County	UHF	X				X																								X	X	X	X	X
A-Tac	Chenango County OES	County	UHF		X		X			x	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B-Tac	Chenango County OES	County	UHF		X		X			x	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
C-Tac	Chenango County OES	County	UHF		X		X			x	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A-Tac Base	Chenango County OES	County	UHF		X		X		x		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B-Tac Base	Chenango County OES	County	UHF		X		X		x		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
C-Tac Base	Chenango County OES	County	UHF		X		X		x		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Interior Operations	Chenango County OES	County	UHF		X		X			x	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fire Police	Chenango County OES	County	UHF		X		X			x	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Helo Ops	Chenango County OES	County	UHF		X		X			x	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Truck to Truck	Chenango County OES	County	UHF				X	x			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Chenango County EMS	Hospital/EMS Agencies	County	VHF	X			X	X																									X	X	X	X
Interagency 45.88	Dispatch/Other Counties	NYS statewide frequency	LB			X			x																											
State EMS		NYS statewide frequency	VHF							x																							X	X	X	X

TABLE 8 - CHANNEL AGENCY MATRIX - COUNTY / LOCAL GOV'T

				Current State				Future State		
Channel name	**Primary User**	**Owner/Operator**	**RF Band**	Conventional Repeated (today)	Simplex (today)	Dispatch only (today)	Monitor only (today)	Expected to migrate to new TRUNKED system	Expected to require an equivalent non-trunked solution	Expected to remain and be used "as is" after migration
MAIN/Dispatch Law	Chenango County Sheriff's Office	County	VHF	X				X		
CityWide	Norwich PD/Fire/EMS	City of Norwich	VHF					?	?	
Main/Dispatch Fire	Chenango County OES	County	UHF	X				X		
County Highway	Chenango County Highway	County	UHF	X				X		

	Local Government (e.g., highways)																																
Channel name	Chenango County DPW	Afton Town	Afton Village	Bainbridge Town	Bainbridge Village	Coventry Town	Greene Town	Greene Village	Smithville Town	Oxford Town	Oxford Village	German Town	Guilford Town	Norwich Town	Norwich City	Preston Town	McDonough Town	New Berlin Town	New Berlin Village	North Norwich Town	Plymouth Town	Pharsalia Town	Pitcher Town	Lincklaen Town	Otselic Town	Smyrna Town	Smyrna Village	Sherburne Town	Sherburne Village	Earlville Village	Columbus Town	State DOT	
MAIN/Dispatch Law																																	
CityWide															X																		
Main/Dispatch Fire	X																																
County Highway	X																																

	County Govt Agencies								
Channel name	Chenango County Probation								
MAIN/Dispatch Law	X								
CityWide									
Main/Dispatch Fire									
County Highway									

Appendix B County Future Vision and Subscriber Use

This appendix describes the County's operational vision for those agencies that may choose to migrate to the future system. This vision is essential for the County to establish appropriate system requirements and estimate funding needs. It also allows stakeholders to weigh in on the planning process, to ensure a plan that satisfies as many stakeholder criteria as practical.

The future County system will be a trunked radio system. Trunked systems use a shared set of talk channels; individual radio users are assigned a channel when they press their PTT (push to talk) button. This makes trunked systems very efficient in their use of RF channels and need for radio infrastructure. The radio system automatically assigns channels to individual users based upon a few factors: an unused channel, priority of user requesting channel, and priority of talk group.

For some operational needs, where radio users are either communicating primarily with dispatch or other distant users − for example, law enforcement, or EMS − countywide system coverage provides reliable communications for their primary tasks. Conversely, where radio users are in close proximity to one another and the bulk of their communications are among themselves − for example, fire ground operations or road crews − direct or simplex operation may very well provide more reliable operation than through a countywide repeater system. These dominant use patterns are fundamental considerations for the agency-specific sections that follow.

As a secondary consideration, the system will be specified to support the expected repeater call traffic under busy-hour load conditions. As such, if there will be significantly more system use than described in the following sections, this should be identified, since it may require increasing the trunked channel count for the future system.

B1 Law Enforcement

B1.1 Municipal Law Enforcement

Except as noted otherwise, all law enforcement agencies will operate on the new system as their primary mode of communication. Talk groups will be provided that are specific to agencies, as well as shared talk groups to support interoperability when needed.

B1.2 NY State Police

NYSP Troop C operates in Chenango County. It is understood that NYSP Troop C cars are equipped with multiband P25 radios capable of being programmed to operate on the future system. Under current NYSP protocol, the NYSP radios will be programmed to include the future system and accept closest car dispatches from the Chenango County 911.

B1.3 NYS Parks Police

NYS Parks Police operate a small law enforcement operation in the County with a minimal presence. There is an infrequent need for communication between the County and this agency. However, Park Police Radios are equipped with multiband P25 radios capable of being programmed to operate on the future system. Park Police radios will be programmed to include the future system. Alternately, the future radio system will include gateway patches that will allow the creation of temporary bridges, should the need arise.

B2 Fire Districts

There are two use cases for fire operations: command and fire ground. Fire command requires communication with dispatch, other command staff, and firefighting crews. On scene fire ground communications will continue to operate in simplex mode using the existing fire ground UHF channels. Command to dispatch communications will take place over the countywide system. In addition to providing the most reliable communications for each use case, this will may reduce the need for replacement subscriber equipment. Although a single multiband radio can be programmed to operate in either mode, to not miss calls, fire command will likely require access to two radios − one operating on the countywide system and one on fire ground. This is an operational decision. Dispatch will monitor UHF fire ground channel(s), however, the ability to reliably monitor fireground communications will be coverage-dependent and not assured, especially for transmissions from inside buildings.

The county will begin simulcast analog paging utilizing the new UHF Simulcast system using existing UHF paging frequency.

B3 EMS agencies

B3.1 Municipal EMS Operations

Municipal EMS operations need communications primarily with dispatch, on-scene command, and hospitals. EMS operations will operate on the countywide system.

Paging operations will use the same paging system as noted under fire districts to alert EMS agency responders.

B3.2 Commercial EMS Operations

Commercial EMS will continue to operate on their own private systems but will also need communications with on-scene command and hospitals over the countywide system.

B4 Municipal Agencies

It is accepted that public safety agencies should receive higher priority access to the radio system than municipal agencies. As such, municipal users and their talk groups will, in general, be assigned lower priorities than those of public safety. This will only have an effect during the infrequent case of system congestion. In this case, the lower priority user or talk group will be momentarily queued, with the channel grant being delayed.

B4.1 Highway Departments, DPW's and Water/Sewer Departments

There are two primary use categories for highway / DPW operations: plow/salt operations and roads repair/maintenance. Plow/salting operation requires communication with dispatch. Repair/maintenance requires primarily on-scene communication, e.g., flagger operation and machine coordination. Additionally, there is some need for longer-range communication with dispatch and others, such as material delivery trucks.

On scene communications will continue to operate in simplex mode using the existing UHF channels. Plow/salt operations and other longer-range communications will use the countywide system. As such, plow trucks, material delivery, and work crew supervisors will need mobiles and/or portables operating on the new system.

Water and Sewer department radio needs are similar to those of highway roads repair/maintenance. On scene communications will continue to operate in simplex mode using Channels yet to be identified. Supervisors will coordinate with dispatch and material delivery using the countywide system and will need mobiles and/or portables operating on the new system.

B4.2 Governmental, Administrative, and other municipal non-public safety operations

These operations will be considered on a case-by-case basis. In general, agency operations that are mobile, have a need for wide area communication, and are characterized by very brief transmissions, *may* be suitable users for the future countywide radio system. Use of commercial cellular service should always be considered as well since the countywide system is prioritized for public safety and dispatch type operations.

Appendix C Coverage

C1 Radio Coverage Areas of Interest

The radio system shall be designed to provide, and the vendor shall demonstrate specified reliable coverage in accordance with this appendix. Within the Service Area, there are specific areas of interest to the County. These areas of interest are defined here and referenced by Table 9 and other sections of this appendix:

- Service Area - The radio system's service area is defined as the Chenango County jurisdictional border plus several fire districts that extend beyond the county boundary.

Specific areas of interest within the Service Area include:

- Calls For Service (CFS) locations[1]
- City of Norwich
- Villages of Afton, Bainbridge, Earlville, Greene, New Berlin, Oxford, Sherburne, and Smyrna
- $^{3}/_{4}$ - mile test grid that encompasses all CFS locations within the defined service area
- $^{1}/_{10}$ - mile test grid that encompasses all CFS locations within the City of Norwich

The coverage boundary for each of these areas of interest is illustrated in Figures 1 - 6. These boundary files are also provided in electronic format as shapefiles in attachment 4. These shapefiles shall be used by the vendor (and the County) when evaluating the proposed system's coverage performance.

[1] "CFS locations" refers to Calls for Service that have been logged by the County over the most recent ten-year interval.

TABLE 9 - SUMMARY OF COVERAGE AREAS OF INTEREST

COVERAGE AREA DESCRIPTION	BOUNDARY TYPE	BOUNDARY FILE	SHAPEFILE
Service Area	area	Fig. 1	Chenango_ServiceArea.shp
Calls for Service	multiple points	Fig. 2	Chenango_ALL_CFS_Projects.shp
City of Norwich	area	Fig. 3	City_of_Norwich_Boundary.shp
Villages	multiple areas	Fig. 4	Chenango_Villages_Boundaries.shp
Service Area Test Grid	test grid	Fig. 5	Chenango_Service Area_Grids.shp
City of Norwich Test Grid	test grid	Fig. 6	City_of_Norwich_Service_Area_Grids.shp

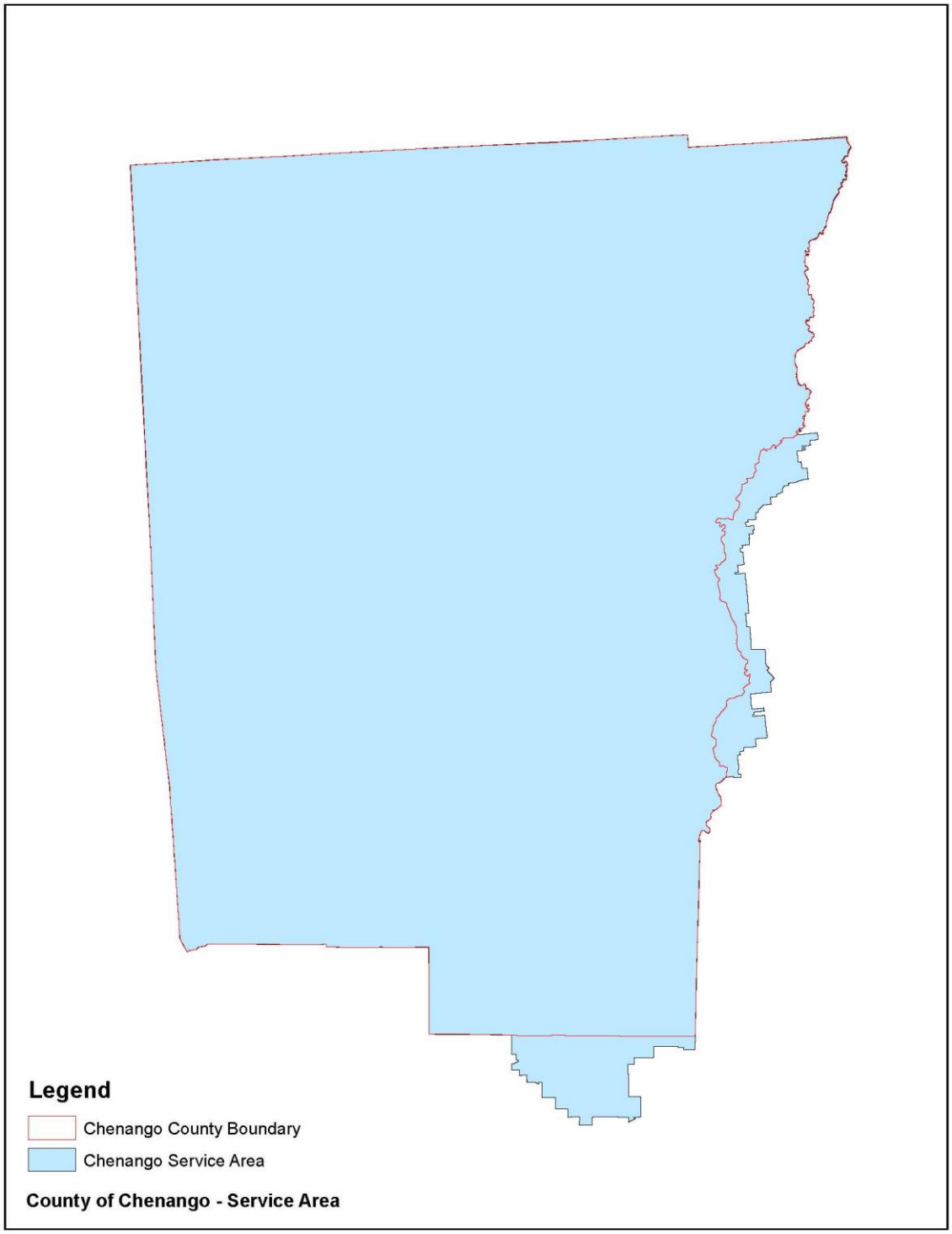


FIGURE 1 - SERVICE AREA

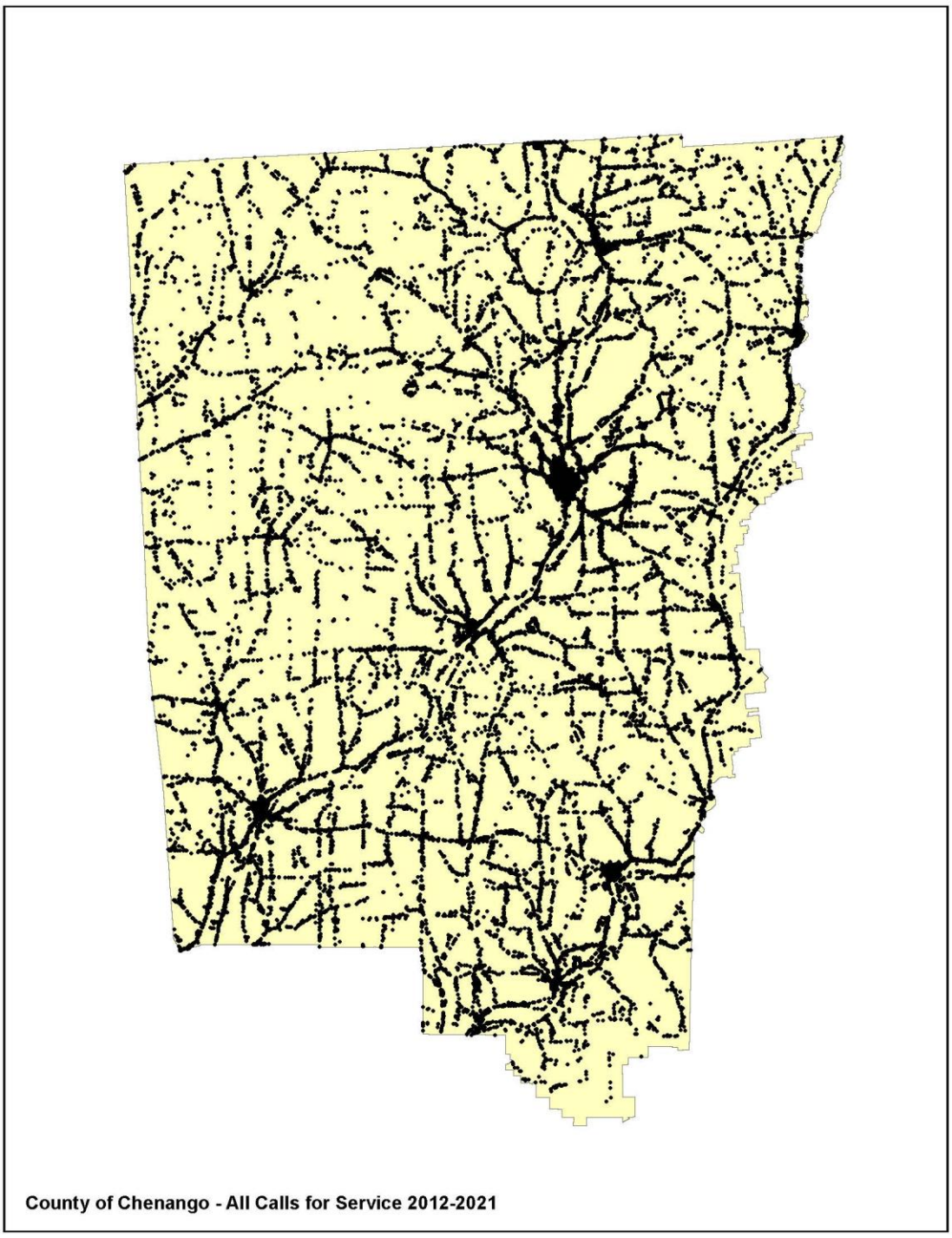


FIGURE 2 - CALLS FOR SERVICE, 10 YEAR INTERVAL

FIGURE 3 - CITY OF NORWICH

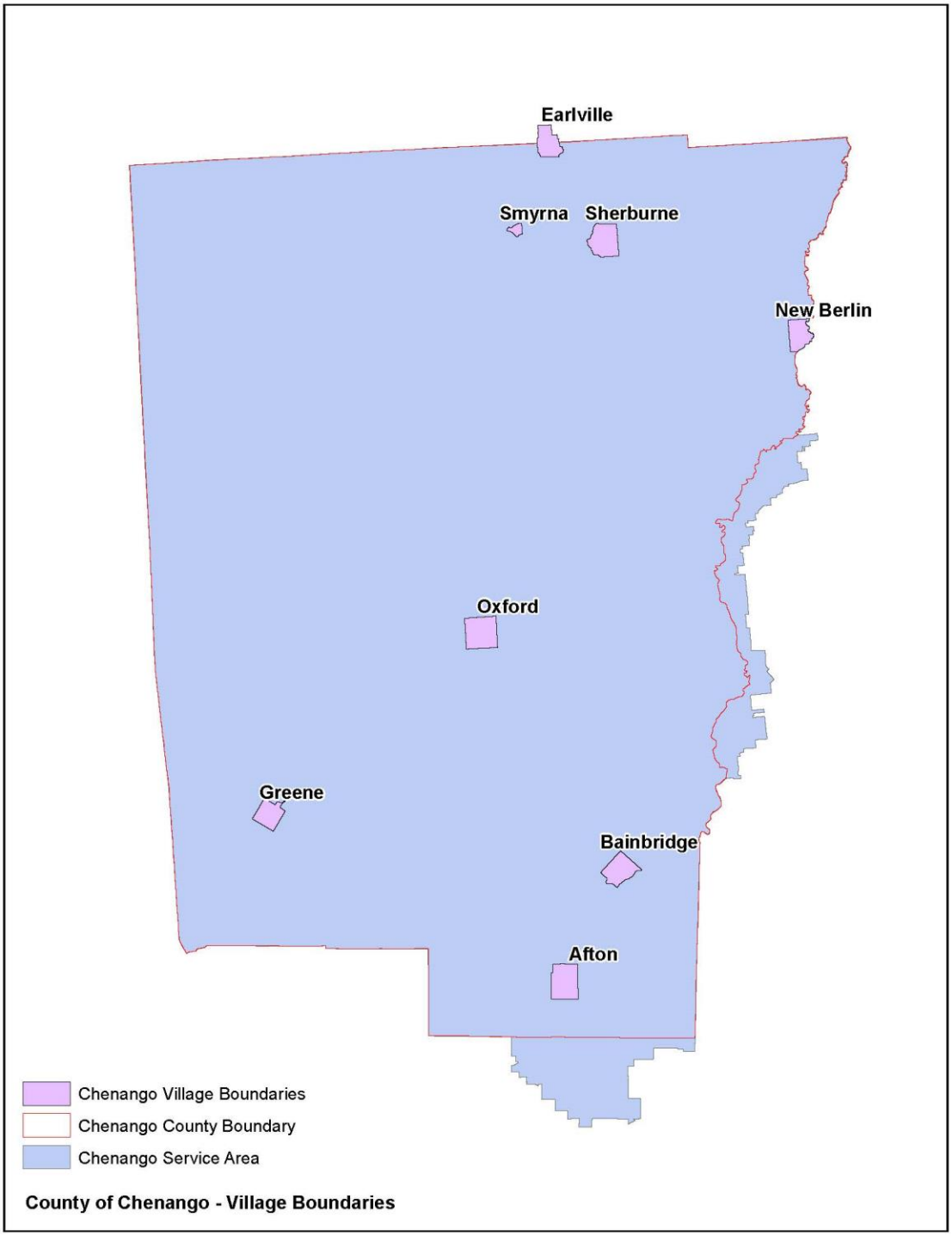


FIGURE 4 - VILLAGES

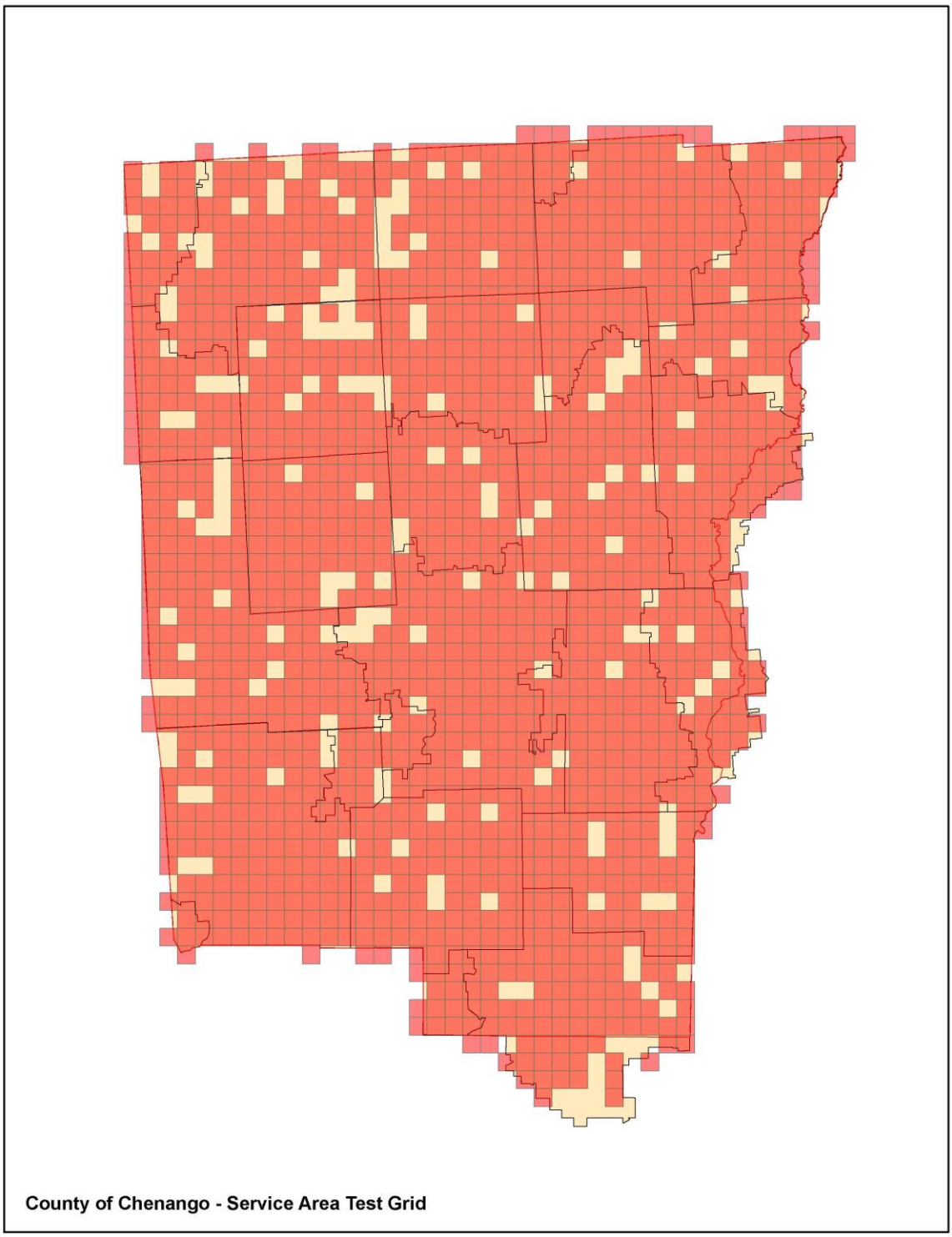


FIGURE 5 - SERVICE AREA TEST GRID

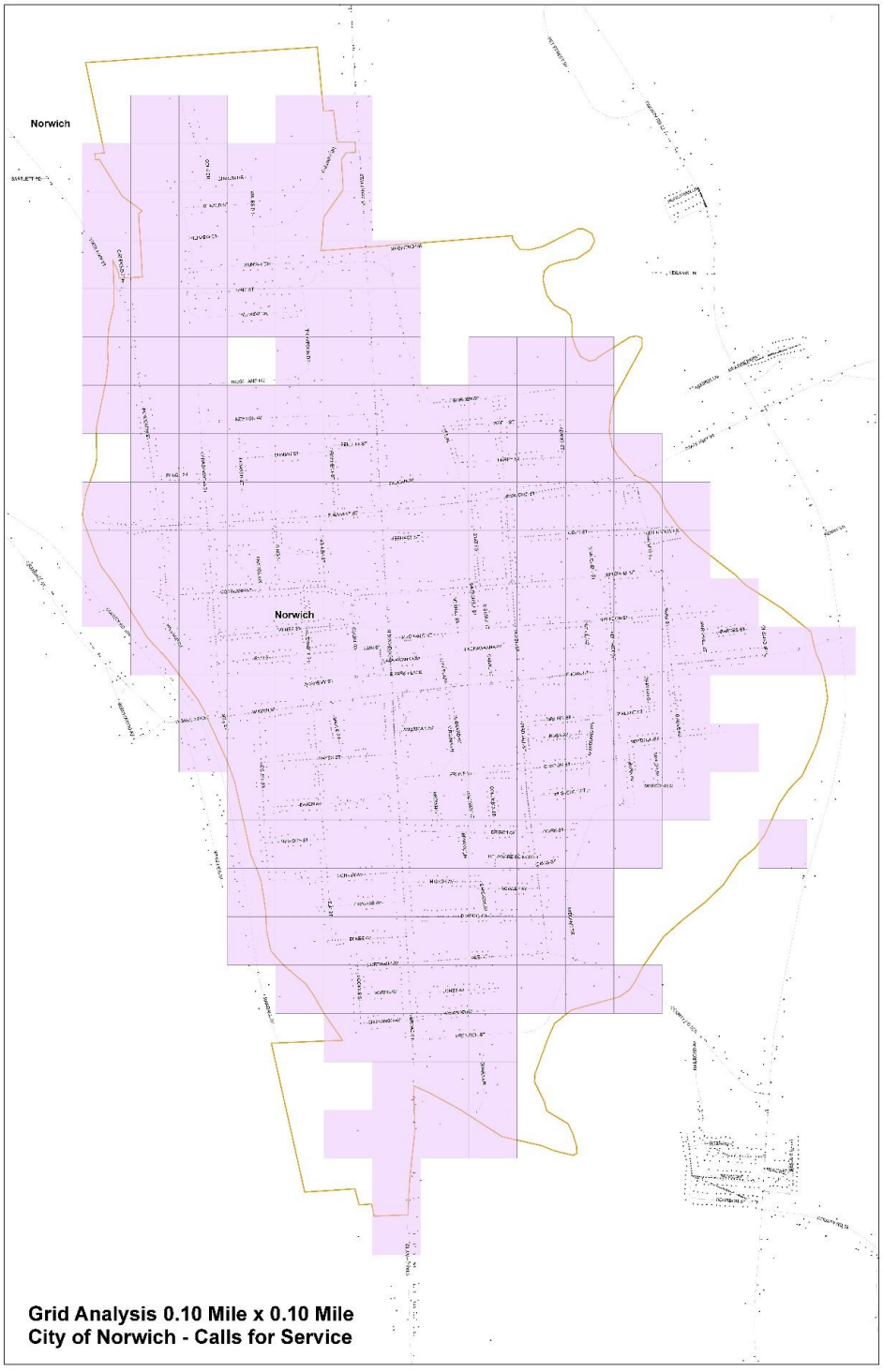


FIGURE 6 - CITY OF NORWICH TEST GRID

C2 Operational Mode of Equipment for Coverage Requirements

It is recognized that, in practice, different agencies may choose to operate their subscriber equipment in a configuration that best suits their operational needs. Nevertheless, for the purposes of establishing a standard for evaluating and guaranteeing coverage performance of the system, the following configurations shall be used for all coverage map generation and coverage guarantees.

C2.1 Portable and Mobile Coverage Requirements

- All coverage requirements and representations are to be based upon P25 Phase 2 (TDMA) operation.
- All coverage requirements for portable operation are to be based upon the portable on-hip (3.5 ft.) for both talk-out and talk-back, equipped with a flexible whip UHF antenna, and use of a cabled shoulder microphone attached at the lapel.
- All coverage representations for mobile operation are to be based upon the mobile antenna mounted on the center roof of a sedan whose roof height is 6 ft. above ground and using a 3dB gain “whip” antenna.
- The portable and mobile subscriber models assumed for coverage predictions and for the coverage guarantee shall be clearly identified. If any lower RF performance models or configurations are included as part of the proposed equipment offering, e.g., for non-public safety users, this shall be clearly noted in the response to this requirement.

C2.2 Pager Coverage

- All coverage requirements and representations shall be based upon conventional analog operation.
- All coverage representations for analog pager operation shall be based upon the pager operating on hip (3.5 ft.).
- The pager model to assume for performance predictions and the coverage guarantee is the Unication G1 (or equivalent).

C3 System Optimized for Portable Subscriber Operation

The radio system design shall be optimized for portable operation based upon the portable unit configuration described in Section C2. The vendor shall provide RF link budgets for their design as a part of their proposal; these shall include downlink and uplink for both portable and mobile operation, and a downlink loss budget for pager operation.

C4 Coverage Maps and Performance Metrics

The vendor shall provide predicted coverage maps for each of the map sets as listed in Table 10. The subscriber equipment configurations used as the basis for map generation shall be in accordance with those stipulated in section C2. All coverage maps shall be generated using TSB-88.1-F prescribed prediction methods, 95% confidence. The vendor shall clearly state the relevant assumptions used to produce all coverage maps.

All maps shall clearly depict two DAQ performance levels, 3.4 and 3, using contrasting colors that make it easy to discern the different levels of predicted performance on both PDF maps and when KML files are viewed using Google Earth. All coverage maps produced as part of the proposal shall be provided in electronic PDF as well as KML format. KML files shall be provided with 1 arc-sec pixel resolution. All coverage maps shall include the "spill" coverage that may extend several miles beyond the County boundary[2]; Map Set 4 and 5 are excluded from this requirement.

TABLE 10 - LIST OF REQUIRED MAP SETS

MAP SET	COVERAGE MODE	COVERAGE BOUNDARY FILE(S) TO DEFINE MAP EXTENT AND TO DISPLAY WITH MAP	DAQ	MAPS REQUIRED[3]
1	Mobile	Service Area, Fig 1	3.4 and 3	TO, TB, RT
2	Portable on-street	Service Area with Village boundaries shown for reference, Figs 1 & 4	3.4 and 3	TO, TB, RT
3	Portable in-building (10dB margin)	Service Area with Village boundaries shown for reference, Figs 1 & 4	3.4 and 3	RT
4	Portable on-street	City of Norwich, Fig 3	3.4 and 3	RT
5	Portable in-building (10dB margin)	City of Norwich, Fig 3	3.4 and 3	RT
6	Pager in-building (10dB margin)	Service Area with Village boundaries shown for reference, Figs 1 & 4	3.4 and 3	TO
7	Pager on-street	Service Area with Village boundaries shown for reference, Figs 1 & 4	3.4 and 3	TO

The vendor shall provide metrics for the proposed design for the coverage modes, DAQ, and specified boundary files, as listed in Table 11. This information is to be an accurate tabulation of the predicted coverage maps and is requested for information purposes only. The predicted area coverage reliability as a percentage of the specified coverage boundary area shall be provided by the vendor for each metric listed in the table. For the purposes of percent tabulation, the vendor shall include in the denominator all tiles that are included inside or touch the boundary files; all tiles counted in the denominator that

[2] "Spill" coverage refers to specified coverage reliability that extends outside the service area.
[3] TO = Talk-out, TB = Talk-back, RT = Round Trip. Where multiple maps are listed, these are to be provided as separate maps, e.g., TO, TB, RT requires three separate maps be provided. RT maps must depict where both TO and TB coverage are supported.

meet the performance criteria shall be included in the numerator. Tile resolution for this tabulation shall be on the order of 100m.

TABLE 11 - LIST OF REQUIRED PERFORMANCE METRICS (FOR INFORMATIONAL PURPOSES)

METRIC #	COVERAGE MODE	COVERAGE BOUNDARY FILE FOR METRIC EVALUATION	DAQ 3, % (@95% CONFIDENCE)
1	Mobile (RT)	Service Area, Fig. 1	(TBD by Vendor)
2	Portable on-street (RT)	Service Area, Fig. 1	(TBD by Vendor)
3	Portable on-street (RT)	City of Norwich, Fig. 3	(TBD by Vendor)
4	Portable on-street (RT)	Villages, Fig. 4	(TBD by Vendor)
5	Portable in-building (RT), 10dB	City of Norwich, Fig. 3	(TBD by Vendor)
6	Portable in-building (RT), 10dB	Villages, Fig. 4	(TBD by Vendor)
7	Pager in-building (TO), 10 dB	Service Area, Fig. 1	(TBD by Vendor)
8	Pager in-building (TO), 10 dB	City of Norwich, Fig. 3	(TBD by Vendor)
9	Pager in-building (TO), 10 dB	Villages, Fig. 4	(TBD by Vendor)
10	Pager on-street (TO)	Service Area, Fig. 1	(TBD by Vendor)
11	Pager on-street (TO)	City of Norwich, Fig. 3	(TBD by Vendor)
12	Pager on-street (TO)	Villages, Fig. 4	(TBD by Vendor)

C5 Vendor Coverage Guarantees

The vendor shall provide its coverage guarantees for each of the requirement categories listed in Section C6, Table 12. These guaranteed performance values shall become the CATP pass/fail requirements with specific CATP procedures to be in accordance with the requirements of Section C6.

C6 Method of Coverage Measurement and Guarantee

Coverage performance shall be verified by the vendor using TSB-88.3-F defined methods with specific elements as detailed here. Prior to coverage acceptance by the county, the vendor shall successfully demonstrate via a mutually agreed upon Coverage Acceptance Test Procedure (CATP) and confirm that each of the vendor's coverage performance guarantees listed in Table 12 below have been tested and passed. The vendor's CATP shall be consistent with TSB-88.3-F methodologies and shall include and comply with all the following additional requirements; in the case of conflict, this document shall take precedence:

P25 Portable and Mobile coverage testing:

- For Talk-out path testing, the acceptance test shall use automated BER measurements. Downlink RSSI shall be measured coincident with the BER measurements, and both sets of data shall be provided to the county as part of the acceptance test record; both measurements shall be recorded continuously during drive testing. A passing talk-out test result requires a BER of 3.1% or less (DAQ 3 operation).
- For Talk-back path testing, the acceptance test may use BER or DAQ voice tests. A passing talk-in test result requires either a BER measurement of 3.3% or less, or a DAQ voice test score of DAQ 3 or better.
- For a test grid to pass, both talk-out and talk-back test criteria must pass.
- The County-supplied test grid map(s), Figs. 5 and 6, shall be fully incorporated into the vendor's proposed CATP and all grids shall be included in both the vendor's coverage guarantee and the pass/fail results calculation.

Analog Pager coverage testing:

- For paging system testing, the acceptance test criteria shall rely on both functional DAQ voice quality tests and automated RSSI measurements of the Talk-out path. Automated RSSI measurements shall be provided to the county as part of the acceptance test record.
- For a grid to pass, the test page must be successfully received with DAQ of 3 or better.

All test equipment shall be calibrated to replicate specified user equipment configurations as specified in section C2 for the coverage mode under test. The method of calibration shall be clearly detailed and specifically quantified in the proposal, and traceable to verifiable documentation.

The vendor shall include with their proposal a draft coverage acceptance test procedure (CATP) that is compliant with all requirements stated herein; any deviations shall be considered non-compliant. Any elements of the test procedure that cannot be finalized prior to contract shall be clearly identified by the vendor and the vendor shall clearly and concisely describe their proposed method to finalize those elements. The final CATP shall require mutual acceptance by the County and vendor as a condition of completing the Critical Design Review (CDR) milestone.

The vendor's proposal and CATP shall include coverage guarantees that are based on testing the specified county-supplied test grid files in their entirety. Any deviations from this requirement shall be considered non-compliant. Using these grid files, the vendor shall state their proposed system coverage performance guarantees in a table having the same format as Table 12, below.

TABLE 12 - COVERAGE ACCEPTANCE CRITERIA AND GUARANTEE

REQ#	COVERAGE MODE	COVERAGE BOUNDARY DESCRIPTION	FIGURE(S)	PASS CRITERIA[4]	GUARANTEED COVERAGE[5], %
1	Mobile	County-supplied 3/4 -mile grid that includes 10-year CFS locations	Fig. 5	DL: BER ≤3.1% and UL: VQ DAQ ≥3 or BER ≤3.3%	(TBD by Vendor)
2	Portable on-street	County-supplied 3/4 -mile grid that includes 10-year CFS locations	Fig. 5	DL: BER ≤3.1% and UL: VQ DAQ ≥3 or BER ≤3.3%	(TBD by Vendor)
3	Portable in-building (10dB)	County-supplied 1/10 -mile grid that includes 10-year CFS locations within the City of Norwich	Fig. 6	DL: BER ≤3.1% and UL: VQ DAQ ≥3 or BER ≤3.3%	(TBD by Vendor)
4	Portable on-street	County-supplied 1/10 -mile grid that includes 10-year CFS locations within the City of Norwich	Fig. 6	DL: BER ≤3.1% and UL: VQ DAQ ≥3 or BER ≤3.3%	(TBD by Vendor)
5	Pager on-street	County-supplied 3/4 -mile grid that includes 10-year CFS locations	Fig. 5	DL: VQ DAQ ≥3	(TBD by Vendor)

[4] CATP pass criteria shall be as stated in the table; they have been selected to be consistent with DAQ 3 audio performance.
[5] Guaranteed coverage refers to the coverage result the vendor will include as a guarantee in the proposed and compliant CATP.

Appendix D Identified Site Candidates

The County currently operates a UHF LMR and paging system from eight existing sites, most of these being county owned. The County has identified nearby site candidates that could enhance coverage performance.

It is anticipated that additional, and possibly different, sites will be needed for the new system. Table 13 lists primary site locations that are anticipated being used as part of the new system. The vendor's system design shall incorporate each of the Table 13 sites. Table 14 provides a list of site alternatives identified as being able to provide coverage improvements in the County's northeast corner. The vendor's design shall include one site from table 14. Sites from Table 13 and Table 14 will comprise the 11-site baseline design.

Additionally, Table 15 lists one optional site that may be used for fill coverage. The Vendor shall separately demonstrate the coverage benefit gained from adding this site to the 11-site baseline design. The addition of this site shall be optionally priced.

Finally, Table 16 lists the Public Safety Building and the Norwich Police Department as a Microwave Only sites and shall be included as part of the backhaul design.

The sites are listed here merely as an aid to the vendor when developing their design.

TABLE 13 - PRIMARY SITES

Site Name	In use today?	future LMR?	future MW?	Address	Latitude	Longitude	Tower Height (ft)	Tower Owner
Pharsalia	yes	X	X	466 County Road 47, Pharsalia	42°33'55.5"N	75°40'23.2"W	280	Chenango County
Otselic	yes	X	X	157 Flannigan Rd, Otselic	42°40' 23.8"N	75°44' 56.0"W	300	Chenango County
Barnes Hill	yes	X	X	217 Burdick Medbury Rd. Norwich	42°30'41.6"N	75°28'7.5"W	220	Chenango County
Coventry	yes	X	X	120 Nursery St, Coventry	42°19' 05.9" N	75°38' 3.6"W	220	Chenango County
Cook Park	yes	X	X	189 Parks Rd, Greene	42°17'47.6" N	75°44'54.6" W	180	Chenango County
Sherburne	yes	X	X	139 Cush Hill Road, Sherburne	42°40'33.7" N	75°32'01.0" W	180	American Tower
North Pond (Guilford)	No	X	X	193 North Pond Rd, Guilford	42°26'13.4"N	75°30'50.2"W	268	Goosetown Comm's
Nabinger (Doraville)	No	X	X	333 Nabinger Hill Rd, Nineveh	42°10'17.2"N	75°33'53.1"W	340	Broome County
Pine Hill	No	X	X	4075 Pine Hill Rd, Sidney	42°17'34.50"N	75°21'51.4"W	250	Delaware County
East Hill	No	X	X	1502 County Road 36	42°29'56.4"N	75°29'38.2"W	TBD	Chenango County

TABLE 14 - ALTERNATE SITES NORTHEAST

Site Name	In use today?	future LMR?	future MW?	Address	Latitude	Longitude	Tower Height (ft)	Tower Owner
One below to be included, Millbrook or Shacktown Mountain								
Millbrook	Yes	TBD	TBD	457 Whitney Rd, New Berlin	42°37'09.8"N	75°21' 56.5"W	180	Chenango County
Shacktown Mountain	Yes (MW reflector only)	TBD	TBD	546 Texas Hill Rd, New Berlin	42°34’66.3”N	75°18’32.3”W	180	Otsego County

TABLE 15 - OPTIONAL SITES

Site Name	In use today?	future LMR?	future MW?	Address	Latitude	Longitude	Tower Height (ft)	Tower Owner
McDonough	No	TBD	TBD	263 Chestnut Rd, McDonough	42°29'20.3"N	75°44'15.9"W	300	Tillman Infrastructure

TABLE 16 - MICROWAVE ONLY SITES

Site Name	In use today?	future LMR?	future MW?	Address	Latitude	Longitude	Tower Height (ft)	Tower Owner
Public Safety Building (Primary Dispatch Center)	Yes		X	279 County Road 46, Norwich	42°30'27.3" N	75°32' 19.6" W	100	County
Norwich Police Department (Backup Dispatch Center)	No		X	18 E Main St, Norwich	42°31’51.3N	75°31’20.2” W	75	Norwich PD

Appendix E Capacity Report

E1 Purpose

NYSTEC worked with Chenango County's dispatch recording vendor, Interaction Insight Corporation (IIC), to obtain representative recordings of radio data traffic for the purposes of assessing the new radio system's trunked channel requirement. This preliminary report summarizes the findings and provides recommendations on the number of channels to implement in the new system.

E2 Method of Analysis

NYSTEC relied on NexLog recorder data reports, using cumulative record times and quantity of recording segments to approximate net radio traffic time. Record time was adjusted to account for a 2 second timeout delay per recording segment. This adjustment method was discussed with the IIC analysts, and they concurred that the segments are typically individual so subtracting 2 seconds from each segment is a reasonable assumption.

After further consideration, NYSTEC confirmed that this method will err on the "high" side if sequential transmissions have less than a two second gap since they will be counted as one segment and only corrected once. Erring on the high side will prevent this analysis from establishing a lower than actual traffic value; erring on the high side is preferable for our purposes.

Recorded data from the following time periods were analyzed for this report:

- 12/1 - 12/28/2021 recent 4-week interval, no particularly remarkable events
- 12/7 – 12/13/2019 1 week interval prior to the COVID period
- 11/27 – 12/3/2021 1 week interval that included the "silo fire"
- 4/30/2020 day with flooding event

Table 17 lists all the recorded channels considered in this analysis.

TABLE 17 - RECORDED RADIO CHANNELS INCLUDED IN STUDY

RECORDED RADIO CHANNELS INCLUDED IN STUDY	
45-88 Sum	BARNES TAC Sum *(Note 1)*
COOK PARK TAC Sum *(Note 1)*	COUNTY HWY Sum
COVENTRY TAC Sum *(Note 1)*	EMS Sum
FIRE COORDINATOR Sum	IA LAW Sum
MILLBROOK TAC Sum *(Note 1)*	NORWICH PD Sum
OTSELIC TAC Sum *(Note 1)*	PHARSALIA TAC Sum *(Note 1)*
SHERBURNE TAC Sum *(Note 1)*	SIDNEY TAC Sum *(Note 1)*
UHF FIRE Sum	VHF SHERIFF Sum
CO Hwy - 337-1715 Sum *(Note 1)*	

Note 1 (2/28/22). NYSTEC learned after the initial analysis was completed that "CO Hwy – 337-1715 Sum" is a phone channel, not a radio channel and should not have been included in the radio traffic tally. We also learned that the eight "TAC" channels listed are receivers tuned to direct mode tactical channels whose traffic is unlikely to be migrated to the trunked system. Upon a re-evaluation of these nine recorder channel contribution to the overall statistics, NYSTEC confirmed that their contributions were relatively minor, however the peak findings have been adjusted accordingly.

Since the goal of this report is to recommend the number of trunked channels required, it is also important to identify all future trunked system agencies and channels that are not included in the above table such that we can estimate their contribution and add that to the measured traffic levels. During discussions with the County on 2/15/22, the team discussed the need to also account for highway department radio traffic that will be added. We also discussed the need to limit the number of talkgroups available for their use, and to provide lower access priority to these non-public safety agencies. See section E4 for a discussion on how this traffic is accounted for in the analysis.

E3 Summary of Recorded Traffic

For the purposes of determining how many trunked channels the system should be configured with, peak traffic levels are the primary metric of interest. Peak radio traffic over the four studied intervals was similar. Provided that these radio channels are representative of the future system's traffic, the consistency of these studies should provide a good basis for planning the system. The peak level was 0.55 Erlangs6 (Erl) and occurred during a typical week prior to the start of COVID. Pre-COVID and

[6] Erlang (Erl) is a unit measure of call traffic. 1 Erl = 1 hour of cumulative call traffic per hour, 2 Erl = 2 hr of cumulative call traffic per hour.

current peaks during a typical week appear to be similar to one another. The flooding event showed elevated traffic over a 10-hour duration but the peak during that time was actually less than the peaks observed during typical weeks. The silo fire of 11/28/2021 showed a peak level of 0.52 Erl, not materially different from the peak during a typical week.

E4 Next Steps

Analysis of existing recorder data is complete. To be thorough, these results should be adjusted for the possible effects listed here:

- Identify any duplicate recordings from data set and remove their contribution. (Complete – none found)
- Identify any recordings of activity that will NOT be part of the trunked system traffic and remove their contribution. Examples may include tactical or simplex channel traffic that will not be part of the trunked system (this step has been completed and the results are reflected in this revised report).
- List system users that were not included in the recordings, but which will be part of the future trunked system traffic and estimate their added load. Examples may include highway departments that were not recorded. Per discussions with the County, the highway agencies are the only significant traffic that has not already been accounted for in the recordings. This traffic is estimated in the following and added onto the recorded data.

Using the adjusted net traffic estimate, NYSTEC will then calculate how many talk paths the future system requires to support this traffic. See also next section.

E4.1 Highway Traffic Estimation

The project team was unable to obtain firm estimates highway subscribers, the number of channels they use today, and assumptions regarding the expected loading they will impose on the system. In place of data, the following assumptions have been relied upon.

- There are 32 local governments listed including NYS DOT
- There will be four shared highway talkgroups. (This is an arbitrary quantity; however, the actual quantity should be intentionally set low to limit impact to public safety access.)
- The priority of all non-emergency highway talkgroups should be set at a lower priority than that of public safety talk groups to prevent them from tying up system capacity with non-public safety use.
- Assume that during peak highway activity, highway talkgroups will occupy not more than 0.5 channel capacity (0.5 Erl).

If any of these assumptions is found to be incorrect, then this analysis should be reviewed to determine if a different number of channels is warranted. It should be noted that the impact of highway traffic may also be tempered based upon fleet-mapping configuration strategies aimed at limiting excess use of the system's capacity.

E5 Recommended Quantity of System Channels

Figure 7 illustrates how various traffic thresholds force the number of channels required to maintain public safety grade of service (GOS) performance levels[7]. It also illustrates how much excess capacity the system may have once the number of channels for the future system has been decided.

Using the measured public safety peak traffic load of 0.55 Erl plus 0.5 Erl of highway traffic as a point of reference, Figure 7 below shows that either 3 channels operated in TDMA (P25 Phase 2) or 5 channels operated in P25 FDMA (P25 Phase 1) are required to support the combined traffic while satisfying public safety GOS requirements.

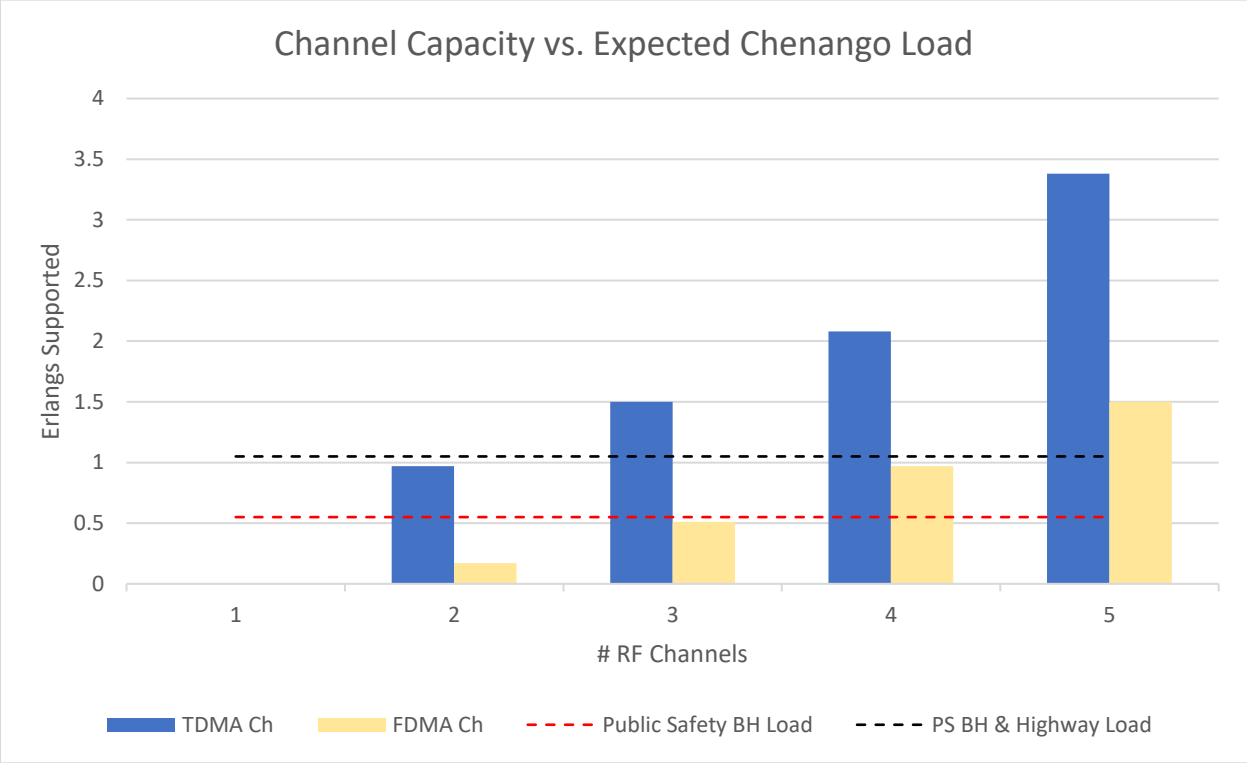


FIGURE 7- REQUIRED CHANNELS AS A FUNCTION OF FDMA/TDMA TECHNOLOGY

Another important consideration when determining the necessary channels is how the system will be affected if one channel fails, or in the case of a TDMA system, if a non-TDMA subscriber is allowed on

[7] For the purposes of analyzing Chenango's channel needs, NYSTEC assumed a GOS requirement of 1% with a maximum queue time of 1 second. This means that no more than 1% of all PTTs will be queued for more than 1 second. This is a typical public safety performance level.

the system since it consumes twice as much capacity as a TDMA subscriber. Since TDMA operation provides two talk paths per channel, it is more adversely affected by either of these conditions.

Referring to the channel performance capabilities illustrated in Figure 7, NYSTEC recommends the following number of channels:

- If implemented as an FDMA (P25 Phase 1) single-cell (countywide) simulcast system, the system should have a minimum of five channels. This provides considerable spare capacity for priority talkgroups, however, if one channel fails, the system will be slightly under sized, which would be most noticed by highway department users. (If implemented as FDMA, six channels would be preferred to support the expected peak capacity even if one channel were temporarily out of service.)
- If implemented as a TDMA (P25 Phase 2) single-cell (countywide) simulcast system, the system should have a minimum of four channels. This provides considerable spare capacity even if one channel fails, or if a very few FDMA talkgroups are allowed on the system, e.g., for mutual aid purposes.
- If implemented as a TDMA (P25 Phase 2) two-cell (e.g., north and south) simulcast system, the system should have a minimum of three channels for each cell. Because each cell's loading can be expected to be reduced from that shown in figure 7, this should provide sufficient spare capacity even if one channel fails, or if a very few FDMA talkgroups are allowed on the system, e.g., for mutual aid purposes. FDMA talkgroup activity should only be enabled on an exception basis.

These recommendations should be revisited if the assumptions for highway department loading is determined to be incorrect.

Lastly, given the challenge of obtaining usable UHF channel pairs, as well as the challenges of optimizing simulcast system performance, NYSTEC recommends that the County seek two sets of three channel pairs each, one set for sites in the north and one set for sites in the south, and to implement them in TDMA mode. Note that the use of "north" and "south" as used here is subjective and merits further discussion in the context of what channels are found to be available for each site and how the sites/channels can be optimally organized into well-performing simulcast cells.

E6 Traffic Load Plots based on Recorded Radio Activity

For the following plots, the vertical axes are in units of cumulative seconds of recording traffic (assumed to equate to radio traffic) per hour interval. Note that 3600 seconds/hour of traffic = 1 Erl. Note that Figures 8 and 9 show a blue and red plot; the red plot represents the corrected public safety recorded traffic whereas the blue includes traffic that is not expected to migrate to the trunked system. Even so, the plots are very similar.

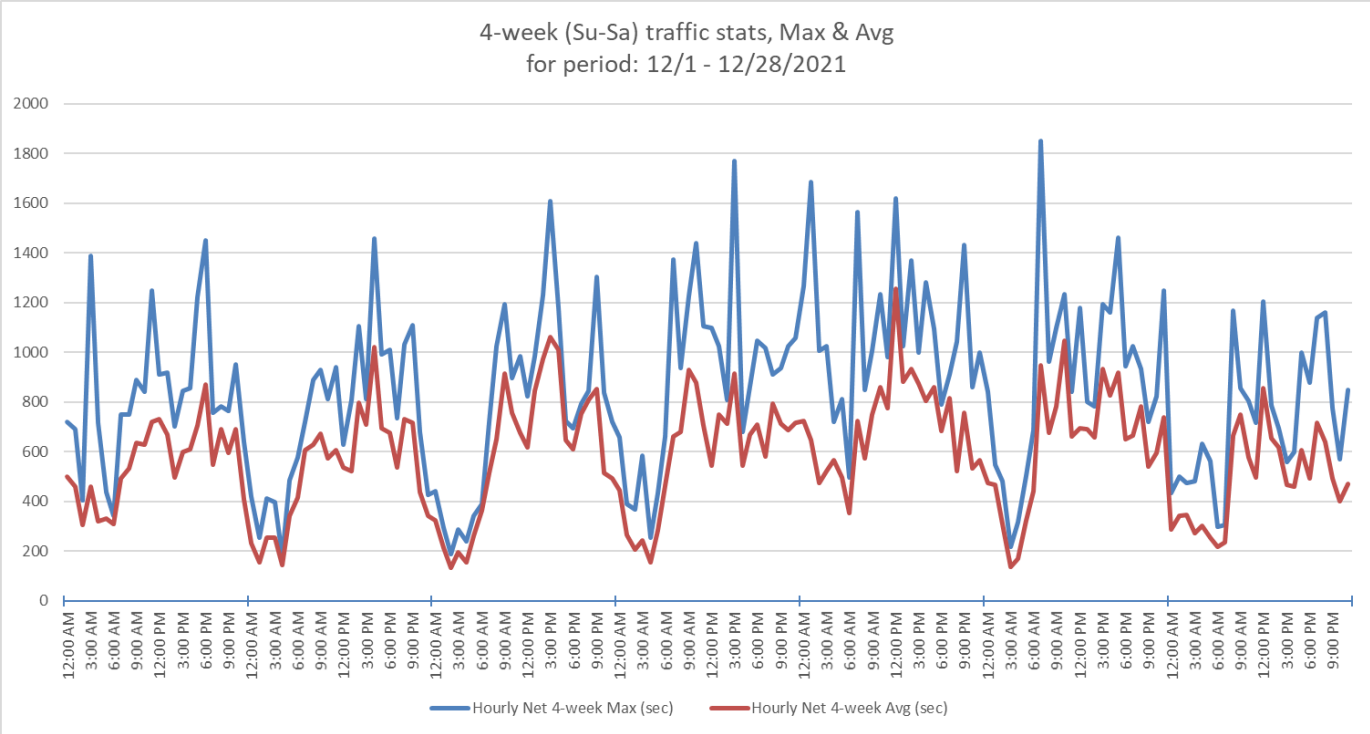


FIGURE 8- 12/1-12/28/2021: RECENT 4-WEEK INTERVAL, NO REMARKABLE EVENTS

Peak measured busy hour over the 4-week interval: 07:00-07:59 on Friday, 12/10/2021 with 1850 secs of active radio traffic (0.51 Erl).

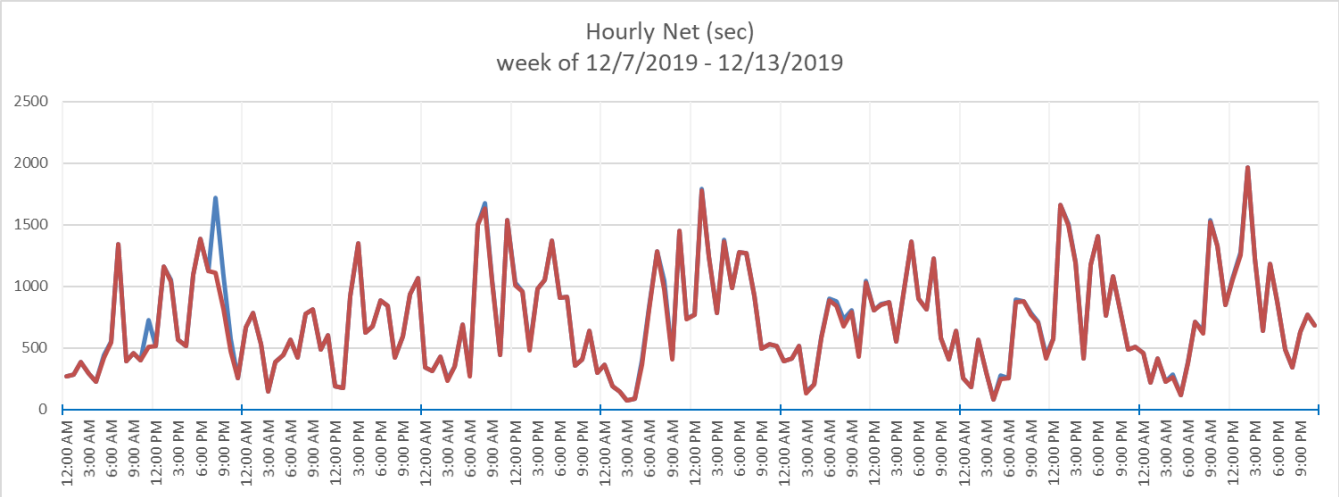


FIGURE 9- 12/7-12/13/2019: 1-WEEK INTERVAL (TUESDAY:MONDAY)PRIOR TO COVID-19 PERIOD

Peak measured busy hour: 14:00-14:59 on Monday, 12/13/2019 with 1968 secs of active radio traffic (0.55 Erl). *Note the blue plot includes non-radio traffic and is n/a.*

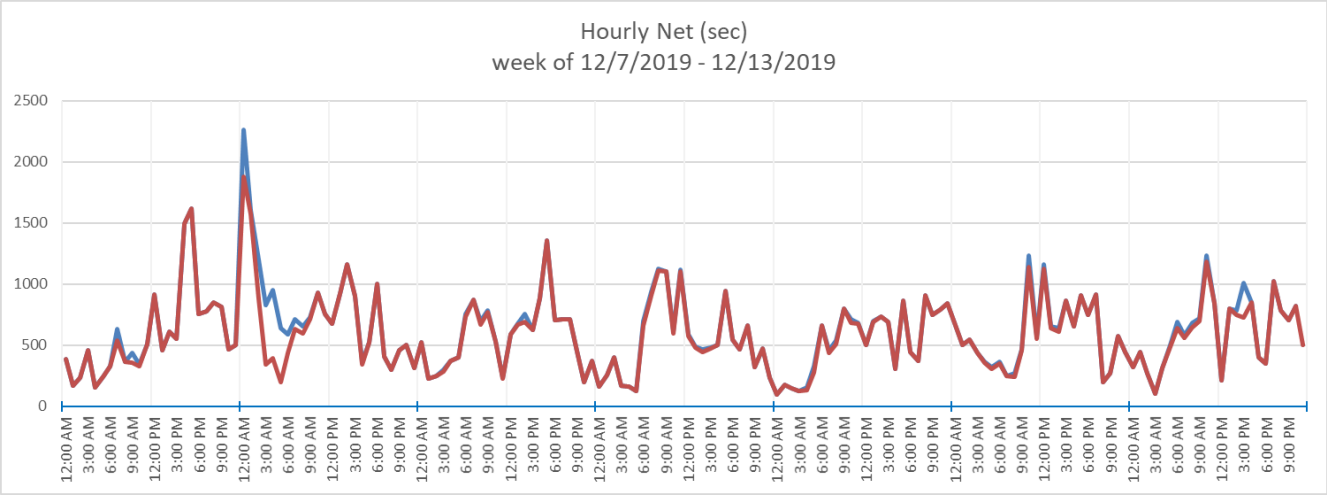


FIGURE 10- 11/27-12/3/2021: 1-WEEK INTERVAL (SATURDAY:FRIDAY) THAT INCLUDED THE "SILO FIRE"

Peak measured busy hour: 00:00-00:59 on Sunday, 11/28/2021 with 1878 secs of active radio traffic (0.52 Erl) – red plot. This peak occurred while responding to the "silo fire" of 11/28/21. Note the blue plot includes non-radio traffic and is n/a.

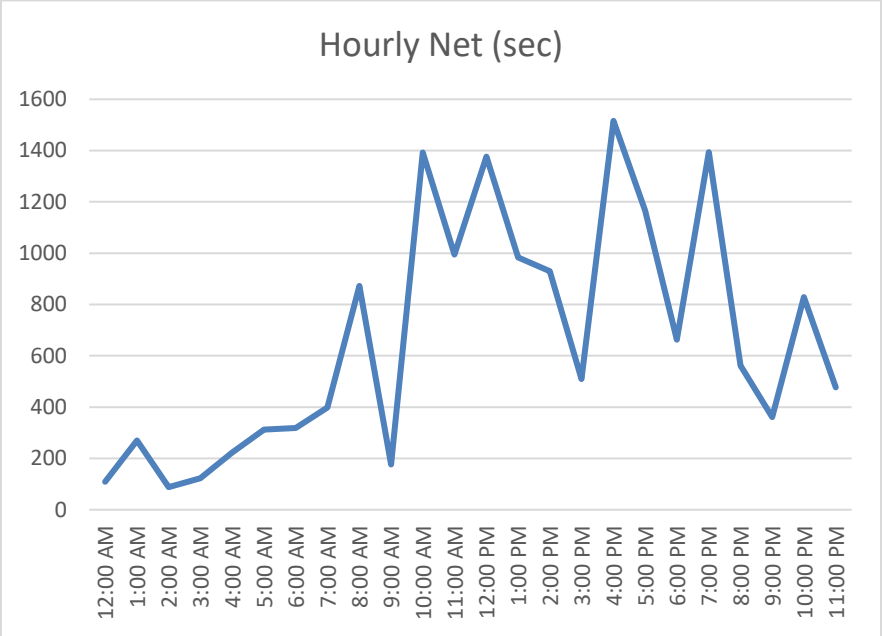


FIGURE 11 - 4/30/2020: FLOODING EVENT

Peak measured busy hour: 16:00-16:59 on 4/30/2020 with 1516 secs of active radio traffic (0.42 Erl). Radio traffic showed multiple similar peaks over a 10-hour interval from 10:00 – 19:59. Note *that this plot still includes some non-radio traffic artifacts; however, since its peaks are still below those of the other events removing those artifacts will not affect the recommended channel count.*

Appendix F Backhaul

F1 Introduction

The County has an existing hot standby hub and spoke microwave network that connects nine sites, as shown in Figure 12. The County's existing microwave network is mostly end of life and requires upgrade or replacement. With the addition of radio sites, this is also an appropriate time to improve overall route plan and seek to achieve a largely protected ring topology. The County requires a complete backhaul system to connect all LMR equipment sites, the P25 Core site, the primary and backup dispatch locations, and any other identified sites that comprise the new system. The backhaul network is to be designed and configured to provide predicted availability commensurate with a public safety critical communications system.

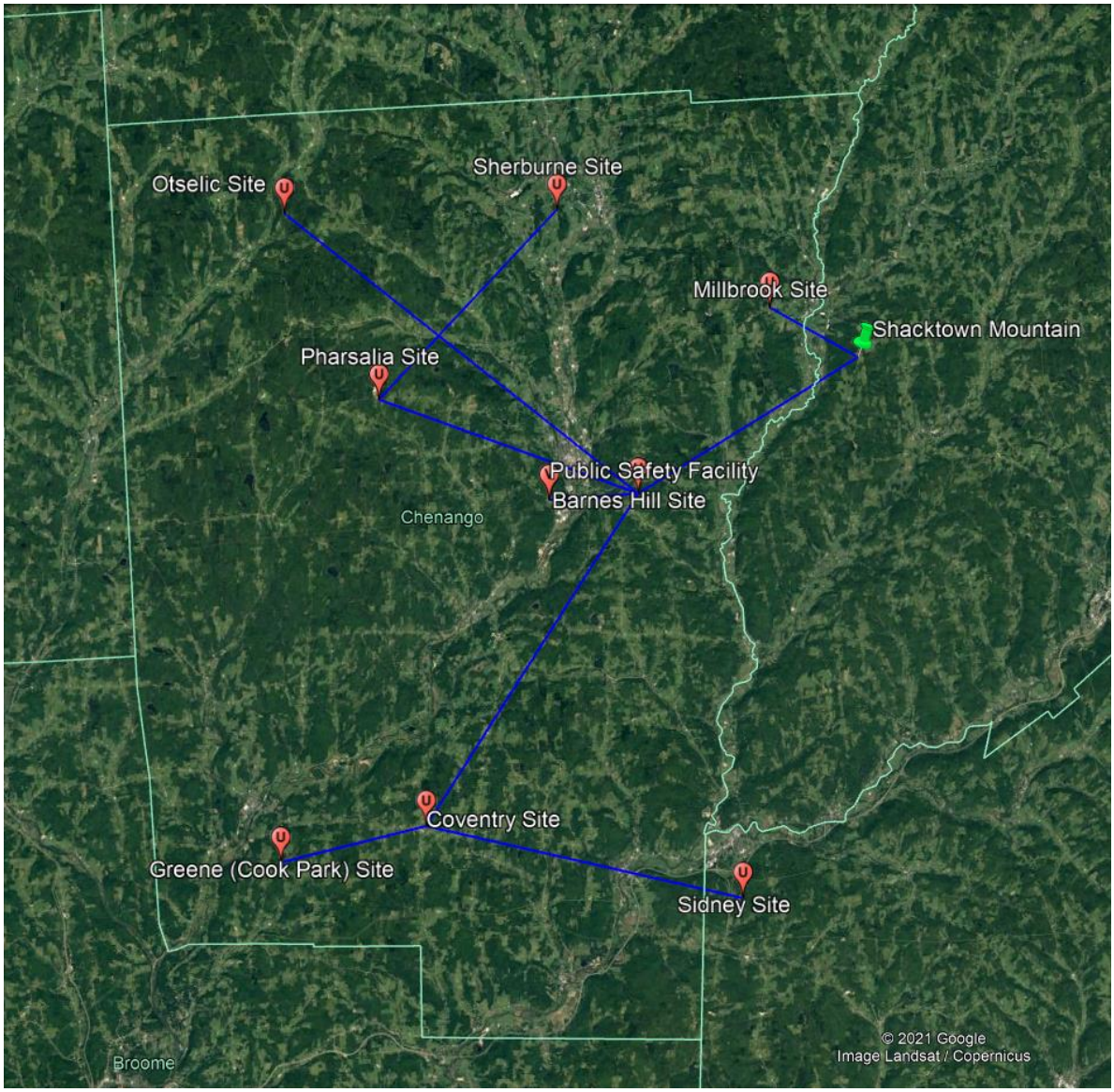


FIGURE 12 – SITES INTERCONNECTED WITH MICROWAVE

IMPORTANT NOTE: In addition to the existing sites and routes, there are also opportunities to connect to and ride on nearby microwave networks owned and operated by neighboring counties (Broome, Delaware, Otsego, Madison, and Cortland) if advantageous to the project. Consideration of these opportunities is important to the County's project team with an interest in the following potential project benefits: better lines of sight, colocation for new LMR site, ring closure, interoperability link. Information regarding the sites and routes of existing public safety backhaul networks may be made available via request to the County project team.

F2 Requirements

The backhaul network shall rely upon microwave connectivity for all critical links. Although microwave is preferred for all links, fiber may be used for non-critical links and redundant links.

The network design shall provide backhaul to all LMR sites and the Primary Dispatch Center. If existing links are planned to be incorporated into the overall network design, whether they are under Chenango County's control or the control of others, these links shall be clearly identified, and their functional and performance requirements needed to support the overall system performance requirements documented and verified to be sufficient. Any additional components and services required to utilize existing links, e.g., interface modules, labor to install, configure, and integrate these links, should be included in the scope.

F2.1 Equipment to be Included

The new/upgraded microwave backhaul IP network shall consist of all equipment necessary to provide a complete microwave system design. Microwave system equipment shall include but not be limited to:

- Transmitter.
- Receiver.
- Modem.
- Power supply to include a backup battery system.
- Antennas and all antenna materials.
- Automatic switching devices such as routers, multiplexers, service channel(s).
- All associated interconnections to provide a complete and functional system.
- Critical spare parts

F2.2 Functional Requirements

The microwave network design should include the following features and design parameters:

- MPLS Protocol
- Network management capability.
- Remote monitoring and provisioning capability.
- Ability to support fiber optic interface.
- Ability to support different data rates.
- Capability of growth and expansion.
- IP interface.

The microwave network shall be fully redundant from a hardware and route diversity (loop protection) perspective.

- The redundancy level built into the microwave design from hardware and route diversity shall have:
  - Redundant microwave radios: each microwave node should be equipped with redundant radio and interface module configuration to support route diversity switching of traffic.
  - Redundant interface module configuration to support route diversity, such as MPLS routers switching traffic as required.
- All microwave system equipment shall be powered from a DC power plant
  - DC power plant shall have 1+1 redundancy to protect against single point failure
  - DC power plants shall be powered by generator-protected AC power, provided by others.
  - Battery runtime shall be capable of supporting at least 10 hours of microwave system operation.
- The microwave management system shall include:
  - Alarm and monitoring capabilities.
  - Troubleshooting capabilities for the microwave system/network.
  - Microwave system diagnostics.
  - Microwave network and equipment configuration.
  - Report generation of historical data such as alarms and other reports.

F2.3 Performance Requirements

Unless specifically stated otherwise, all sites comprising the radio system shall be connected via microwave. Furthermore, all these sites shall be connected in a loop-protected topology unless it is shown to be impractical for a particular site. Any sites unable to be included in the protected loop network shall be configured as monitored hot standby (MHSB) spurs off the loop. The microwave network shall include all equipment needed to support route diversity and to protect against single points of hardware failure in the backhaul network.

Each microwave hop shall be designed to meet or exceed a two-way, end-to-end annual reliability of 99.999%.

Fiber links shall not be used for critical site connectivity unless specifically stated otherwise. Fiber connectivity may be used as backhaul for non-critical systems (Cameras, weather stations etc.).

F2.4 Out of County Backhaul Requirements

As a part of the backhaul design, connectivity to the LMR sites and the system Core is critical. If the Chenango County system will rely upon connectivity via links that are managed by others, the performance of these links must also be considered as a part of the design. This shall include performance attributes including, but not limited to, capacity, latency, jitter, and reliability/availability. Performance requirements shall be based upon minimum link performance requirements required to fully support the vendor's system solution and specified functionality.

F3 Sites List

The County requires a backhaul solution that connects all sites in the system. This includes sites that support P25 system operation, dispatch, paging, microwave relay, as well as fiber solution termination points. The tables listed in Appendix D – Identified Site Candidates lists all sites that potentially require a backhaul solution.

F4 Known Obstructions

Although not yet constructed, a large windmill turbine farm is expected to be built in the Town of Guilford. Twenty-four windmill turbine sites and a permanent MET tower are planned between County Route 36 and State Route 8. Each windmill turbine is projected have a hub height of 120 meters with blade length of 75 meters. The circle formed by the blades is 195 meters at the top and a diameter of 150 meters. The MET tower is 120m guyed tower. The table below is the planned location of each windmill and the MET tower.

TABLE 18 - PROPOSED WINDMILL TURBINE LOCATIONS

Windmill	Latitude	Longitude
MET Tower	42° 24' 27.84"N	75° 25' 06.50"W
Windmill 101	42° 26' 49.85"N	75° 29' 55.50"W
Windmill 102	42° 26' 31.99"N	75° 29' 20.68"W
Windmill 103	42° 26' 15.74"N	75° 28' 29.57"W
Windmill 104	42° 26' 48.64"N	75° 28' 15.89"W
Windmill 105	42° 27' 27.55"N	75° 28' 27.55"W
Windmill 106	42° 26' 58.57"N	75° 27' 44.65"W
Windmill 112	42° 27' 45.28"N	75° 26' 03.47"W
Windmill 113	42° 27' 43.24"N	75° 25' 41.83"W
Windmill 115	42° 27' 00.30"N	75° 25' 45.88"W
Windmill 117	42° 26' 51.84"N	75° 25' 05.90"W
Windmill 118	42° 26' 47.49"N	75° 24' 33.68"W
Windmill 120	42° 26' 09.61"N	75° 25' 19.29"W
Windmill 121	42° 26' 02.33"N	75° 24' 32.38"W
Windmill 122	42° 26' 06.98"N	75° 27' 29.32"W
Windmill 123	42° 26' 24.65"N	75° 27' 30.98"W
Windmill 124	42° 26' 38.81"N	75° 26' 53.24"W
Windmill 126	42° 25' 06.08"N	75° 24' 47.78"W
Windmill 127	42° 25' 11.88"N	75° 24' 25.71"W
Windmill 128	42° 25' 03.55"N	75° 24' 07.54"W
Windmill 129	42° 24' 48.93"N	75° 24' 43.67"W
Windmill 131	42° 24' 44.55"N	75° 25' 07.34"W
Windmill 133	42° 24' 32.56"N	75° 24' 51.55"W
Windmill 134	42° 24' 13.10"N	75° 25' 01.42"W
Windmill 135	42° 23' 52.23"N	75° 25' 05.21"W

Appendix G Subscriber Units

G1 Introduction

"Subscriber" is the Land Mobile Radio (LMR) generic term used in referring to user devices, such as mobile radios, portable radios, desktop control stations, pagers, etc.

Many factors need to be considered in purchasing or obtaining subscribers; the type of user (e.g., law enforcement, EMS, fire suppression, etc.), the environmental conditions such as temperature, moisture conditions (e.g., rain, full submersion, etc.), and the area radio coverage expectations, among other factors.

Chenango County, NY, will be supporting a variety of agencies with the new LMR system. Some of these agencies and users work with neighboring counties and will require subscribers to interoperate with these entities.

G1.1 Requirements covering all Public Safety user groups

System coverage reliability (refer to Appendix C) is based upon portable radios being at hip level with design-specified antennas. If the radios are configured or operated differently, this may result in a reduction in system coverage reliability in fringe coverage areas.

It is expected that all Law Enforcement, Fire Suppression, and Emergency Medical Service users (Public Safety Users) will be using their portable radios at hip level, in a leather carrying case that is either attached at their hip with a belt loop or using a shoulder strap. In the scenario that the radio is used at hip level, the user will operate the radio using a remote speaker-microphone attached to the portable radio.

Both the mobile and portable radios shall support the use of the national interoperability channels (in the specific band the radio is capable of). If the radio is multi-band, all appropriate interoperability channels will be programmed, and local interoperability as specified in Appendix I – Interoperability.

G1.2 Status/Messaging

The County will use their existing Mobile Data Computers (MDC) for status and messaging.

G1.3 Unit ID and Emergency Signaling

Subscriber units shall be capable of transmitting a unit identification when transmitting and sending an emergency message by pushing an “emergency button” on the device (signals). The specific subscriber identification number (ID) shall be chosen by The County during programming (see Section G6.2). These signals shall be transported by the radio system and presented to the dispatcher so the specific unit can be readily identified by the ID. An emergency signal shall be presented to the dispatcher in a manner that shows that an emergency signal was sent as described in Appendix H. An emergency signal can be canceled by pressing and holding the emergency button on the subscriber.

G1.4 Portable Radio Rack (Gang) Chargers

Portable radio rack chargers shall be provided. The vendor shall propose a quantity of chargers adequate to support the number of portable radios with 20% spare batteries per agency.

G1.5 Environmental Factors

Portable radios and batteries shall be rated at a minimum of IP67 and have been tested to applicable Military Standards MIL-STD 810C, D, E, F, and G. Specific MIL-STD 810 methods and procedures testing results to be provided if requested by The County.

It is preferred that the Portable Radio Remote Speaker Microphones (RSM) meet or exceed the portable radio rating of IP67. However, the RSM shall be no less than IP54 rated.

Portable radios will be subject to extreme temperature variations and must have an operating range of minus 30 degrees Celsius (-22F) to plus 60 degrees Celsius (+140F)

Mobile radios shall be rated at a minimum of IP56 and have been tested to applicable Military Standards MIL-STD 810C, D, E, F, and G. Specific MIL-STD 810 methods and procedures testing results to be provided if requested by The County.

Mobile radios will be subject to extreme temperature variations and must have an operating range of minus 30 degrees Celsius (-22F) to plus 60 degrees Celsius (+140F)

G2 Law Enforcement (LE)

G2.1 Mobile Radios

Law enforcement vehicles will require a mobile radio mounted in the vehicle. The determination of how the radio will be installed, including whether it shall be used as a “dash mount” (radio and control head attached as a single unit) or as a “remote mount” (radio chassis mounted in a secure area and connected to the control head via a control cable or similar) shall be determined by the County during design reviews. The radio antenna model will be of the type to support coverage performance reliability consistent with Appendix C – Coverage Requirements.

G2.2 Portable Radios

Law enforcement users will require a portable radio. As described in G1.1, the portable radio will be operated at hip level, secured in a leather case with either a belt loop or shoulder strap. A remote speaker-mic will be provided to operate the radio. The remote speaker-mic will be equipped with an “emergency button” as described in G1.3. The radio antenna model will be of the type to support coverage performance reliability consistent with Appendix C – Coverage Requirements.

G2.2.1 Portable Radio Operating Environment

The portable radio will be exposed to various weather conditions and must endure temperature extremes as well as moisture ingress. The portable radio shall withstand and continue to operate reliably in any ambient outside environment that is expected within The County. See section G1.5.

G2.2.2. Portable Radio Accessories

Portable radio cases, straps, single unit chargers, and spare batteries may be purchased by the individual agencies. Radio cases provided with shoulder straps shall also include anti-sway straps for optional use. Cases, straps, single unit chargers, and spare batteries shall be listed as an option with separate pricing.

G2.3 Desktop Radios/Control Stations

For locations requiring a desktop radio, one shall be provided, inclusive of a speaker, desk microphone, power supply, antenna, and cable. Installation shall be done in compliance with NFPA, IEEE, and TIA standards as well as the manufacturer’s grounding and bonding standards. All planned desktop installations shall be evaluated for coverage reliability performance to determine minimum antenna

gain and installation height needed to support reliable system coverage operation (and localized talk-around operation, if applicable).

G2.4 Vehicle Repeater Systems

No vehicle repeaters will be needed for LE units.

G2.5 Encryption

All LE radios will require AES-256 single key and multi-key encryption as separate options.

G2.6 LE User Agencies

Table 19 lists the Law Enforcement Department users in Chenango County as of 2022. The quantities in Table 19 are to be used as an estimate for subscriber radios and is subject to change.

TABLE 19 - LAW ENFORCEMENT SUBSCRIBER QUANTITIES

USER	PORTABLES	MOBILES	BASES
Chenango County Sheriff's Office	69	34	2
Norwich PD	26	7	2
Afton PD	5	1	1
Bainbridge PD	6	2	1
New Berlin PD	5	3	1
Greene PD	4	2	0
Oxford PD	5	2	0
Sherburne PD	4	2	1
Total:	**124**	**53**	**8**

G3 Fire Suppression (Fire)

G3.1 Mobile Radios

Fire apparatus and vehicles will require a mobile radio mounted in the vehicle. The determination of how the radio will be installed, including whether it shall be used as a "dash mount" (radio and control

head attached as a single unit) or as a “remote mount” (radio chassis mounted in a secure area and connected to the control head via a control cable or similar) shall be determined by the County during design reviews. The radio antenna model will be provided and installed to support coverage performance reliability consistent with Appendix C.

G3.1.1 Dual Control Head Operation

Pumpers may require a dual control head mobile mount radio. Installation location of the control heads will be determined at the time of installation and may vary by each user agency. Vendor shall provide optional pricing for dual control head operation.

G3.2 Portable Radios

Firefighters will require a portable radio. As described in G1.1, the portable radio will be operated at hip level, secured in a leather case with either a belt loop or shoulder strap. An anti-sway strap shall be provided for cases using the shoulder strap for optional use. A remote speaker-mic will be provided to operate the radio. The remote speaker-mic will be equipped with an “emergency button” as described in G1.3. The antenna provided shall support performance as specified within Appendix C – Coverage Requirements.

G3.2.1 Fire Specific Requirements

Firefighters place unique demands on portable radios. Operation within hazardous environments while wearing specialized gear and carrying equipment and tools, require specific operational requirements. It is expected that the portable radio provided is designed for firefighter use, inclusive of the following requirements:

- It will be used with a remote speaker-microphone (speaker-mic). The speaker-mic must be able to support continuous operation in firefighting environments
- Both the radio and speaker-mic must provide noise reduction on transmit audio
- Bluetooth connectivity to Self-Contained Breathing Apparatus (SCBA) would be considered.
- Portable subscribers operating on a conventional simplex fireground channel shall be able to send an emergency signal (“mayday”) that is received on other conventional simplex fireground subscribers operating in the vicinity. The units receiving the mayday shall show the unit ID of the mayday (if the subscriber has a display) and generate an audible alarm that alerts the firefighter that a mayday was sent.

G3.2.2 Portable Radio Accessories

Portable radio cases, straps, single unit chargers, and spare batteries may be purchased by the individual agencies. Radio cases provided with shoulder straps shall also include anti-sway straps for optional use. Cases, straps, single unit chargers, and spare batteries shall be listed as an option with separate pricing.

G3.3 Desktop Radios/Control Stations

For locations requiring a desktop radio, one shall be provided, inclusive of a speaker, desk microphone, power supply, antenna, and cable. Installation shall be done in compliance with NFPA, IEEE, and TIA standards as well as the manufacturer's grounding and bonding standards. All planned desktop installations shall be evaluated for coverage reliability performance to determine minimum antenna gain and installation height needed to support reliable system coverage operation (and localized talk-around operation, if applicable).

G3.4 Vehicle Repeater Systems

No vehicle repeaters will be needed for fire units operating in the county.

G3.5 Pagers

It is expected that the county will continue to use the existing paging system and pagers. Proposer shall provide optional pricing for additional paging devices that will integrate with the existing paging system.

G3.6 Fire User Agencies

Table 20 lists the Fire Department users in Chenango County as of 2022. The quantities in Table 20 are to be used as an estimate for subscriber radios and is subject to change.

TABLE 20 – FIRE DEPARTMENT SUBSCRIBER QUANTITIES

USER	PORTABLE RADIOS	SINGLE HEAD MOBILES	BASE RADIOS
Afton FD	20	16	1
Bainbridge FD	19	110	1
Brisben FD	20	7	1
Chenango Cty Bur of Fire	60	11	0
Coventry FD	16	7	1
Earlville FD	20	7	1
Greene FD	35	5	1
Guilford FD	20	5	1
McDonough FD	13	4	1
Mount Upton FD	26	6	2
New Berlin FD	30	10	2
North Norwich FD	15	6	1
Norwich City FD	70	13	3
Oxford FD	37	10	2
Pharsalia FD	20	7	1
Plymouth FD	23	6	1
Preston FD	20	7	1
Sheburne FD	27	7	1
Smithville FD	16	4	1
S. New Berlin FD	30	9	1
Smyrna FD	20	7	1
South Otselic FD	22	6	1
Totals:	579	170	26

G4 Emergency Medical Services (EMS)

G4.1 Mobile Radios

Emergency Medical Service vehicles and ambulances will require a mobile radio mounted in the vehicle. The determination of how the radio will be installed, including whether it shall be used as a “dash mount” (radio and control head attached as a single unit) or as a “remote mount” (radio chassis mounted in a secure area and connected to the control head via a control cable or similar) shall be

determined by the County during design reviews. The antenna provided will support coverage performance reliability consistent with Appendix C.

It should be noted that some fire departments run EMS calls. For those entities it might be necessary to procure Fire-style subscribers. Refer to section G3.

G4.1.1 Dual Control Head Operation

No dual control head radios will be needed for EMS users.

G4.2 Portable Radios

Emergency Medical Service users will require a portable radio. As described in G1.1, the portable radio will be operated at hip level, secured in a leather case with either a belt loop or shoulder strap. An anti-sway strap shall be provided for cases using the shoulder strap for optional use. The operator will use a remote speaker-mic to operate the radio. The antenna provided shall support performance as specified within Appendix C – Coverage Requirements.

G4.2.1 Portable Radio Operating Environment

The portable radio will be exposed to various weather conditions and must endure temperature extremes as well as moisture ingress. The portable radio shall withstand and continue to operate reliably in any ambient outside environment that is expected within The County.

G4.2.2 Portable Radio Cases, Straps, Single Unit Chargers, and Spare Batteries

Portable radio cases, straps, single unit chargers, and spare batteries may be purchased by the individual agencies. Radio cases provided with shoulder straps shall also include anti-sway straps for optional use. Cases, straps, single unit chargers, and spare batteries shall be listed as an option with separate pricing.

G4.3 Desktop Radios/Control Stations

For locations requiring a desktop radio, one shall be provided, inclusive of a speaker, desk microphone, power supply, antenna, and cable. Installation shall be done in compliance with NFPA, IEEE, and TIA standards as well as the manufacturer's grounding and bonding standards. All planned desktop installations shall be evaluated for coverage reliability performance to determine minimum antenna gain and installation height needed to support reliable system coverage operation (and localized talk-around operation, if applicable).

G4.4 Vehicle Repeater Systems

No vehicle repeaters will be needed for EMS units.

G4.5 Pagers

It is expected that the county will continue to use the existing paging system and pagers. Proposer shall provide optional pricing for additional paging devices that will integrate with the existing paging system.

G4.6 EMS User Agencies

Table 21 lists the Emergency Medical Service users in Chenango County as of 2022. The quantities in Table 21 are to be used as an estimate for subscriber radios and is subject to change.

TABLE 21 - EMS SUBSCRIBER QUANTITIES

USER	SINGLE HEAD MOBILES	PORTABLE RADIOS	BASE RADIOS
Greene EMS	**6**	**6**	**0**
New Berlin Ambulance	**2**	**1**	**0**
Coventry EMS	**2**	**2**	**0**
County EMS	**7**	**8**	**0**
Totals:	**17**	**17**	**0**

G5 Public Works – Highway

G5.1 Mobile Radios

Department of Public Works (DPW) and Highway maintenance vehicles will require a mobile radio mounted in the vehicle. The determination of how the radio will be installed, including whether it shall be used as a “dash mount” (radio and control head attached as a single unit) or as a “remote mount” (radio chassis mounted in a secure area and connected to the control head via a control cable or similar) shall be determined by the County during design reviews. The radio antenna provided will support coverage performance reliability consistent with Appendix C.

G5.2 Portable Radios

Certain users will require a portable radio. As described in G1.1, the portable radio will be receiving at hip level, secured in a leather case with either a belt loop or shoulder strap and transmitting from hip level. A Speaker Mic will not be utilized. The vendor shall supply the proper antenna to deliver coverage performance reliability consistent with Appendix C – Coverage Requirements.

G5.2.1 Portable Radio Accessories

Portable radio cases, straps, single unit chargers, and spare batteries may be purchased by the individual agencies. Radio cases provided with shoulder straps shall also include anti-sway straps for optional use. Cases, straps, single unit chargers, and spare batteries shall be listed as an option with separate pricing.

G5.3 Desktop Radios/Control Stations (Bases)

For locations requiring a desktop radio, one shall be provided, inclusive of a speaker, desk microphone, power supply, antenna, and cable. Installation shall be done in compliance with NFPA, IEEE, and TIA standards as well as the manufacturer's grounding and bonding standards. All planned desktop installations shall be evaluated for coverage reliability performance to determine minimum antenna gain and installation height needed to support reliable system coverage operation (and localized talk-around operation, if applicable).

G5.4 Vehicle Repeater Systems

No vehicle repeaters will be needed for Highway or DPW users.

G5.5 Highway and DPW Users

Table 22 lists the Highway and DPW users in Chenango County as of 2022. The quantities in Table 22 are to be used as an estimate for subscriber radios and is subject to change.

TABLE 22 - DPW / HIGHWAY SUBSCRIBER QUANTITIES

HIGHWAY DEPARTMENT USER	PORTABLES	SINGLE HEAD MOBILES	BASES
Afton Highway	0	7	0
Bainbridge Highway	0	7	0
Columbus Highway	3	9	1
Coventry Highway	2	13	1
German Highway	0	5	1
Greene Highway	7	23	3
Guilford Highway	0	13	1
Lincklaen Highway	1	8	0
McDonough Highway	4	7	1
New Berlin Highway	2	15	1
North Norwich Highway	8	2	2
Norwich Highway	15	5	0
Otselic Highway	1	8	1
Oxford Highway	0	8	0
Pharsalia Highway	7	4	0
Pitcher Highway	1	8	0
Plymouth Highway	1	12	1
Preston Highway	0	7	0
Sherburne Highway	15	5	0
Smithville Highway	6	8	1
Smyrna Highway	0	12	0
Afton Village DPW	3	2	0
Bainbridge Village DPW	3	2	0
Earlville Village DPW	3	2	0
Greene Village DPW	3	2	0
New Berlin Village DPW	5	0	1
Oxford Village DPW	3	2	0
Sherburne Village DPW	6	15	3
City of Norwich DPW	20	40	3
Chenango County Highway	21	78	2
Totals:	140	329	23

G6 Installation and Programming

G6.1 Installation

Installations are to be performed to the following minimum specifications and requirements

G6.1.1 Vehicle Antennas

Vehicle antennas shall be installed with a proper ground plane. If the vehicle itself cannot provide a ground plane (e.g., Fiberglas) then a ground plane plate or metallic disk designed for such use shall be installed to provide a proper ground plane.

The antenna line shall be one contiguous run from antenna to radio; no splices are allowed. Connectors shall be of the proper type for the radio and antenna; no adapters shall be used.

The antennas shall not allow for more than 10% reflected power and should provide an omnidirectional radiation pattern as practically as possible. Antennas shall be separated from each other or from metal vehicle parts by a minimum of 6 inches.

G6.1.2 Power and other Cabling

Power shall be installed as recommended by the manufacturer. The County may require other power protections depending on vehicle (e.g., shut down timers). Unless specified differently by the manufacturer, all cables shall be placed in protective flexible conduits (loom) and/or secured in protected environments as practically as possible.

G6.1.3 Airbag and Personnel Safety

Dash mount radios or radio control heads, microphones, speakers, and other user devices shall be installed so not to interfere with the proper operation of personnel safety devices, such as airbags and seat belts.

G6.2 Programming

Subscriber programing is to be performed to the following minimum specifications and requirements.

G6.2.1 General Programming

The County expects that all supplied radios will have the same flash code or internal software version for each radio model so not to need different versions of codeplug software to support programming (i.e., all individual models will use the same programming software, etc.).

G6.2.2 Agency Programming

Each agency or user group will require an individual codeplug. The County will require, at minimum, the following configurations

TABLE 23 - CODEPLUG CONFIGURATION EXAMPLES

LAW ENFORCEMENT	FIRE	EMS	PUBLIC WORKS/HIGHWAY
Deputy Sheriff	Firefighter	EMT/Paramedic	Operator/Laborer
Supervisor	Fire Officer	EMS Officer	Supervisor
Sheriff	Fire Chief	EMS Chief	
Corrections Officer			

In addition to these general configurations, specific users may require a unique codeplug configuration.

The County would optionally consider subscriber Programming over P25 (PoP25).

G7 Warranty, Subscriptions, Discontinuance

G7.1 Warranty

The warranty period will commence when the system is cut over or the radio is installed, programmed, and operating providing beneficial use to the county, whichever is later.

G7.2 Subscriptions

The radio programming software shall be provided to the County, along with all system keys and related hardware, firmware, codeplugs, or software needed to program, configure, operate, and secure the radios.

For any software requiring a subscription, a three-year subscription shall be provided as part of the purchase.

G7.3 Discontinuance

The radio models shall be of current production and shall not be discontinued for a minimum of two years after beneficial use by The County.

Parts, labor, software, firmware, and service shall not be discontinued by the manufacturer before three years after discontinuance of the production of the purchased models.

Appendix H Dispatch

H1 Introduction

The County desires to replace the existing communications dispatch console.

The Dispatch Console shall be expandable to easily accommodate growth and expansion. This includes the number of sites, the number of external radio system interfaces, and the number of operator positions. A single point of failure shall not inhibit or interrupt console operations.

The new system shall be developed, installed, and tested in a manner that provides for continued, uninterrupted full featured communications of the current systems during system cutover. The new system shall be installed while the current systems are still in place and operating. The Contractor shall carefully plan and develop a detailed design and system cutover plan to ensure the continuous operation of both systems throughout system cutover.

Following the installation period, a training period shall follow, where management, telecommunicators and technical support staff are to become familiar with the new system's operations prior to cutover. Additionally, training resources will be provided to the County for the purpose of continuing education.

As an option [priced separately], The Proposer shall provide a cost to remove the current console.

As an option [priced separately], The County desires a system that incorporates primary and backup servers at two geographically separated locations to help minimize the chance of a server failure forcing the system into a failure mode. The locations include and the backup at an alternate location to be determined. The Proposer shall describe their method of providing redundancy in their Proposal.

No loss of system functionality shall be suffered due to geographic separation of components.

A list of dispatch locations in Chenango County follows below. The quantities in this table are suitable for budgetary purposes only and will be refined in the future.

H1.1 Console Locations

Six (6) radio console positions to be installed at the primary dispatch location at the Chenango County Sheriff's Office.

Two (2) radio console positions to be installed at the Norwich Police Department, 2nd floor (backup location).

As an option [priced separately], a laptop or other remote positions may be proposed for the backup location.

TABLE 24 - ESTMATE OF DISPATCH POSITION NEEDS BY AGENCY

Locations	Full-featured positions (primary)	Back-up positions	Desktop
Chenango Dispatch Center	6		
Norwich Police Department (Back up Dispatch Location)	2		

H2 Requirements

H2.1 Equipment to be included

Each full featured position will include the following equipment/interfaces:

- Desktop Minicomputer.
- 19-inch Touch Screen Monitor.
- Audio Interface Module (AIM).
- Three (3) Speakers.
- Two (2) Headset Jacks.
- One (1) Gooseneck Microphone.
- One (1) Dual Pedal Footswitch.
- One (1) Secure Module along with multi-key AES Encryption License.
- Fully customizable GUI

H2.2 Console Architecture

The new console system shall be Ethernet/IP based and shall be capable of full-featured support of County operations, the following primary functions and services shall be provided:

1. Operate and control the proposed channel resources plus 20% growth.
2. Existing UHF conventional analog stations on the system; multiple channel base stations and TAC channels; the Proposer shall provide the required gateway interfaces to accommodate these units.
3. Radio Dispatch on County conventional channels from new consoles at the existing 911 Center as well as the remote operating position at the backup facility.

H2.3 System Equipment and Software

The dispatch console shall be comprised of the following components:

Server/CPU and system software [server]; audio processor for analog and digital inputs/outputs; console operating positions - local and remote; and RF station gateways.

All system elements shall be fully configurable via a password-protected administrator software application over a network connection, whether located on the local network or over a VPN.

The system shall be capable of deploying configuration changes to the Console Positions over the network that takes effect immediately without restarting system elements. Solutions that require each system element to be separately administered may not acceptable due to maintainability issues.

H2.4 Console Server/CPU

The system shall be provided with Server/CPU call processor [redundancy as an option] that interfaces to all system RF stations and consoles using IP. This equipment shall be server grade with redundant power supplies and redundant NICs

The Server shall communicate and arbitrate control to all shared system resources, including base stations, VoIP telephone, and radio remote controller without incurring performance penalties.

Server administration shall be protected by user authentication. All updates and modifications shall take effect immediately after editing. Rebooting the gateway and/or console positions to enable a configuration change is unacceptable.

The Server shall be deployed in a redundant configuration with automatic failover capability to ensure continuous uptime.

Failover capability shall provide a highly resilient system design that can continue to operate in numerous disaster or failure scenarios. Such redundant capability shall ensure that all RF stations continue to be available for uninterrupted control from all console positions.

H2.4.1 Server Requirements

- Redundant power supplies
- Redundant NICs
- Solid State Drives
- RAID 10 HD configuration
- RAID with SD card
- 8GB RAM - minimum
- DRAC - Remote System Management

- Active Directory Domain integration

H3 Dispatch Console Positions

Each console position shall physically consist of a workstation, a dedicated processor, audio peripherals, monitor, footswitch, dual headset jacks and input device.

As an option, the console position's workstation [desktop or small form factor] shall be capable of remote installation, rack-mounted in the equipment room with all necessary cabling and interface/extension equipment required for remote operation.

The monitor shall display a graphical representation of RF stations, menus, controls, and system resource icons. Control of the user interface shall be via any workstation compatible pointing device.

Console software shall operate under a 64-bit operating system.

The console position equipment shall connect to the system gateway via 1000BASE-T Ethernet to access RF stations or other consoles.

The console graphical user interface shall be configurable by administrator software to include system control buttons, audio level controls, and RF resources. All aspects of the console presentation and operation parameters shall be configured from the administrator software and downloaded to the console position.

A standard PC workstation shall be provided with each console position. The provided workstation shall contain a dual NIC interface to support redundant network connections for enhance reliability.

At each operator position, the contractor shall provide position headset arbitration so that all contractor provided functionality audio are present in a single headset.

The console shall support Plantronics wired and wireless headset with noise cancelling.

The console shall be able to provide cross muting function, including:

1. Console audio muting of nearby consoles speakers [or headset] when transmitting.
2. Channel audio muting of nearby consoles select or unselect speakers [or headset] when transmitting on a specific channel.
3. Console audio cross-muting between the Contractor-provided consoles and existing COUNTY consoles.

Each console position shall be capable of enabling user authentication to provide free seating of console operators. The free seating feature shall allow console operators to log in at any console and receive their unique configuration.

Each console position shall be configurable to display and/or access multiple unique user screens. These screens shall present the console operator with the RF stations, radio controls, and informational resources in the form of "electronic push buttons" [button] labeled with names and status colors.

Display and/or access items include:

1. Logging & Instant recall Recorder [IRR] recording functions. IRR must be selective based upon the resource and not a position recording
2. Patch function
3. Multi-select

Each screen shall be administrator configurable to display any combination of RF stations and/or controls, screen change shortcut [button], pop-up windows, call queues, activity history or a variety of other functions at any location on a screen.

Button size, colors, text, and fonts shall be programmable on a per object basis. Background highlights, images and selectable colors shall be available to accent application workspace groupings.

RF station graphic shall display the authorized RF stations available to the operator at a particular console.

RF station status shall be shown in a separate text field for select, unselect, multi-select, patch, monitor, hold, busy and mute.

A call on a resource shall display flashing on that resource button for the duration of the call. The RF stations button color shall be used to identify RF stations status condition so that overall console status can be determined at a glance.

There shall be different RF stations status colors to identify the following conditions: select, unselect, multi-select, patch, monitor, busy and mute.

Each RF station shall have an individual volume setting for the Select state and Unselect state. This volume level shall be retained when toggling the RF stations between different states and have an administrator configurable minimum level to prevent muting entirely. The volume level shall only affect a single console position.

A location configurable RF station receive audio indicator window shall be present to aid in visual identification of active audio on a specific RF station. The RF station’s activity window background normally will be one color; and another color when Receive Audio is present; and shall be a third color during active transmit. The system shall allow configurable icons to be added to RF station buttons enabling visual call indication to associate the call with the corresponding RF station.

The system shall support the display of programmable 12/24-hour clocks, a master PTT status bar, and VU meter.

Contractor shall synchronize the time-of-day clock to an external time source using industry standard Network Time Protocol method to be provided in this proposal.

All resources shall have individually settable audio level adjustments for select and unselect conditions.

Console audio level presented to the console operator headset shall have memory such that when returned to a given state [select or unselect] the audio level returns to the level last used when in that state.

The console shall support multi-key AES encryption.

The console position audio processor shall provide operator audio, all peripheral interfacing for headsets, desk microphone, and speaker audio. The processor shall be configurable to support interfaces for a select and unselect speaker, two microphone devices (headset or desk microphones).

Audio peripherals shall be connected to the audio processor using industry standard USB connectors. Additionally, USB connected relays shall be available as an option to provide workstation state indications to external display devices.

The system shall support the following I/O controls at a minimum: ten [10] I/O to be shared by all operators at that facility and two [2] individual I/O's for each position.

H3.1 Supervisor Position

The system shall provide a console monitor capability designated as supervisor console.

When configured, this function shall allow the supervisor's console to activate the function and select one or more other consoles to monitor.

While activated, the monitoring console shall hear all conversations in the monitored console's selected RF stations.

H3.2 Remote Operating Positions [option]

The dispatch console system shall be capable of remote operation. Remote operation will consist of a PC, laptop, or desktop, loaded with the appropriate contractor supplied software and connected to the radio infrastructure network to operate as a fully functional operator position.

All the functionality provided at the operator positions at the communications center shall be functional at the remote location. The remote console position must be functional whether connected to the radio infrastructure network directly, or VPN connection over the COUNTY's network. The remote console connectivity must be properly firewalled to protect the integrity of the network and radio infrastructure networks.

H3.3 Speakers and Headsets

Speakers: The console speakers shall be capable of providing audio and power from the audio processor. Each speaker shall have an individual volume control. The speaker shall be configurable so the volume control cannot fully mute the speaker output. Each speaker shall feature a multi-colored LED to indicate power and receive audio activity.

Each position shall include select and unselect speakers. Each position shall have the capability to add four (4) additional speakers.

Headset Jack Box: The headset jack box shall be designed to mount in proximity and accommodate headsets devices with an industry standard tip/ring/sleeve plug. The jack box shall be equipped with a single Ethernet patch cable providing audio and power from the audio processor. The jack box shall provide an industry standard PJ 327 dual tip/ring/sleeve jack supporting 4W [PTT] operation. The jack box shall provide an input for a hanger/hook switch for use with handsets.

The headset shall be capable of interfacing with other audio sources

H4 Console Functionality

H4.1 Alert Paging Function

The console electronics shall be equipped with a processor based signaling encoder that will generate all formats and codes associated with the paging and signaling requirements that follow.

The encoder shall broadcast the chosen signaling format(s) and code(s) on the currently selected radio channels and/or on the selected radio channels defined by pre-programmed buttons. It shall also allow the simultaneous selection of multiple signaling formats and codes and broadcast them automatically using a 'first-in, first-out' stacking technique.

The selection and entry of the paging and signaling functions shall be from the PC monitor screen at each operator position. The encoder shall provide both a visual and audible indication of operation and proper signaling.

H4.1.1 Paging Formats

The console shall be capable of generating the existing COUNTY alert tone paging formats. The console electronics shall be equipped to provide two-tone sequential paging in all paging tone formats.

H4.2 Station Alerting [OPTION]

The Fire Department requires a station alerting function that provides an alert tone, announces a voice page, and can provide relay closure for local activation of station lighting etc.

The unit shall be capable of transmitting an alert warning tone prior to the voice announcement; for example, a steady, hi-lo, or warble tone.

The station alert unit shall be capable of decoding single tone, two tone sequential, DTMF, or FSK tones.

When the alert receiver decodes proper the activation code, the unit shall sound an alert warning tone; enable the unit to receive a voice message over the speaker; and then automatically reset upon completion of the voice announcement to await the next activation code. The length of the alert warning tone, automatic channel monitor timing, and reset functions shall be programmable.

The alerting unit shall have a 600-ohm audio output for an external PA system.

The unit shall have a local antenna, as well as an external antenna receptacle for connection to an external antenna.

The unit shall have battery back up in the event of AC power failure.

H4.3 Subscriber ID and Emergency Function

Unit Identification - The console shall be capable of decoding [MDC1200] signaling and provide a real-time display of push-to-talk subscriber unit identification at the dispatch positions.

Emergency Alarm & Call - A display and audible alert to the dispatcher position upon activation of an emergency switch on a subscriber radio shall be provided. The display shall identify the unit number of the radio initiating the emergency alarm.

H4.4 Instant Recall Recording [IRR]

The IRR shall allow the operator to quickly replay recent audio on demand.

The recording equipment shall provide Instant Recall Function at each dispatch position. The function shall provide continuous recording of the telecommunicator activity, including both telephone/911 audio and selected radio audio.

The unit shall provide simultaneous record and playback capability, time stamping of messages, and a minimum of 20 minutes of recording time.

H4.5 Analog/ IP Voice Logging Recorder

The COUNTY currently uses an Eventide recorder for logging of telephone [7-digit POTS line and 9-1-1 lines] and radio function.

H4.6 Intercom

Intercom to and from another operating position [local and remote] shall be via an IP connection and initiated by touching/clicking a screen control corresponding to the called party.

The called party's console shall provide clear indication of a received intercom call.

When the called party desires to respond, the receiving operator shall have a straightforward [ex. Single-touch] method to answer the intercom call, and the audio shall be routed to the select speaker.

The microphone path shall be configurable as full duplex or requiring PTT.

There shall be a one-way "announcement" mode that allows a console to broadcast a message to one, a group of, or all consoles.

The intercom audio shall be capable of being patched to an ongoing conversation.

H4.7 CAD Integration

The provided solution shall offer an API at the console position level allowing third-party applications to control the console resources. The API shall support simultaneous use of both the standard console GUI and the third-party CAD application. The CAD system that the County utilizes is Mobiletec.

H4.8 Dispatch Console Controls

The County, using a centralized administration tool may incorporate any of these parameters into the console screen design according to their functional requirements. The following configurable controls and capabilities shall be available in the system.

Operator screen shall have the capacity to display any combination of RF stations or controls, at any location on a screen.

Tabbed modules shall be definable allowing easy access to RF stations and controls when required. All tabbed backgrounds and the tabs themselves shall be administratively configurable for color, text, font, and size and the addition of icons when required.

Action Buttons [buttons] when placed on the operator screen shall provide a navigation feature enabling the dispatcher to switch screens or invoke a “pop-up” screen with a single button selection. These Buttons shall be configurable and shall contain the text necessary to identify the action to be taken.

Each console position shall be capable of providing an activity history display. Activity history shall display the operator console's receive audio activity to the dispatcher on a per-RF stations / per-transmission basis.

Activity History filters shall be included enabling an operator to segregate emergency calls from regular calls.

The activity history display shall provide a scroll function and allow the operator to search history to view call activity.

The activity history retention period shall be configurable from one minute to twenty-four [24] hours.

Required button and functions are listed below in alphabetical order followed by a brief description of the associated operation.

ALERT TONE button shall provide the control for generation of programmable alert tones. Each shall be programmable for frequency, duration, and level. When touched/clicked, the tone will be applied to all selected RF stations and will be displayed on the VU bar graph.

ALL MUTE buttons shall provide a timed mute function on all monitored RF stations. Mute time shall be owner configurable from 0 to 600 seconds. When active, the ALL MUTE function button shall be flashed to alert the workstation operator of a mute condition. To cancel an ALL MUTE command, the operator shall simply touch the function button again.

BROWSER CONTROL button, when directed to a specific IP address, website, or local document, such as online help manuals, streaming media, weather alerts, etc., shall invoke a screen within the operator’s display providing the preconfigured content. Configuration of the URL and/or content shall not be accessible to the dispatcher and will be administered by authorized personnel only. The operator shall have the ability to close browser screens when not in use.

CROSSPATCH button to provide cross connection of audio between desired channels. Operation of crosspatch shall not inhibit the dispatcher’s ability to operate on other channels. The controls shall provide a visual indication of crosspatch activity and inactivity. A minimum of two (2) separate, distinct and simultaneous crosspatches shall be possible at each console position, independently. Each crosspatch shall be able to accommodate any number of desired console resources.

CTCSS button shall disable CTCSS allowing the dispatcher to listen in on a pre-configured CTCSS enabled radio RF stations without transmitting. This button shall function as a toggle enabling and disabling the CTCSS function when selected.

HEADSET MONITOR button shall temporarily override the select speaker mute function, which is automatically enabled when a headset is inserted into the console jack box. Automatic select speaker muting shall also be permanently disabled on a per console basis by editing the system database.

INPUT ALERT/ALARM Buttons shall represent an external input to the system. When the input is activated, the button shall provide a visual indication, and an optional audible indication, of the activation. The indication shall be configurable to require touching/clicking the button to acknowledge, to acknowledge on de-activation of the input, or to automatically acknowledge after a settable period of time. Each alert/alarm shall be configurable to be logged and to create an SNMP trap on the network. The user or console that acknowledges the Alert shall be logged.

INSTANT TRANSMIT button shall provide the workstation operator with an integrated instant transmit function for an associated radio RF station.

RF STATIONS button shall provide access to the circuits assigned to the console for the current shift in the form of "electronic push buttons." Each shall be labeled with names and status colors. The first two lines of text on an RF stations button shall identify the associated RF stations. The last line shall show the RF stations status. Each button shall be owner programmable to display visual call alerts, audible call alerts, and the default RF stations monitor status on a per console basis.

MULTI-SELECT button shall allow functions to be performed on a preset group of RF stations. Touching/clicking the RF stations group button will place all the RF stations in multi-select and allow PTT on the entire group. Likewise, the entire group may be placed in unselect or patch or reverted to default state with a single touch of the proper function button.

MUTE FUNCTION button shall control the individual audio level of a given radio RF stations. If the RF station is presently in a monitor condition, receive audio shall be presented to the workstation via the workstation unselect speaker. Touching/clicking the mute function button and then touching/clicking the RF station button shall change the RF station to a mute condition. Likewise, if the RF station is in the mute condition, repeating the action shall reverse the process and place the radio RF stations in a monitor condition.

PUSH-TO-TALK - PTT [On-Screen] button shall automatically invoke a PTT transmit action on the Select or Simul-select RF stations.

PTT INDICATOR shall display the PTT status of that specific console when the respective console is transmitting.

PTT FOOTSWITCH a rugged PTT footswitch with a non-skid weighted base shall be provided. The cable shall not require a proprietary connector to connect to the console position. When activated, the footswitch shall initiate a general PTT function on the selected RF stations.

REPEAT ENABLE/DISABLE button shall turn RF station in-cabinet repeat and the external [function tone] repeat on and off. When enabled, in-cabinet repeat shall take inbound receive audio and send it back out as transmit audio, along with PTT, to the associated transmitter.

SUPERVISORY TAKEOVER button shall allow the console to take control of an RF station that is being used at another console. Only the console that initiated the takeover shall be able to transmit on the RF station. Other consoles shall be able to have the RF station in select or unselect to monitor the audio activity. When the takeover console de-selects the RF station, its operation at other consoles shall return to normal.

SYSTEM CLOCK button/module shall be placed on the screen and be configurable for 12/24-hour display formats.

TEST TONE button shall cause a 1000 Hz tone to be generated and inserted into the transmit audio path. Tone level shall be indicated on the console VU bar graph.

VOLUME CONTROL button/module shall allow the operator to adjust a selected RF station's Select and Unselect audio levels. The Volume display shall indicate the name of the selected RF stations for clarity.

VOTING DISPLAY functions shall be accessible from each console operator position as follows:

- Force vote a receiver; momentary or timed period
- Enable/disable a receiver
- Indicate a disabled receiver
- Voted display that shows the operator which receivers are receiving
- Indicate a failed receiver
- Indicate receive status of a receiver with signal quality display

VU METER shall support the display of a VU bar graph that depicts the measured audio amplitude of outbound audio from the dispatcher's console position. This module shall be configurable for size and may be located anywhere on the operator’s screen.

H5 System Reports

The console shall be equipped to produce usage activity information reports on demand. At a minimum, hourly, daily, weekly, and monthly reports shall be possible. The reports shall include, at a minimum, the following, each event time, and date stamped:

- Number of transmissions per position
- Number of transmissions per channel
- Total transmission time per position
- Total transmission time per channel
- Total receive time per position

- Total receive time per channel
- Captured activity data shall be able to be reviewed by operator position, channel, time, type of event, etc.

H6 Power Requirements

Note that each console position shall have its own local UPS to be provided by the contractor.

The Contractor shall clearly define and provide power loads calculation and circuit requirements for their equipment.

The contractor shall finalize the number of, and type of electrical circuits needed for their equipment and identify if new circuit breaker, conduit, and receptacles are required for their equipment.

H7 Grounding/bonding requirements

The sites have adequate grounding systems; however, it is the contractor's responsibility to provide and install proper grounding, lightning protection, and surge suppression of all equipment that are installed as part of this contract.

All provided equipment and associated cabling shall be adequately bonded/grounded to the existing substantial building ground system per the manufacturers grounding standard. All grounding and bonding are to be conducted with clean workmanship in accordance with a national recognized communications equipment grounding and bonding guideline. A grounding and bonding audit shall be performed by a manufacturer's representative certified by the Electronics Technician's Association, or a similar professional organization in the grounding and bonding of communication sites according to a nationally recognized standard.

H8 Dispatch Console Furniture

The County will continue to utilize the existing dispatch console furniture. The existing furniture is manufactured by Xybix.

H9 Console Transition Plan

The Proposer shall provide a detailed transition plan for the communications center installation. This plan shall include the fact that the new radio console will be installed in the same location as the existing radio console and furniture.

Therefore, the Proposer must minimize the impact to on-going operations in the communications center.

The Proposer's proposal shall describe a high-level transition plan to ensure simultaneous console operations. The final plan will be discussed at the Detailed Design Review meeting.

H10 SUBSET of DATA

Console and channel plans and a paging plan.

Dispatch Consoles

Primary Dispatch Center

The following table are the channels currently for the primary dispatch center consoles.

TABLE 25 - CHANNELS AT THE PRIMARY DISPATCH CENTER

CHANNEL NAME	PRIMARY USER
Main Dispatch Law	Chenango Co. Sheriff's Office
Corrections	Chenango Co. Corrections
Norwich PD (Monitor Only)	Norwich PD
Tactical 1	Chenango County Sheriff's Office
Tactical 2	All law enforcement agencies
Citywide	Norwich PD/Fire/EMS
Main Dispatch Fire	All fire department & EMS agencies
Fire Coordinator	All county fire coordinators
A-Tac (Monitor Only)	All fire department & EMS agencies
B-Tac (Monitor Only)	All fire department & EMS agencies
C-Tac (Monitor Only)	All fire department & EMS agencies
Interior Operations (Monitor Only)	All fire department & EMS agencies
Fire Police (Monitor Only)	All fire department & EMS agencies
Helo Ops (Monitor Only)	All fire department & EMS agencies
A-Tac Base (Monitor Only)	All fire department & EMS agencies
B-Tac Base (Monitor Only)	All fire department & EMS agencies
C-Tac Base (Monitor Only)	All fire department & EMS agencies
Truck to Truck (Monitor Only)	All fire department & EMS agencies
County Highway	County Highway
County EMS (Monitor Only)	Hospital / EMS agencies
Interagency 45.88	Dispatch / Other counties

Backup Dispatch Center

Given in the following table are the channels currently for the backup dispatch center. It is preferred that the legacy channels be available to the backup dispatch center. Depending upon system design, the legacy channels from the primary dispatch center may be available to the backup dispatch center through the IP network. Proposer should note as such and delineate between which are analog interfaces and which are available only through the network.

TABLE 26 - CHANNELS AT THE BACKUP CENTER

CHANNEL NAME	PRIMARY USER
Main Dispatch Law	Chenango Co. Sheriff's Office
Corrections	Chenango Co. Corrections
Norwich PD (Monitor Only)	Norwich PD
Tactical 1	Chenango County Sheriff's Office
Tactical 2	All law enforcement agencies
Citywide	Norwich PD/Fire/EMS
Main Dispatch Fire	All fire department & EMS agencies
Fire Coordinator	All county fire coordinators
A-Tac (Monitor Only)	All fire department & EMS agencies
B-Tac (Monitor Only)	All fire department & EMS agencies
C-Tac (Monitor Only)	All fire department & EMS agencies
Interior Operations (Monitor Only)	All fire department & EMS agencies
Fire Police (Monitor Only)	All fire department & EMS agencies
Helo Ops (Monitor Only)	All fire department & EMS agencies
A-Tac Base (Monitor Only)	All fire department & EMS agencies
B-Tac Base (Monitor Only)	All fire department & EMS agencies
C-Tac Base (Monitor Only)	All fire department & EMS agencies
Truck to Truck (Monitor Only)	All fire department & EMS agencies
County Highway	County Highway
County EMS (Monitor Only)	Hospital / EMS agencies
Interagency 45.88	Dispatch / Other counties

H10.1 Paging Plan

The following table is an example of the County's paging plan. Note that paging is dynamic. The following table is supplied only as a sample of the County's paging tones.

TABLE 27 - CHENANGO COUNTY PAGING PLAN

MUNICIPALITY	DESCRIPTION	TONE A	TONE B
County	All Call-Pager	928.0	928.0
County	All Call-Siren	903.2	903.2
County	Chief Dispatcher	767.4	584.8
County	Dispatcher - Off Duty	767.4	767.4
County	Communications Super	767.4	651.9
County	EMO 1	651.9	584.8
County	EMO 2	651.9	617.4
County	EMO 3	688.3	584.8
County	EMO 4	651.9	688.3
County	EMO 5	651.9	726.8
County	EMO 6	651.9	767.4
County	EMO 7	651.9	810.2
County	EMO 8	651.9	855.5
County	EMO 10	688.3	553.9
County	EMO 12	688.3	617.4
County	EMO Group	651.9	651.9
County	Car 1	553.9	584.8
County	Car 2	553.9	617.4
County	Car 3	553.9	651.9
County	Car 4	553.9	688.3
County	Car 5	553.9	726.8
County	Car 6	553.9	767.4
County	Car 7	553.9	810.2
County	Car 8	553.9	855.5
County	Car 301	584.8	553.9
County	Car 401	584.8	617.4
County	Car 501	584.8	651.9
County	Car 59	584.8	688.3
County	Car 302	584.8	810.2

MUNICIPALITY	DESCRIPTION	TONE A	TONE B
County	Fire Coord. Group	584.8	584.8
County	EMS Coord. Group	617.4	617.4
County	Investigator 411	726.8	584.8
County	Investigator 412	726.8	617.4
County	Investigator 413	726.8	651.9
County	Investigator 414	726.8	688.3
County	Investigator 415	726.8	553.9
County	Investigator 416	726.8	767.4
County	Investigator 417	726.8	810.2
County	Investigator 418	726.8	855.5
County	Investigator 419	726.8	903.2
County	Investigator 421	767.4	553.9
County	Investigator Group	726.8	726.8
County	Code Enforcement	584.8	726.8
County	OFPC Fire Protection	767.4	617.4
County	Weekly Siren Test	810.2	810.2
County	Noon Siren	855.5	855.5
County	Special Teams	879.0	879.0
County	Hazmat	832.5	832.5
County	United Radio	651.9	903.2
Special Emergency	Green Electric	634.5	410.8
Special Emergency	Sherburne Electric	634.5	433.7
Special Emergency	Afton Highway	569.1	349.0
Special Emergency	Bainbridge Highway	569.1	368.5
Special Emergency	Columbus Highway	569.1	389.0
Special Emergency	Coventry Highway	569.1	410.8
Special Emergency	German Highway	569.1	433.7
Special Emergency	Greene Highway	569.1	457.9
Special Emergency	Guilford Highway	569.1	483.5
Special Emergency	Lincklaen Highway	569.1	510.5

MUNICIPALITY	DESCRIPTION	TONE A	TONE B
Special Emergency	McDonough Highway	569.1	539.0
Special Emergency	New Berlin Highway	600.9	330.5
Special Emergency	North Norwich Highway	600.9	368.5
Special Emergency	Norwich Highway	600.9	389.0
Special Emergency	Otselic Highway	600.9	410.8
Special Emergency	Oxford Highway	600.9	433.7
Special Emergency	Pharsalia Highway	600.9	457.9
Special Emergency	Pitcher Highway	600.9	483.5
Special Emergency	Plymouth Highway	600.9	510.5
Special Emergency	Preston Highway	600.9	539.0
Special Emergency	Sherburne Highway	634.5	330.5
Special Emergency	Smithville Highway	634.5	349.0
Special Emergency	Smyrna Highway	634.5	389.0
Special Emergency	Highway All Call	569.1	330.5
Afton	Fire	569.1	600.9
Afton	EMS	569.1	634.5
Afton	Fire Officer	569.1	669.9
Afton	Siren	903.2	553.9
Bainbridge	Fire	569.1	707.3
Bainbridge	EMS	569.1	746.8
Bainbridge	Fire Officer	569.1	788.5
Bainbridge	Siren	903.2	584.8
Mt. Upton	Fire	569.1	707.3
Mt. Upton	EMS	569.1	746.8
Mt. Upton	Fire Officer	569.1	788.5
Mt. Upton	Siren	903.2	584.8
Brisben	Fire	600.9	569.1
Brisben	EMS	669.9	832.5
Brisben	Fire Officer	669.9	879.0
Brisben	Siren	903.2	617.4

MUNICIPALITY	DESCRIPTION	TONE A	TONE B
Earlville	Fire	707.3	600.9
Earlville	EMS	707.3	634.5
Earlville	Fire Officer	707.3	669.9
Earlville	Siren	855.5	553.9
Coventry	Fire	600.9	832.5
Coventry	EMS	600.9	879.0
Coventry	Fire Officer	600.9	928.0
Coventry	Siren	903.2	651.9
Preston	Fire	634.5	569.1
Preston	EMS	634.5	600.9
Preston	Fire Officer	634.5	669.9
Preston	Siren	855.5	767.4
Smithville	Fire	634.5	707.3
Smithville	EMS	634.5	746.8
Smithville	Fire Officer	634.5	788.5
Smithville	Siren	855.5	903.2
Guilford	Fire	634.5	832.5
Guilford	EMS	634.5	879.0
Guilford	Fire Officer	634.5	928.0
Guilford	Siren	903.2	767.4
Greene	Fire	669.9	569.1
Greene	EMS	669.9	600.9
Greene	Fire Officer	669.9	634.5
Greene	EMS Officer	879.0	707.3
Greene	Siren	903.2	726.8
McDonough	Fire	707.3	569.1
McDonough	EMS	669.9	746.8
McDonough	Fire Officer	669.9	788.5
McDonough	Siren	903.2	810.2
Norwich	Monitors	600.9	634.5

MUNICIPALITY	DESCRIPTION	TONE A	TONE B
Norwich	Off Duty	600.9	669.9
Norwich	Officer	707.3	746.8
Norwich	Paid (Station)	600.9	707.3
North Norwich	Fire	669.9	707.3
North Norwich	EMS	707.3	788.5
North Norwich	Fire Officer	707.3	832.5
North Norwich	Siren	855.5	584.8
New Berlin	Fire	669.9	928.0
New Berlin	EMS	600.9	746.8
New Berlin	Fire Officer	600.9	788.5
New Berlin	EMS Officer	879.0	788.5
New Berlin	Siren	903.2	688.3
Oxford	Fire	879.0	600.9
Oxford	EMS	879.0	669.9
Oxford	Fire Officer	788.5	634.5
Oxford	Siren	855.5	651.9
Plymouth	Fire	788.5	832.5
Plymouth	EMS	788.5	879.0
Plymouth	Fire Officer	746.8	707.3
Plymouth	Siren	855.5	726.8
Sherburne	Fire	707.3	879.0
Sherburne	EMS	707.3	928.0
Sherburne	Fire Officer	746.8	569.1
Sherburne	EMS Officer	879.0	746.8
Sherburne	Siren	855.5	810.2
Smyrna	Fire	746.8	600.9
Smyrna	EMS	746.8	634.5
Smyrna	Fire Officer	746.8	669.9
Smyrna	Siren	810.2	553.9
South New Berlin	Fire	746.8	788.5

MUNICIPALITY	DESCRIPTION	TONE A	TONE B
South New Berlin	EMS	746.8	832.5
South New Berlin	Fire Officer	746.8	879.0
South New Berlin	Siren	810.2	584.8
South Otselic	Fire	746.8	928.0
South Otselic	EMS	788.5	569.1
South Otselic	Fire Officer	788.5	600.9
South Otselic	Siren	810.2	617.4
Pharsalia	Fire	788.5	928.0
Pharsalia	EMS	788.5	669.9
Pharsalia	Fire Officer	788.5	707.3
Pharsalia	Siren	855.5	688.3
CMT	Ambulance	928.0	879.0

Appendix I Interoperability

I1 Introduction

The COUNTY desires interoperable solutions to communicate with neighboring counties and agencies in those counties, some of which have disparate systems. Any interoperable solutions proposed shall be developed, installed, and tested in a manner that provides for continued, uninterrupted communications of the radio system. All interoperable solutions proposed shall be priced separately as an option.

I2 Surrounding Counties and their Radio Systems:

I2.1 Madison County –

I2.1.1 Police / Fire / EMS – UHF P25 Phase 2 system as part of the Central New York Shared Core

I2.1.2 Fire – UHF Simplex Fireground

I2.2 Otsego County

I2.1.1 Police – VHF Encrypted P25 Conventional System

I2.2.2 Fire – UHF Analog Conventional System with Simplex Fireground

I2.3 Delaware County

I2.3.1 Police – VHF Analog Conventional System

I2.3.2 Fire – UHF Analog Conventional System with Simplex Fireground

I2.4 Broome County – Future UHF P25 Phase 2 system as part of the Central New York Shared Core.

I2.5 Cortland County

I2.5.1 Police / Fire / EMS - UHF P25 Phase 1 system.

I2.5.2 Fire - UHF Analog Conventional System with Simplex Fireground

I3 State Agencies and their Radio Systems

I3.1 NYSP – Conventional VHF System but will program the Trunked System as allowed.

I3.2 New York State Parks Police – Will program the Trunked System as allowed.

I3.3 New York State Department of Environmental Conservation to include the Forest Rangers – Will program the Trunked System as allowed.

I3.4 New York State Division of Homeland Security and Emergency Services (DHSES), which includes Office of Emergency Management (OEM), Office of Interoperable and Emergency Communications (OIEC) as well as the Office of Fire Prevention Control (OFPC) are all considered part of DHSES. This division will program the Trunked System as allowed.

Proposer should estimate a quantity of State Agency Subscriber radios and include the quantity of Radio / User ID's.

I4 Optional Interoperable Solutions

Different technical interoperability solutions are envisioned by the County to establish interoperable communications with surrounding radio systems. Each solution has its characteristics as well as advantages and disadvantages. Proposer shall summarize each solution below, outlining benefits and shortfalls of each. Proposer shall provide optional pricing and/or potential savings for each solution proposed.

- P25 ISSI connectivity with adjacent P25 counties.
- P25 CSSI connectivity with adjacent counties
- P25 RFSI interfaces, or their equivalent, with non-P25 adjacent counties.
- Connecting to a shared system core.

I4.1 National Interoperability Channels

New York State Department of Homeland Security and Emergency Services, Office of Interoperable Communications recommend that National Interoperability Sites be placed in strategic locations to ensure the best use of available infrastructure and regional coverage across jurisdictional boundaries. With this in mind, the Proposer shall review National Interoperability Channels already implemented in the region and provide optional pricing for the following National Interoperability channels:

- VCALL10 on four (4) sites with the additional option for a multi-select solution for VTAC11, VTAC12, VTAC13 and VTAC14
- 7CALL50 on four (4) sites with the additional option for a multi-select repeater solution for 7TAC55 and 7TAC51
- 8CALL90 on four (4) sites with the additional option for a multi-select repeater solution for 8TAC91, 8TAC92, 8TAC93 and 8TAC94.

Additionally, the County has existing UCALL and UTAC stations in service at Barnes Hill, Pharsalia, Millbrook, Coventry, and the Public Safety Building. The Proposer shall incorporate these stations into the overall system design and provide the capability and seamless control at the dispatch console as described below.

In addition to these stations, the Proposer shall provide optional pricing on a per site basis for UCALL40 with the additional option for a multi-select repeater solution for UTAC41, UTAC42 and UTAC43 at the remaining sites in the system design that do not currently have National Interoperability UHF channels.

Proposer shall include an antenna design that takes up minimal tower space but still maximize regional area coverage and avoid duplicating coverage areas for all National Interoperability channels listed above.

The console must be able to monitor the receive side of the repeater and enable or disable the repeater function from the console. In addition, for the TAC channels that console operator must be able to select the TAC channel from the available TAC channels to operate on.

The normal operation will be for the dispatcher to monitor the CALL channels in each band. The proposer shall implement a voted receive solution for the CALL channels. As needed, the dispatcher will enable the repeater of the CALL channel. All National Interoperability repeaters in general will have the repeater disabled, until enabled by the dispatcher. None of the National Interoperability Channels will be simulcast.

Appendix J Spectrum

The tables below represent the spectrum and parameters expected to be used on the paging and trunked radio system. The antennas shown in the tables below are notional and were used when evaluating FCC license parameters. The vendors proposed design should have similar contours in order to be likely to be licensed. Vendors are required to provide interference contour study with the response to the RFP.

TABLE 28 - SPECTRUM - TRUNKED SYSTEM - NORTH ZONE

Trunked System – North Zone	
Transmit Frequency	**Receive Frequency**
453.3750	458.3750
453.4875	458.4875
460.3250	465.3250

TABLE 29 – SPECTRUM – TRUNKED SYSTEM – SOUTH ZONE

Trunked System – South Zone	
Transmit Frequency	**Receive Frequency**
453.6375	458.6375
460.6375	465.6375
460.0875	465.0875

TABLE 30 – NORTH ZONE SITE PARAMETERS

Site Name	Antenna Name	Antenna Height	Antenna Azimuth	Antenna Tilt	ERP
Barnes Hill*	BA160-67-DIN-T3 @460	51.6 m	0 deg		95 w
East Hill*	BA160-67-DIN-T3 @460	48.8 m	0 deg		100 w
McDonough*	OA80-67-DIN	73.2 m	45 deg	-3 deg	150 w
Millbrook	OA80-67-DIN	49.1 m	180 deg	-3 deg	90 w
Otselic	OA80-67-DIN	57.4 m	135 deg	-3 deg	80 w
Pharsalia	BA160-67-DIN-T3 @460	57 m	0 deg		90 w
Shacktown Mountain	OA80-67-DIN	48.8 m	220 deg	-3 deg	45 w
Sherburne	OA80-67-DIN	41.2 m	180 deg	-3 deg	125 w

*Sites can be licensed for either the North or the South zone.

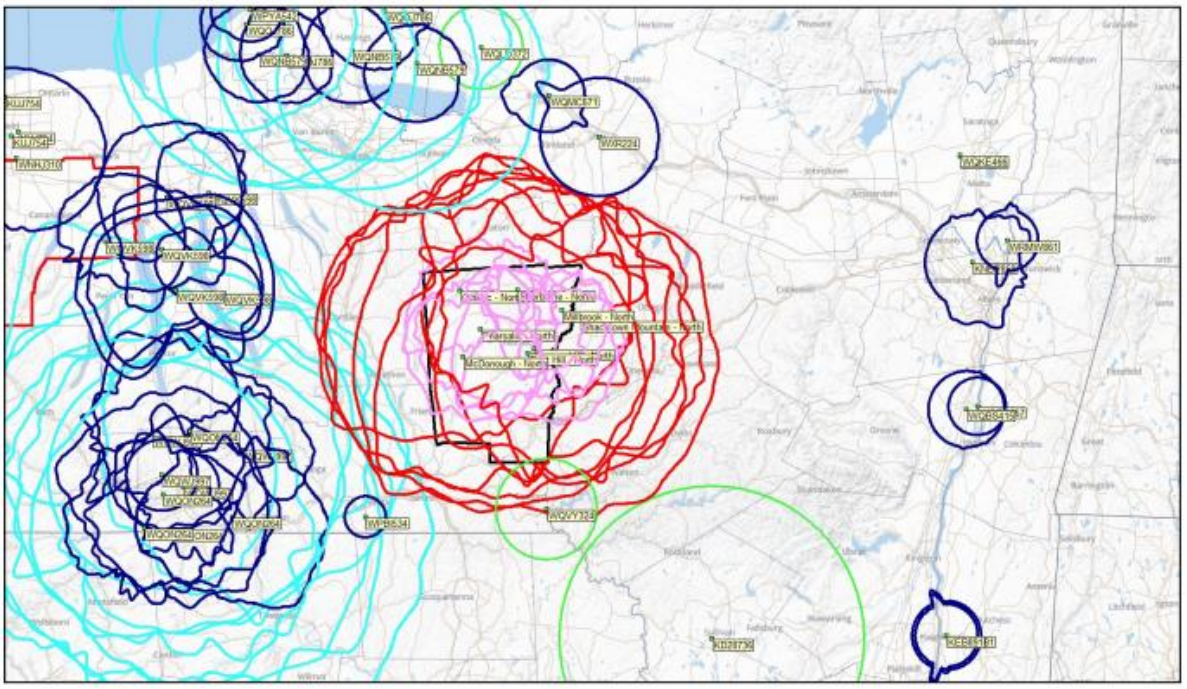
TABLE 31 - SOUTH ZONE SITE PARAMETERS

Site Name	Antenna Name	Antenna Height	Antenna Azimuth	Antenna Tilt	ERP
Barnes Hill*	OA80-67-DIN	51.6 m	225 deg	-3 deg	85 w
Cook Park	OA80-67-DIN	50 m	30 deg	-3 deg	275 w
Coventry	OA80-67-DIN	57 m	45 deg	-3 deg	275 w
East Hill*	BA160-67-DIN-T3 @460	48.8 m	0 deg		100w
McDonough*	BA160-67-DIN-T3 @460	73.2 m	0 deg	0 deg	80 w
Nabinger	OA80-67-DIN	85.4 m	15 deg	-3 deg	275 w
North Pond	BA160-67-DIN-T3 @ 460	73.2 m	0 deg		25 w
Pine Hill	OA80-67-DIN	70.2 m	270 deg	-3 deg	225 w

*Sites can be licensed for either the North or the South zone.

SPECTRUM CENTER

3-Channel North Cell



Green Line - Incumbent mobile service area (no associated base station)

Blue Line - Incumbent 39 dBu 50:50 service area contour

Cyan Line - Incumbent FB8 21 dBu 50:10 interfence contour

Red Line - Proposed 21 dBu 50:10 interference contour

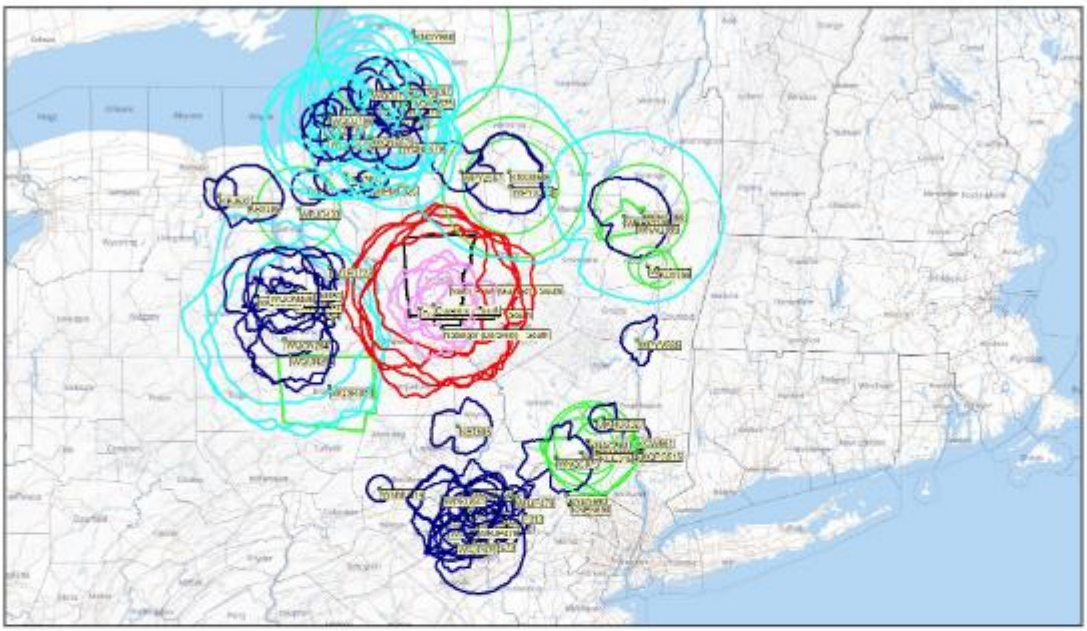
Magenta Line - Proposed 39 dBu 50:50 service contour

Note that WQVY324 is only using mobile transmit frequencies

FIGURE 13 - 3 CHANNEL NORTH CELL CONTOUR MAP

SPECTRUM CENTER

South Design



Black Line - Chenango County Border

Red Line - 21 dBu 50:10 proposed interference contour

Magenta Line - 39 dBu 50:50 proposed service contour

Blue Line - 39 dBu 50:50 incumbent service contour

Cyan Line - 21 dBu 50:10 trunked incumbent interference contour

Green Line - Incumbent mobile area of operation (i.e. no associated base station)

Requires LOC with Herkimer County on WPRG253. Note Herkimer uses a smaller radius on WPYX513.

FIGURE 14 - 3 CHANNEL SOUTH CELL CONTOUR MAP

TABLE 32 - SPECTRUM - PAGING

Transmit Frequency
460.0750

TABLE 33 - PAGING SYSTEM PARAMETERS

Site Name	Antenna Height	ERP
Barnes Hill	51.8 m	70 w
Cook Park	50.0 m	70 w
Coventry	57.9 m	70 w
East Hill*	50.0 m	70 w
McDonough*	50.0 m	70 w
Millbrook	50.0 m	70 w
Nabinger*	50.0 m	70 w
North Pond*	50.0 m	70 w
Otselic	57.9 m	70 w
Pharsalia	57.9 m	70 w
Pine Hill*	36.5 m	70 w
Shacktown*	50.0 m	70 w
Sherburne	57.5 m	70 w

*Assumed site parameters. Not yet licensed by the FCC