



County of Westchester, New York

Request for Proposals

**For Voice Radio Communications
Systems Replacement**

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1. Project Overview

1.1 Introduction

The County of Westchester (the “County”) relies on radio communications systems to provide public safety-first responders from the police, fire, and emergency medical services (EMS) communities and the Bee-Line Bus System with communications services on a 24x7 basis. Although the County’s mission-critical radio systems have and continue to serve them well, most of the technology has reached its end-of-life (“EOL”). The County has negotiated an agreement with its existing system vendor, Motorola Solutions, Incorporated (MSI) to provide best-effort maintenance and support through December 2019 to coincide with Stage One of the Replacement Methodology. See Section 1.1.2 for additional information.

In addition to technology obsolescence concerns, Public Law 112-96, part of the Middle-Class Tax Relief and Job Creation Act, mandates that beginning in 2021, the County, among other public safety licensees in the major metropolitan areas, relinquish T-Band radio frequencies used by radio systems serving fire, EMS, and the Bee-Line System. Therefore, this Request for Proposals (“RFP”) sequences the replacement of the systems in “Stages” to coincide with the reallocation of the T-Band timeframe.

The County Department of Information Technology (“DoIT”) solicits, via this RFP, proposals from qualified entities hereinafter referred to as “Responder” or “Responders” to replace the following land mobile radio (LMR) and paging/alerting systems:

- UHF T-Band Trunked System – used primarily by the County Department of Emergency Services (“DES”) and the County’s Bee-Line Bus System
- F1/F3 VHF Conventional Radio System – used primarily by the Westchester County Police, formally known as the County Department of Public Safety (“DPS”)
- Paging and Alerting Systems – used primarily by DES and various fire service agencies and EMS providers

DoIT is the lead agency for radio system selection, evaluation, and oversight.

The remaining portions of this section provide an overview of the project background, overview of this RFP, and other key information guiding this procurement.

Please be advised that all matters concerning this RFP, from the Date of Issuance of the RFP until the contract award or awards are made, are to be directed in writing to **John B. McCaffrey** at:

RFP-2017-Radio-System@westchestergov.com

This is the email address to be used for all written correspondence regarding this RFP including requests for copies of the appendices, and requests for clarification.

Note that appendices are not included in the RFP file. The appendices may be requested by sending an email to the address above.

1.1.1 Overview of Existing Radio Systems

1.1.1.1 Existing UHF T-Band Trunked System

The UHF T-Band Trunked Radio System (“Trunked System”) is the primary County-provided fire and EMS voice radio communications system.

The Trunked System consists of nine sites and 12 channels implemented with MSI proprietary SmartZone™ analog trunking technology. Two 6-channel simulcast cells comprise the system with the North Cell having 6 sites and the South cell having 3 sites to provide users with voice radio service. Based on County requirements, the Trunked System was designed to provide countywide mobile coverage.

The DES PSAP located at 4 Dana Road, Valhalla (60 Control), provides dispatch services for 52 fire departments and 29 EMS agencies within Westchester. The 60 Control PSAP presently supports 11 operator positions equipped with MSI CENTRACOM™ Gold Elite series dispatch consoles. The MSI CENTRACOM™ Gold Elite series dispatch consoles are an integral part of the County’s radio systems. Dispatchers at 60 Control use the console system to communicate with fire and EMS units via the Trunked System and multiple conventional channels. Bus dispatchers in Yonkers also use the console system to communicate with Bee-Line buses and other personnel. This console system relies on MSI’s Ambassador Electronics Bank (AEB) and several central electronics banks (CEBs), which are out of production.

The County’s Department of Public Works & Transportation (“DPW&T”) operates a CAD/AVL system supplied by Xerox. Known as the Transit Communications System (“TCS”), it provides computer aided dispatching and automatic vehicle location capabilities for the Bee-Line fixed-route buses and non-revenue vehicles. It operates on

two channels in the UHF T-Band separately from the UHF Trunked System. The TCS integrates with the UHF Trunked System to provide voice communication between Bee-Line buses, dispatchers, and other personnel on a request-to-talk basis. While the evolution of the TCS is not included in this RFP, the Selected Vendor shall cooperate with the County and the TCS system vendor to interface the P25 Trunked System with the evolved TCS system to maintain equivalent compatibility and functionality.

1.1.1.2 Existing F1/F3 VHF Conventional Radio System

The F1/F3 VHF Conventional System is the primary radio system for DPS. Purchased and installed beginning in 2005 this system, based on analog conventional technology, consists of two conventional analog simulcast transmit, voted receiver repeater channels and 14 radio communications sites throughout Westchester to provide DPS users with voice radio service. Based on County requirements, the F1/F3 system was designed to provide countywide mobile coverage. The F1 and F3 channels have slightly different site configurations.

DPS Headquarters (DPSHQ) in Hawthorne provides dispatch services for DPS as well as interoperability and law enforcement dispatch support for some local municipalities. Five (5) Avtec Inc. consoles at DPSHQ allow dispatchers to accomplish their duties. DPSHQ is the primary PSAP for County and local jurisdictions served by DPS and a secondary PSAP for local municipalities where DPS is not the primary law enforcement agency. In addition, there is one (1) Avtec, Inc. console at the County EOC, one (1) at the New York State Police PSAP (both at 200 Bradhurst Avenue), and one (1) in the DPS MCP.

1.1.1.3 Existing Paging and Alerting System

The County's existing Low Band Paging/Alerting System primarily relies on five transmitter sites located throughout the County to provide paging and alerting communications for first responders. During a typical incident, fire, EMS, or specialty team responders are dispatched by 60 Control which transmits tone and voice paging/alerting messages via the County and/or agency base station radio systems to field personnel equipped with pagers who receive the pages/alerts and respond via the existing Trunked System, their local system (if applicable), or cellular telephone. In some instances, local agency-owned base stations will store-and-forward (retransmit) the pages/alerts from 60 Control on the same or a different frequency thereby allowing these agencies to improve local coverage and reception and provide greater flexibility in the type of personal pager required for use by its users.

1.1.2 Staged Replacement Methodology

- A. The County’s Staged Replacement Methodology includes three project “Stages” that the County anticipates will span approximately ten years from 2018 to 2028. (All timeframes shown for project Stages as approximate). Stage One calls for the immediate replacement of all end-of-life equipment to ensure continued reliable communications for public safety first responders and Bee-Line Bus System users. Stages Two and Three expand trunked system coverage for on-street and in-building portable coverage respectively. In addition, Stage Two provides for the expansion of the UHF (T-Band System or replacement of the UHF (T-Band) trunked system with 700 MHz equipment should the County choose this course of action due to Public Law 112-96 or other factors.
- B. The Staged Replacement Methodology enables the County to implement additional infrastructure equipment to increase on-street and in-building portable radio coverage beginning in 2020 as Figure 1 shows.

STAGE 1: JULY 2018 TO DECEMBER 2019 Replace Existing Systems (18 MONTHS)	STAGE 2 JANUARY 2020 TO DECEMBER 2023 Portable On-Street Coverage (48 MONTHS)	STAGE 3: JANUARY 2024 TO DECEMBER 2028 Portable In-Building Coverage (60 MONTHS)
UHF T-BAND TRUNKED SYSTEM (DES & Bee-Line Bus System)		
F1 & F3 VHF CONVENTIONAL SYSTEM (DPS)		
PAGING / ALERTING SYSTEMS (DES & Various Local Agencies)		
700 MHZ REPLACEMENT TRUNKED SYSTEM		

Figure 1 – Staged Replacement Methodology

- C. The top stream depicting the UHF T-Band Trunked System begins with a solid school bus yellow/orange color and transcends gradually to grey to represent the T-Band reallocation. Likewise, the bottom stream depicting a potential 700 MHz trunked system begins in white and transcends during the Stage Two (2020-2023) timeframe to school bus yellow/orange to depict the potential implementation of a trunked system in an alternate band to accommodate the T-Band reallocation mandate.

D. Stage One Replacement and Enhancement (2018 – 2019)

1. Replacement UHF T-Band Trunked System

The Staged Replacement Methodology calls for the replacement “in-place” of the existing Trunked System with a new APCO Project 25 (P25) Phase 2 trunked system using the same radio communications sites, radio frequencies, antenna systems, and other supporting infrastructure. P25 Phase 2 adds two-slot Time Division Multiple Access (TDMA) technology using two-time slots in each 12.5 kHz channel. The replacement of the Radio Dispatch Console System serving DES and DPW&T is required during Stage One. If the Trunked System relies on centralized control components, then in order to provide active redundancy the County requires that these components be replicated at a minimum of two geographic locations with complete routing and switching capabilities for the system. Also required is the replacement of the current MOSCAD alarm monitoring system with an Internet Protocol (IP) based equivalent system. Most user radio equipment will also be replaced in Stage One.

2. Replacement F1/F3 VHF Conventional Radio System

The Staged Replacement Methodology calls for the replacement “in-place” of the existing F1/F3 system with new P25 Phase 1 equipment using the same radio communications sites, radio frequencies, antenna systems, and other supporting infrastructure. Both conventional channels will be equipped to operate in both analog FM mode and P25 Phase 1 mode. The F1 system will be operated in P25 Phase 1 conventional mode with occasional analog users (mixed mode). The F3 system will be operated in conventional analog mode with occasional P25 users (mixed mode). DPS user radio equipment will be replaced and upgraded in Stage One, DPS will continue to use their existing Avtec, Inc. dispatch console system. An interface solution that allows the Avtec, Inc. dispatch consoles to interconnect to the P25 Phase 2 Trunked System must also be supplied. If the F1/F3 System relies on centralized control components, then in order to provide active redundancy the County requires that these components be replicated at a minimum of two geographic locations with complete routing and switching capabilities for the system.

3. Replacement Paging and Alerting System

The Replacement Methodology calls for the addition of a VHF High Band or UHF Paging/Alerting System, beginning in the Stage One time frame. It is anticipated that the Paging/Alerting System may not be completed by the end of the Stage One time frame due to the need to add sites to achieve coverage requirements to meet the DES requirement to transmit multiple pages/alerts for different incidents simultaneously within Westchester. This new system will operate in conjunction with the existing VHF Low-Band System until all stakeholders have migrated to the new system. The new paging system shall provide sufficient signal strength to activate pagers and produce understandable audio inside residential and small commercial buildings countywide.

The purchase by the County of pagers used by local fire and EMS agencies is beyond the scope of this project. The paging/alerting receivers owned by the County will be replaced to allow operation on VHF or UHF radio spectrum band.

E. Stage Two System Expansion (2020 – 2023)

1. P25 Phase 2 UHF T-Band Trunked System

The Staged Replacement Methodology calls for expanding the 9-site Stage One design by adding trunked sites to accomplish the primary goal of increasing radio coverage to provide on-street portable radio coverage within 95% of the County's geographic area.

Should the County chose to do so due to Public Law 112-96 or other factors, the T-Band elements of the trunked system will be replaced with 700 MHz components during this Stage.

2. F1/F3 VHF P25/Conventional Radio System

The Staged Replacement Methodology calls for the sustainment of this system with no expansion or upgrade in order to provide continued radio communications for its users until DPS is satisfied that the Trunked System provides equivalent or better portable radio coverage.

F. Stage Three Continued Expansion (2024 – 2028)

1. P25 Phase 2 UHF T-Band or 700 MHz Trunked System

The Staged Replacement Methodology calls for the expansion of the P25 Phase 2 UHF T-Band or 700 MHz Trunked System by adding radio communications sites to provide portable radio coverage within 95% of the County's light/residential and medium construction structures at a minimum signal quality level of Delivered Audio Quality ("DAQ") 3.4 and 95% reliability level.

2. F1/F3 VHF P25/Conventional Radio System
 - a. The Staged Replacement Methodology calls for the F1/F3 system to be sustained as stated in Stage Two.
 - b. Potential decommissioning of any remaining Low Band paging/alerting equipment from the radio communications sites, PSAPs, and other facilities when all users have migrated to the new system or failed base stations or other components cannot be replaced.

1.2 Overview of this RFP

- A. This document structures the primary contents of the RFP in the following sections:
 1. **Section 1, Project Overview** - Provides background information and a general overview of the requirements contained in this RFP.
 2. **Section 2, Instructions to Responders** - Provides instructions to Responders, including, but not limited to; proposal due date; pre-proposal conference information; evaluation criteria and required structure of the response.
 3. **Section 3, Radio System Replacement Project Management** - Provides project management structure requirements for development by the Selected Vendor.
 4. **Section 4, Stage One Functional Requirements** - Provides requirements for the desired communications systems.
 5. **Section 5, Stage Two Functional Requirements** - Provides requirements+ for the desired communications systems.
 6. **Section 6, Stage Three Functional Requirements** - Provides requirements for the desired communications systems.

7. **Section 7, Training** - Provides requirements for training programs to be delivered by the Selected Vendor.
8. **Section 8, System Implementation, Test, and Acceptance** - Provides requirements for system transition, staging, installation, coverage testing, and final acceptance.
9. **Section 9, Radio System Warranty, Maintenance, and Support** - Provides requirements for the warranty, extended warranty, maintenance, and support of the proposed system and subsystems.

B. This RFP also includes several appendices:

1. Appendix A – *Mandatory Submittals*
2. Appendix B – *Proposal Pricing Forms*
3. Appendix C – *Compliance Matrix*
4. Appendix D – *Sample Contract*
5. Appendix E – *Existing Site Conditions*
6. Appendix F – *Existing Console Locations*
7. Appendix G – *Existing Equipment Alarm Points*
8. Appendix H – *Existing Antenna Systems*
9. Appendix I – *Radio Sites Floor Plans*
10. *Appendix J – Targeted Buildings*
11. *Appendix K – County Properties*
12. *Appendix L – Boundaries and Tiles*
13. *Appendix M – Preventive Maintenance Checklist*
14. *Appendix N – Conventional Resources on Gold Elite Consoles*
15. *Appendix O – Antenna Systems Test Steps*
16. *Appendix P – Radio Coverage Prediction Maps*
17. *Appendix Q – Control Stations*
18. *Appendix R – AC Powered Equipment*

1.3 Project Summary

This section defines the terms “Responder” and “Selected Vendor”. It outlines and summarizes the guidelines and functional requirements for both Responders and Selected Vendors as detailed in the various Sections of this RFP.

- A. If requirements are stated in more than one section and appear to conflict, Responders are advised to request clarification from the County. If clarification is not requested or provided, the more stringent requirement shall apply.
- B. Requirements described as an "OPTION" or "OPTIONAL" refer to features or equipment, which the County may or may not purchase, or items whose quantities are not determined yet. It is not the Responders' option to include or exclude these requirements. Responders are required to include all OPTIONAL requirements to the greatest extent possible.
- C. If the requirements of this RFP conflict with those of the governing codes and regulations, Responders are advised to request clarification from the County. If clarification is not requested or provided, then the more stringent of the two shall become applicable.

1.3.1 Responder Requirements Summary

- A. Responder is defined as all entities that have submitted responses to this Request for Proposals. Responders shall provide the following with their proposals:
- B. Responders shall completely describe the equipment and methods used to implement the systems described in their proposals. The intent of this document is to allow Responders to propose the best equipment, technology, and methods available to provide state-of-the-art public safety communications systems of highest quality, performance and reliability.
- C. All equipment proposed shall be in new, unused condition and be covered by a full factory and/or manufacturer's warranty of not less than 3 years.
- D. The County will not accept proposals that include systems that are within 3 years of the end of the period during which they are expected to be available as current product offerings, or that are scheduled to be replaced with new system architectures within 3 years.

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- E. Responders shall state where in the product lifecycle each proposed component is and shall commit to support of that product for a minimum of 20 years from the date of acceptance by the County.
- F. A Work Breakdown Structure (“WBS”) is defined as a deliverables-oriented breakdown of a project into smaller components.
- G. Responders shall provide a project management plan, which includes a detailed WBS, project scope, deliverables schedule, quality assurance/quality control (QA/QC) processes, and risk management sections.
- H. Responders shall submit proposals for the products and services required herein for each of the three evolution Stages.
- I. Responder’s proposal must be a complete system that operates as described in their proposal without requiring any additional hardware or software to operate as proposed. Should the Responder be the Selected Vendor to install its system and the system not perform as proposed, the Selected Vendor shall make any upgrades or additions necessary to the system to make it operate as proposed, at no additional cost to the County.
- J. Responders shall only propose electronic equipment that meets all FCC requirements for certification and compliance for intentional and unintentional radiators.
- K. Responders shall comply with at least one of the following industry best practices for communications sites. Responders shall declare which practice it uses and provide reasoning for their selection. Responders that cannot meet one of the standards or guidelines listed shall provide written detail of all deviations from these guidelines in their proposal for approval by the County.
 - 1. Motorola R56 - *Standards and Guidelines for Communication Sites* (latest revision)
 - 2. Harris® *Site Grounding and Lightning Protection Guidelines* (AE/LZT - 123 4618/1 - latest revision)
 - 3. United States Military Standard (MIL) 188-124B Standards current edition
 - 4. Other industry standards - Responders shall provide such documents to the County for review and approval prior to contract award

- L. If the Responder proposes use of a standard or standards other than R56, that standard or standards must address all of the areas addressed by R56, and the Responder must provide with their proposal an electronic copy of each such standard.

1.3.2 Selected Vendor Requirements Summary

- A. Selected Vendor is defined as the Responder, or Responders, that are awarded a contract to supply the radio systems infrastructure and/or the user radio equipment.
- B. It is anticipated that a single Responder will be selected to enter into a contract with the County to supply the radio system infrastructure as defined in this RFP, in accordance with the requirements of this RFP, its response to this RFP and any contract entered into with the County.
- C. One or more Responders may be selected to enter into a contract with the County to provide user radio equipment only. These Selected Vendors shall be required to supply user radio equipment in accordance with the requirements of this RFP, its response to this RFP and any contract entered into with the County.
- D. The Selected Vendor contracted to provide the radio system infrastructure shall be responsible for furnishing complete and fully functional systems that provide the following project components as required in each Stage:
 - 1. Guarantee radio coverage as required by project Stage specifics
 - 2. Furnish and install interfaces to fiber optic and microwave facilities provided by others, at the IP level.
 - 3. Furnish and install microwave links to all new radio sites in the Responder's proposal as well as existing sites included in Stage One. This may be either point to point (star) or ring architecture.
 - 4. Furnish and install radio dispatch console systems and ancillary interfaces as required by Stage specifics
 - 5. Furnish and install new system equipment and ancillary facilities as required in each Stage, including removal and disposal of existing equipment
 - 6. Furnish engineering services as required to deliver the system design as required in each Stage

7. Prepare and deliver a project management plan that describes how the Selected Vendor intends to monitor and control the installation and deployment of the proposed system and mitigate risks to ensure that the system meets the design specifications and delivery schedule.
 8. Furnish and install the required software and programming as required for proper system operation
 9. Furnish training as required in Section 7
 10. Design and conduct all acceptance testing in each Stage, including coverage testing as required in Section 8
 11. Develop and conduct system transition plans as required in Section 8
 12. Furnish warranty and maintenance services as required in Section 9
 13. Plan, coordinate, and conduct all work with minimal interruption of service to existing critical systems
 14. Furnish equipment that is new, unused and covered by a full factory warranty
 15. Establish regular status meetings between the County Project Team and the Selected Vendor. These meetings will be conducted through a combination of in-person and teleconference calls. The Selected Vendor shall provide a schedule for these meetings subject to the approval of the County.
 16. Furnish any products and services that are not specifically addressed in this RFP, but are necessary to provide the functional capabilities required in this RFP.
- E. The Selected Vendor or Vendors contracted to provide the user radio equipment shall:
1. Furnish and install equipment that is new, unused and covered by a full factory warranty
 2. Furnish complete and fully functional equipment
 3. Furnish and install new mobile user radios and accessories in user vehicles, including an OPTION for the removal of existing mobile radio equipment
 4. Furnish and install software and program user radios as required for proper system operation
 5. Furnish and program new portable user radios
-

6. Furnish training for purchased user radio equipment
7. Provide warranty and maintenance for purchased user radio equipment

1.3.3 Proposals Desired

Responders shall submit proposals for the products and services required herein for each of the three evolution stages.

- A. The system proposed in the Responders' proposal must be complete and must operate as described without requiring any additional hardware or software to operate as proposed. Should the system not perform as proposed, the Selected Vendor shall make any upgrades or additions necessary to the system to make it operate as proposed, at no additional cost to the County.
- B. Proposal Options: Requirements described as an "OPTION" or "OPTIONAL" refer to features or equipment, which the County may or may not purchase, or items whose quantities are not determined yet. It is not the Responder's option to include or exclude these requirements. Responders are required to include all OPTIONAL requirements to the greatest extent possible.
- C. Any products and services that are not specifically addressed in this RFP, but are necessary to provide the functional capabilities required in this RFP or proposed by the Respondent, must be included in the system design and provided by the Selected Vendor.

1.3.4 Codes, Regulations, Standards, and Guidelines

- A. Responders shall comply with the latest revisions of the codes, regulations, standards, and industry guidelines of the following entities (presented here in alphabetical order; not reflective of priority):
 1. American National Standards Institute (ANSI)
 2. American Society of Testing Materials (ASTM)
 3. American Standards Association (ASA)
 4. Association of Public-Safety Communications Officers (APCO)
 5. Electronic and Telecommunications Industry Associations (EIA-TIA)
 6. Federal Aviation Administration (FAA)

7. Federal Communications Commission (FCC)
 8. Institute of Electrical and Electronics Engineers (IEEE)
 9. National Electrical Code (NEC)
 10. National Electrical Manufacturer's Association (NEMA)
 11. National Fire Protection Association (NFPA) 1221
 12. Telecommunications Distribution Methods Manual (TDMM)
 13. Occupational Safety and Health Administration (OSHA)
 14. Telecommunications Standards Bulletin (TSB88)
 15. Underwriters Laboratories, Inc. (UL)
- B. Responders shall identify the version of the codes, regulations, standards and industry guidelines noted above that they use at the time of submitting their proposals as apply to the various sections of this RFP. The Selected Vendor shall notify the County of any version changes or changes in their use of the version identified in the proposal throughout the duration of the contract. The County reserves the right to specify the version of a specification that shall be used during any stage.
- C. Responders shall comply with the following industry best practices for system installation, grounding, bonding, and transient voltage surge suppression (TVSS), and declare and provide reasoning for their selection:
1. Motorola R56 - *Standards and Guidelines for Communication Sites* (latest revision)
 2. Harris[®] *Site Grounding and Lightning Protection Guidelines* (AE/LZT - 123 4618/1 - latest revision)
 3. United States Military Standard (MIL) 188-124B Standards current edition
 4. Other Responders / industry standards - Responders shall provide such documents to the County for review and approval prior to contract award
- D. Governing codes and conflicts: If the requirements of this RFP conflict with those of the governing codes and regulations, then the more stringent of the two shall become applicable.

- E. Responders shall comply with industry best practices for cybersecurity. Responders shall specify hardware, software, and protocols that protect against cyber-attacks, minimize network vulnerabilities, and mitigate security breaches. Responders shall provide security management tools that allow system managers to manage access to resources, maintain confidentiality, and ensure data integrity.
1. Responder shall comply with the following security standards and industry guidelines, provided here in no particular order with no implication of priority:
 2. FIPS PUB 140-2; "Security Requirements for Cryptographic Modules"
 3. ISO/IEC 27000:2009; "Information Technology – Security Techniques – Information Security Management Systems – Overview and Vocabulary"
 4. ISO/IEC 27001:2005; "Information Security Management Systems – Requirements"
 5. ISO/IEC 27002:2005; "Code of Practice for Information Security Management"
 6. ISO/IEC 27005:2008; "Information Security Risk Management"
 7. ISO/IEC 27010:2012; "Information Technology – Security Techniques – Information Security Management for Inter-Sector and Inter-Organizational Communications"
 8. ISO/IEC 27031:2011; "Guidelines for ICT Readiness for Business Continuity"
 9. ISO/IEC 27032:2012; "Information Technology – Security Techniques – Guidelines for Cybersecurity"
 10. ISO/IEC 27033; "Information Technology – Security Techniques - Network Security"
 11. ISO/IEC 27035:2011; "Information Security Incident Management"
 12. ISO/IEC 18043; "Selection, Deployment, and Operations of Intrusion Detection Systems"
 13. ISO FCAPS; "Fault management, Configuration management, Accounting management, Performance management, Security management"
 14. ITIL Version 3; "Service Design, Section 4.6 Information Security Management"
- F. If Responders cannot meet any of the standards or guidelines listed above, they shall list all deviations in their proposal for approval by the County.
-

1.3.5 Frequency Coordination and Licensing

- A. The County currently operates the trunked SmartZone™ System on licensed UHF T-Band frequencies, the F1/F3 system on licensed VHF High Band frequencies, the Paging/Alerting System on VHF licensed Low Band frequencies and backhaul on licensed microwave frequencies.
- B. The Selected Vendor shall be responsible for all frequency research, coordination, preparation and submittal of applications associated FCC licensing as required to implement the Selected Vendor's design.
- C. All applications and other licensing documents shall be in the name of Westchester, County of.
- D. The Selected Vendor shall be responsible for all coordination fees and other licensing costs.
- E. The selected Vendor shall obtain County approval of all licensing applications prior to submission to any third party.
- F. The Selected Vendor shall complete and submit Federal Aviation Administration (FAA) forms as necessary in the name of Westchester, County of.
- G. Where applicable, the Selected Vendor shall secure RPC approval, coordination and FCC license application grants. RPC documents may be found at:

<https://www.fcc.gov/general/700-mhz-rpc-directory-0>

1.3.6 Site Selection Requirements

- A. It shall be the responsibility of the Responders to propose all new radio sites needed to carry out their system designs in each stage.
- B. Because of the high recurring costs to use commercially owned tower sites, the County prefers the use of its existing radio sites or other government owned property for any new sites. However, the Responders shall propose system designs that optimize system coverage while minimizing site count. County properties that may be considered for the provision new sites is provided in Appendix K.

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- C. If Responders propose use of sites currently in use by the County, they shall include in their proposals any required modifications to any radio sites currently in use by the County for any of its systems. A list of existing site conditions is included in Appendix E.
- D. If Responders propose use of sites not currently used by the County (new sites) they shall include in their proposals for all new sites, details of the labor, materials, equipment, supporting systems and infrastructure necessary to furnish and install the equipment.
- E. The County shall have final approval of all proposed sites. The Selected Vendor shall work in good faith with the County in the final selection of new sites.
- F. If the Selected Vendor selects sites owned by others, it shall upon Notice to Proceed for each Stage, conduct due diligence and provide letters from the site owner(s) that state:
 - 1. The owner is willing to lease space at the site to the County, and the lease rate offered.
 - 2. Space is available on the tower at the Selected Vendor's defined heights, and space is also available for equipment in an existing room, or space is available for a shelter to be placed within the secured site area.
- G. The County will be responsible for the negotiation of site purchase or lease.
- H. The County will be responsible for the development of radio sites including site, shelter, tower construction, and utilities.
- I. For all new sites, the Selected Vendor shall prepare a complete specification package, based on County specifications and requirements, suitable for bidding including a project manual (specification book) and drawings both stamped and signed by a professional engineer (PE) or architect licensed by the State of New York for all site modifications and developments. This shall include, but not be limited to:
 - 1. Final site layout and design per network requirements design
 - 2. Preparation and submission of National Environmental Policy Act (NEPA)/State Historic Preservation Office (SHPO) studies
 - 3. Site preparation

4. Grounding
 5. Shelters
 6. Towers
 7. Generators
 8. HVAC Systems
 9. Fencing
 10. Utilities
- J. The Selected Vendor shall be obligated to implement each system in each stage with radio coverage as indicated on the respective prediction map in their response to this RFP for no more than the respective cost indicated in said response. Failure of the Selected Vendor to have properly determined the cost to implement each system with the indicated coverage due to their own underestimation of the number of radio sites needed, or due to their own overestimation of their ability to license transmitters with the necessary operating parameters in the County's name, or due to any other factor that was within their control shall not free the Selected Vendor from this obligation.

2. Instructions to Responders

2.1 Procurement Overview

- A. Proposals shall be submitted in a sealed envelope or package and received by the County no later than the Deadline for Receipt of RFP Proposals by the County as shown in Table 1. The County will not accept proposals received after this time. Proposals must be submitted on the Responder's letterhead and signed by Responder's authorized representative. Proposals in the form of telegrams, telephone calls, facsimiles, or telex messages will not be accepted.
- B. **Please take notice**, proposal submission packages must be marked: "RESPONSE TO REQUEST FOR PROPOSAL FOR VOICE RADIO COMMUNICATIONS SYSTEMS REPLACEMENT"
- C. Procurement Schedule and Dates

Table 1 reflects the timeframes and dates for the Procurement/RFP process.

Table 1 – Timeframes and dates for RFP process

RFP Timeframes and Dates	
Item and Description	Date and Time
RFP Release and Public Notice	September 5, 2017
Deadline for Submission of Names to Attend Site Visits	October 3, 2017
Mandatory Pre-Proposal Site Visits	October 10-20, 2017
Deadline for Responders Question Submittals	October 27, 2017, 5:00 pm EDT
Deadline for Answers to Responders Questions	November 17, 2017
Deadline for Receipt of RFP Proposals by the County	December 15, 2017, 12:00 pm EDT

2.2 Proposal Format

- A. The proposal must include the following information:
1. Responders Profile – Responders shall provide the following information:
 - a. Company Name

- b. Address
 - c. Year the company was founded
 - d. Total number of employees
2. Scope of work to be performed – Provide a detailed narrative of how the County’s required scope of work would be separately performed for each of the three Stages.
3. Preliminary Final Acceptance Test Plan (FATP)
4. Identification of Key Personnel – Identify and provide background information on the key personnel who would provide services to the County. The proposal must include the professional qualifications and experience of these individuals.
5. Other Information – Provide any other information not specifically requested by this RFP that is necessary to evaluate the Responders proposal or to complete the County’s required scope of work.
6. Timetable – Provide a schedule for the completion of all engineering, construction, testing and other work as set forth in this RFP, that conforms to or shortens the intervals provided in Section 1, Figure 1 for each of the three Stages. Such timetable shall be reviewed and approved during the negotiation of any contract.
7. Proposed Fee – The fee proposed for all equipment and services for each of the three Stages shall be indicated as part of the proposal. Failure to include the fee proposal amount with the proposal shall disqualify the proposal. If the fee is a not-to-exceed amount based on your estimate of hourly rates and costs necessary to complete the scope of work, Responders must provide a detailed budget outlining all such hourly rates and cost estimates.
8. Experience - The Proposal should list the Responders’:
 - a. Experience providing the services requested by this RFP
 - b. Experience providing services requested by this RFP to New York counties of similar size to Westchester County
 - c. Membership in appropriate professional organizations
 - d. Expertise of individuals who Responders have identified as the individuals who will provide the services to the County

9. References – The Responders shall provide three current references for similar services. The Responders will provide:
 - a. Client Name
 - b. Client Address
 - c. Client Point of Contact, Title and Telephone Number
 - d. Description of Services

- B. The proposal cover letter signed by a person authorized by Responder to make a binding proposal must set forth that *“this proposal constitutes a valid, binding and continuing offer at the prices set forth in the proposal for a period of 1 year from the Deadline for Receipt of RFP Proposals by the County as set forth herein.”*

- C. Responder shall submit:
 1. One original proposal on paper with original signatures and
 2. Five complete paper copies and
 3. Six thumb sized USB Flash Drives, each containing:
 - a. One electronic copy of the complete proposal with all attachments in PDF format and
 - b. One electronic copy of the complete proposal with all attachments in a format that is readable and modifiable using Microsoft applications.
 - c. All of the above items MUST be received no later than the Deadline for Receipt of RFP Proposals by the County as listed in Table 1 at the following address:
John B. McCaffrey
Chief Information Officer
148 Martine Avenue, Room 313
White Plains, NY 10601

- D. Proposal must be typed. All corrections made by Responder prior to the submittal deadline must be initialed and dated by Responder. No changes will be allowed after the submittal deadline.

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- E. Proposals delivered prior to the deadline shall be secured unopened so long as the package is properly marked as set forth above. Late proposals will not be accepted.
- F. Requests for clarification must be submitted, via email to the email address provided in Section 1.1, no later than the Deadline for Responders Question Submittals as Shown in Table 1.
- G. Formal written responses will be distributed by the County on or before the Deadline for Answers to Responders Questions. NO COMMUNICATIONS OF ANY KIND WILL BE BINDING AGAINST THE COUNTY, EXCEPT FOR THE FORMAL WRITTEN RESPONSES TO ANY WRITTEN REQUEST FOR CLARIFICATION. All requests and/or questions and their responses will be shared with all Responders by posing same on the County's RFP website each Friday until the deadline.

<https://rfp.westchestergov.com/rfp/rfps.jsp>

- H. Responders may be required to give an oral presentation to the County to clarify or elaborate on the written proposal.
- I. No proposal will be accepted from nor any agreement awarded to any Responder that is in arrears upon any debt or in default of any obligation owed to the County. Additionally, no agreement will be awarded to any Responder that has failed to satisfactorily perform pursuant to any prior agreement with the County.
- J. Order of Response:

The order of responses shall be as follows:

- 1. An executive summary (optional)
- 2. A full-description of the proposed systems, including equipment, software, design, and services to be provided separately for each stage:
 - a. Radio communications system equipment
 - b. Dispatch console system
 - c. Detailed equipment specification sheets for all proposed equipment

- d. System design information which shall include a complete detailed description, block diagrams, equipment layouts, and equipment lists necessary to provide a complete and comprehensive description
3. A project schedule for each Stage with a detailed Gantt chart that addresses at a minimum:
 - a. Detailed site surveys
 - b. Detailed design review
 - c. Equipment order and manufacturing
 - d. Factory acceptance test
 - e. Equipment delivery
 - f. System installation (per site and/or subsystem)
 - g. System configuration
 - h. System optimization
 - i. Acceptance testing
 - j. Coverage testing
 - k. Training
 - l. System transition plan
 - m. System documentation development and delivery
 - n. System and equipment warranty period.
4. A full-response to all sections in the RFP arranged in the same order and with the same numbering including all required responses in all appendices.
 - a. Responders shall address each paragraph of the RFP, in writing, paragraph by paragraph, as follows, using a font with bold and italics to clearly delineate responses to each subsection. Each response shall be placed directly below the paragraph to which it pertains.
 - b. The response to each paragraph shall be as follows:
 - 1) **COMPLY** - Indicates that the Responder's system meets the requirement or complies with the statement.

- 2) COMPLY WITH CLARIFICATION - the proposal does not meet the exact stated requirement; however, meets a substantial portion of, or meets the intent of the requirement. Responders shall provide a detailed explanation when using this statement.
 - 3) EXCEPTION - Indicates that the Responder's system does not meet the requirement or does not comply with the statement. Present all EXCEPTIONS, referenced to the RFP paragraph number in Appendix C - Compliance Matrix.
5. Supplemental information not included in the body of the proposal.
6. Appendices **Take Note**, Responders are required to include all appendices in their proposals. Responders must provide complete information requested in Appendices A, B, and C. Failure to provide any of this mandatory information in the proposal may be cause for rejection. Appendices D through Q are provided for Responders use in preparing proposals. All appendices must be included in the proposal.
- a. Appendix A - Mandatory Submittals – Complete all required Schedule forms
 - b. Appendix B – Proposal Pricing Forms – Responders shall submit the proposed system pricing by completing the pricing forms per the instructions in the Appendix B.
 - c. Appendix C – Compliance Matrix – Complete all required information.
 - 1) Responders shall demonstrate compliance with all RFP requirements by completing the compliance matrix provided in Appendix C.
 - 2) Responders shall provide an electronic copy of the Compliance Matrix in Microsoft® Excel format.
 - 3) Responders shall mark an "X" in the appropriate column for each line of the Compliance Matrix. Compliance statements are limited to the following three choices:

COMPLY - Indicates that the Responder's system meets the requirement or complies with the statement.

COMPLY WITH CLARIFICATION - the proposal does not meet the exact stated requirement; however, meets a substantial portion of, or meets the intent of the requirement. Responders shall provide a detailed explanation when using this statement.

EXCEPTION - Indicates that the Responder's system does not meet the requirement or does not comply with the statement. Present all EXCEPTIONS, referenced to the RFP paragraph number in Appendix C - Compliance Matrix.

- d. Appendix D – Sample Contract - Completely read sample contract and concur or list exceptions.
- e. Appendix E - Existing Site Conditions - Completely review existing site conditions listed.
- f. Appendix F - Existing Consoles Locations – Completely review existing dispatch center and consoles listed.
- g. Appendix G – Existing Equipment Alarm Points - Completely review existing equipment alarm points listed.
- h. Appendix H – Existing Antenna Systems- Completely review existing antenna systems listed.
- i. Appendix I – Radio Site Floor Plans - Completely review floor plans.
- j. Appendix J - Targeted Buildings – Completely review list of Buildings for in-building design
- k. Appendix K –County Properties – Completely review list of possible sites listed that are County preferred.
- l. Appendix L – Boundaries and Tiles – Completely review maps for use in Drive Testing and Coverage Acceptance Testing
- m. Appendix M – Preventative Maintenance Checklist
- n. Appendix N – Conventional Resources on Gold Elite Consoles
- o. Appendix O – Antenna Systems Test Steps
- p. Appendix P – Radio Coverage Prediction Parameters
- q. Appendix Q – Control Stations
- r. Appendix R – AC Powered Equipment

Note that appendices will be delivered as separate documents upon request to the email address provided in Section 1.1

- K. The County will evaluate proposals with appropriate consideration given to the best overall cost of ownership to the County. Responders shall provide detailed cost of support, maintenance and repair for all of the systems and equipment to be provided under the contract(s) awarded under this RFP for ten years. For the purposes of this requirement, Responders should assume that the County will enter into a maintenance agreement with the Selected Vendor to maintain the systems following the 3-year warranty period.
- L. The County may elect to purchase software maintenance agreements and system upgrades through year 10 following acceptance of the Stage Three system. Therefore, Responders shall include information for these products and services. Responders shall provide individual pricing for the proposed products and services. The County may elect to purchase all, some, or none of the items offered.
- M. Responders shall submit a proposed milestone payment schedule listing each milestone and/or deliverable for which payment will be due for all three Stages. Invoice amounts shall be listed separately for the Categories listed in the pricing forms summary pages. Payment for all deliverables or milestones shall be dependent on County acceptance.
- N. Responders shall submit copies of any standard support agreements (e.g., warranty, maintenance, software licensing) requiring County review and signature.
- O. Responders shall submit a proposed fee schedule and contract discount (if applicable) for the hardware, software, and services following the warranty period. Responders shall support the proposed fee schedule for a minimum of five years beyond the initial warranty period. Responders shall commit to extending contract pricing for user equipment to local agencies within the County.

2.3 Proposal Evaluation

The County will apply the following evaluation criteria in selecting Responders with whom to commence contract negotiations. Such criteria are not necessarily listed in order of importance. The County reserves the right to weigh its evaluation criteria in any manner it deems appropriate.

2.4 Mandatory Pre-Proposal Site Visits

- A. Responders are required to attend Mandatory Pre-Proposal Site Visits on the date shown in Table 1. Responders are required to meet at the Westchester Fire Training Center, located at 4 Dana Road, Valhalla, New York on the indicated date at 9:00 a.m. EDT. Responders must confirm attendance by submitting the names of all its attendees, before the Deadline for Submission of Names to Attend Site Visits, via email to the email address provided in Section 1.1. Individuals whose names are not submitted will not be permitted access to certain sites. Responders shall gather all information needed about existing County sites for their proposals during these walks. A list of existing site conditions is included in Appendix E to assist Responders. Responders are required to assess site conditions independent of this list and propose appropriate solutions.
- B. Depending on the number of Responders, the County reserves the right to limit the number of attendees per Responder. Notification of any limits imposed will be given to the individual Responder within two working days of the Deadline for Submission of names to Attend Site Visits. Any and all verbal communications between Responders and officers, employees or agents from the County, or its elected officials, during the site walks, shall not be binding against the County, its elected officials, officers, employees or agents unless and until formal written questions are submitted to the County and a formal written response is posted on the RFP web site.

2.4.1 First-Tier Evaluation

Proposals will be evaluated against the following criteria using a pass/fail determination.

- A. Compliance with requirements of the RFP. .
- B. Compliance with the essential minimum experience and qualifications required in this RFP.
- C. Compliance with the essential minimum experience and qualifications of the Responders' project team members.
- D. Evidence of sufficient levels of insurance coverage.
- E. Proposals must pass this first-tier evaluation to move on to the second-tier evaluation.

2.4.2 Second-Tier Evaluation

Second-tier evaluation will include, but not be limited to, consideration of the following (not necessarily listed here in the sequence of priority).

A. Price:

1. Relative cost benefit and quality as a function of the proposal (best value)
2. Proposed acquisition and implementation cost
3. Unit costs of user equipment
4. Lifecycle costs (such as user radio equipment, maintenance, software licenses)
5. Projected enhancement costs at 5, 10, and 15 years of service
6. Costs of other supporting infrastructure and facilities provided by the Responder
7. Cost of supporting infrastructure and facilities not provided by the Responder

B. Proposal:

1. Overall system design
2. Radio coverage guarantee
3. Responsiveness to County requirements
4. Soundness of technical approach
5. Compliance Matrix response
6. Management Approach
7. Minimization of risk(s) to the County including care, custody and control
8. Warranty, Maintenance and Support programs

C. Equipment:

1. Compliance with specifications
2. Serviceability
3. Quality of workmanship and materials

4. Superior design features that are advantageous to the County
5. Equipment inter-changeability
6. Ease of installation and removal
7. Equipment performance and reliability
8. Clarity of instruction material and system documentation

D. Experience:

1. Past performance of the firm including timely completion of projects, compliance with scope of work performed within budgetary constraints, and user satisfaction
2. Oral presentations, if required
3. Composition of the principals and staff assigned to the project, particularly the proposed project manager and immediate staff, and their qualifications and experience with projects such as that being proposed
4. Adequacy of the personnel of the firm to accomplish the proposed scope of work in the required time
5. References from previous clients, including size and scope of the project
6. Firm's familiarity with problems applicable to this type of project

Since it is the County's desire to select the most qualified firm, the County reserves the right to schedule oral presentations of those firms it deems most qualified, to take place within ten business days following notification.

2.5 Addenda to the RFP

During the proposal period, the County may issue written addenda making changes or corrections to the requirements as issued. Such changes or corrections shall be reflected in the products and services covered by Responders' proposal, and such addenda shall become part of the specifications and contract.

2.6 Legal Understandings

Take notice, by submission of a proposal in response to this RFP, Responders agrees to and understands:

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- A. That any proposal, attachments, additional information, etc. submitted pursuant to this RFP constitute merely a suggestion to negotiate with the County and is not a bid under Section 103 of the New York State General Municipal Law.
- B. Submission of a proposal, attachments, and additional information shall not entitle the proposing entity to enter a service agreement with the County for the required services.
- C. By submitting a proposal, the Responders understands that the County is not obligated to respond to the proposal, nor is it legally bound in any manner whatsoever by submission of same.
- D. Any and all counter-proposals, negotiations or any communications received by Responders, its officers, employees or agents from the County, its elected officials, officers, employees or agents, shall not be binding against the County, its elected officials, officers, employees or agents unless and until a formal written agreement for the services sought by this RFP is duly executed by both parties and approved by the Westchester County Board of Acquisition & Contract and the Office of the Westchester County Attorney.
- E. In addition to the foregoing, by submitting a proposal, Responders also understands and agrees that the County reserves the right, and may at its sole discretion exercise, the following rights and options with respect to this RFP, except to the extent restricted by applicable law, including, but not limited to, the Westchester County Procurement Policy, as amended:
 - 1. To reject proposals that do not conform in all material respects to the RFP or meet the minimum evaluation criteria
 - 2. To reject all proposals
 - 3. To issue additional solicitations for proposals and/or amendments to this RFP
 - 4. To waive any irregularities in proposals received after notification to all Responders
 - 5. To negotiate for amendments or other modifications to proposals
 - 6. To conduct investigations with respect to the qualifications of Responders

7. To exercise its discretion and apply its judgment with respect to any aspect of this RFP, the evaluation of proposals, and the negotiations and award of any contract
8. To enter an agreement for only portions (or not to enter an agreement for any) of the services contemplated by the proposals with one or more of the Responders
9. To select the proposal that best satisfies the interests of the County and not necessarily based on price or any other single factor in the evaluation criteria
10. While this is an RFP and not a bid, the County reserves the right to apply the case law under General Municipal Law § 103 regarding bidder responsibility in determining whether Responders are responsible vendor for this RFP process
11. The County assumes no responsibility or liability of any kind for costs incurred in the preparation or submission of any proposal
12. The County is not responsible for any internal or external delivery delays which may cause any proposal to arrive beyond the stated deadline. To be considered, proposals MUST arrive at the place specified herein and be time stamped prior to the deadline

2.7 Non-Collusion

The Responders, by signing the proposal, does hereby warrant and represent that any ensuing agreement has not been solicited, secured or prepared directly or indirectly, in a manner contrary to the laws of the State of New York and the County, and that said laws have not been violated and shall not be violated as they relate to the procurement or the performance of the agreement by any conduct, including the paying or the giving of any fee, commission, compensation, gift, gratuity or consideration of any kind, directly or indirectly, to any County employee, officer or official.

2.8 Applicable Laws/Conflicts of Interest

Any contract that results from this RFP will be subject to the applicable provisions of all federal, state and county laws.

All Responders must disclose with their proposals the name of any officer, director or agent who is also an employee of the County. Further, all Responders must disclose the

name of any County officer, employee, or elected official who has an interest in the proposal. An interest is defined in this agreement in accordance with Section 883.11(f) of the Laws of Westchester County as:

- A. A direct or indirect pecuniary or material benefit accruing to a county officer or employee, his or her spouse, child or dependent, whether as the result of a contract with the county or otherwise. For the purpose of this chapter, a county officer or employee shall be deemed to have an "interest" in the contract of:
 - 1. His/her spouse, children and dependents, except a contract of employment with the County
 - 2. A firm, partnership or association of which such officer or employee is a member or employee
 - 3. A corporation of which such officer or employee is an officer, director or employee
 - 4. A corporation of which more than 5 percent of the outstanding capital stock is owned by any of the aforesaid parties.
- B. Such disclosure shall be made on a separate piece of paper attached to the proposal and signed and dated by the same person signing the proposal.

2.9 MBE/WBE Questionnaire

This Section addresses Minority Business Enterprise (MBE) and Woman Business Enterprise (WBE). Pursuant to Section 308.01 of the Laws of Westchester County, it is the goal of the County to use its best efforts to encourage, promote and increase the participation of business enterprises which are owned and controlled by persons of a minority group or women in contracts and projects funded by the County. Therefore, the County asks Responders to complete the questionnaire attached in Appendix A.

2.10 Disclosure Forms

- A. To avoid conflicts of interest and the appearance of impropriety, the Responders shall be required to complete the Disclosure Form attached in Appendix A.
- B. The Responders agree to complete the Criminal Background Disclosure as required by Executive Order No. 1-2008 and attached in Appendix A, which is hereby incorporated by reference.

2.11 Hold Harmless / Indemnification Clause and Insurance Requirements

Prior to entering a contract with the County, the Selected Vendor must provide a Certificate of Insurance showing proof of insurance, which meets or exceeds requirements set forth in Standard Hold Harmless and Indemnification Clause, And Insurance Requirements, included in Appendix A.

2.12 Proposal, Performance, and Payment Bond

- A. A proposal security bond of 5% (five percent) of the total price in the Responder's proposal shall accompany all proposals. The proposal security bond shall be attached to the front of the proposal and no proposal will be considered unless accompanied by the proposal security bond. The proposal security bond for the unsuccessful Responders will be returned within ten (10) business days after the Selected Vendor executes any required contract and/or furnishes the County with all necessary payments, insurance certificates or other requirements as specified in this proposal. A sample PERFORMANCE AND PAYMENT BOND is included in Appendix A.
- B. Failure of the Selected Vendor to execute the agreement, furnish the necessary insurance, make the required payments or remove items within the time specified shall result in forfeiture of any proposal security deposit by the Selected Vendor. Such forfeiture shall not limit any other rights or remedies to which the County may be entitled. Forfeited security will be retained by the County as liquidated damages for such specified failure.

2.13 Proposal Retraction

Responders are advised that proposals submitted as part of this RFP offering may not be withdrawn for a minimum of 150 days following the Deadline for Receipt of RFP Proposals by the County unless circumstances justify consideration by the County of a release from this provision. Requests to withdraw a proposal must be in writing and received by the County at least 24 hours prior to the Deadline for Receipt of RFP Proposals by the County.

2.14 Records Retention and Disclosure

The Selected Vendor shall be required to maintain, for a period of 6 years from the date of final payment, all books and records pertaining to the awarded proposal.

- A. The New York State Freedom of Information Law as set forth in Public Officers Law, Article 6, Sections 84-90, mandates public access to government records. However, proposals submitted in response to this RFP may contain technical, financial background or other data, public disclosure of which could cause substantial injury to Responders' competitive position or constitute a trade secret. Responders who have a good faith belief that information submitted in their proposals is protected from disclosure under the New York Freedom of Information Law shall:

1. Insert the following notice in the front of its proposal:

“NOTICE

The data on pages ___ of this proposal identified by an asterisk (*) contains technical or financial information constituting trade secrets or information the disclosure of which would result in substantial injury to the proposer's competitive position.

The proposer requests that such information be used only for the evaluation of the proposal, but understands that any disclosure will be limited to the extent that the County considers proper under the law. If the County enters into an agreement with this proposer, the County shall have the right to use or disclose such information as provided in the agreement, unless otherwise obligated by law.”

2. Clearly identify the pages of the proposals containing such information by typing in bold face on each page:

“The proposer believes that this information is protected from disclosure under the state freedom of information law.”

- B. The County assumes no liability for disclosure of information so identified, provided the County has made a good faith legal determination that the information is not protected from disclosure under applicable law or where disclosure is required to comply with an order or judgment of a court of competent jurisdiction. The contents

of the proposal which is accepted by the County, except portions "Protected from Disclosure", may become part of any agreement resulting from this RFP.

2.15 Contract Award

- A. The term of any ensuing agreement will commence on or about July 1, 2018, and will continue through the successful installation, testing, system transition, and maintenance/warranty periods.
- B. The Selected Vendor shall be responsible for fulfilling all requirements for all Stages in response to this RFP at the pricing established in the contract resulting from this RFP. The County reserves the right to modify its contract with the Selected Vendor to provide all, none, or portions of the scope of work defined for all Stages.
- C. After selection of the Selected Vendor, and following contract negotiations, a formal written contract will be prepared by the County and will not be binding until signed by both parties and approved by the Westchester County Board of Acquisition and Contract and the Office of the County Attorney.
- D. No rights shall accrue to any Proposer by the fact that a proposal has been selected by the County for submission to the Board of Acquisition and Contract for contract approval. Said board has the right to reject any recommendation and the approval of said board is necessary before a valid and binding contract may be executed by the County.
- E. The Selected Vendor will be asked to sign a contract substantially in the form attached in Appendix D.
- F. The Selected Vendor will be asked to agree to a payment schedule for each Stage substantially the same as follows:
 - 1. 10% of contract value for Stage X upon completion of the Final Detailed Design Review for Stage X
 - 2. 10% of contract value for Stage X upon successful factory staging of equipment, including successful completion of the Staging Acceptance Test Plan (SATP)
 - 3. 40% of contract value for Stage X upon delivery of equipment and user radios to all sites in Stage X

4. 20% of contract value for Stage X upon acceptance by the County of the installation at all sites including installation of user radios in Stage X
5. 10% of contract value for Stage X upon successful completion of the Final Acceptance Test Plan (FATP) in Stage X
6. 10% of contract value upon successful completion of all open items and Final Acceptance by the County

3. Radio System Replacement Project Management

This Project Management section shall apply equally, individually and collectively to all three Stages of the Voice Radio Communications Systems Replacement project as a whole.

3.1 Project Staffing

- A. The Selected Vendor shall provide the appropriate project staff based on workload and the level of effort required throughout the implementation/installation process. The staff identified in the Responders' proposal, in accordance with Section 2.3 - Proposal Format of this RFP, shall serve the duration of each Stage of the project unless otherwise approved by the County in writing.
- B. The County reserves the right to accept or reject any proposed staffing changes.
- C. Selected Vendor's Project Manager:
 - 1. The Selected Vendor's Project Manager shall be the primary point of contact between the County and the Selected Vendor.
 - 2. The Selected Vendor shall reaffirm the Project Manager named in its response and provide a detailed resume.
 - 3. The Selected Vendor's Project Manager shall bear full responsibility for supervising and coordinating the installation and deployment of the communications system; be responsible for development and acceptance, by the County, of the project management plan; managing the execution of the project against that plan; and overseeing the day-to-day project activities, deliverables, and milestone completion.
 - 4. The Selected Vendor's Project Manager shall be responsible for coordinating, and facilitating weekly status meetings.
 - 5. The Selected Vendor's Project Manager shall be responsible for arranging for tele and web-conferencing facilities to host the status meetings and other project related meetings.
- D. Selected Vendor's Project Engineer:

1. The Project Engineer shall have the primary responsibility for managing the system design and ensuring system installation in accordance with the approved system design.
2. The Selected Vendor shall reaffirm the Project Engineer named in its response and provide a detailed resume.
3. The Project Engineer shall ensure the accurate development of block diagrams, system-level diagrams, and rack diagrams to assist the installation team in completing the system installation.
4. The Project Engineer shall also supervise the development and execution of all acceptance test plans, and guide the project team through the processes and procedures necessary to prove that the system performs as specified in the contract.
5. The Project Engineer must develop the system transition plans in consultation with the County and with the County's final approval.

3.2 Project Scheduling

- A. The Selected Vendor shall develop and maintain a project schedule for each Stage of the project, including tasks, milestones, start and end dates, task predecessors, and task owners based on an approved WBS.
- B. The schedule shall represent tasks associated with completing work on all items identified in the WBS. The Selected Vendor shall update the project schedule with actual dates as tasks are completed.
- C. The Selected Vendor shall present all schedule updates to the County during the weekly status meetings.
- D. The schedule shall address the following where applicable at a minimum:
 1. Site surveys
 2. Detailed design review
 3. Site preparation
 4. Equipment order and manufacturing
 5. Factory acceptance test
 6. Equipment delivery

7. System installation
8. System configuration
9. System optimization
10. Acceptance testing
11. Coverage testing
12. User training
13. System transition and plans
14. System documentation development and delivery
15. System and equipment warranty

3.3 Project Meetings

The Selected Vendor shall schedule an in-person project kickoff meeting at a location specified by the County prior to the beginning of each Stage of the project.

- A. The Selected Vendor shall schedule weekly project status meetings following contract award and the initial kickoff meeting. These meetings will be a combination of in-person and teleconference calls as mutually agreed between the Selected Vendor and the County. The weekly status meetings shall continue throughout the duration of the project until the County issues final system acceptance and the final invoice is rendered.
- B. The Selected Vendor shall be responsible for facilitating status meetings as well as preparing and distributing meeting agendas and detailed minutes to the County via e-mail at least 24 hours prior to each scheduled meeting. In addition to those identified in Section 3.2, - Project Scheduling, meeting agenda items shall include, as a minimum, the following items:
 1. Schedule review
 2. Status of deliverables
 3. Risk items and planned responses
 4. Proposed changes
 5. Plans for the next period
 6. Action item assignments

7. Punch list review

3.4 Quality Assurance/Quality Control (QA/QC) Program

- A. The Selected Vendor shall include a project QA/QC plan. The Selected Vendor shall submit the QA/QC plan for review during preliminary design as described in this section. The plan shall address all steps of the project, including, but not limited to:
 1. System design
 2. Installation
 3. Implementation
 4. Testing
 5. System Transition
- B. The QA/QC plan shall specifically describe the plans and procedures that ensure compliance of the proposed system design with the requirements of the contract.
- C. The QA/QC plan shall be included in the project management plan developed by the Selected Vendor's project manager.
- D. 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.
- E. The proposed QA/QC plan shall address the following project tasks at a minimum:
 1. Design analysis and verification
 2. RF coverage analysis and verification
 3. Design changes and document control
 4. Material ordering, shipping, receiving, and storage
 5. Site preparation (if required)
 6. Field installation and inspection
 7. Equipment inventory and tracking
 8. System testing and validation

9. Software regression testing
10. Deficiency reporting and correction
11. Implementation and live system transition
12. Training and certification

3.5 Project Punch List

- A. The Selected Vendor shall establish and maintain a punch list, as mutually agreed to with the County, for site facilities, equipment, and acceptance tests separately for each Stage of the project.
- B. The Selected Vendor shall maintain the punch list in real time and distribute it to the County weekly via e-mail. The punch list shall include the following at a minimum:
 1. Sequential punch list item number
 2. Date identified
 3. Item description
 4. The party responsible for resolution
 5. Expected resolution date
 6. Progress and status notes
 7. Resolution date
 8. Details about how each punch list item was resolved and tested
 9. Notes about the item
- C. If the Selected Vendor receives written permission from the County to transfer the responsibility of an item to another person or group, the Selected Vendor shall add a new entry to the punch list and appropriately note the original entry.
- D. The Selected Vendor shall be responsible for reviewing each punch list item and advising the County of any changes. The Selected Vendor shall update the status of punch list items during each weekly status meeting.

3.6 Project Documentation

The Selected Vendor shall provide all project documentation in accordance with the following considerations and requirements:

- A. All project documentation shall be subject to review and approval by the County and its engineer and/or consultant.
- B. The Selected Vendor shall provide all final documentation in hard copy, properly bound, and in electronic format on CD-ROM or flash drive. The County shall notify the Selected Vendor of the number of copies required for submitted documents, such as training, service, and operational manuals.
- C. The Selected vendor shall develop and submit the Project Schedule and all revisions in Microsoft Project format.
- D. The Selected Vendor will provide and maintain, through project completion as well as warranty and contracted maintenance services, an on-line Internet accessible document management system. The Selected Vendor shall store, and provide the County with access to all initial, revised and completed project documents such as data files, hardware and software configuration files, and other electronic documentation. All said documents and other electronic deliverables that are specific to the County's systems shall be stored in a format that allows the County to update their content with common commercially available software.
- E. The Selected Vendor shall provide and maintain, through project completion as well as warranty and contracted maintenance service periods, in the on-line Internet document system, RF coverage prediction, microwave path analysis, tower structural analysis, RF safety (MPE), and RF Interference analysis files in their native formats.
- F. The Selected Vendor shall ensure that any documentation changes or updates completed by its subcontractors shall adhere to all of the Selected Vendor's refresh policies and procedures and be maintained in the on-line Internet accessible document management system.
- G. The Selected Vendor shall develop and deliver to the County a full description of system behavior and operational procedures for all possible failure modes of key component of the system.

3.6.1 Draft Detailed Design

- A. The Selected Vendor shall submit the draft detailed design package 60 days after the Notice to Proceed (“NTP”) is issued for each Stage.
- B. The County shall review the final design within 30 days and, if approved, authorize the Selected Vendor to proceed with the Final Detailed Design.
- C. The draft detailed design shall include the following:
 - 1. Site selection as appropriate to each Stage
 - 2. QA/QC plan
 - 3. Detailed project schedule in Microsoft Projects files and pdf format
 - 4. Patching schedules and termination details for all cabling necessary for a complete record of the installation
 - 5. Radio and microwave channel plans
 - 6. Microwave path engineering report(s)
 - 7. Equipment room layout (plan) drawings
 - 8. Equipment rack/cabinet layout (elevation) drawings
 - 9. Tower profile (elevation) drawings indicating antenna mounting locations and antenna installation detail drawings
 - 10. Detailed lists of materials for each site
 - 11. 30-Day operational test plan
 - 12. Coverage Acceptance Test Plan (“CATP”)
 - 13. Final Acceptance Test Plan (“FATP”)
 - 14. Detailed list, including but not limited to, materials, equipment, and supporting systems/infrastructure to prepare each site to accept the installation of new equipment.

3.6.2 Final Detailed Design

- A. The Selected Vendor shall submit the final design package 90 days after the Notice to Proceed for each Stage.

- B. The County shall review the final design within 30 days and, if approved, authorize the Selected Vendor to proceed with implementation.
- C. The Detailed Design for each Stage shall include the following:
 - 1. Any updates to previously submitted design information based on County review and feedback and changes proposed by the Selected Vendor
 - 2. The final system transition plan shall be due 30 days before transition is started for each Stage
 - 3. System operation and maintenance manuals for all equipment
 - 4. Factory test data
 - 5. Site installation drawings
 - 6. Structural analyses and results
 - 7. Updated coverage maps
 - 8. Radio Frequency Interference (“RFI”) study for all new sites and any existing sites where changes require a new study for all Stages
 - 9. Suitable filtering and isolation components to correct any identified interference between the proposed and existing systems at all sites where RF changes require a new study for all Stages
 - 10. Maximum Permissible Exposure (MPE) study for all new sites and any existing sites where RF changes require a new study for all Stages
- D. Any deviation from the proposed system design shall be subject to project change control procedures and will not be undertaken until approved by the County.

3.6.3 System Staging

- A. The Selected Vendor shall Stage system components within the United States.
- B. The Selected Vendor shall submit a detailed Staging Acceptance Test Plan (“SATP”), outlining a comprehensive series of tests that will demonstrate proof of performance and readiness for shipment.
- C. The Selected Vendor shall submit the SATP no later than 30 business days before testing starts. The County shall approve the SATP no later than five business days before testing starts.

- D. The Staging test suite for the Trunked System, for Stage One, shall demonstrate proper functionality of all components to be installed at all sites. Demonstration and validation of cell roaming and handoff, and of all system component and functional redundancy shall be included in the test suite.
- E. A County representative must observe and approve all system staging testing.

3.6.4 Delivery, Storage and Handling

- A. Selected Vendor shall be responsible for, and bear the costs of, the delivery, storage, and handling of all equipment prior to system acceptance including insurance for equipment.
- B. The Selected Vendor shall submit a bill of materials (BOM) / packing list with two copies for each shipment of equipment. The packing list shall include the following information at a minimum for each component included in the packaging:
 - 1. Manufacturer
 - 2. Model
 - 3. Serial number
 - 4. Unique identification of the package containing the item
- C. All items shipped by the Selected Vendor or their suppliers will include the above information in a barcode format.

3.6.5 Final System Acceptance

The Selected Vendor shall submit a detailed Final Acceptance Test Plan (“FATP”), outlining a comprehensive series of tests that will demonstrate proof of performance and readiness for final acceptance by the County.

- A. The Selected Vendor shall submit the FATP no later than 30 business days before testing is scheduled to start. The County shall review the FATP within 15 business days of receipt and, if approved, authorize the Selected Vendor to proceed with testing.
- B. The Selected Vendor shall submit three final and complete sets of as-built documentation in accordance with Section 3.6 – Project Documentation, including the following:

- C. The County will take ownership of all equipment at time of final system acceptance.

3.6.6 Decommissioning and Removal of Legacy Equipment

- A. After the County's final acceptance of the System, the Selected Vendor shall consult with the County and remove legacy equipment that is not being reused. The County reserves the right to keep any equipment removed from service.
- B. Removal of legacy equipment includes the equipment and brackets, screws, bolts, cable ties, other fasteners, power cables, supplies, and all ancillary equipment and/or devices supporting the equipment.
- C. Equipment removed from exterior surfaces shall have those exterior services exposed weatherproofed to the county's satisfaction
- D. The Selected Vendor shall package, label, and transport all the removed equipment to one or more County-provided storage location(s) within the County.
- E. All equipment and devices being removed shall be cleaned externally, defaulted (remove programming), and the Selected Vendor shall make every effort not to damage the equipment. In the event the Selected Vendor causes damage to legacy equipment; they shall be responsible for compensating the County for the damages based on the fair market value of the equipment.
- F. The Selected Vendor shall maintain a detailed inventory of the removed equipment, listing the following at a minimum:
 - 1. The owning agency
 - 2. Brief description of the equipment being removed
 - 3. Model numbers
 - 4. Serial numbers
 - 5. Asset numbers
 - 6. Location removed from
 - 7. Location within the County-provided storage location(s)

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- G. Unless otherwise agreed to by the Selected Vendor and the County, proper disposal of equipment shall be the responsibility of the County in accordance with applicable law.

4. Stage One Functional Requirements

4.1 Stage One Overview

Stage One calls for the replacement of the County's Trunked System operating in UHF T-Band and the F1/F3 Conventional Radio System operating in the VHF High Band. It also requires the addition, in the same time frame, of a simulcast Paging and Alerting System operating on frequencies in the VHF (or UHF) spectrum to operate in a multicast fashion with the existing Paging/Alerting Systems operating in VHF Low Band. Stage One calls for the replacement of the DES dispatch console system and the implementation of an IP-based site condition and alarm monitoring system. Stage One will also require the replacement of user radio equipment as specified in the appropriate sections of this RFP.

4.1.1 Common Site Equipment

- A. The County currently deploys UPS systems at many sites as indicated in Appendix E. A system that utilizes DC powered equipment and the associated DC rectifier power systems is preferred eliminating the need for UPS systems.
- B. To the greatest extent possible, all site equipment shall be powered by an AC to DC power plant whose primary output is a nominal -48-volt DC with battery back-up.
- C. The required input power to the DC plant shall be 208-240 VAC whenever available at each site.
- D. Batteries shall be sized for a minimum of 8 hours of reserve capacity at the maximum load required for the site as designed plus a 20% increase in load.
- E. The DC plant modular in design such that a failure of any module shall not render the plant incapable of supporting the load (n+1). Each module shall not be loaded greater than 85% of its individual capacity during a single module failure.
- F. The DC plant shall be fully expandable by at least 50% to serve future equipment additions at each site.
- G. Selected Vendor shall furnish and install DC to AC inverters for existing AC powered equipment that will not be replaced in Stage One and new equipment that is AC powered that is not capable of utilizing the -48 volt power directly. The DC to

AC inverters shall be hardwired to feed the existing UPS distribution panels where applicable. It is expected that all such new equipment will be kept to a minimum. Appendix R is a site by site list of existing AC powered equipment that will not be removed in Stage One. Proposals shall include a complete list of equipment (existing and new) that requires AC power.

- H. The Selected Vendor shall remove all UPS units currently installed at existing sites as part of the Stage One installation.

4.2 Stage One Trunked Radio System

The County intends to purchase and implement an integrated P25 Phase 2 radio communications system that will provide first responders real time operable and interoperable voice and data services that support day-to-day, mutual aid, and task force operations. The system shall be highly-reliable, fault tolerant, spectrally efficient, easily scalable, and meet the operational requirements for first responders.

The existing UHF T-Band Trunked System comprises 9 sites and 12 channels implemented with analog trunking technology that provides County wide mobile voice coverage. Two 6-channel simulcast cells comprise the system with the North Cell having 6 sites and the South cell having 3 sites as Tables 2 and 3 identify. The replacement of the existing Trunked Radio Systems is required as part of this RFP. This will consist of the radio, control, dispatch, monitoring and management equipment needed to provide a new P25 Phase 2 system using the same radio communications sites, radio frequencies, antenna systems, and other supporting infrastructure.

Table 2 – UHF T-Band Trunked System Channels

Channel	North Cell Frequencies (MHz)	South Cell Frequencies (MHz)
#1	470.5750	476.2375
#2	470.5500	476.2125
#3	470.5250	476.1125
#4	470.3750	476.0750
#5	470.3500	470.2000
#6	470.3250	478.3125

Table 3 – UHF T-Band Trunked System sites and call signs

Site Name	FCC License
North Cell	
Adams Lane, Pound Ridge	WQDW263
Benefield, Peekskill	WQDW263
Fox Lane, Bedford	WQDW263
Maryknoll, Ossining	WQDW263
Mohansic, Yorktown	WQDW263
Mountain Lakes, North Salem	WQDW263
South Cell	
Dunwoodie, Yonkers	KVN918, WQBR539, WQHV394
Grasslands, Valhalla	KVN918, WQBR539, WQHV394
Summit Ave., Port Chester	KVN918, WQBR539, WQHV394

- A. The P25 Phase 2 replacement radio system shall consist of the equipment and interfaces required to provide:
1. Voice radio communications, UHF T-Band P25 Phase 2 operation
 2. Interconnection to the replacement dispatch console system
 3. Integration with the existing Avtec, Inc. dispatch console system
 4. Interface to the existing optical fiber and microwave backhaul systems
 5. Support for integration with the County’s Intergraph I/CAD 9.3 computer-aided-dispatch system
 6. VPI™ Empower Logging Recorder interface
 7. Standards-based Console Sub-System Interface (CSSI) to system
 8. Replacement consoles for DES and DOT
 9. Conventional channel gateways
 10. DPS Avtec consoles CSSI interface
 11. Dispatch Console System
 12. User radios (portable radios, mobile radios, and control stations) as identified in this RFP
 13. IP based Network Management System (NMS)

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- B. Responders shall provide a P25 Phase 2 technology solution capable of operating with mobile, portable and control station radio units manufactured by at least three different manufacturers certified to operate through the P25 compliance assessment process¹ and shall identify these manufacturers.
- C. The P25 Phase 2 system shall support the voice communication needs for agency users throughout the Service Area, employing standards-based P25 trunked system technology in the UHF T-Band spectrum.
- D. The new system shall include, but not be limited to the following functionality:
 - 1. Wide-area radio communications throughout the Service Area
 - 2. Interoperability among all participants in accordance with their level of authorization
 - 3. Interoperability with others using specifically designated interoperability and mutual aid channels as well as specifically designated talkgroups
 - 4. Interconnection of systems to other systems by means of open standard and nonproprietary inter/intra-system network interfaces as defined by the P25 Phase 2 specification for subsystem and inter-system communications
- E. The radio network shall be fault tolerant and contain no single point of failure that could disrupt communications at greater than a single site or single channel.
- F. The County expects the useful life of the systems provided in each Stage to be 20 years from the date of final acceptance of the Stage One systems. It is inadvisable for the Responder to propose use of components that will not meet this expectation. Therefore, it is possible to encounter changes in operating systems as they relate to servers, network management terminals, and dispatch position computers. In the event, such changes occur (e.g., Windows 7 to Windows 10), Responders shall describe the impact of operating system changes in detail throughout the communications network in their proposals. A change in operating system shall not require an upgrade to the entire system.

¹ <http://www.safecomprogram.gov/NR/rdonlyres/D295A545-44A4-4226-AAF7-56A33684908E/0/Project25ComplianceAssessmentProgramCharter.pdf>

- G. The system shall provide mobile radio coverage throughout the County areas as described in Section 4.2.4 - Stage One Radio Systems Coverage Prediction Requirements.
- H. The Selected Vendor shall work with the County to determine required system capacity and loading, and fleet mapping, to determine the most efficient division of available channels.
- I. All existing functionality and access to resources provided on the current Gold Elite dispatch consoles must be maintained by the replacement dispatch console system. Responders shall disclose any loss of functionality no matter how minor.

4.2.1 Project 25 Statement of Requirements (SoR)

- A. The proposed radio system shall comply with the latest applicable P25 suite of standards adopted as TIA and/or ANSI documents at the time of proposal submission. These standards establish technical parameters that allow compatibility and interoperability of digital radio equipment from different manufacturers.
- B. By stating compliance with a level two heading in the P25 Statement of Requirements (SoR), Responders claims compliance with all applicable third-level headings (requirements) in the SoR. If Responders are not compliant with a requirement, Responders shall identify the requirement by number and name, and provide a detailed explanation of why the proposed system does not meet the requirement. Responders shall reference the complete P25 SoR for a detailed description of each requirement.
- C. Responders shall provide pricing, in the Pricing Forms, for all P25 SoR requirements (features) not included in the base price of any component. System or user features not included in the SoR shall be listed separately.

4.2.2 Stage One Trunked System Features and Capabilities

- A. Based on their comprehensive study, knowledge and understanding of the County's existing radio systems, Responders shall propose locations to implement system controllers, or other critical control equipment, for the UHF T-Band Trunked System in a redundant geographically diverse configuration. Responders shall consider use of the data center in the Michaelian MOB for this purpose.

- B. The proposed radio system shall implement the following minimum features and capabilities:
1. IP architecture throughout the system
 2. UHF T-Band P25 Phase 2 operation
 3. IP Interface with existing Microwave and Fiber backhaul
 4. Reuse of existing antenna systems, filters and combiners
 5. Active redundancy and geographic diversity for all critical system control equipment.
 6. Encrypted communications using 256 bit AES with Multi-key capability
 7. Over-the-air rekeying (OTAR)
 8. Encryption key management system for OTAR
 9. Over-the-air programming (OTAP)
 10. Over the Internet Programming (OTIP)
 11. Real-time system monitoring and logging
 12. Backup and restore capability
 13. Text messaging using user radios
 14. Call alert/paging function
 15. Private call
 16. Emergency alarm/alert function
 17. Voice prioritization over data
 18. User and talkgroup priority levels
 19. Out of range indication
 20. Support for integration with the County's Intergraph I/CAD 9.3 computer-aided-dispatch system
 21. VPI Empower Logging Recorder interface
 22. Standards-based Console Sub-System Interface (CSSI) to system
 23. P25 Inter-RF Sub-System Interface (ISSI)
 24. Geo-location (i.e., Global Positioning System (GPS))

25. Transparent site roaming (automatic intra-system roaming)
26. Radio enable/disable function
27. Remote monitoring (remote radio key-up)
28. Ability to silence radio remotely
29. Interoperability with conventional channel resources
30. Talkgroup scanning - the scanning functionality shall not load or stress a system or a collection of sites, affecting Grade of Service (GoS)
31. IP-Based NMS and site condition and alarm monitoring system
32. Fallback failure modes such as failsoft and site trunking

If any of the above features and capabilities are optional, at additional cost, they shall be listed in the Pricing Forms.

- C. The system shall be expandable by adding additional hardware and/or software to increase coverage, capacity, or features. Responders shall propose equipment that accommodates the smooth and efficient implementation of Stages Two and Three.
- D. Responders shall make all efforts to design a system without a single point of failure. For those elements that would result in a major system failure that could result in more than the loss of one site and/or one channel, redundancy and diversity is required. Such elements include, but are not limited to the following:
1. System controllers
 2. Site controllers
 3. Simulcast controllers
 4. Backhaul network interface
 5. Power systems
- E. The proposed radio system shall include fallback failure modes that permit continuing use of the system with degraded operation. The system shall be capable of automatic activation of failure modes in the event of a failure. Additionally, the system shall switchover to a graceful degradation mode. The following failures shall invoke the activation of a failure mode and not prevent wide area trunked communications:

1. Loss of system controller
 2. Loss of simulcast controller
 3. Loss of multiple sites
 4. Loss of single site
 5. Loss of multiple channels
 6. Loss of single channel
- F. A detailed description shall be supplied by Responders describing the system operation when any of the failures described above occurs. The description shall include the effect to the system users, dispatchers, system coverage and capacity. The description shall also describe the process by which the system returns to normal including restoral delays due to resyncing with the restored equipment.

4.2.3 TIA TSB-88.3-D / County User Choices

The County requires that the proposed UHF T-Band Trunked System comply with the TSB-88.3-D standards and County user choices as outlined in this section.

- A. Identify Service Area
- The Service Area is the area of the County covered by the Responders projected coverage as defined by Section 4.2.4 Radio System Coverage Prediction Requirements
- B. Identify Channel Performance Criteria
- The Channel Performance Criterion is DAQ 3.4 and the Bit Error Rate that will produce an equivalent DAQ of 3.4
- C. Identify Reliability Design Targets
- 97% Covered Area Reliability
- D. Identify the acceptable terrain profile extraction methods
- Snap to Grid
- E. Identify acceptable interference calculation methods

- Monte Carlo Simulation Method
- F. Identify the metaphor(s) to be used to describe the plane of the Service Area
- Tiles Method
- G. Willingness to accept a lower area reliability in order to obtain a frequency Reference, Frequency Assignment Criteria, Interaction Between Shared and PSA Users
- No
- H. Identify adjacent channel drift confidence
- 95%
- I. Determine Conformance Test confidence level
- 99%
- J. Identify which Pass/Fail Criterion to use
- Greater than Test
- K. Identify treatment of inaccessible grids
- All are eliminated from the calculation

4.2.4 Radio Systems Coverage Prediction Requirements

- A. Coverage design, implementation, and testing for all systems shall adhere to the Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB-88, Wireless Communications Systems Performance in Noise-Limited Situations (all parts), revision D. The County must approve the use of later editions should they become available.
- B. Responders shall submit individual prediction maps for the following portions of this project:
1. Trunked System – separately for each Stage
 - a. Stage One, P25 Phase 2 on-street mobile coverage
 - b. Stage Two, P25 Phase 2 on-street portable coverage

- c. Stage Three, P25 Phase 2 light and medium in-building portable coverage
 - d. Stage Three, P25 Phase 2 targeted in-building portable coverage
 2. F1 channel on the F1/F3 System – for Stage One only, P-25 Phase 1 and Analog FM
 3. F3 channel on the F1/F3 System – for Stage One only P-25 Phase 1 and Analog FM
 4. Paging, Analog FM light and medium in-building coverage.
 - 5.
- C. The Responders' coverage prediction maps for the Trunked System for both UHF and 700 MHz, in Stages Two and Three and the Paging/Alerting System, shall use the following colors to indicate coverage as defined elsewhere in this RFP:
 1. For all points inside the County, paint the point yellow if the point has on-street coverage
 2. For all points inside the County, paint the point green if:
 - a. the point is inside an in-building area and the point has in-building coverage
 - OR
 - b. the point is outside an in-building area and the point has on-street coverage
 3. Green takes precedence over yellow (i.e. step 2 changes some points from yellow to green).
 4. This should produce a map that is:
 - a. Green where:
 - 1) In-building areas have in-building portable coverage
 - 2) On-street areas have on-street portable coverage
 - b. Yellow where:

- 1) In-building areas have only on-street portable coverage
- c. White where:
- 2) Areas do not have at least on-street portable coverage
- D. The Responders' coverage prediction maps for the Trunked System and the F1/F3 System in Stage One shall paint the point green for all points inside the County if the point has mobile coverage and white for all points that do not have coverage as defined elsewhere in this RFP.
- E. Subjective and Objective coverage shall be predicted as round-trip (talk out only for paging).
- F. Responders shall include coverage prediction maps that are compliant with the mapping requirements in Section 8.
- G. The Channel Performance Criteria ("CPC") for round-trip subjective DAQ tests , for talk in and talk out, is 3.4 as defined in TSB-88.1 Table 3.
- H. The CPC for Objective BER testing is defined as the minimum BER that will produce a voice DAQ 3.4 equivalent as defined in current revision of TSB-88.1 Table A.1 for the modulation type proposed.
- I. "County Boundary" is defined as the legal County boundary including the eastern half of the Hudson River, a portion of Long Island Sound, plus the entire area of the Continental Village Fire District, the entire area of the Mohegan Fire District and the entire area of the Croton Falls Fire District as shown on the County Boundary map in Appendix L.
- J. "County Buffer" is defined as area within the County Boundary plus the areas extending westerly to the Rockland County Hudson River shoreline, easterly to the Nassau County, Long Island Sound shoreline five (5) kilometers beyond the County Boundary with Bronx County, Putnam County, and Connecticut.
- K. "Coverage Area" is defined as the area within the County Boundary, which the Responder's prediction maps indicate will meet or exceed the minimum Channel Performance Criteria.
- L. "Drive Testing" is defined as the act of driving through all accessible tiles while collecting objective and subjective data.

- M. “Coverage Acceptance Testing” is defined as the application of pass/fail criteria to the objective and subjective testing in tiles included in the Coverage Area results.
- N. The county requires that the Coverage Area Reliability shall provide at least a 97% statistical probability that in the coverage area predicted by the Responder, if tested, would be found to support electrical performance that meets or exceeds the minimum signal level needed to deliver the required Delivered Audio Quality and Bit Error Rate as specified herein.
- O. For Stage One only, all tiles within the County Boundary that meet the minimum mean signal level of -107 dBm for the Trunked System and the F1 channel and – 97dBm for the F3 channel must meet the required CPC for both objective and subjective tests.
- P. The Responder shall include in its RF Coverage Analysis a comprehensive explanation of its Modeling Tool, Propagation Model, along with associated RF and model parameters. Responders shall complete and submit with their proposals the spreadsheet for the Radio Coverage Map Prediction Parameters as shown in Appendix P.
- Q. Coverage testing shall be performed as provided in Section 8.

4.2.4.1 Stage One UHF Trunked System Coverage Prediction Requirements

- A. Responders shall provide a detailed, individual roundtrip coverage prediction map showing predicted coverage within the County Buffer based on the existing sites, antenna systems and licenses as provided in Appendix H.
- B. Coverage shall be predicted as round-trip, with simulcast distortion, using a mobile radio mounted in a vehicle with a 3 dB antenna (phasing coil type) mounted in the center of the vehicle rooftop at 1.5 meters AGL. The output power of the mobile radio shall be in accordance with the County’s FCC licenses for the frequency(s) of use.
- C. Because the County is specifying all of the fixed sites to be used, Selected Vendor is not required to meet a Service Area coverage requirement. However, the system must be capable of providing the required DAQ and BER in 97% of the predicted coverage area, whenever the local mean RSSI amplitude is stronger than -107 dBm at the test port of the radio in the normal operating environment. The normal operating environment includes a moving user vehicle, multipath

fading and the associated delay spread from multipath and from simulcast interference.

4.2.4.2 Stage One F1/F3 System Coverage Prediction Requirements

- A. Responders shall provide a detailed, individual roundtrip coverage prediction map showing predicted coverage within the County Buffer based on the existing sites, antenna systems and licenses as provided in Appendix H.
- B. Coverage shall be predicted as round-trip, with simulcast distortion, using a mobile radio mounted in a vehicle with a 3 dB antenna (phasing coil type) mounted in the center of the vehicle rooftop at 1.5 meters AGL. The output power of the mobile radio shall be in accordance with the County's FCC licenses for the frequency(s) of use.
- C. Because the County is specifying all of the fixed sites to be used, Selected Vendor is not required to meet a Service Area coverage requirement. However, the system shall meet the required CPC in 97% of the predicted coverage area. For all tiles within the County Boundary that meet the minimum mean signal level of -107 dBm for the F1 channel and -97 dBm for the F3 channel at the test port of the radio in the normal operating environment must also meet the required CPC. The normal operating environment includes a moving user vehicle, multipath fading and the associated delay spread from multipath and from simulcast interference.

4.2.4.3 Paging/Alerting System Coverage Prediction Requirements

- A. Responders shall provide a detailed talk-out coverage prediction map showing predicted coverage within the County Buffer based on the sites, antenna systems and licenses in their proposals.
- B. Responders shall describe the coverage guaranty provisions, including remedial actions to be undertaken by and at the proposer's expense if the coverage guaranty is not met.
- C. Responders shall include within their coverage prediction map, the levels of radio coverage provided inside the County Buffer as identified in Appendix L.
- D. Coverage shall be predicted as talk-out only, with simulcast distortion, using a typically configured Motorola Minitor VI pager worn on the hip.

- E. For the purposes of coverage prediction, talk out coverage shall be in provided in 95% of the light and medium buildings in the County Boundary.

4.2.5 Stage One Trunked System Radio Site Selection

- A. The Stage One Trunked System shall utilize the nine sites currently in use by the County for its UHF Trunked System.
- B. Responders shall comply with all of the Site Selection Requirements in Section 1.

4.2.6 Stage One Trunked System Radio Site Equipment

All replacement Trunked System site equipment supplied shall be new, of high quality, and designed to provide high-reliability to support mission critical communications.

- A. The site equipment, consists of but is not limited to the following components:
 - 1. Simulcast equipment
 - 2. Receiver voting
 - 3. Transmitters and Receivers
 - 4. Antenna Systems (not replaced in Stage One)
 - 5. GPS Receivers

4.2.6.1 Stage One Trunked System Simulcast Equipment

- A. Responders shall provide all necessary simulcast components and signal processing elements required to optimize voice quality in coverage overlap areas.
- B. Non-captured overlap areas with delay spreads exceeding those required to meet the DAQ objective shall be minimized inside the Service Area.
- C. Simulcast systems shall operate without the need for frequent manual optimization and system/subsystem alignment. All alignment and adjustments shall be automated where possible (e.g., signal conditioning adjustments for channel banks, and signal launch times at sites).

- D. If the Responders' design includes centralized simulcast control equipment, the system shall include redundant simulcast control equipment geographically separated from the primary simulcast control site.

4.2.6.2 Stage One Trunked System Receiver Voting

- A. Responders shall furnish and install all receiver voting equipment necessary for proper system operation.
- B. Receiver voting equipment shall monitor all receivers in the system and select the best signal for processing and rebroadcast through the network. The system shall include redundant receiver voting equipment geographically separated from the primary receiver voting site.

4.2.6.3 Stage One Trunked System Transmitters and Receivers

- A. Responders shall furnish and install all repeaters necessary for proper system operation of the Trunked System.
- B. Repeater equipment shall be solid state in design and function within standard site conditions for temperature, altitude, and humidity.
- C. Repeater equipment shall be monitored and remotely configurable by the IP Network Management System (NMS). Monitoring shall include, but not be limited to interrogating the base station equipment for power amplifier temperatures, high/low voltage conditions, transmitter power output and high Standing Wave Ratio (SWR). Responders shall detail any additional operating conditions capable of being monitored.
- D. The County has installed Bird Technologies Power/ VSWR monitors on all Trunked System antenna feedlines at all sites. These units shall be upgraded to properly interfaced with the NMS via an IP connection to provide an alarm indication when low transmitter power or high VSWR is detected. The alarms require a logic input from the transmitter to enable the sensor alarm only when the transmitter is active.
 - 1. The units shall be as compact as possible, with mounting configurations for use in standard 19" equipment racks or cabinets.
 - 2. Repeater equipment shall be controlled via IP connection and not analog control methods such as two or four-wire ear and mouth (E&M) signaling.

- E. Repeater equipment shall comply with Part 90 or other applicable FCC Rules and Regulations, as well as appropriate EIA and similar agency standards.

4.2.6.4 Stage One Trunked System Antenna Systems

Where feasible, all existing antenna systems shall be reused. The Selected Vendor shall perform, at a minimum, VSWR testing and any other testing required to validate the performance characteristics of the antenna systems and identify any systems that may require replacement. Sweep the antenna system across its frequency range measuring the return loss of the antenna system. Appendix H, *Existing Antenna Systems* provides a description of the existing antenna systems.

4.2.6.5 Stage One Trunked System Time Base System

- A. Responders shall furnish and install all Time Base System equipment necessary for proper system operation.
- B. All Time Base System equipment shall be fully redundant such that no single component failure shall result in loss of GPS data to the site.
- C. A single Time Base System complex shall serve all equipment at the site that requires GPS data for proper functioning.
- D. Time Base System shall synchronize and provide useable data within the shortest time possible after a restoral of power to the GPS complex. Responders shall indicate their product's restoral time.

4.2.7 Stage One User Equipment

- A. Due to the diverse operational requirements of system users and potential T-Band reallocation, the County requires that Responders provide pricing for all grades or tiers of user radio equipment available for potential use on the system, including, but not limited to:
 - 1. Single-band radios capable of operating in each of the following frequency bands:
 - a. UHF: 450-512 MHz
 - b. VHF: 150-174 MHz

- c. 700/800 MHz: 762 – 862 MHz
 2. Dual-band radios capable of operating in each of the following frequency bands:
 - a. VHF: 150 – 174 MHz and UHF: 450 – 512 MHz
 - b. UHF: 450 – 512 MHz and 700/800 MHz: 762 – 862 MHz
 - c. VHF: 150 – 174 MHz and 700/800 MHz: 762 – 862 MHz
 3. Tri-band radios capable of operating in the VHF, UHF, and 700/800 MHz spectrum as noted above
- B. Pricing for dual and tri-band radios should be provided as follows:
1. Price with a single-frequency band operational at purchase time
 2. Cost to add each operating additional frequency band post initial purchase
 3. Price with two frequency bands operational at purchase time
 4. Price with three frequency bands operational at purchase time where applicable
- C. Pricing for all end user equipment must be extended to non-County agencies operating in the jurisdiction of the County

4.2.8 Stage One System User Equipment Overview

- A. User equipment includes all non-infrastructure equipment, including:
1. Portable radios
 2. Mobile radios
 3. Control stations
- B. Table 4 provides an estimate of the quantities of user radios that the County may purchase. Responders shall use these quantities for pricing in their proposals. Responders should note that these quantities may change during negotiations with the Selected Vendor(s).

Table 4 – Stage One UHF T-Band Trunked System User Radios

County of Westchester, New York
Request for Proposals
Voice Radio Communications Systems Replacement

TOTALS	
Mobile Units	1828
Portable Units	1305
Control Stations	205

- C. Responders shall provide detailed unit pricing for all of its own current make and model user equipment capable of operating on the proposed P25 Phases 1 and 2 radio systems.
- D. Responders shall detail any quantity level discounts associated with each model proposed in the pricing forms.
- E. The Selected Vendor(s) shall be responsible for programming all purchased user devices to operate on the existing and proposed County radio systems and other channels such as fire ground and other local agency systems as requested by the County.
- F. The Selected Vendor(s) shall supply the County with three sets of programming software and programming cables for each user model purchased.
- G. The Selected Vendor(s) shall supply the County with software licenses and programming software for each model of radio purchased that is valid for three years from the date of Stage One acceptance.
- H. The County may select more than one responder to supply user radios. The Selected Vendor(s) shall furnish all new, unused, user radios and be responsible for:
1. Removal of existing mobile units and control stations at the County's OPTION
 2. Complete installation of mobile units and control stations with all accessories needed for operation at the County's OPTION
 3. Replacement of all mobile radio antennas, at the County's option, with antennas supplied by the Selected Vendor(s) and approved by the County
 4. Programming of all user units according to the fleet map and templates developed with the County and the Selected Vendor(s)

4.2.9 Stage One User Radio Equipment General Requirements

- A. All user radio equipment shall be FCC certified for operation in accordance with FCC Part 90 and other applicable rules and regulations.
- B. All user radio equipment shall meet MIL-STD-810 latest revision. Responders shall list, by model, each MIL-STD-810 requirement that its products meet.
- C. All user radio equipment shall be software configurable to allow field programming to install OPTIONAL features and modes.
- D. User radios may provide, as an OPTION, field programming to activate additional frequency bands
- E. All user radio equipment shall be provided with a 3-year warranty with the warranty start date to coincide with the system warranty start date.
- F. All user radio equipment shall support the following operating modes:
 - 1. Conventional P25 Phase 1
 - 2. Trunked P25 Phase 1 with enhanced vocoder
 - 3. Trunked P25 Phase 2 with enhanced vocoder
 - 4. Radio-to-radio direct communication (talk-around) P25 Phase 1
 - 5. Conventional analog FM
- G. All user radios proposed shall be compliant with TIA-603-D Land Mobile FM or PM Communications Equipment Measurement and Performance Standards and TIA-102.CAAB-D: Land Mobile Radio Transceiver Performance Recommendations Project 25 - Digital Radio Technology C4FM/CQPSK Modulation Transceiver Performance Recommendations.
- H. Responders shall provide detailed equipment specifications for all proposed user radios and accessories, including the following:
 - 1. Radio dimensions
 - 2. Weight with battery (portable)
 - 3. Antenna and antenna connector type
 - 4. Channel/mode capacity (including talkgroup capacity)

5. Environmental specifications and applicable standards
6. Performance in strong signal environments including digital adjacent channel rejection, digital offset adjacent channel rejection, spurious response rejection, intermodulation rejection, and blocking rejection

4.2.10 Stage One Portable Radios

- A. The County has estimated the quantities of portable radios in Table 4. For the purpose of this RFP, Responders shall provide pricing within the Price Forms (Appendix B) with the assumption that the County may purchase the number of portable radios shown. The County reserves the right to change the quantities and features ordered of all user radios as well as purchase such equipment from multiple vendors.
- B. Responders shall propose portable radios capable of operating on the existing and proposed systems and with the following features:
 1. Full-compliance with P25 (Phase 1 & 2) features and operation
 2. Push-to-Talk (PTT) button
 3. Top-mounted on/off volume knob
 4. Top-mounted Talkgroup/channel selector
 5. Emergency button, physically protected from inadvertent activation, with software defined configurable activation delay
 6. Backlit alphanumeric display (on applicable models), minimum of eight characters
 7. Transmit and receive indicator
 8. Accessory connector for remote speaker microphone, tactical headsets, or vehicular adapter for operational use in a vehicle
 9. Battery life indication or low battery alert, graphical indication on display
 10. Minimum 500-milliwatt (mW) speaker audio output and maximum 5% distortion as in TIA 603
 11. Background noise abatement or cancellation system optimized to reject audio signals identified by the P25 Audio Performance Working Group (APWG) such as, but not limited to, Personal Alert Safety System (PASS)

alarms, and chain saws. Responders shall explain operation of this feature in P25 trunked and conventional modes.

12. Self-Contained Breathing Apparatus (SCBA) Interface

C. Battery:

1. Responders shall propose batteries without cadmium. Pricing shall be provided for the following:
 - a. Lithium-ion
 - b. Lithium Polymer
 - c. Intrinsically safe
2. Batteries shall provide a minimum operational use of twelve hours in a public safety environment. Responders shall specify assumed duty cycle.
3. Responders shall provide detailed specifications for all batteries proposed, including the following at a minimum:
 - a. Battery life
 - b. Total battery life-cycle expectancy
 - c. Recharge time
 - d. Dimensions
 - e. Weight
 - f. Warranty

D. Accessories:

1. Responders shall provide pricing for all accessories and software features that may be purchased as an OPTION, including the following at a minimum:
2. Data cables
3. Battery chargers – single unit, multiple bay, and vehicular chargers:
 - a. Responders shall provide smart, mixed chemistry battery chargers. Responders shall provide complete specifications on all chargers offered.
 - b. Battery chargers shall have the ability to cycle the battery by application of load to condition it.

- c. Battery chargers shall have the ability to gauge the capacity of the battery after recharge, and indicate whether the battery failed the test. Indicator lights or display is a minimum requirement.
 - d. Battery chargers shall have the ability to detect the battery chemistry and configure themselves to charge accordingly.
4. Radios certified as intrinsically safe
 5. Alternate antennas
 6. GPS (internal to radio)
 7. Bluetooth[®] (accessories)
 8. Remote speaker microphone without antenna
 9. Remote speaker microphone with antenna
 10. Remote speaker microphone with GPS capability
 11. Remote speaker microphone with keypad
 12. Remote speaker microphone with Amplified Speaker (Audio)
 13. Bluetooth[®] remote speaker microphone
 14. Headset:
 - a. Wired
 - b. Bluetooth[®]
 15. Carrying cases / belt clips
 16. Vehicular adapter – provides in vehicle portable radio battery charging, mobile microphone, amplified speaker, transmit power amplifier, external antenna connection.

E. Features:

1. Wireless (e.g., Wi-Fi[®], Bluetooth[®], LTE, LMR) connectivity for OTAP
2. 256 bit AES Encryption with Multi-key capability
3. OTAR
4. OTAP
5. OTIP

6. Send and receive text messages

4.2.11 Stage One Mobile Radios

- A. The County has estimated the quantities of mobile radios in Table 4. For the purpose of this RFP, Responders shall provide pricing within the Price Forms (Appendix B) with the assumption that the County may purchase the number of mobile radios shown. The County reserves the right to change the quantities and features of all user equipment as well as purchase such equipment from multiple vendors.
- B. Mobile radios shall be supplied complete with microphone, external speaker, cables, fusing, mounting hardware, coaxial cable (as required), and antennas to provide for a complete installation. Responders shall specify the available mounting styles.
- C. Responders shall provide pricing for dash mounted units, dual head units and remote mounted units including appropriate control heads and control software and hardware.
- D. Responders shall propose mobile radios capable of operating on the proposed systems and feature:
 1. Full-compliance with P25 Phase 1 and Phase 2 features and analog narrowband FM operation
 2. Mobile remote mount, with control head
 3. Front-mounted on/off volume knob
 4. Talkgroup / channel / mode selector
 5. Talkgroup / channel bank / zone or deck selection
 6. OPTIONAL microphone with full keypad for telephone interconnect and other functions such as call alert/page or private call
 7. OPTIONAL full keypad on control head
 8. Programmable side buttons on keypad microphone
 9. Emergency button, protected from inadvertent activation, with software defined configurable activation delay
 10. Multi-line alphanumeric display

11. Transmit and Receive indicator
 12. Programmable buttons on control head
 13. Minimum 5-watt external speaker audio output at rated distortion
- E. Accessories – Responders shall provide pricing for all OPTIONAL accessories and software options, including the following at a minimum:
1. Cables:
 - a. Data cables
 - b. Extension cables
 - c. Adapters
 - d. Power cables
 2. OPTIONAL user activated external speaker (outside vehicle)
 3. OPTIONAL call alert/page feature for horn/lights
 4. OPTIONAL dual control heads
 5. Dual control head
 6. External speakers
 7. Public address kits
 8. Antennas of various types for user selection including but not limited to:
 - a. Gain antennas (including unity gain),
 - b. Various mounting devices (roof, side body, mirror, others)
 - c. With and without spring
 9. External weatherproof speakers
- F. Features:
1. OTAP
 2. OTIP
 3. AES Encryption with Multi-key capability
 4. OTAR

4.2.12 Stage One Control Stations

- A. A “Control Station” is defined as a user radio installed at a fixed location with an external antenna, and powered by AC power (nominal 120VAC).
- B. The County has estimated the quantities of Control Stations in Table 4. For the purpose of this RFP, Responders shall provide pricing within the Price Forms (Appendix B) with the assumption that the County may purchase the number of control station radios shown. The County reserves the right to change the quantities and features of all user equipment as well as purchase such equipment from multiple vendors.
- C. All Control Stations are located within Westchester or close to the its borders. A list of control station locations to be replaced is provided in Appendix Q.
- D. Control Stations shall be able to be remotely controlled via multiple desk set devices. Responders shall detail how many desk set devices can control a single control station.
- E. Full-function desk sets shall be able to control every feature available on the front panel of the Control Station.
- F. Features:
 - 1. Full-compliance with P25 features and operation
 - 2. Desk top microphones
 - 3. Front-mounted on/off volume knob
 - 4. Talkgroup/channel selector
 - 5. Emergency button, protected from inadvertent activation
 - 6. Alphanumeric display
 - 7. Transmit indicator
 - 8. OTAR
 - 9. AES & DES Encryption with Multi-key capability
 - 10. OTAP
 - 11. OTIP

- G. Accessories – Responders shall provide pricing for all OPTIONAL accessories that may be purchased, including the following at a minimum:
1. Cables:
 - a. Data cables
 - b. Extension cables
 - c. Adapters
 - d. Power cables
 2. Antennas
 3. External Speakers
 4. Desktop microphone
 5. Send and receive text messages

4.3 DES and DPS Deployable Mobile Facilities

4.3.1 DES Sites on Wheels (SOW)

At 35 Walker Road, adjacent to 4 Dana Road and 60 Control, DES maintains two Sites on Wheels (SOW 1 & 2) and two mobile generators to support incident response and radio system operations.

- A. SOW 1 provides the County with LMR coverage to enhance communications during natural and manmade disasters and planned events. SOW 1's main mast of 78', combined with a supplemental mast, and the trailer height boasts a portable communications tower of nearly 85'. VHF, UHF, 700/800 MHz radios and a Raytheon JPS Communications ACU-2000™ gateway that can equip first responders with tools to communicate in virtually any situation with any local, state, or federal mutual aid partner.
- B. SOW 2 houses two MSI MTR3000 base station/repeaters; one normally configured to support UTAC repeater operation or remote linking / backhaul to Grasslands, and the other normally configured to support VTAC.
- C. Integral generators provide power to both SOWs in the event an external feed is not available.

- D. Radio equipment shall be replaced as needed in each SOW to ensure continued operation on the new Trunked System, F1/F3 Radio System, and Paging and Alerting System.

4.3.2 DES Field Communications Unit 1 (FC1)

- A. The DES mobile command vehicle (MCV), also known as Field Communications Unit 1 (FC1), stored at 4 Dana Road in Valhalla, provides DES with communications capabilities on all of the County's primary radio systems and supports interoperable communications.
- B. Radio equipment shall be replaced in FC1 to ensure continued operation on the new Trunked System, F1/F3 Radio System, and Paging and Alerting System.

4.3.3 DPS Mobile Command Post (MCP)

- A. DPS's mobile command post ("MCP"), stored at the DPSHQ in Hawthorne, provides DPS with a mobile facility to conduct field operations for prolonged periods. VHF and UHF radios enable DPS to communicate on the County's F1/F3 System and with local law enforcement agencies in addition to DES users on the Trunked System. DPS's MCP also includes two full Avtec, Inc. dispatch console positions for local and remote dispatch operations. The Avtec, Inc. consoles on the MCP connect through mobile radios onboard the MCP.
- B. Radio equipment shall be replaced in the MCP to ensure continued access by the MCP to the new Trunked System and F1/F3 System through the Avtec, Inc. radio dispatch console.

4.4 Stage One F1/F3 VHF Replacement Conventional Radio System

- A. The F1/F3 VHF Conventional Radio System is the primary radio system for DPS. The system uses analog conventional technology consisting of two conventional analog simulcast transmit, voted receiver repeater channels and 14 radio communications sites throughout Westchester to provide DPS users with voice radio service. Similarly, to the existing Trunked System, the County requests proposals for the replacement "in-place" of the existing system with a new P25 Phase 1 F1/F3 System using the same radio communications sites, radio frequencies, antenna systems, and other supporting infrastructure.

- B. DPSHQ in Hawthorne provides dispatch services for DPS as well as interoperability and law enforcement dispatch support for some local municipalities. Five (5) Avtec Inc. consoles allow dispatchers to accomplish their duties. DPSHQ is the primary PSAP for County and local jurisdictions served by DPS and a secondary PSAP for local municipalities where DPS is not the primary law enforcement agency. In addition, there is one (1) Avtec, Inc. console at the County EOC, one (1) at the New York State Police PSAP (both at 200 Bradhurst Avenue), and two (2) in the DPS MCP.
- C. Responders shall include in their responses all necessary updates and interfaces to connect the AVTEC, Inc. consoles directly (i.e. not via a control station) to the F1/F3 VHF Conventional Radio System with support for all P25 Phase 1 features
- D. Responders shall include in their responses all necessary updates and interfaces to connect the AVTEC, Inc. consoles via CSSI directly to the Trunked UHF P25 Phase 2 System and the new P25 F1/F3 System.
- E. Stage One does not require Responders to propose replacement dispatch console system equipment for DPS.

4.4.1 Stage One F1/F3 Radio System Features and Capabilities

The proposed system will be configured as follows.

- A. The F1 channel will be a 14-site P25 Phase 1 system operating in P25 Phase 1 conventional mode with 11 transmit-receive sites and three receive-only sites, as shown in Table 6. The F1 channel shall continue to use the frequency shown in Table 5.
- B. The F3 channel will be a 11-site P25 Phase 1 system operating in analog conventional mode with 10 transmit-receive sites and one receive-only site, as shown in Table 6. The F3 channel shall continue to use the frequency shown in Table 5. Note – Although licensed, the Mountain Avenue-Mount Kisco site is not equipped for F3.

Table 5 – F1/F3 System channels

Channel	Frequency (MHz) / CTCSS (Hz)	
F1	155.31 / 192.8 TX	158.97 / 192.8 RX
F3	155.55 / 192.8 TX	159.03 / 103.5 RX

Table 6 – F1/F3 System sites and call signs

Site Name	FCC License F1	FCC License F3
Benefield	WPEM283	WQBM883
Courthouse	WQLN766	WQLN766
Croton Point	Receive-only	None
Dunwoodie	KEH749	WPEM284
Fox Lane	WPEM283	WQBM883
Grasslands	KEH749	WPEM284
Guard Hill	Receive-only	Receive-only
Hangar E	WQLN766	WQLN766
Maryknoll	WPEM283	WQBM883
Mohansic	KEH749	WPEM284
Mountain Avenue	WQLN766	WQLN766
Mountain Lakes	KEH749	WQBM883
Playland	Receive-only	None
Wilmot Road	WPEM283	WQBM883

4.4.2 TIA TSB-88.3-D / County User Choices

The County requires that the proposed F1/F3 System comply with the TSB-88.3-D standards and County user choices as outlined in this section.

A. Identify Service Area

- The Service Area is the area of the County covered by the Responders projected coverage as defined by Section 4.4.3 - Stage One VHF Replacement F1/F3 Radio Coverage

- B. Identify Channel Performance Criteria
- The Channel Performance Criterion for F1 operated in P25 Phase 1 mode is DAQ 3.4 and the Bit Error Rate that will produce an equivalent DAQ of 3.4
 - The Channel Performance Criterion for F3 operated in analog mode is DAQ 3.4 and a SINAD level that will produce an equivalent DAQ of 3.4
- C. Identify Reliability Design Targets
- 97% Covered Area Reliability
- D. Identify the acceptable terrain profile extraction methods
- Snap to Grid
- E. Identify acceptable interference calculation methods
- Monte Carlo Simulation Method
- F. Identify the metaphor(s) to be used to describe the plane of the Service Area
- Tiles Method
- G. Willingness to accept a lower area reliability in order to obtain a frequency Reference, Frequency Assignment Criteria, Interaction Between Shared and PSA Users
- No
- H. Identify adjacent channel drift confidence
- 95%
- I. Determine Conformance Test confidence level
- 99%
- J. Identify which Pass/Fail Criterion to use
- Greater than Test
- K. Identify treatment of inaccessible grids
- All are eliminated from the calculation

4.4.3 Stage One F1/F3 Radio System Site Selection

- A. The Stage One F1/F3 System shall utilize the fourteen F1 sites and the twelve F3 sites currently in use by the County for its F1/F3 System.
- B. Responders shall comply with all of the Site Selection requirements in Section 1.

4.4.4 Stage One F1/F3 Radio System Site Equipment

- A. All replacement F1/F3 System site equipment supplied shall be new, of high quality, and designed to provide high-reliability to support mission critical communications.
- B. The site equipment, or RF infrastructure, consists of the following components:
 - 1. Simulcast equipment
 - 2. Receiver voting
 - 3. Transmitters and Receivers
 - 4. Antenna Systems (not replaced in Stage One)
 - 5. Time Base System
- C. Both channels of the F1/F3 VHF Conventional Radio System shall be configured for operation dynamically in both P25 Phase 1 and analog operation modes as well as mixed mode. The F1 channel will primarily be operated in P25 Phase 1 conventional mode; the F3 channel will primarily be operated primarily in conventional analog mode.

4.4.4.1 Stage One F1/F3 Radio System Simulcast Equipment

- A. Responders shall propose all necessary simulcast components and signal processing elements required to optimize voice quality in coverage overlap areas.
- B. Non-captured overlap areas with delay spreads exceeding those required to meet the DAQ objective shall be minimized inside the Service Area.
- C. Simulcast systems shall operate without the need for frequent manual optimization and system/subsystem alignment. All alignment and adjustments shall be automated where possible (e.g., signal conditioning adjustments for channel banks, and signal launch times at sites).

- D. If the Responders' design includes centralized (or distributed) simulcast control equipment, the system shall include redundant simulcast control equipment geographically separated from the primary simulcast control site.

4.4.4.2 Stage One F1/F3 Radio System Receiver Voting

Receiver voting equipment shall monitor all receivers in the system and select the best signal for processing and rebroadcast through the network. The system shall include redundant receiver voting equipment geographically separated from the primary receiver voting site.

4.4.4.3 Stage One F1/F3 Radio System Transmitters and Receivers

- A. Responders shall furnish and install all repeaters necessary for proper operation of the F1/F3 System.
- B. Repeater equipment shall be solid state in design and function within standard site conditions for temperature, altitude, and humidity.
- C. Repeater equipment shall be monitored and remotely configurable by the NMS. Monitoring shall include, but not be limited to interrogating the base station equipment for power amplifier temperatures, high/low voltage conditions, transmitter power output and high standing wave ratio (SWR). Responders shall detail any additional operating conditions capable of being monitored.
- D. The County has installed Bird Technologies Power/VSWR monitors on all F1/F3 System antenna feedlines at all sites. These units shall be upgraded to properly interfaced with the NMS via an IP connection to provide an alarm indication when low transmitter power or high VSWR is detected. The alarms require a logic input from the transmitter to enable the sensor alarm only when the transmitter is active.
 - 1. The units shall be as compact as possible, with mounting configurations for use in standard 19" relay racks or cabinets.
 - 2. Repeater equipment shall be controlled via IP connection and not analog control methods such as two or four-wire ear and mouth (E&M) signaling.
- E. Repeater equipment shall comply with Part 90 and other applicable FCC Rules and Regulations, as well as appropriate EIA and similar agency standards.

4.4.4.4 Stage One F1/F3 Radio System Antenna Systems

Where feasible, all existing antenna systems shall be reused. The Selected Vendor shall perform, at a minimum, VSWR testing and any other testing required to validate the performance characteristics of the existing antenna systems and identify any systems that may require replacement. The antenna system shall be swept across its frequency range measuring the return loss of the antenna system. Appendix H, *Existing Antenna Systems*, provides a description of the existing antenna systems.

4.4.4.5 Stage One F1/F3 System Time Base System

The F1/F3 System shall use the common Time Base System complex provided for the Stage One Trunked System.

4.5 Paging and Alerting Systems

4.5.1 Existing Paging and Alerting System Description

The County's existing VHF Low Band Paging/Alerting System primarily relies on five transmitter sites located throughout the County to provide paging and alerting communications for first responders. During a typical incident, fire, EMS, or specialty team responders are dispatched by 60 Control which transmits tone and voice paging/alerting messages via the County and/or agency base station radio systems to field personnel equipped with pagers who receive the pages/alerts and respond via the existing Trunked System, their local system (if applicable), or cellular telephone. In some instances, local agency-owned base stations will store-and-forward (retransmit) the pages/alerts from 60 Control on the same or a different frequency thereby allowing these agencies to improve local coverage and reception and provide greater flexibility in the type of personal pager required for use by its users.

4.5.2 Paging and Alerting System Features and Capabilities

The County requires Responders to propose a Paging/Alerting system that replaces the County owned Low VHF Band system with a system that has the following features and capabilities:

- A. The Responders shall propose an analog voice Paging/Alerting system capable of providing critical emergency alerting fire and EMS agencies within the Service Area as defined in Section 4.5.3, County User Choices.

- B. The system shall support two-tone sequential paging and voice alerting.
- C. The system shall provide tone and voice alerting for individual on hip pagers, fire station alerting receivers, siren/horn activation, and KNOX-BOX[®] key access.
- D. The system shall carry traffic simultaneously with the existing County owned paging system, for a time period to be determined by DES in order to allow agencies to transition to the new system.
- E. The system shall be capable of initiating multiple tone and voice pages simultaneously on different frequencies, for unrelated incidents occurring at the same time and needing to be dispatched simultaneously throughout the County.
- F. The system must be compatible with the Responders' proposed replacement consoles.
- G. Digital text paging is not an acceptable solution.
- H. There is no requirement for a single countywide paging frequency.
 - I. A "Paging Sector" is defined as a geographical segment of the County in which there are one or more radio sites.
- J. DES shall assign agencies within the Paging Sectors to one of the frequencies in that Paging Sector. This assignment will be based on the operational needs of DES.
- K. The frequency band of the new system shall be either VHF High Band or UHF (not T-Band) and shall be determined for the purposes of the proposal by the Responder based on the availability of suitable, FCC licensable frequencies. (UHF preference and reuse of existing combiners and antenna systems where possible)
- L. The Selected Vendor shall be responsible for frequency selection (subject to County approval), and all costs associated with FCC licensing.

4.5.3 TIA TSB-88.3-D / County User Choices

The County requires that the proposed Paging/Alerting system comply with the TSB-88.3-D standards and County user choices as outlined in this section.

- A. Identify Service Area
-

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- The Service Area is the County Boundary as shown on the map in Appendix L and as defined in section 4.5.4 - Paging/Alerting System Coverage
- B. Identify Channel Performance Criteria
- The Channel Performance Criterion is DAQ 3.4 and SINAD that will produce an equivalent DAQ of 3.4
- C. Identify Reliability Design Targets
- 95% Service Area Reliability
- D. Identify the acceptable terrain profile extraction methods
- Snap to Grid
- E. Identify acceptable interference calculation methods
- Monte Carlo Simulation Method
- F. Identify the metaphor(s) to be used to describe the plane of the Service Area
- Tiles Method
- G. Willingness to accept a lower area reliability in order to obtain a frequency Reference, Frequency Assignment Criteria, Interaction Between Shared and PSA Users
- No
- H. Identify adjacent channel drift confidence
- 95%
- I. Determine Conformance Test confidence level
- 99%
- J. Identify which Pass/Fail Criterion to use
- Greater than Test
- K. Identify treatment of inaccessible grids

- All are eliminated from the calculation

4.5.4 Paging/Alerting System Design

- A. The system shall contain one or more Paging Sectors within the County.
- B. Each Paging Sector shall provide 95% in-building coverage; with a 99% confidence level for each frequency in its area
- C. Each Paging Sector shall exceed the boundaries of the jurisdictions within the Paging Sector allowing for the required signal strength and redundancy if a single Paging Sector transmitter or site fails
- D. Each Paging Sector shall contain one or more operational frequencies
- E. There shall be a total of six frequencies in the system. The frequencies shall be distributed as evenly as FCC licensing permits among the Paging Sectors
- F. Each frequency shall serve one or more agencies
- G. Any agency assigned to a frequency shall have its jurisdictional boundaries completely within the Paging Sector

4.5.5 Paging and Alerting System Site Selection

- A. For the purposes of cost and practicality, Responders shall give preference to use of the County's existing radio sites and equipment, as listed in Table 8 below, in the design of the paging/alerting system. The County's second preference is to use other County owned properties as listed in Appendix K. However, Responders are free to choose any and all sites for the system that will provide the required coverage and reliability with optimal site count.

Table 8 – Existing County Sites

County Site Names		
Adams Lane	Dunwoodie	Mohansic
Alpine Tower	Fox Lane	Mountain Avenue
Benefield	Grasslands	Mountain Lakes
Courthouse	Guard Hill	MVDO
Crompond Road	Hanger E	Summit Avenue
DPSHQ Tower	Maryknoll	Wilmot Road
		Winged Foot

B. Responders shall comply with all of the Site Selection requirements in Section 1.

4.5.6 Paging and Alerting System Site Equipment

All Paging and Alerting System site equipment supplied shall be new and of high-quality.

A. The site equipment, or RF infrastructure, consists of the following components:

1. Simulcast equipment where applicable
2. Transmitters
3. Antenna systems
4. Time Base System

4.5.6.1 Paging and Alerting System Simulcast Equipment

- A. The County prefers a simulcast design for each frequency. Responders may propose alternate technologies that achieve the equivalent coverage results.
- B. Responders shall provide all necessary simulcast components and signal processing elements required to optimize voice quality in each Paging Sector.
- C. Non-captured overlap areas with delay spreads exceeding those required to meet the DAQ objective shall be minimized inside the Service Area zone.
- D. Simulcast systems shall operate without the need for frequent manual optimization and system/subsystem alignment. All alignment and adjustments shall be

automated where possible (e.g., signal conditioning adjustments for channel banks, signal launch times at sites, etc.).

- E. If the Responders' design includes centralized or distributed simulcast control equipment, the system shall include redundant simulcast control equipment geographically separated from the primary simulcast control site.

4.5.6.2 Paging and Alerting System Radio Transmitters

- A. Responders shall furnish and install all transmitters necessary for proper system operation of the Paging/Alerting System.
- B. Each selected radio site shall house one or more paging transmitters that each operate on a different frequency within the same radio frequency band.
- C. Transmitter equipment shall be solid state in design and function within standard site conditions for temperature, altitude, and humidity.
- D. Transmitter equipment shall be monitored and remotely configurable by the NMS. Monitoring shall include, but not be limited to interrogating the base station equipment for power amplifier temperatures, high/low voltage conditions, transmitter power output and high SWR. Responders shall detail any additional operating conditions capable of being monitored.
- E. The County has installed Bird Technologies Power/VSWR monitors on all Trunked and F1/F3 System antenna feedlines at all sites. Similar units shall be furnished and installed by the Selected Vendor on all paging/alerting antenna feedlines, at all paging/alerting sites. These units shall be properly interfaced with the NMS via an IP connection to provide an alarm indication when low transmitter power or high VSWR is detected. The alarms require a logic input from the transmitter to enable the sensor alarm only when the transmitter is active.
- F. The external RF sensors described above shall be installed after the combiner when the combiner is equipped with circulators. Existing county combiners are so equipped.
 - 1. The units shall be as compact as possible, with mounting configurations for use in standard 19" relay racks or cabinets.

2. Transmitter equipment shall be controlled via IP connection and not analog control methods such as two or four-wire ear and mouth (E&M) signaling.
- G. Base station equipment shall comply with Part 90 and other applicable FCC Rules and Regulations, as well as appropriate EIA and similar agency standards.
 - H. Transmitters shall employ filtered circulators that provide a minimum of 50 dB of isolation.
 - I. All feedlines shall have surge protection devices installed. All antenna system surge protection devices proposed must be approved by the County.

4.5.6.3 Paging and Alerting System Antenna Systems

- A. Responders shall propose all antenna system equipment necessary for a complete design including combiners and circulators as required.
- B. Antennas shall be appropriate to provide the required coverage and meet applicable FCC rules and regulations. The County has a strong preference for exposed dipole antennas in the UHF and VHF bands. The county shall have approval of the antenna selected.
- C. Reuse and/or expansion of the existing Trunked or F1/F3 System combiner and antenna systems is preferred where possible.
- D. Combiners may be used where applicable.
- E. Responders shall use the existing antenna system parameters of the existing F1/F3 VHF Radio System, as defined elsewhere in this RFP, if proposing a VHF Paging/Alerting system.
- F. Transmitter output power and antenna VSWR shall be monitored continuously whenever the transmitter is active.
- G. Responders shall use the existing antenna system parameters for the existing UHF T-Band Trunked System, as defined elsewhere in the RFP, if proposing a UHF paging/alerting system
- H. Responders shall select proposed antenna based on the conditions of the site and efficient system design. The County expects that the antenna model will not be the same at all sites.

- I. New Antennas shall be swept as required in Appendix O

4.5.6.4 Stage One F1/F3 System Time Base System

- A. The F1/F3 System shall use the common Time Base System complex provided for the Stage One Trunked System.

4.5.7 Paging and Alerting System User Equipment

- A. The County requires that the proposed user equipment for the tone and voice paging system contain the following features and be capable of the following:
 - 1. Decoding and alerting on 2 tone sequential paging using the Quick Call II format
 - 2. Provide a clear audible alert
 - 3. Provide a visual alert
 - 4. Record voice page for recall
 - 5. Operate in silent/vibrate mode
 - 6. Operate with rechargeable batteries
 - 7. Meet Military Standard 810, Procedure 1 for driving rain
 - 8. Accessories:
 - a. Amplified charging base unit
 - b. Charging base unit with relay output
- B. Responders shall indicate the models and capabilities of the pagers they offer that are compatible with the proposed system.
- C. Quantities of user pagers by type have been noted in the Pricing Forms, and all Responders shall use these quantities for pricing in their proposal. Responders should note that these quantities may change during negotiations with the Selected Vendor.
- D. The County DES anticipates the purchase of approximately 70 pagers for internal use.

- E. The County is not purchasing pagers for local non-County first responders. The estimated number of non-County users is 4,558.
- F. Pagers shall be made available to all fire and EMS agencies in Westchester at County negotiated pricing covered under an awarded contract.

4.6 Stage One Backhaul Network

- A. The County requires that the new radio systems use the existing fiber and microwave networks to interconnect radio systems at all existing sites unless otherwise indicated by the County. The existing backhaul transport system consists of an Aviat Networks point to point microwave radio system used as a back up to principal connectivity via an optical fiber transport system provided by Altice Business (“Lightpath”).
- B. The fiber optic network is currently delivering synchronous time-division multiplex (TDM) circuits. Beginning in Stage One it will be used to deliver IP connectivity.
- C. The microwave network is currently delivering synchronous time-division multiplex (TDM) circuits. Beginning in Stage One it will be used to deliver IP connectivity.
- D. All new Stage One equipment shall use IP connectivity via the fiber optic network and the microwave network. Responders must provide any necessary modifications to the existing microwave network to provide the necessary IP connectivity.
- E. Responder shall specify the requirements for packet latency, jitter, throughput and other performance criteria that must be met by the Lightpath network.
- F. Should the Responder’s Paging/Alerting System design require additional sites, the proposed backhaul is required to comply with all Stage Two Backhaul Network requirements.
- G. The Responder’s proposal shall include the addition of microwave connectivity at all existing sites that currently do not have microwave except Playland and Croton Point.
- H. The Dunwoodie site cannot support the addition of a microwave link as of the issue date of this RFP. Responders shall include, in their proposals, a microwave link

from Dunwoodie to the Courthouse in anticipation of the County replacing the tower at Dunwoodie.

4.7 Stage One Dispatch Console System

4.7.1 Stage One Dispatch Console System General Requirements

- A. The dispatch console system is a critical link for emergency services personnel. The replacement of the radio dispatch console system serving DES and DPW&T is required during Stage One. The replacement dispatch console system shall support dispatch operators for the current dispatch centers.
- B. See Appendix F for a complete listing of PSAPs and their associated dispatch consoles.
- C. The dispatch console system shall support connectivity to local and remote dispatch consoles.
- D. The dispatch console system shall be scalable and capable of supporting 50 operator positions.
- E. Responders shall include in the Pricing Forms the cost for adding licenses and/or software to support additional dispatch centers or operator positions shall be clearly stated for the life of the system.
- F. The dispatch console system shall support both P25 Phase 1 and 2 call processing and P25 group and individual addressing modes, including but not limited to the following:
 - 1. P25 CSSI specification (TIA-102 suite, a component of the P25 ISSI)
 - 2. At least one unique trunked identity assigned to an operator position
 - 3. An operator position shall support the capability to affiliate with at least one valid trunked talkgroup
 - 4. An operator position shall have the capability to affiliate with multiple valid trunked talkgroups simultaneously
 - 5. Console must support MDC1200 signaling
 - 6. Console must support 256 bit AES encryption with Multi-key capability.

- G. The dispatch console system shall support entry, by the dispatch shift supervisor, of an alias list that associates an alias name with each user radio ID.
- H. The new dispatch console system shall be interconnected to the existing conventional analog infrastructure. The list of conventional systems connect to the existing console system is listed in Appendix N.
- I. The dispatch console system shall be capable of paging using:
 - 1. Two-tone sequential Quick Call II format paging
 - 2. Five-tone paging
 - 3. DTMF paging.
- J. The dispatch console system shall support at least 50 conventional resources. Responders shall provide pricing within Appendix B – *Proposal Pricing Forms*, to expand the system to support additional resources in Stages Two and Three.
- K. The dispatch console system shall support processing of supplementary data messaging to and from field radio units (e.g., text and status indication).
- L. The dispatch console system shall support dispatch consoles directly connected to the trunked radio network (e.g., microwave, optical fiber).
- M. Direct-connect dispatch consoles shall use IP connectivity for all voice, data, control, and parallel console status information.
- N. Responders shall provide a backup solution for dispatch consoles that maintains dispatch operations in the event of a dispatch system failure. The County expects that this backup solution shall be based upon the use of standalone control stations at each location where consoles are being replaced in Stage One. If the Responder proposes a backup solution that does not use standalone control stations, that solution shall be fully described.
 - 1. The backup solution shall not be dependent on the primary dispatch console system for operations.
 - 2. The backup solution shall allow users to change channels/talkgroups at dispatch positions without affecting other dispatch positions.
 - 3. The backup solution shall be capable of operation in trunking and conventional modes.

4. The backup solution shall have the capability of initiating a private radio call.
- O. The dispatch console system shall not contain a single point of failure. Redundant hot standby units, cards, power supplies, and all other accessories shall be used to prevent a single point of failure.

4.7.2 Stage One Dispatch Console System Operator Equipment Requirements

- A. The Selected Vendor shall provide dispatch console system operator equipment that meets or exceeds the following requirements:
1. All equipment supplied for use by the dispatch operators will be capable of withstanding the rigorous 24 hours a day, 7 days a week environment of a busy dispatch center.
 2. Equipment shall be designed for installation on modular workstation furniture and provide operators with an ergonomic design permitting ease of operation over extended periods, typically 8-12 hours for each operator.
 3. Console monitors shall be a minimum of 21 inches, measured diagonally, LCD technology, with resolution of 1024 x 768 or greater. Touch screen-equipped monitors shall be included in the pricing as an OPTION.
 4. Console monitors shall be capable of displaying all dispatching functions on a single unit.
 5. Console monitors shall allow authorized personnel to determine which functions are available at each operator position.
 6. Console monitors shall provide an individual unit ID and text alias readout for calling units and a stacking display to reflect at least the last ten unit calls for the visible channels/talkgroups.
 7. Keyboards shall be a standard 101-key keyboard.
 8. Operators shall be able to perform console functions by positioning a screen pointer (cursor) over the appropriate icon and pressing the mouse button or by touching the monitor screen if touch screens are provided.
 9. Each operator position shall have a high-quality gooseneck microphone.

10. Responders shall include Plantronics model SHS2900-1 wireless headset base and P/N 64338-31 headset with each new dispatch console and each existing Avtec, Inc. console.
11. At each dispatch position, the new dispatch console headset systems shall:
 - a. Include dual headset jacks
 - b. Allow the operator to hear select audio via a headset and allow the operator to respond via a microphone attached to the headset.
 - c. Be interconnected to existing telephone systems used by the operator
 - d. Include two volume knobs, one to control the phone volume and one to control the radio volume.
 - e. A headset plug inserted into a jack in the new headset system shall automatically disconnect the console's microphone and mute the select speakers.
12. Each operator position shall have a heavy-duty footswitch to allow operators to key the selected channel hands free.
13. Personal computers (PCs) supplied shall be capable of providing a Graphical User Interface (GUI) using a currently supported version of the Microsoft Windows[®] operating system and support multiple Microsoft compliant applications.
14. The failure of one or more consoles shall have no or minimal effect on the remaining console positions.
15. PCs supplied shall be state of the art PC technology. PCs shall be manufacturer certified for the most recent released version of the Microsoft Windows[®] operating system.
16. Equipment shall enable operators to acoustically cross-mute channels to eliminate acoustic feedback between operators.
17. Upon activation of an emergency alarm by field units, dispatch console system operator positions shall provide an audible alert, display unit ID of calling unit, provide a visual alert of an emergency activation, and have the ability to acknowledge the emergency alarm.
18. The unit ID and alias for an unacknowledged emergency alarm shall not scroll from the unit ID display.

19. Equipment shall have the ability to decrypt and encrypt secure voice communications and a distinctive icon shall signify encrypted channels.
 20. Operators shall have a single headset enabling them to converse on the telephone and the radio system.
 21. The dispatch console system shall provide an instant recall recording capability for each operator position. It shall provide an interface to provide connection to the console operators' microphone/telephone audio and the selected radio channel receiver and telephone audio. Playback shall be available on the operator position.
- B. Dispatch console system shall include an instant transmit switch for each conventional channel resource.
 - C. Dispatch console shall permit the control of conventional resources (e.g., repeaters, base stations, control stations, etc.) that are capable of operating on multiple frequencies and/or modes to be reconfigurable to select the desired transmit frequency / mode (select channel). The dispatch console shall be able to control every feature available on front panel of every control station or base station connected to the console system. Upon selecting a channel or mode, the operator shall be able to transmit on this channel by pressing the footswitch or transmit button.
 - D. The Dispatch Console shall provide programmable, single PTT button control of stacked, simul-selected, and DTMF sequential string pages in any combination.
 - E. A transmit audio level meter shall be provided showing the level of transmitted voice. This meter shall also indicate the level of receive audio present on the selected channel/talkgroup.
 - F. Operator positions shall have the ability to independently set each channel/talkgroup's volume level. Minimum audio levels shall be capable of being set to avoid missed calls.
 - G. Operators shall have the ability to mute or un-mute audio from unselected channels/talkgroups. The operator's monitor shall indicate muted audio status.
 - H. Selected audio and unselected audio, shall be audible from separate speakers.

- I. Operators shall have the ability to select multiple channels/talkgroups for broadcast to several channels/talkgroups at once.
- J. Operators shall have the ability to patch two or more resource channels/talkgroups so that users may communicate directly. Operator positions shall be equipped such that a minimum of eight simultaneous patches shall be available.

4.7.3 Stage One Dispatch Console System Operability Requirements

- A. The dispatch console shall support new features and screen configurations through software programming and not reconfiguration of hardware.
- B. The dispatch console shall support the capability to program, store, retrieve, and edit multiple, custom operator screens and configurations for each operator position.
- C. Operator display configurations and alias database shall be stored locally, at each position, or on a centrally located server.

4.7.4 Stage One DPS Avtec, Inc. Dispatch Console System Requirements

The Avtec, Inc. dispatch consoles listed in Appendix F shall be updated to provide connectivity and interoperability with the replacement P25 Phase 2 UHF T-Band Trunked System and the replacement F1/F3 P25 Phase 1 system.

4.8 Stage One IP-Based Network Management System (NMS)

- A. The NMS shall be a hierarchical Simple Network Management Protocol (SNMP)-based system capable of incorporating that integrates management of the County's Trunked System, F1/F3 System, Paging System, Backhaul Network System, and radio site infrastructure including but not limited to existing and new power, environmental, and security systems ("Managed Systems") multiple management systems into a single unified high-level management platform that provides a single point to manage multiple subsystems.
- B. A list of currently monitored environmental, equipment, and access control functions at radio sites is included in Appendix G, *Existing Equipment Alarm Points*. All listed items and all new devices equipped with alarming capabilities shall be monitored by the NMS.

- C. The NMS shall be capable of receiving and displaying all traps, alarms, and other event notifications generated by equipment in the Managed Systems, and shall be installed and configured to monitor and control these systems.
 - D. The NMS shall maintain a log of all events captured. The log must remain viewable for 180 calendar days minimum.
 - E. Responders shall include in their proposals a list of all new equipment and functional units to be included in the Managed Systems, and for each item on the list shall indicate whether the item will or will not :
 - 1. Be monitored by the NMS
 - 2. Send event notifications and/or report status to the NMS
 - 3. Send an alarm to the NMS upon a malfunction in the item
 - F. Responders shall identify any network management features, functionality, or applications required by this RFP that require individual licensing by any third party.
 - G. The NMS shall display the status of all Managed System alarm conditions and shall provide the ability to remotely access the Managed Systems to check operational status and view alarms through the network. This includes the ability to:
 - 1. Monitor the health of all networked devices
 - 2. Remotely interrogate equipment and troubleshoot to board level failures
 - 3. Configure components remotely
 - 4. Routinely backup remote equipment configuration with redundant off-site backup media
 - 5. Remotely restore equipment configuration
 - 6. Push updates to remote equipment
 - 7. Generate system statistical reports
 - 8. Provide paging function based on multiple levels of fault configurations
 - 9. Monitor environmental alarms (site temperature, door intrusion, etc.)
 - H. NMS management of the Managed Systems shall include, as a minimum:
-

1. Maintaining network components
 2. Upgrading network components when necessary
 3. Managing encryption capabilities
 4. Managing and operating over-the-air features
 5. Optimizing performance
 6. Managing intersystem interoperability
- I. The NMS shall be capable of providing access-controlled management of user equipment by authorized entities, thereby enabling seamless operation and local autonomy for local user management should the County elect to utilize such capability. Such management shall include but not be limited to talkgroup population, configuration and control of user access privileges and security assignments, and generation of failure reports, usage reports, and performance reports.
- J. The Selected Vendor's Network Operations Center (NOC) shall monitor the Managed Systems 24 hours per day, seven days per week as indicated in Section 9 of this RFP. Such monitoring shall utilize the NMS which shall be connected to the NOC via a secure dedicated private point-to-point circuit whose cost is to be included in pricing for the services described in Section 9.
- K. The NMS shall provide, at a minimum, these key elements:
1. Local administration database
 2. Real-time airtime usage tracking and reporting on at least a radio and talkgroup basis
 3. Real-time monitoring of network element status
 4. Hierarchical updates on error conditions
 5. Real-time status of network usage
 6. Real-time alarm management (to facilitate easy and intuitive maintenance)
 7. Full (SNMPv3) compliance and support allowing interfaces with higher-level network management systems
 8. Notification and historical recording of any significant change in the state of Managed System components and equipment.

9. Transmission of event notifications via email using the Simple Mail Transfer Protocol (SMTP) and via SMS/text messaging using the Simple Network Paging Protocol (SNPP).
- L. Managed elements shall send alarms, traps, and event data to the NMS via the IP network used to operate the Managed Systems.
- M. Alarms shall be displayed on all Network Management Terminals designated to receive the alarms.
- N. Alarm notification and processing shall not interfere with operation of the Managed Systems as seen by end users.
- O. For devices that originate an alarm through a wired circuit, alarm contacts or circuit operation shall be normally closed when no alarm is present to reduce false alarms and increase reliability.
- P. The capability to detect, properly report and display a normally open alarm circuit shall also be provided.
- Q. The NMS shall have a minimum of 96 alarm contact inputs and 16 alarm outputs at each site.
- R. The NMS shall be capable of expansion to allow for the addition of all new sites and equipment necessary to implement Stages Two and Three. Responders shall explain any expansion limits for individual sites and for each Managed System including any limitation on the number of sites or managed elements that the NMS can support.
- S. The County currently utilizes Aviat Networks ProVision to configure, manage, and monitor its microwave network and associated equipment. The unified network management platform provided by the NMS shall:
 1. Incorporate all of the functionality currently available in the County's ProVision installation.
 2. Support building an end-to-end microwave path without requiring manual configuration of each intermediate device. Graphical display of resulting configurations is preferred.

3. Include automated error checking to prevent typical microwave system configuration problems such as oversubscription of a link, and alert the user when such errors occur.
4. Perform automated backups of all microwave system device configurations and include a change log of all changes made to a device over time.

4.8.1 Stage One Network Management Terminal (NMT)

- A. The NMT shall provide an intuitive user interface for primary processing, display, and control of information to and from a variety of locations. System status and alarm conditions shall be displayed.
- B. The NMT shall provide highly secure remote access to the NMS in order to enable authorized personnel to monitor and control operation of the Managed Systems and view alarms.
- C. The following locations shall receive an NMT:
 1. Emergency Communications Center (60 Control), 4 Dana Road
 2. Radio Systems Manager, 4 Dana Road
 3. County Emergency Operations Center
 4. Grasslands and the geographically diverse location(s) chosen to house redundant critical system control equipment
- D. The NMT shall meet the following general requirements:
 1. Expandable software architecture shall be easily updated by adding software applications.
 2. Hardware and software platform shall be PC based using a current operating system version and comprised of hardware certified for use with the supplied software.
 3. Both graphic and tabular displays shall provide instantaneous and comprehensive Managed System status information.
 4. The NMT shall provide full archiving and control functions.
 5. All NMTs shall be licensed to operate concurrently the entire suite of management applications available to manage the system.

6. The NMT shall be designed to monitor a large cross section of equipment so that it can consolidate multiple alarm systems rather than just poll alarms from RTU locations.
 7. The NMT must be capable of performing full management functions.
 8. The NMT shall provide alarm filtration and consolidation.
- E. All NMT and NMS remote access shall be via highly secure means with support for encrypted connectivity. Remote user access mechanisms shall support two factor authentication.
- F. The NMT and NMS shall support multiple user account privilege levels in order to control access to available data and functionality.
- G. The Selected Vendor shall be responsible for initially configuring all the NMT, NMS and all associated user accounts according to the County's requirements. Once configured, the County shall be able to add, modify, delete, and otherwise manage user accounts without vendor service or intervention.
- H. The NMT and NMS shall allow the County to add, modify, delete and configure alarms and monitored elements without vendor service or intervention. Such configuration shall include but not be limited to:
1. Enabling and disabling individual alarms and event notifications
 2. Modification of alarm and monitored event names displayed by the NMT
 3. Designation of specific alarms to be displayed by each particular NMT and/or for each NMT user
 4. Control of alarm polarity, time delay, and de-bouncing parameters

5. Stage Two Functional Requirements

5.1 Stage Two Overview

During Stage Two on-street portable radio coverage shall be implemented and paging coverage shall be improved as needed.

5.2 Stage Two Trunked Radio System

The intent of Stage Two is to provide coverage improvement as described in this section by either expanding the existing UHF trunked system or by first replacing the T-Band elements of the system with P25 Phase 2 700 MHz equipment and then expanding the system. Responders shall provide pricing for both the UHF and 700 MHz options the County may choose after the conclusion of Stage One.

5.2.1 Stage Two Trunked Radio System Features and Capabilities

All functional features and capabilities required in Stage One of this RFP are to be maintained during the system expansion in Stage Two.

5.2.2 TIA TSB-88.3-D / County User Choices

The County requires that the proposed UHF/700 MHz System comply with the TSB-88.3-D standards and County user choices as outlined in this section.

- A. Identify Service Area
 - The Service Area is the County Boundary as shown on the map in Appendix L and as defined in section 5.2.3 - Stage Two Trunked Radio System Coverage Prediction Requirements
- B. Identify Channel Performance Criteria
 - The Channel Performance Criterion is DAQ 3.4 and the Bit Error Rate that will produce an equivalent DAQ of 3.4
- C. Identify Reliability Design Targets
 - 95% Service Area Reliability

- D. Identify the acceptable terrain profile extraction methods
 - Snap to Grid
- E. Identify acceptable interference calculation methods
 - Monte Carlo Simulation Method
- F. Identify the metaphor(s) to be used to describe the plane of the Service Area
 - Tiles Method
- G. Willingness to accept a lower area reliability in order to obtain a frequency Reference, Frequency Assignment Criteria, Interaction Between Shared and PSA Users
 - No
- H. Identify adjacent channel drift confidence
 - 95%
- I. Determine Conformance Test confidence level
 - 99%
- J. Identify which Pass/Fail Criterion to use
 - Greater than Test
- K. Identify treatment of inaccessible grids
 - All are eliminated from the calculation

5.2.3 Stage Two Trunked Radio System Coverage Prediction Requirements

- A. All Stage One Radio System Coverage Prediction Requirements for the UHF Trunked System shall apply to both the proposed Stage Two UHF and 700MHz Systems except as follows:
- B. The Service Area is defined as the County Boundary as shown in Appendix L.

- C. The County requires that the Service Area Reliability shall provide at least a 95% statistical probability with a 99% confidence level that any area in the County's Service Area, if tested, would be found to support electrical performance that meets or exceeds the minimum signal level needed to deliver the Delivered Audio Quality and Bit Error Rate as specified herein.
- D. The P25 Phase 2 Trunked System design shall provide on-street roundtrip radio coverage within the County Boundary using a minimum quality level of DAQ 3.4 and a signal reliability level of 95% with 99% confidence level.
- E. A portable is defined as a 4 watt radio worn on the hip in a swivel case with a 1/2 wave flexible antenna.

5.2.4 Stage Two Trunked Radio System Site Selection

- A. Responders shall perform an initial design that includes candidate sites to satisfy the coverage requirements of Stage Two. All sites chosen shall be listed in the response with critical RF design parameters including, but not limited to, antenna types, azimuths, heights, ERP, etc. as shown in Appendix P.
- B. Once the NTP for Stage Two has been issued, the Selected Vendor and the County shall review the selected sites to determine their availability and suitability for use. The Selected Vendor shall, with the approval of the County, choose alternate sites as necessary to provide the desired coverage. Revised coverage prediction maps shall be developed by the Selected Vendor based on the proposed alternate sites and then on final site selection. The County will approve the final site selection prior to authorizing the Selected Vendor to proceed with implementation.
- C. The County desires that Responders select from the sites in Table 9 where practical to provide the desired coverage before considering alternative locations. However, Responders are free to choose any and all sites for the system that will provide the required coverage and reliability with optimal site count. However, any new site must have a microwave path to an existing site that is acceptable to the county. The use of microwave relay sites is strongly discouraged.

Table 9 – Preferred Locations

Preferred Site Locations		
Adams Lane	Fox Lane	Mountain Lakes,
Alpine Tower	Grasslands	MVDO
Benefield	Guard Hill	Summit Ave
Courthouse	Hangar E	Wilmot Road
Crompond Road	Maryknoll	Winged Foot
DPSHQ Tower	Mohansic	
Dunwoodie	Mountain Ave	

5.2.5 Stage Two Trunked Radio System Site Equipment

- A. All site equipment supplied shall be new, of high quality, and designed to provide high-reliability to support mission critical communications.
- B. The site equipment or RF infrastructure, consists of the following components:
 - 1. Simulcast equipment
 - 2. Receiver voting
 - 3. Transmitters and Receivers
 - 4. Antenna systems
 - 5. GPS systems
 - 6. Alarms and NMS

5.2.5.1 Stage Two Trunked Radio System Simulcast Equipment

- A. Responders shall provide all necessary simulcast components and signal processing elements required to optimize voice quality in coverage overlap areas while improving the P25 Phase 2 Trunked System coverage as required.
- B. Non-captured overlap areas with delay spreads exceeding those required to meet the DAQ objective shall be minimized inside the Service Area.
- C. Only linear repeaters will be used.
- D. Simulcast systems shall operate without the need for frequent manual optimization and system/subsystem alignment. All alignment and adjustments shall be

automated where possible (e.g., signal conditioning adjustments for channel banks, signal launch times at sites, etc.).

- E. If the Responders' design includes centralized simulcast control equipment, the system shall include redundant simulcast control equipment geographically separated from the primary simulcast control site.

5.2.5.2 Stage Two Trunked Radio System Receiver Voting

- A. Receiver voting equipment shall monitor all receivers in the system and select the best signal for processing and rebroadcast through the network. The system shall include redundant receiver voting equipment geographically separated from the primary receiver voting site.

5.2.5.3 Stage Two Trunked Radio System Transmitters and Receivers

- A. Base station equipment shall be solid state in design and function within standard site conditions for temperature, altitude, and humidity.
- B. Base station equipment shall be monitored and remotely configurable by the IP Network Management System (NMS). Monitoring shall include, but not be limited to interrogating the base station equipment for: power amplifier temperatures, high/low voltage conditions and high standing wave ratio (SWR). Responders shall detail any additional operating conditions capable of being monitored.
- C. The County has installed Bird Technologies Power/VSWR monitors on all Trunked System antenna feedlines at all sites. Similar units shall be installed at all new sites. These units shall be properly interfaced with the NMS via an IP connection to provide an alarm indication when low transmitter power or high VSWR is detected. The alarms require a logic input from the transmitter to enable the sensor alarm only when the transmitter is active.
- D. The units shall be as compact as possible, with mounting configurations for use in standard 19" equipment racks or cabinets.
- E. Base station equipment shall be controlled via IP connection and not analog control methods such as 2, or 4 wire ear and mouth (E&M) signaling.
- F. Base station equipment shall comply with Part 90 and other applicable FCC Rules and Regulations, as well as appropriate EIA and similar agency standards.

5.2.5.4 Stage Two Trunked Radio System Antenna Systems

- A. Responders shall propose all antenna system equipment necessary for a complete design including combiners, circulators and multi-couplers as required.
- B. All existing UHF Trunked System antennas shall be replaced, in kind, with the same make and model antennas unless otherwise indicated by the County.
- C. Antennas shall be appropriate to provide the required coverage and meet applicable FCC rules and regulations. The County has a strong preference for exposed dipole antennas in the UHF and VHF bands. Antennas shall be approved by the County.
- D. If Responders' proposed solution includes the use of tower top amplifiers (TTAs), the amplifiers shall be equipped with dual amps, and a bypass mode of operation. Transmission line for the receive side shall be the same size as the transmit side (except for any transmission lines associated with test monitoring functions).
- E. Transmission line type and length shall be appropriate to provide the required coverage.
- F. Responders shall fully describe expansion capacity for combiner and multicoupler systems.
- G. Responders shall include detailed specification sheets for all proposed equipment, including, but not limited to antennas, receiver multicouplers, transmitter combiners and circulators, tower top receiver pre-amps (if applicable).
- H. All antennas and their feedlines shall be identified by color code provided by the County. The colors must be identifiable from the ground with binoculars.
 - I. All feedlines shall have surge protection devices installed. All antenna system surge protection devices proposed must be approved by the County.
- J. 7/16 DIN Connectors are preferred for RF connections. The county shall approve all connector types proposed.
- K. Responders shall specify the standards and guidelines to be used to design and install the new antenna systems and antenna support structures.
- L. All UHF and 700 MHz circulators shall be triple circulators with filters

- M. The Selected Vendor shall perform, at a minimum, the sweep tests shown in Appendix O.
- N. See Appendix H, *Existing Antenna Systems*

5.2.6 Stage Two User Radio Equipment

All user radio equipment requirements in Stage One of this RFP shall apply to all user radio equipment purchases in Stage Two.

5.2.7 Stage Two User Radio Equipment Overview

- A. User radio equipment includes all non-fixed user equipment, such as:
 - 1. Portable radios
 - 2. Mobile radios
 - 3. Control stations
- B. Stage Two of the Project assumes that additional County departments may migrate to the expanded P25 Phase 2 Trunked System. The use of radio equipment procured during Stage One will continue during Stage Two.
- C. The County has estimated that it may purchase an additional 200 to 300 user radios in Stage Two. Responders shall use these quantities for pricing in their proposal. Responders should note that these quantities may change during negotiations with the Selected Vendor.

5.3 Stage Two F1/F3 Radio System

- A. The Staged Replacement Methodology calls for the system to be sustained as implemented in Stage One.
- B. The County intends to migrate all or a portion of the F1/F3 VHF Conventional System users to the Trunked Radio System when Stage Two portable, street level coverage requirements are achieved.
- C. The VHF F1 and F3 systems must appear as two way talk groups on the trunk system in stage 2

5.3.1 Stage Two F1/F3 Radio System Features and Capabilities

All radio system features and capabilities required in Stage One of this RFP are to be maintained during the system expansion in Stage Two.

5.3.2 Stage Two User Radio Equipment

All user radio equipment requirements in Stage One of this RFP shall apply to all user radio equipment purchases in Stage Two.

5.4 Paging and Alerting System

The County anticipates that the construction of the Paging/Alerting System may extend into the Stage Two time frame due to the potential need to acquire new sites for the system.

5.5 Stage Two Backhaul Networks

The Stage Two backhaul networks shall be an extension of the Stage One networks. It shall use both fiber optic and microwave facilities in a hot standby, redundant configuration. All requirements stated for the Stage One backhaul network shall apply to Stage Two.

5.5.1 Stage Two Optical Fiber Network

Stage Two requires that an IP/Ethernet interface hardware/software for the Lightpath optical fiber network at new locations proposed in their design.

5.5.2 Stage Two Microwave Backhaul Network

- A. The Responders shall propose microwave backhaul products provided by Aviat Networks or price their proposal replacing all existing microwave components currently in service.
- B. Stage Two digital IP microwave network shall consist of a primary and a hot standby (MHSB) configuration.
- C. Unlicensed microwave is unacceptable. Microwave systems shall be licensed under FCC Part 101 in the 6 GHz or higher spectrum bands.

- D. Indoor microwave radio units are preferred. Indoor Unit (IDU)/Outdoor Unit (ODU) configurations are acceptable where conditions easily accommodate service under adverse weather conditions and they are appropriately engineered/designed and approved by the County.
- E. Microwave links not ring protected shall be configured for MHSB operation.
- F. Microwave terminal equipment shall include transmitter, receiver, modem, power supply, automatic switching device, multiplexer, service channel(s), and all associated interconnections to provide a complete and functional system.
- G. The radio shall deliver two-frequency, full duplex operation. Space diversity configurations are acceptable if necessary to meet reliability requirements.
- H. The expanded microwave backhaul network must provide adequate bandwidth to support all equipment aggregated in the path plus a future growth margin of 25%.
 - I. Responders must indicate packet latency and jitter performance of the microwave backhaul network proposed. In addition, Responders must confirm that such performance is sufficient to accommodate all radio and dispatch communications traffic transported by the microwave backhaul network.
- J. There must be no single point of failure within the IP network. Each site shall have redundant routers that support the MHSB spurs or dual paths for loop-based sites. The failure of one router must not affect the performance of the overall network or of the individual site.
- K. The network must reroute network traffic in less than 50-milliseconds (ms) in the case of a path or device failure. Responders must describe how the proposed system fulfills this requirement.
- L. Microwave connectivity between each individual RF site and any site at which consoles are located or which provides control of trunking, simulcast, receiver voting must be designed to meet or exceed a two-way annual rain + multipath + end to end quality performance (availability) of 99.999% (BER = 10^{-6}) at the required capacity. All microwave paths shall be designed with 100% first Fresnel zone radius over $K=4/3$, or 60% first Fresnel zone radius over $K=1$, whichever is greater.

- M. The Selected Vendor shall be responsible for all microwave frequency research, prior coordination, costs and preparation of all associated FCC license applications and submittals in the County's name.
- N. After installation, the Selected Vendor shall test all RF paths to demonstrate proper antenna alignment by measuring the net path loss between sites as measured at the equipment rack interface. For any actual path loss that is greater than the predicted path loss by 3 dB or more, an investigation into the cause of the difference must be performed and the results provided to the County. Any remedy must meet with County approval, and unless otherwise indicated in writing by the County shall be carried out by the Selected Vendor at no additional cost..
- O. Adaptive code modulation capability shall be included in all microwave backhaul systems.

5.5.3 Stage Two Microwave Backhaul Network Engineering

- A. Responders shall provide preliminary microwave path details including centerline mounting heights, fade margins, antenna sizes, system gains and losses, path profiles and predicted end to end rain + multipath reliability.
- B. The proposed microwave backhaul network equipment must be approved for use under Part 101 of the FCC Rules and Regulations.
- C. The Selected Vendor shall conduct physical path surveys to assure that all proposed paths meet proper clearance criteria.
- D. The Selected Vendor must provide modified antenna centerline mounting height recommendations, if required, based upon the information gathered during the physical path surveys and site visits.
- E. The Selected Vendor must provide radomes in their proposals as a requirement for each microwave antenna.

5.5.4 Stage Two Microwave Antenna System

- A. Microwave antennas shall be compatible with the radio frequency bands and conform to applicable FCC requirements. Solid parabolic type, Category A antennas shall be used in accordance with FCC Part 101.115.

- B. All mounting brackets, connectors and other hardware shall be supplied as necessary for a complete installation.
- C. An ice shield shall be provided and installed to protect each microwave dish from falling ice unless the dish is within 30 feet of the top of the tower. The County reserves the right to determine whether an ice shield is required at any site during the preliminary detailed design.
- D. A dehydrator shall be provided and installed at every radio site where pressurized feedline is required. Dehydrators shall:
 - 1. Be of the membrane dryer type
 - 2. Not require filter cleaning or replacement at intervals of less than one year when operated under normal conditions
 - 3. Not require rebuild or replacement at intervals of less than 6000 hours of actual compressor runtime when operated under normal conditions.
 - 4. Metal caps shall be used to cap off unused ports
 - 5. Provide contact closure alarms for the following, which shall be configured and connected to the NMS/alarm system:
 - a. Power Fail
 - b. High Humidity
 - c. Excess Run
 - d. Low Pressure

5.5.5 Stage Two Microwave Backhaul Network Management

The Stage Two Microwave Backhaul Network shall be fully integrated into and supported by the NMS and NMT as described in Section 4.

5.6 Stage Two Dispatch Console System

Stage Two of the project may require additional operator dispatch radio consoles. The Responders shall provide a design and pricing to:

- A. Add 7 radio consoles at the EOC at Hawthorne, or other locations to be determined, with the same make and model consoles proposed for DES at 4 Dana Road.
- B. Replace the existing Avtec DPS consoles with the same make and model of consoles as are proposed for DES at 4 Dana Road.

5.6.1 Stage Two Dispatch Console System General Requirements

- A. The dispatch console system expansion shall support dispatch operations for the current dispatch centers identified in Appendix F and support all the features and functionality as in Stage One.
- B. Responders shall provide a backup solution for dispatch consoles that maintains dispatch operations in the event of a dispatch system failure and complies with the requirements in Stage One.

5.6.2 Stage Two Dispatch Console System Operator Equipment Requirements

The Selected Vendor shall provide dispatch console system operator equipment that meets or exceeds the requirements stated in Stage One.

5.6.3 Stage Two Dispatch Console System Operability Requirements

The Selected Vendor shall provide dispatch consoles that support features and screen configurations that are consistent with those provided in Stage One.

5.7 Stage Two NMS & NMT

- A. The Selected Vendor shall provide all hardware, software and services necessary to integrate all additional sites and Managed System equipment installed in Stage Two into the NMS and NMT as implemented in Stage One, with all of the features and functionality provided by the NMS and NMT at the end of Stage One.
- B. The Selected Vendor shall ensure proper equipment configuration to enable the NMS and NMT to monitor and control all new sites and Managed System components installed in Stage Two.

6. Stage Three Functional Requirements

6.1 Stage Three Overview

- A. Stage Three adds radio communications sites in order to meet the requirement for portable, in-building Trunked System radio coverage.
- B. Providing the desired coverage is expected to require the implementation of additional sites.
- C. During Stage Three, the County also anticipates the potential migration of local municipal law enforcement agencies to the Trunked System.

6.2 Stage Three Trunked Radio System

The intent of Stage Three is to provide coverage improvement as described in this section through the expansion of the existing system.

6.2.1 Stage Three Trunked Radio System Features and Capabilities

All functional features required in Stages One and Two are to be maintained during Stage Three.

6.2.2 TIA TSB-88.3-D / County User Choices

The County requires that the proposed UHF/700 MHz system comply with the TSB-88.3-D standards and County user choices as outlined in this section.

- A. Identify Service Area
 - The Service Area is the County Boundary as shown on the map in Appendix L and as defined in section 6.2.3 Stage Three Trunked Radio System Coverage Prediction Requirements
- B. Identify Channel Performance Criteria
 - The Channel Performance Criterion is DAQ 3.4 and the Bit Error Rate that will produce an equivalent DAQ of 3.4
- C. Identify Reliability Design Targets

- 95% Service Area Reliability
- D. Identify the acceptable terrain profile extraction methods
- Snap to Grid
- E. Identify acceptable interference calculation methods
- Monte Carlo Simulation Method
- F. Identify the metaphor(s) to be used to describe the plane of the Service Area
- Tiles Method
- G. Willingness to accept a lower area reliability in order to obtain a frequency Reference, Frequency Assignment Criteria, Interaction Between Shared and PSA Users
- No
- H. Identify adjacent channel drift confidence
- 95%
- I. Determine Conformance Test confidence level
- 99%
- J. Identify which Pass/Fail Criterion to use
- Greater than Test
- K. Identify treatment of inaccessible grids
- All are eliminated from the calculation

6.2.3 Stage Three Trunked Radio System Coverage Prediction Requirements

- A. All Stage One and Two Radio System Coverage Prediction Requirements for the UHF Trunked System shall apply to both the proposed Stage Three UHF and 700MHz Systems except the following:

- B. The P25 Phase 2 Trunked System design shall provide roundtrip radio coverage in 95% of the light, medium and campus buildings within the County using a minimum quality level of DAQ 3.4 with 99% confidence as defined below.
- C. Building types and losses are defined as follows:
1. Light Building
 - a. A Residential building (Single/2 Family) or small commercial building (single story, open floor plan) as defined in TSB-88.3 Section 5.6.3.
 - b. Penetration loss in a light building shall be 5 dB less than that specified for Medium buildings in TSB-88.2 Figure 18
 2. Medium Building
 - a. A small school, light industrial or medical office as defined in TSB-88.3 Section 5.6.3.
 - b. Penetration loss in medium building shall be in accordance with TSB-88.2 Figure 18
 3. Campus Building
 - a. Campus buildings are listed in Appendix J.
 - b. Penetration loss in campus buildings shall be 10dB more than specified for Medium buildings in TSB-88.2 Figure 18
 4. Targeted Building
 - a. Targeted buildings are listed in Appendix J.
 - b. All targeted buildings are required to have 95% interior coverage.
 5. Responders shall explain the use of building penetration loss values smaller than those found in TSB-88 and demonstrate the accuracy of the vendor's proposed building penetration loss in its proposal
- D. The County will provide separate tile maps with the type of building coverage required in each tile for all light and medium buildings in Appendix L.
- E. Responders shall provide a detailed test plan to physically demonstrate that coverage inside targeted buildings meet both the subjective (DAQ 3.4) and

objective (BER 2.6%) CPC criteria for both talk-out and talk-in in a statistically significant number of locations inside these buildings using a portable radio as described above.

- F. Responders shall design the CATP for targeted buildings using TSB-88 as a guide.
- G. The County desires that coverage of targeted buildings be provided by fixed tower sites (full sites, receive only sites, etc.). However, the county realizes that it may be more cost effective to provide the required in-building coverage using custom in-building solutions. If custom in-building solutions are selected, channelized and managed active fiber DAS systems to supplement in-building coverage shall be used. These custom solutions must have backup power providing a 6 hour minimum run time. Implementation and performance of these solutions shall conform to the requirements found in TSB-88. The County shall approve all such designs.
- H. Responders shall provide separate pricing for the design and installation of all radio enhancement systems, in targeted buildings, required to insure 95% in-building coverage.

6.2.4 Stage Three Trunked Radio System Site Selection

- A. Responders shall perform an initial design that includes candidate sites to satisfy the coverage requirements of Stage Three. All sites chosen shall be listed in the response with critical RF design parameters including, but not limited to, antenna types, azimuths, heights, ERP, etc. as shown in Appendix P.
- B. Once the NTP for Stage Three has been issued, the Selected Vendor and the County shall review the selected sites to determine their availability and suitability for use. The Selected Vendor shall, with the approval of the County, choose alternate sites as necessary to provide the desired coverage. Revised coverage prediction maps shall be developed by the Selected Vendor based on the proposed alternate sites and then on final site selection. The County will approve the final site selection prior to authorizing the Selected Vendor to proceed with implementation.
- C. The County desires that Responders select from the sites in Table 10 where practical to provide the desired coverage before considering alternative locations.

Table 10 – Preferred Locations

Preferred Site Locations
Adams Lane
Alpine Tower
Benefield
Courthouse
Crompond Road
DPSHQ Tower
Dunwoodie
Fox Lane
Grasslands
Guard Hill
Hangar E
MVDO
Maryknoll
Mohansic
Mountain Ave.
Mountain Lakes
Summit Ave.
Wilmot Road
Winged Foot

6.2.5 Stage Three Trunked Radio System Site Equipment

- A. All site equipment supplied shall be new, of high quality, and designed to provide high-reliability to support mission critical communications.
- B. The site equipment, or RF infrastructure, consists of the following components:
 - 1. Simulcast equipment
 - 2. Receiver voting
 - 3. Transmitters and Receivers
 - 4. Combiners/multicouplers
 - 5. Antenna systems

6.2.5.1 Stage Three Trunked Radio System Simulcast Equipment

- A. Responders shall provide all necessary simulcast components and signal processing elements required to optimize voice quality in coverage overlap areas while improving the Trunked System coverage as required.
- B. Non-captured overlap areas with delay spreads exceeding those required to meet the DAQ objective shall be minimized inside the Service Area.
- C. Only linear repeaters will be used.
- D. Simulcast systems shall operate without the need for frequent manual optimization and system/subsystem alignment. All alignment and adjustments shall be automated where possible (e.g., signal conditioning adjustments for channel banks, signal launch times at sites).
- E. If the Responders' design includes centralized simulcast control equipment, the system shall include redundant simulcast control equipment geographically separated from the primary simulcast control site.

6.2.5.2 Stage Three Trunked Radio System Receiver Voting

- A. Receiver voting equipment shall monitor all receivers in the system and select the best signal for processing and rebroadcast through the network. The system shall include redundant receiver voting equipment geographically separated from the primary receiver voting site.

6.2.5.3 Stage Three Trunked Radio System Transmitters and Receivers

- A. Base station equipment shall be monitored and remotely configurable by the IP Network Management System (NMS). Monitoring shall include, but not be limited to interrogating the base station equipment for: power amplifier temperatures, high/low voltage conditions, transmitter power output and high Standing Wave Ratio (SWR). Responders shall detail any additional operating conditions capable of being monitored.
- B. The County has installed Bird Technologies Power/VSWR monitors on all Trunked System antenna feedlines at all sites. Similar units shall be installed at all new sites. These units shall be properly interfaced with the NMS via an IP connection to provide an alarm indication when low transmitter power or high VSWR is detected.

The alarms require a logic input from the transmitter to enable the sensor alarm only when the transmitter is active.

- C. The units shall be as compact as possible, with mounting configurations for use in standard 19" equipment racks or cabinets.
- D. Base station equipment shall be controlled via IP connection and not analog control methods such as 2, or 4 wire ear and mouth (E&M) signaling.
- E. Base station equipment shall comply with Part 90 and other applicable FCC Rules and Regulations, as well as appropriate EIA and similar agency standards.

6.2.5.4 Stage Three Trunked Radio System Antenna Systems

- A. Responders shall propose all antenna system equipment necessary for a complete design.
- B. Antennas shall be appropriate to provide the required coverage and meet applicable FCC rules and regulations. The County has a strong preference for exposed dipole antennas in the UHF and VHF bands. Antennas shall be approved by the County.
- C. If Responders' proposed solution includes the use of tower top amplifiers (TTAs), the amplifiers shall be equipped with dual amplifiers, and a bypass mode of operation. Transmission line for the receive side shall be the same size as the transmit side (except for any transmission lines associated with test monitoring functions).
- D. Transmission line type and length shall be appropriate to provide the required coverage.
- E. Responders shall fully describe expansion capacity for combiner and multicoupler systems.
- F. Responders shall include detailed specification sheets for all proposed equipment, including, but not limited to antennas, receiver multicouplers, transmitter combiners, and tower top receiver pre-amps (if applicable).
- G. All antennas and their feedlines shall be identified by color code provided by the County. The colors must be identifiable from the ground with binoculars.

- H. All feedlines shall have surge protection devices installed. All antenna system surge protection devices proposed must be approved by the county.
- I. 7/16 DIN Connectors are preferred for RF connections. The county shall approve all connector types proposed.
- J. The vendor shall specify the standards and guidelines they will use to design and install the new antenna systems and antenna support structures.
- K. The Selected Vendor shall perform, at a minimum, the sweep tests shown in Appendix O..
- L. See Appendix H, *Existing Antenna Systems*

6.3 Stage Three F1/F3 Radio System

If necessary, the County will maintain operation of the F1/F3 Radio System in Stage Three to provide interoperable communications with local users who have not migrated to the Trunked Radio System or other radio communications system.

6.4 Stage Three User Radio Equipment

- A. User radio equipment includes all non-fixed user equipment, such as:
 - 1. Portable radios
 - 2. Mobile radios
 - 3. Control stations
- B. Stage Three of the Project assumes that other local governmental agencies may migrate to the expanded P25 Phase 2 Trunked System. The Selected Vendor(s) shall make available for purchase by these agencies all user equipment listed within the Price Forms at the prices stated in the Price Forms for the duration of their contract(s) with the County.

6.5 Stage Three Backhaul Networks

The Stage Three backhaul networks shall be an extension of the Stage One and two networks. It shall use both fiber optic and microwave facilities in a hot standby,

redundant configuration. All requirements stated for the Stage One and Two backhaul network shall apply to Stage T.

6.5.1 Stage Three Optical Fiber Network

Stage Three requires that an IP/Ethernet interface hardware/software for the Lightpath optical fiber network at new locations proposed in their design.

6.5.2 Stage Three Microwave Backhaul Network

The Stage Three microwave backhaul network shall be an extension of the Stage Two network and comply with all requirements of Stage Two. Microwave backhaul links shall be installed at all Stage Three sites.

6.5.3 Stage Three Microwave Backhaul Network Engineering

Responders shall comply with all engineering requirements as outlined in *Stage Two Backhaul Network*.

6.5.4 Stage Three Microwave Antenna System

Stage Three Microwave antennas shall comply with all specifications outlined for Stage Two.

6.5.5 Stage Three Microwave Backhaul Network Management

The Stage Three Microwave Backhaul Network shall be fully integrated into and supported by the NMS and NMT as described in Section 4.

6.6 Stage Three Dispatch Console System

Stage Three of the project may require additional operator dispatch radio consoles. Responders are required to provide all features and functionality supported in the existing dispatch console system.

6.7 Stage Three NMS & NMT

- A. The Selected Vendor shall provide all hardware, software and services necessary to integrate all additional sites and Managed System equipment installed in Stage Three into the NMS and NMT implemented in Stages One and Two.
- B. The Selected Vendor shall ensure proper equipment configuration to enable the NMS and NMT to monitor and control all new sites and Managed System components installed in Stage Three.

7. Training

7.1 Training Requirements

- A. Responders shall fully describe all proposed training programs detailing how they intend to provide training. The training description shall include the following:
1. A list of all subjects with a description of each
 2. Class material to be provided by the Selected Vendor
 3. Number of classes
 4. Class duration
 5. Need for recurring training
 6. Class size
 7. Class cost
- B. Training proposed by the Responder shall include:
1. Training programs to allow County personnel to become knowledgeable with the system, subsystems, and individual equipment.
 2. The Selected Vendor shall provide complete and comprehensive operational training covering features, operation, and special care associated with the equipment supplied.
 3. The Selected Vendor shall provide model specific training for all equipment provided.
 4. The Selected Vendor shall provide technical/system management training, including:
 - a. Complete and comprehensive technical training in the theory, maintenance, and repair of all equipment provided
 - b. This training shall include, as a minimum, system theory, troubleshooting, repair, and servicing techniques as applicable to the selected system
 - c. Technical training shall include the following categories:
 - 1) Infrastructure maintenance and troubleshooting.

- 2) Microwave backhaul network maintenance, and troubleshooting.
- C. The Selected Vendor shall provide complete and comprehensive technical training for County technical staff charged with managing the system. This training shall include, but is not limited to:
1. Planning and setting up the system and network
 2. Building and implementing system and network profiles and configurations
 3. Performing database management functions
 4. Monitoring and managing the system's performance
 5. Writing and printing system reports
- D. System management training shall include the following categories:
1. Radio programming
 2. Microwave backhaul network management
- E. The Selected Vendor shall conduct all training at a location where duplication of system operation will not impact daily operations. The Selected Vendor shall coordinate with the County regarding number of attendees, schedule, and training location. The County prefers that training be provided at a County location whenever possible.
- F. The Selected Vendor shall schedule classes as near to system transition as possible.
- G. The Selected Vendor shall train County employees or designated individuals.
- H. For console and user unit training, the Selected Vendor shall provide "train-the-trainer" courses to selected County personnel.
- I. The Selected Vendor shall provide all instructional material, including printed manuals, audio, video, interactive self-paced personal computer programs, and complete equipment operating instructions for all technical and operational training classes for the exact model and series of equipment delivered. All instructional material shall be subject to the approval of the County and shall become property of the County.
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- J. Training materials shall be provided for all students covering all aspects of the training. Students will retain all such training materials.
- K. Training materials shall be professionally produced, and provided in binders. Loose leaf materials are not permitted. Paper shall be shall be 8 ½ x 11” whenever possible. If larger paper is utilized it must be professionally incorporated into the document. Binders shall be color coded where it will provide an organizational benefit.
- L. Illustrations and photographs, where provided, shall be specific to the County installation. Color photos must be provided where detail or clarity is supported by use of color. Black and white photocopying of color materials is unacceptable.
- M. Fully editable (softcopy) versions of all training materials shall be provided so that the County trainers can update the course materials over time.
- N. Responders shall provide unit pricing for all media (e.g., CDs, DVDs, and manuals) used for training to allow the County to purchase additional training materials if necessary. The pricing provided shall be valid for a period of 3 years following system acceptance.

8. System Implementation, Test and Acceptance

- A. The Selected Vendor shall attend, in person, all project and construction meetings as defined in Section 3 - Radio System Replacement Project Management, for all project Stages. The County may also schedule additional implementation, acceptance, and test meetings, which the Selected Vendor is required to attend in person.
- B. The Selected Vendor shall comply with all requirements specified in Section 3 - Radio System Replacement *Project Management*.

8.1 System Staging

- A. Each individual assembly or equipment unit shall undergo factory testing prior to shipment.
- B. The Selected Vendor shall submit to the County standard factory test documentation, documenting the tests performed and indicating successful completion of testing.
- C. The Selected Vendor shall perform complete system staging and testing at a location in the United States. The intent of the staging tests is to demonstrate to the County that the system is ready for shipment and installation.
- D. The Selected Vendor shall provide all necessary technical personnel, and test equipment to conduct staging tests. All deviations, anomalies, and test failures shall be resolved at the Selected Vendor's expense before shipment to any County facility.
- E. The Selected Vendor shall use a County approved Staging Acceptance Test Plan (SATP). The County expects the Selected Vendor to successfully perform all tests before the County witnesses the official SATP. The Selected Vendor and the County shall jointly execute and date the SATP following completion of all tests. All tests in the SATP shall be marked as either pass, fail, or pass qualify. The full SATP shall not be considered to be passed until accepted in writing by the County.
- F. Responders shall include in their proposals all costs associated with the involvement of the County personnel in the SATP. The County shall be responsible for its own travel and labor expenses.

- G. The Selected Vendor shall document, correct, and retest all failed components. The Selected Vendor shall replace at its own expense failed components.
1. Retest of individual failed SATP tests or the entire plan shall be at the County's discretion.
 2. The Selected Vendor shall provide the County with the fully executed and complete SATP document.

8.2 System Installation

- A. Successful installation is defined as a complete, tested system that satisfies the requirements described in this Request for Proposals for each Stage. The Selected Vendor shall furnish and install all hardware and software to deliver a complete operable system to the County at the time of acceptance of each Stage.
- B. Installation of all user radios including control station shall be considered part of the entire system and necessary for acceptance.
- C. Only factory authorized or Selected Vendor affiliated service shops shall perform installations. The Selected Vendor may use other shops or installers upon mutual agreement with the County. Qualified, adequately trained personnel familiar with this type of work shall perform all installations.
- D. The Selected Vendor shall provide the names of the service shops, a summary of their experience and a list of five references (minimum) for each proposed shop.

8.2.1 System Installation

- A. Upon receipt of a NTP and prior to the start of the system installation for each Stage, the Selected Vendor shall participate in a mandatory site survey of each site, that will receive equipment in that Stage, with County personnel or the County's representative. The purpose of which is to confirm actual equipment location within each space. At that time, the Selected Vendor will determine and document the exact equipment locations and any modifications required to the existing equipment in the shelter, the shelter structure or shelter environmental systems.
- B. The Selected Vendor shall coordinate with others, as appropriate, to confirm that any preparatory work that affects the installation of the fixed network equipment,

such as tower work, coring, bracing, conduit, and electrical is complete before start of FNE equipment.

- C. The Selected Vendor shall provide and pay for all materials necessary for the execution and completion of all work as specified in this RFP. Unless otherwise approved by the County, all materials incorporated into the permanent work shall be new and shall meet the requirements of this RFP. All materials furnished and work completed shall be subject to inspection by the County or the County's Engineer or Consultant.
- D. The Selected Vendor shall not use equipment supplied as spares for installation of the proposed system. The Selected Vendor shall supply all spare equipment in new condition. The equipment will be delivered to the site with a detailed inventory sheet which must be signed by a County representative to complete the delivery
- E. The Selected Vendor shall clean all equipment and devices internally and externally and repair all damaged finishes.
- F. The Selected Vendor's workers shall leave sites neat and broom swept upon completion of work each day. Workers shall thoroughly clean all equipment shelter and building floors and remove all scuff marks and abrasions prior to acceptance. Workers shall also remove all trash weekly.
- G. The County shall conduct an inspection of the installations upon substantial completion. The County shall document any deficiencies on a single punch list and provide the punch list to the Selected Vendor for resolution.
- H. Final acceptance testing shall not commence until all punch list items are resolved.

8.2.2 Mobile Radio Installation

- A. The radio equipment Selected Vendor shall program all mobile radios according to the fleet map as approved by the County.
- B. The radio equipment Selected Vendor shall furnish, program and install all mobile radios complete with a microphone, any optional equipment specified for that radio and all required mounting hardware.
- C. The radio equipment Selected Vendor shall replace all mobile antennas with a type approved by the County.

- D. The radio equipment Selected Vendor shall connect all existing Knox Boxes and other ancillary devices to the new radios and test that functionality.

8.2.3 Control Station Installation

- A. The radio equipment Selected Vendor shall program all control stations according to the fleet map as approved by the County.
- B. The radio equipment Selected Vendor shall furnish and install all control stations complete with an internal power supply for operation with a 120 volt, 60 Hertz power source, a desktop microphone, and all required mounting hardware.
- C. The radio equipment Selected Vendor shall test all Control station antenna system by measuring the VSWR, and examine coaxial cable, surge protection and grounding system, as practicable, at the time of installation and report the results discrepancies to the County. The owner of the control station site shall be responsible to correct any problems discovered.

8.2.4 Portable Radio Installation

- A. The radio equipment Selected Vendor shall program all portable radios according to the fleet map as approved by the County.
- B. The radio equipment Selected Vendor shall deliver all portable radios with the required battery and accessories as specified by the County.

8.3 Radio System Coverage Testing

- A. Responders shall submit preliminary Coverage Acceptance Test Plans that provide verifiable means of confirming the overall communications coverage goals and requirements of this project have been met including, live, “over-the-air” methods and processes for each system, for each Stage.
- B. Responders shall submit individual CATPs for the following portions of this project:
 - 1. Trunked System – separately for each Stage
 - a. Stage One, P25 Phase 2 on-street mobile coverage
 - b. Stage Two, P25 Phase 2 on-street portable coverage

- c. Stage Three, P25 Phase 2 light and medium in-building portable coverage
 - d. Stage Three, P25 Phase 2 targeted in-building portable coverage
 2. F1 channel on the F1/F3 System – for Stage One only, P25 Phase 1 and Analog FM
 3. F3 channel on the F1/F3 System – for Stage One only, P25 Phase 1 and Analog FM
 4. Paging, Analog FM light and medium in-building coverage.
 - C. Subjective and Objective coverage shall be measured as round-trip (talk out only for paging), using a mobile radio with appropriate attenuation (or pager as appropriate).
 - D. Coverage testing shall commence only after the radio system under test is fully optimized, tested and aligned. Any changes in transmit power, simulcast synchronization, antenna systems, or any testing anomalies that are observed during testing will require retesting of coverage at the County's discretion.
 - E. Testing of coverage from individual sites for coverage acceptance will not be allowed.
 - F. Tiles are defined as the smallest, uniformly sized areas that divide the Service Area for the purpose of testing. Tile sizes vary for each Stage as shown in Appendix L.
 - G. Tiles that do not provide the minimum number of samples, as specified below, to yield a valid test shall be deemed inaccessible and not be counted as either a pass or fail in the acceptance test calculation.
 - H. Tiles may also be deemed inaccessible if there are no public roadways, accessible private roads, or if it completely contains a body of water.
 - I. One Hundred percent (100%) of the tiles deemed to be accessible, by agreement between the County and the Selected Vendor, within the County Buffer, shall be Drive Tested as described herein. The tiles in the County Buffer that are outside the County Boundary, shall be Drive Tested but are not counted in the Coverage Acceptance Test pass/fail criteria. All accessible tiles in the County Boundary shall be included in the Coverage Acceptance Test pass/fail criteria.
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- J. A complete drive route that accomplishes the 100% Drive Testing requirement shall be included in all CATPs. Tiles that do not allow the minimum amount test data points to be collected shall not be part of the 100% requirement.
- K. Only tiles in the Coverage Area shall be included in the Coverage Acceptance Tests for the Trunked System and the F1/F3 System in Stage One.
- L. Both an automated, objective Bit Error Rate test and a manual, subjective Delivered Audio Quality test shall be performed during each drive test. A tile must pass both the Objective BER or SINAD as specified and Subjective DAQ tests, for talk out and talk in, for the test tile to be considered a passing tile (talk-out only for paging).
- M. If less than the required number of tiles pass the objective or subjective tests, the Selected Vendor shall make additions or changes to the failing system, at no charge to the County and repeat the entire Coverage Acceptance Test for that system.
- N. The Selected Vendor shall provide a test form for recording test results. The form shall identify the system that is under test and the performance criteria that is being evaluated along with the tile ID and the test score. The form shall also show the date the testing occurred on for that page, the page number and the name of the tester. There shall be space for comments.
- O. If three or more adjoining tiles, fail any combination of either DAQ (subjective) or BER (objective) the entire coverage test shall be considered as failed.
- P. Any tile that fails to meet the CPC, not due to equipment malfunctions, may be retested once however the maximum number of tiles allowed to be retested cannot exceed 5% of the total tiles tested.
- Q. Responders shall perform all coverage tests under full foliage conditions utilizing the newly installed fixed transmitters and receivers.
- R. Rain shall not delay the scheduled testing.
- S. All equipment must be laboratory certified in the parameters used for measurements. All test equipment must be calibrated to test BER, RSSI and SINAD.

- T. Responders shall supply documentation, for County approval, that states the radios used for coverage testing will provide an equivalent DAQ of 3.4 when a BER is measured on the radio as stated in TSB 88.1 Table A.1 for the P25 Phase 2 Trunked System and the P25 Phase 1 F1 channel on the F1/F1 System, and an equivalent SINAD for a DAC 3.4 for the F3 channel on the F1/F3 System and for the paging system.
- U. The effects of ambient levels of environmental RF noise shall be applied in accordance with TSB-88.2 section 5
- V. Tested tiles that are removed due to interference shall not to be counted as a pass for the acceptance test calculation.
- W. Drive Tests shall be performed while the vehicle is moving at normal driving speeds.
- X. Test conditions shall be in accordance with TSB-88.3 section 5.5-5.7 for outdoor testing including the recommendations of paragraph 5.7.1.4 for determination of the local mean using many samples each consisting of 50 subsamples recorded over a distance of 40 wavelengths.

8.3.1 Stage One Trunked Radio System Coverage Test Requirements

- A. Coverage shall be tested as round-trip, with simulcast distortion, using a mobile radio mounted in a vehicle with a 3 dB antenna (phasing coil type) mounted in the center of the vehicle rooftop at 1.5 meters AGL. The output power of the mobile radio shall be in accordance with the County's FCC license for the frequency(s) of use.

8.3.2 Stage Two Trunked System Coverage Test Requirements

- A. Coverage shall be tested as round-trip, with simulcast distortion, using a mobile radio mounted in a vehicle with a 3 dB antenna (phasing coil type) mounted in the center of the vehicle rooftop at 1.5 meters AGL. The output power of the mobile radio shall be in accordance with the County's FCC license for the frequency(s) of use.
- B. The in-vehicle mobile radio shall simulate a portable radio for DAQ and BER measurements by using an attenuator calculated to simulate the differences between the test radio configuration and a portable used on-street with the

portable mounted on the hip in a swivel case. These differences include receiver sensitivity, ambient RF noise, antenna height and body loss as specified in TSB-88. The correction factors for this configuration shall be as stated in the current version of TSB 88.1 Annex D. The use of differing corrections factors shall be demonstrated and documented to the County for each of the following:

1. Antenna Efficiency
 2. Polarization Loss
 3. Body Absorption
- C. The County reserves the right to perform a subjective (DAQ) test using a portable radio, selected by the County, outside of the vehicle, while walking, as a substitute for the simulated subjective test in that tile.

8.3.3 Stage Three Trunked System Coverage Test Requirements

- A. The in-vehicle mobile radio shall simulate a portable radio for DAQ and BER measurements by using an attenuator calculated to simulate the differences between the test radio configuration and a portable used in light and medium buildings with the portable mounted on the hip in a swivel case. These differences include receiver sensitivity, ambient RF noise, antenna height, body loss and building penetration loss as specified in TSB-88. The correction factors for this configuration shall be as stated in the current version of TSB 88.1 Annex D. The use of differing corrections factors shall be demonstrated and documented to the County for each of the following:
1. Antenna Efficiency
 2. Polarization Loss
 3. Body Absorption
 4. Building Loss
- B. The county reserves the right to perform testing using a portable radio, in light and medium buildings in any tile in place of the simulated objective test. When a given building penetration loss is agreed to and a building fails to meet the CPC, the actual penetration loss of that building shall be measured if that building's failure has an effect on the overall Coverage Acceptance Test results. If the measured penetration loss exceeds the agreed to value for that building type, the test result representing that building is deemed invalid and is not included in any of the

calculations for determining any Coverage Acceptance Test success or failure percentages that have been agreed to prior to testing.

- C. For targeted buildings, the required physical in-building testing shall occur during normal working hours when normal pedestrian traffic occurs.
- D. The Selected Vendor shall provide maps detailing areas inside the interior of all targeted buildings where coverage does not exist.
- E. Tests shall be performed in hallways offices, elevators, stairwells, underground and above ground parking lots and basements including electrical, mechanical and boiler rooms.

8.3.4 F1/F3 System Coverage Test Requirements

- A. Objective and subjective coverage testing for F1 channel of the F1/F3 System shall be conducted in P25 Phase 1 (FDMA) mode while operating in the simulcast mode. Objective and subjective coverage testing for the F3 channel of the F1/F3 System shall be conducted in analog (FM) mode while operating in the simulcast mode.
- B. Because the County is specifying all of the fixed sites to be used, the Vendor is not required to meet a bounded area coverage requirement. However, the Vendor is required to provide a minimum Delivered Audio Quality of 3.4 when a minimum local mean signal level is present in the absence of external interference in 97% of the area of the vendor's area coverage guarantee. The minimum threshold for a BER equivalent to DAQ 3.4 shall be met when the local mean RSSI amplitude is stronger than -108 dBm for F1 and the subjective test shall pass the DAQ 3.4 requirement when the local mean signal level is -97 dBm or stronger for F3.
- C. Responders must detail strategies to account for co- and adjacent channel interference and adherence to FCC rules during the Drive Testing. In particular, be aware that objective coverage testing on the F1 and F3 channels may cause bothersome interference to co-channel users.
- D. Coverage shall be tested as round-trip, with simulcast distortion, using a mobile radio mounted in a vehicle with a quarter wave antenna mounted in the center of the vehicle rooftop at 1.5 meters AGL. The output power of the mobile radio shall be in accordance with the County's FCC license for the frequency(s) of use.

8.3.5 Paging/Alerting System Coverage Test Requirements

- A. Testing shall be performed as required in paragraph 8.3.3 except that only talk-out shall be tested for the Paging/Alerting System.
- B. The Objective test shall use SINAD measurements for all Paging/Alert System Drive Tests. The measured value shall provide an equivalent DAQ of 3.4 as indicated in TSB-88.1 Table 3 using the parameters for 2.5 KHz, FM.
- C. Field Strength (measured in dBm) shall be collected but shall not be criteria for passing the coverage test requirements..

8.3.6 Coverage Test Records and Maps

- A. Responders shall provide Countywide coverage maps in PDF format.
- B. Countywide maps must be centered on the same geographic point, have the same resolution, orientation, justification and size so that multiple maps in pdf form can be compared using the page-up page-down function alone.
- C. The Selected Vendor shall use the results of the Stage One Drive Tests to adjust the parameters of its prediction software. The Selected Vendor shall demonstrate to the County that the adjusted parameters result in a predictive coverage map that closely matches the Drive Test results.
- D. The Selected Vendor shall use the modified parameters of Stage One in performing coverage predictions for Stage Two Trunked System prior to the final system design for Stage Two.
- E. The Selected Vendor shall use the results of the Stage Two Drive Tests to adjust the parameters of its prediction software. The Selected Vendor shall demonstrate to the County that the adjusted parameters result in a predictive coverage map that closely matches the Drive Test results.
- F. The Selected Vendor shall use the modified parameters of Stage Two in performing coverage predictions for Stage Three Trunked System prior to the final system design for Stage Three.
- G. The Selected Vendor shall be responsible for correcting any and all coverage deficiencies.

- H. The Selected Vendor shall furnish to the County the software used to create prediction maps as well as all the associated data files.
- I. The Selected Vendor shall perform all coverage modeling and coverage testing with software and hardware tools available to the County and shall include in its pricing, the cost of those software and hardware tools.
- J. The Selected Vendor shall, throughout the life of the project, furnish all prediction and coverage files, in native format, to the County.

8.4 Radio System Transition Plans

- A. The Selected Vendor shall be responsible for planning and coordinating the implementation of all equipment, subsystems, and the overall systems implemented in each Stage.
- B. The proposed system shall interface with existing County radio systems in a seamless manner for dispatch and field communications during system transition.
- C. Execution of the system transition plan shall ensure that new systems are brought online with minimum interruption to all existing systems and communications. All planned down time is to be approved by and coordinated with affected departments (e.g. DES, DPS, etc.).
- D. The Selected Vendor shall be responsible for any costs associated with their proposed system transition plan.
- E. Responder's proposal shall include a preliminary system transition plan describing how the new radio system will be placed in service, the existing system phased out with no or minimal disruption to the users.
- F. The Selected Vendor shall successfully complete all tests prior to the actual transition of systems.
- G. The Selected Vendor shall provide the necessary services to transition from existing systems to the proposed systems.
- H. The system transition plan shall include the schedule and procedures associated with the transition of each operational user group. The plan shall specifically

address how the existing users will begin using the new system with minimal operational impact.

- I. The system transition plan shall provide detailed component or subsystem transition plans, and specifically delineate between systems that affect and do not affect ongoing operations.
- J. The County reserves the right to approve and change the system transition plan as it relates to any or all system components and users.

8.5 Radio System Final Acceptance Testing

- A. Prior to final acceptance testing, the Selected Vendor shall verify and document upgrades of all equipment, hardware, and software to the latest factory revision. Multiple revision levels among similar equipment are not acceptable. The Selected Vendor shall provide the County with 2-weeks written notice that the system is ready for final acceptance testing.
- B. The Selected Vendor shall develop and use a completed and approved Final Acceptance Test Plan (FATP). The County shall approve the FATP prior to its execution.
- C. The FATP for the Trunked System shall include, but shall not be limited to:
 - 1. Failover tests of all redundant components and subsystems which demonstrate that upon failure of the active component or subsystem, the redundant component or subsystem takes over as the new active component or subsystem. Such tests shall demonstrate successful full fail-over of all call processing, audio processing, and control components and subsystems. This test shall include the failover and restoral of both redundant components.
 - 2. System Testing shall demonstrate full loading of the Trunked System. Testing of the physical radio sites coupled with IP-based and other loading equipment shall be used to demonstrate performance of the system under fully loaded conditions.
- D. The Selected Vendor shall successfully perform a preliminary FATP before the County witnesses the official FATP. The Selected Vendor and the County's representatives shall jointly execute and date the FATP following completion of all

tests. All tests in the FATP shall be marked as either pass or fail. The full FATP shall not be considered to be passed until accepted in writing by the County.

- E. The Selected Vendor shall provide all necessary technical personnel, and test equipment to conduct FATP tests. All deviations, anomalies, and test failures shall be resolved at the Selected Vendor's expense.
- F. The Selected Vendor shall document, correct, and retest all failed components. The Selected Vendor shall replace at its own expense any failed component.
- G. Retest of individual failed FATP tests or the entire plan shall be at the County's discretion.
- H. The Selected Vendor shall provide the County with the fully executed and completed FATP document.

8.6 30-Day Operational Verification Period

- A. There shall be a 30-calendar day operational verification of the system, under full load with all users on the system, to ensure that all hardware and software defects have been corrected.
- B. The verification period shall begin after all FATP tests are successfully completed and all system components are in-service.
- C. The verification period shall demonstrate the reliability, long-term stability, and maintainability of the systems.
- D. Any critical failure of the system during this verification period shall cause the verification period to restart after the repair is completed. The Selected vendor and the County will agree on what constitutes a critical failure.
- E. If an individual fixed network equipment component fails more than twice during the verification period, the Selected Vendor shall replace the failed component rather than repair it at no cost to the County.
- F. The Selected Vendor shall provide a 30-day operational verification period plan for County approval as part of the Draft Detailed Design. The plan shall specify what constitutes a critical failure.

8.7 Decommissioning, Removal, and Disposal of Legacy Equipment

- A. For each system at each stage and after the County's final acceptance of the system, the Selected Vendor shall consult with the County and remove legacy equipment that is not being reused.
- B. Removal of legacy equipment includes the equipment and brackets, screws, bolts, cable ties, other fasteners, power cables, supplies, etc. and all ancillary equipment and/or devices supporting the equipment.
- C. All equipment removed shall be packaged, labeled, and transported to one or more County-provided storage location(s) within the County.
- D. All equipment and devices being removed shall be cleaned externally, defaulted (remove programming), and the Selected Vendor shall make every effort not to damage the equipment. In the event the Selected Vendor causes damage to legacy equipment, they shall be responsible for compensating the County for the damages based on the fair market value of the equipment.
- E. The Selected Vendor shall maintain a detailed inventory of the removed equipment, listing the following at a minimum:
 - 1. The owning agency
 - 2. Brief description of the equipment
 - 3. Model numbers
 - 4. Serial numbers
 - 5. Asset numbers
 - 6. Location removed from
 - 7. Location within the County-provided storage location(s)
- F. Unless otherwise agreed to by the Selected Vendor and the County, proper disposal of equipment shall be the responsibility of the County.

8.8 Radio System As-Built Documentation

- A. At the completion of the installation phase for each Stage, the Selected Vendor shall provide complete as-built documentation as outlined below:
1. Documentation index
 2. Setup and alignment information
 3. Log of all level settings and performance measurements
 4. Equipment Inventory List with serial numbers and installation locations
 5. Equipment rack configurations
 6. A system block diagram identifying all equipment by its designated name and all terminals and cables by their numbers
 7. The wiring diagram showing, in detail, the individual connections of all control and audio functions carried on external cables interconnecting the various system components
 8. Terminal block data labels listing the following information
 - a. Origin
 - b. Destination
 - c. Function and Signal Type
 9. Site drawings, including all cabling, and terminations
 10. Complete civil, electrical, and system as-built drawings
 11. Plan and elevation drawings of all equipment including antennas on towers
 12. Antenna network drawings
 13. Antenna line sweeps in accordance with Appendix O
 14. Configuration files (e.g., routers, switches, servers, and base stations)
 15. System configuration data
 16. Channelization plans and IP addressing maps
 17. Successfully completed, signed, and dated FATP
 18. Field test reports
 19. Coverage test reports
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20. Acceptance test reports
21. Software and firmware version numbers
22. Programming and configuration files
23. Interconnection drawings that show all connections between sub-assemblies, such as terminal boards, panel assemblies, or other equipment, which external connections are made
24. Manufacturer's warranty documents, installation instructions, and Operating and Maintenance Manuals
25. Manuals for all equipment including equipment not manufactured by the vendor
26. Sufficient technical, engineering, and theoretical documentation, and equipment and maintenance manuals and System drawings of commercial standard with sufficient information included therein so that a qualified technician or engineer will be able to understand its operations and perform corrective and preventive maintenance on it
27. Other documentation as the Selected Vendor and the County deem necessary
28. All documentation shall be provided in pdf form and native form updatable using commercially available software.
29. Other documentation as the Selected Vendor and the County deem necessary

8.9 Radio System Final Acceptance

- A. The County shall deem the system ready for Final Acceptance following successful completion and approval of the following:
 1. Final design submittals
 2. SATP
 3. System installation
 4. Final inspection and punch list resolution
 5. As-built documentation
 6. FATP

7. CATP
 8. Punch list completely cleared
 9. Training
 10. 30 day operational test
- B. No conditional acceptances shall be granted.
- C. The County will take ownership of all equipment and the initial warranty period will begin at the time of final system acceptance.

9. Radio System Warranty, Maintenance, and Support

9.1 Initial Radio System Warranty

- A. Responders' proposals shall include an initial warranty for each system at each Stage which includes, but is not limited to, all of the following at no additional cost:
1. An initial warranty period of 3 years. The 3-year warranty period shall commence upon the successful conclusion of the 30 day Operational Verification Period.
 2. Guaranty of system performance and all hardware, parts, and materials including all related return and delivery fees.
 3. A single toll-free telephone number that answers 24 hours a day, 7 days a week, 365 days a year, for service requests and warranty claims.
 4. 24 hours per day, 7 seven days per week, at a minimum the following services:
 - a. Remote monitoring of system status and alarm conditions
 - b. Notification of system degradation, or alarm conditions
 - c. An on-line Trouble-ticketing system to record each alarm/event and all actions taken with time-stamps for each action from opening the ticket to closing the ticket. The trouble ticketing system shall be internet accessible and available to the County, the Selected Vendor, any sub-contractors used by the Selected Vendor for warranty service.
 - d. For onsite maintenance, the Selected Vendor will dispatch the proper technician in the prescribed response time to resolve the problem
 - e. On-call personnel to respond to system issues
 - f. Technical support service to answer any questions related to the system and its components shall be available to the County or its designated representatives.
 5. At a minimum, the following services:
 - a. Preventative maintenance services as specified in Appendix M. The Selected Vendor shall maintain equipment in a clean condition. Oil, dust, and other foreign substances shall be removed on a routine basis.

- b. Depot repair services for repair of faulty equipment
 - c. Anti-virus support including updates and security patches
 - d. Software updates that resolve software defects and security vulnerabilities
 - e. Software subscriptions
- B. The Responders' proposal shall include the name, address, and capabilities of the remote monitoring and service station(s) providing warranty service including for any extended warranty (service contract).
- C. When service is performed under the initial warranty the Selected Vendor shall adhere to the following procedures:
- 1. Provide a written statement to the County indicating the cause of the service outage, the resolution, and all post-repair testing procedures to ensure proper operation.
 - 2. Include the model and serial number of both the defective unit and spare unit in the documentation
 - 3. Utilize a comprehensive tracking/ticketing system for all equipment needing service. The tracking shall include tracking of any units to and from the factory/depot.
 - 4. Ensure that all replacement parts are equal in quality and ratings as the original parts.
 - 5. Complete all fixed network equipment mail-in board repair within 7 days.
- D. The Selected Vendor shall warranty all software and firmware provided and associated with equipment features, functions, and capabilities as required by this RFP and according to the County's contract with the Selected Vendor.
- E. The Selected Vendor shall provide, at no additional cost, commercially available upgrades to all software and firmware sold to the County as part of the system installation. The frequency and timing of installation of upgrades during this period will be at the sole discretion of the County.
- F. The Selected Vendor shall make every effort to separate corrective software revisions from enhancements. If the Selected Vendor is unable to do so, and new releases are necessary to correct software defects or security vulnerabilities, then

the Selected Vendor shall provide the entire release (including enhancements) to the County at no additional expense.

- G. The Selected Vendor shall provide all installation media and revised software manuals to the County at no extra cost at the time of any software revisions.
- H. The Selected Vendor shall bring software releases for all devices to the latest release level prior to the conclusion of the warranty period.
- I. The service facility shall provide prompt repair service, with service personnel arriving onsite within two hours after a service request by the County.
- J. If an individual fixed network equipment component fails more than twice during the first year of the initial warranty period, the Selected Vendor shall meet with the County to discuss, explain, and document such failures. If, in the opinion of the County, these failures indicate that the equipment is potentially prone to continuing failures, the Selected Vendor shall replace it rather than repair it at no cost to the County.
- K. The Selected Vendor, at no cost to the County, shall correct latent design defects or recurring problems relating to software, hardware, or overall system design, during the warranty period.
- L. The Selected Vendor shall maintain equipment and system performance at the level initially described in these equipment and systems specifications. The service organization shall maintain records to confirm completion at intervals defined by the County.
- M. The Selected Vendor shall utilize only factory trained and authorized maintenance personnel.

9.2 Radio System Post-Warranty Maintenance

- A. Responders shall propose maintenance services for subsequent years, renewable on an annual basis and a five year basis.
- B. Responders shall provide a comprehensive list of all post-warranty service offerings, statement of work documents and costs associated with each which shall include, but not be limited to, all services specified in the RFP for the initial warranty period.

- C. Responders shall fully describe the terms and conditions of the maintenance services in the proposal.
- D. Responders shall indicate who the local authorized repair facility will be for post warranty repairs.
- E. Responders shall be aware that the ongoing maintenance costs associated with the system may be considered in evaluating their proposals.

9.3 Radio System Maintenance

The County reserves the right to have technical staff onsite to witness, and if desired, assist in the maintenance and troubleshooting procedures. This does not relieve the Selected Vendor from warranty and maintenance responsibility as defined in this RFP.

9.3.1 Radio System Maintenance General Requirements

The approach to maintenance of this system shall be one of preventive maintenance.

9.4 Radio System Parts Availability

- A. All equipment shall be of a model currently in production and not planned for discontinuation, in new condition, and covered by a full warranty from the manufacturer and/or the Selected Vendor of not less than 3 years. Responders shall not propose equipment or a system when they intend to replace the system architecture within the next 3 years. They shall propose the new architecture instead.
- B. From the date of final acceptance to the tenth anniversary of the date of final acceptance, the Selected Vendor shall stock replacement parts for all delivered equipment in order to provide and sustain the provided systems.
- C. In the event the Selected Vendor plans to discontinue stocking any part required for maintenance after the seventh anniversary of acceptance, the Selected Vendor shall send written notice to the County 24 months prior to the date of discontinuance to allow for last-time buys and replenishment.

- D. The Selected Vendor shall provide year-round, 24-hour ordering facilities via telephone, internet, e-mail, and fax service and shall deliver all parts, ordered on a priority basis within 24-hours after placing an order.

9.5 Radio System Spare Equipment

- A. Responders shall propose to the County two levels of Spare Parts to be maintained in County owned local inventory (“Spare Parts”). The County will determine the level of Spare Parts to be maintained for inventory for:
1. Responders recommended Spare Parts for the system, subsystems, and individual equipment.
 2. A level of Spare Parts that provides sufficient components to completely duplicate the most complex radio site including spares that may unique to a lesser site.
- B. The list of recommended Spare Parts shall include, but not be limited to:
1. Complete station assemblies (base station or mobile relay)
 2. Any vendor identified field-replaceable units (FRUs)
 3. Any infrastructure component, which does not have FRU sub-components, that can cause a critical failure if it were to fail (e.g., backplane assemblies and other non-modular components)
 4. Power supplies
 5. Spares for less critical items shall also be enumerated
- C. The list shall include items that will rapidly and completely restore all critical system functionality with the least amount of effort (e.g., board replacement instead of troubleshooting to the component level when a critical unit has failed).
- D. The list shall include quantities of Spare Parts appropriate to accommodate equipment quantities in the system.
- E. The list shall define the primary equipment category each Spare Parts kit supports (e.g., transceiver board for a repeater, interface board for a console, etc.).

- F. The system engineering design documentation shall include a narrative on the Selected Vendor's ability to replace failed units from stock and the process and timing to repair, replace, and return failed units delivered for repair.
- G. System engineering design documentation shall also include the life cycle of equipment, parts, and other maintenance support for the system.

9.6 Repair of Non-Fixed Subscriber Equipment

During the 3-year warranty period malfunctioning mobile and portable non-fixed equipment units will be removed and re-installed by the Selected Vendor at its sole cost. The Responder shall state the method for handling and the turn-around time for the repair of mobile and portable radios during the warranty period.

Appendix A - Mandatory Submittals

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix B - Proposal Pricing Forms

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix C - Compliance Matrix

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Appendix D - Sample Contract

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Appendix E - Existing Site Conditions

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix F - Existing Console Locations

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix G - Existing Equipment Alarm Points

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix H - Existing Antenna Systems

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix I - Radio Site Floor Plans

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix J - Targeted Buildings

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix K - County Properties

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix L - Borders and Tiles

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix M - Preventative Maintenance Checklist

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix N - Conventional Resources on Gold Elite Consoles

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix O - Antenna Systems Test Steps

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix P - Radio Coverage Prediction Parameters

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix Q - Control Stations

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1

Appendix R - AC Powered Equipment

This appendix will be provided as a separate document upon written request sent to the email address indicated in Section 1.1