



Fulton County, GA

Department of Purchasing & Contract Compliance

February 6, 2013

Re: 13RFP122112C-DR, APCO P25 Phase 2 TDMA 800 MHZ Simulcast Trunked Radio System

Dear Bidder(s):

Attached is one (1) copy of Addendum 2, hereby made a part of the above referenced **13RFP122112C-DR, APCO P25 Phase 2 TDMA 800 MHZ Simulcast Trunked Radio System.**

Except as provided herein, all terms and conditions in the **13RFP122112C-DR** referenced above remain unchanged and in full force and effect.

Sincerely,

Donald R. Riley

Donald R. Riley, CPPB
Assistant Purchasing Agent

Winner 2000 - 2009 Achievement of Excellence in Procurement Award • National Purchasing Institute



**13RFP122112C-DR, APCO P25 Phase 2 TDMA 800 MHZ Simulcast Trunked Radio System
Addendum No. 2
Page Two**

This Addendum forms a part of the contract documents and modifies the original RFP documents as noted below:

1. See attached document, concerning all questions submitted concerning this proposal.
2. Section 3 and Section 4 has been replaced in its entirety. See attached documents.

For additional information regarding this addendum, contact Donald R. Riley, Assistant Purchasing Agent at (404) 612-7916.

Except as provided herein, all terms and conditions in the bid referenced above remain unchanged and in full force and effect.

Failure to return a signed copy of this addendum could render your bid non-responsive.

ACKNOWLEDGEMENT OF ADDENDUM NO. 1

The undersigned proposer acknowledges receipt of this addendum by returning one (1) copy of this form with the proposal package to the Department of Purchasing & Contract Compliance, Fulton County Public Safety Building, 130 Peachtree Street, Suite 1168, Atlanta, Georgia 30303 by the RFP due date and time **February 13, 2013 at 11:00 A.M.**

This is to acknowledge receipt of Addendum No. 2, _____ day of _____, 20__.

Legal Name of Bidder

Signature of Authorized Representative

Title

Questions concerning 13RFP122112C-DR, APCO P25 Phase 2 TDMA 800 MHZ
Simulcast Trunked Radio System

Question: We would like to request clarification/additional information on the following
items specific to the RFP document:

Response : [Section 3 Proposal Requirements and Section 4 Evaluation Criteria](#) has
been replaced in its entirety.

SECTION 3 PROPOSAL REQUIREMENTS

3.1 SUBMISSION REQUIREMENTS

3.1.1 Proposal Submission Date and Submittal Format

All Proposals, including all attachments, must be received by the County in a
sealed package no later than **Monday, February 13, 2013 at 11:00 A.M.** and
must be addressed to:

**REQUEST FOR PROPOSALS RFP #13RFP122112C-DR
Fulton County Department of Purchasing & Contract Compliance
Public Safety Building
130 Peachtree Street S.W. Suite 1168
Atlanta GA 30303**

The Proposal shall consist of a Technical Proposal, a Cost Proposal and all
documents listed on the Required Submittal Checklist (Exhibit 1). The Technical
Proposal shall include proposer information, technical information, business-
related information, and any Technical Proposal forms requested. The Cost
Proposal shall include the Cost Proposal Forms and any information describing
the basis for pricing and must be separately, sealed, marked and packaged.

The required content of the Technical Proposal and Cost Proposal is further
specified in this section of the RFP. The Proposal must be signed and
acknowledged by the Proposer, including certain information to be provided
under oath as required under applicable law, in accordance with the instructions
herein and the various proposal forms.

**THE TECHNICAL PROPOSAL, THE COST PROPOSAL AND CONTRACT
COMPLIANCE EXHIBITS SHALL BE SUBMITTED IN SEPARATE, SEALED
ENVELOPES OR PACKAGES. THE INCLUSION OF ANY COST**

INFORMATION IN THE TECHNICAL PROPOSAL MAY RESULT IN SUCH PROPOSAL BEING REJECTED BY THE COUNTY.

Each envelope or package shall be clearly marked as follows:

**REQUEST FOR PROPOSALS RFP
Project # and Title
[Technical or Cost Proposal]
Proposer's Name and Address**

3.1.2 Number of Copies

Proposers shall submit the following:

Technical Proposal, one (1) original and five (5) copies on CD media in PDF format.

Contract Compliance Exhibits, one (1) original with the Technical Proposal marked "Original" and one (1) copy in a separate sealed envelope.

Financial Information, one (1) original with the Technical Proposal marked "Original" and one (1) copy in a separate sealed envelope.

Cost Proposal, one (1) original and one (1) copy in a separate sealed envelope.

All Proposals must be complete with all requested information.

3.2 OVERVIEW OF PROPOSAL REQUIREMENTS

Proposers shall submit Proposals in accordance with the content and format requirements set forth in this RFP. Proposals should be clearly organized and structured in a manner that allows materials included in the document to be located easily.

Each of the instructions set forth in this section must be followed for a Proposal to be deemed responsive to this RFP. In all cases, the County reserves the right to determine, at its sole discretion, whether any aspect of the Proposal meets the requirements set forth in this section. The County reserves the right to reject any Proposal, which in its judgment, does not comply with these Proposal submission requirements.

3.3 SCOPE OF WORK

I. RADIO SYSTEM DESCRIPTION

3.3.1 System Configuration

Proposer will be responsible for proposing and providing all equipment, services, and resources that are required to meet the performance requirements of this Scope of Work.

3.3.2 Trunking Requirements

This section of the Scope of Work provides an overview of the performance requirements of the system.

3.3.2.1 Channel Priority

RF channels shall be assigned automatically in real-time by the system controller in response to system user (field units and console dispatchers) requests, in accordance with channel availability and user assignment priorities. A minimum of eight levels of priority shall be incorporated in the system.

3.3.2.2 User Group Organizational Structure

To provide for flexibility and use of the trunked radio system and to provide additional flexibility and capability for future system operational expansion, at least 2,000 individual talk groups shall be available within the system.

All field units (mobiles, portables, and RF control stations) and console dispatch positions shall be capable of being assigned user group address designators that shall permit communications between groups of field units or groups of field units and individual dispatch positions. All units operating within the same user group shall receive both sides of every conversation addressed to or from the group members.

The system shall be capable of individual call, group call (sub-fleet), and all

call (fleet) voice communications and alerting. The talk group plan must be submitted by Proposer to the consultant, and approved by the County prior to equipment programming.

3.3.2.3 Addressing and Signaling

The addressing and signaling system shall permit the assignment of a minimum of 48,000 discrete field unit addresses. All discrete addresses shall be able to be a member of any or all user groups. Regardless of the user group affiliation, the discrete unit address for a unit shall not change. Each unit shall have a unique discrete unit address.

Talkgroup addresses shall have the capability of being partitioned into various organizational user group structures. Proposer shall assist the County in the development of a Countywide / citywide talkgroup plan.

3.3.2.4 System Access Time

The system controller shall automatically assign all RF channels. Each system user (field units, console dispatchers, etc.) shall have access to all RF channels via an operator programmable priority protocol. Voice truncation time for each simulcast system shall be less than 500 milliseconds based on the following assumptions:

- A voice or data channel is available for assignment.
- Minimum receiver threshold.
- Simulcast site configuration.

Proposer must provide a timing chart depicting the performance of its system. Voice truncation time shall be described on a timing chart as follows:

- Length of time speech would be lost or “truncated” by system setup delays.
- Length of time the recoverable speech would be delayed within

the system by the vocoder (digital alternative), the transmission network, and all related processes until recovered at the speaker of the listening radio unit.

- All significant delays from PTT until audio is recovered at a listening radio unit.
- Multi-system patch to adjacent agencies and hospitals (worst case).
- A time line showing all events measured in milliseconds must accompany the chart

3.3.2.5 Private Conversation

The trunked radio system shall permit designated radios to have individual conversations with one another. This mode shall allow two units to have a conversation so that no one else is privileged to the communications, or is aware of it being requested. An originating radio user specifies the identification of the destination radio user and initiates the transmission. The destination radio user receives the transmission and is able to communicate with the originating radio user without having to change any settings on the radio.

3.3.2.6 Dynamic Switching Between Technologies

The trunked radio system shall permit radios to access the system in either the APCO Project 25 Phase 1 FDMA mode or the APCO Project 25 Phase 2 mode real-time on a channel by channel basis. Individual channels shall not have to be partitioned or dedicated as either FDMA or TDMA. This will allow the controller to assign channels in the most flexible manner and will allow the users to migrate from FDMA technology to TDMA technology without concern for channel resources. The switching device will assign channels without concern for technology as the channels will be equipped with TDMA/FDMA operations. Selection of TDMA/FDMA modes of operation shall be determined by the subscriber programming.

3.3.2.7 Selective Alerting

The trunked radio system shall provide a means for selectivity alerting radio units on an individual, group (sub-fleet), or all-call (fleet) basis.

3.3.2.8 On-Channel Interference

The trunked radio system controller shall have the capability of detecting an interfering signal on any of the RF channel receivers. If such a signal is detected, the system controller shall shut down the associated channel transmitters and receivers for the duration of the interference. If the interference appears on the control / signaling channel, the system controller shall switch to an alternative control / signaling channel, as well as remove the channel being interfered with from the system. Once the interference is gone, the RF channel shall be reactivated by the system controller for system use.

3.3.2.9 Out-of-Range (Contact) Indication

Whenever a field unit leaves the radio coverage area of Fulton County's system, an alert to the user shall be provided. The user shall be notified of this condition by a visible or audible signal when the condition is first sensed.

3.3.2.10 Unit Disable

The trunked radio system shall provide the capability of allowing the system supervisor using a system-manager terminal to enable or disable any field units on the trunked system. The disabling of a field unit shall prevent the unit from monitoring any voice communications on any channel or user group in the system. A disabled unit shall not be able to transmit or otherwise join into any voice conversation on the system. The enabling or disabling function shall occur while the field unit is on the system anywhere within the radio coverage area. The system shall have the capability to search the trunked system for the unit. The system manager terminal shall provide a positive indication to the system supervisor when the system succeeds in enabling or disabling the unit. The

field unit and system shall “handshake” so that the system shall have a positive indication of success.

This process shall not involve any “shutdown” of the system. The operation shall not require the use of any working channel. A disabled unit can only be re-enabled by the system supervisor. If for any reason the trunked system is shutdown or disabled, any disabled units shall stay disabled.

If the unit is not on the system at the time the enabling or disabling function is initially invoked, the system shall have the ability to capture the unit when it comes into the system. When the target unit comes into the system, the system shall have the capability to “quickly” capture and automatically enable or disable the unit.

3.3.2.11 Unit Identification (ID)

Each unit (mobile, portable, RF control station, and dispatch console) shall send its unique discrete address identification to the system each time the unit transmits. The ID shall be displayed on the associated dispatch-control-console channel module, as well as any other field units or RF control stations that are equipped with display capabilities. The ID that is displayed shall be system programmable and shall be either the unit ID number or the plain language alias (fleet, sub-fleet, talk group, affiliation group, or individual unit name) name. Proposer shall state the alias naming capabilities of the system in its proposal.

3.3.2.12 Automatic Station ID

Automatic International Morse Code Station Identification shall be provided for the trunked radio system. Operation of the Automatic Station ID shall be in accordance with FCC rules for trunked radio systems.

3.3.2.13 Dynamic Regrouping

The trunked radio system shall permit the reassigning of radio units to new or other temporary user-group assignments. The system supervisor using the system manager terminal can initiate the reassignments.

This reassignment of user groups shall occur while the field unit is operating on the system anywhere within the RF coverage range of the system. The system shall handshake with the target unit and confirms that the requested change has been accomplished. The system manager shall be capable of regrouping field units once they have re-entered the RF coverage range or when they are powered up (turned on) at any time after the initial regrouping has taken place.

The system shall include the ability to perform this function manually, and also with a stored software plan to allow for the automatic programming of many units into predetermined user groups. This reprogramming shall allow for the saved “plan” to be initiated at any future time by the system supervisor.

Proposer shall provide a description of this feature and the total time required to regroup 100 units of a pre-stored group. Total time is to be measured from the time that the regrouping activity is initiated by the system supervisor, to the time that the 100 units are regrouped and able to receive voice messages. All 100 units are presumed to be on and within RF coverage range of the system.

3.3.2.14 Trunking Protocol

The trunking protocol shall allow for “message”-type trunking (repeater hang time after release of PTT switch) or “transmission”-type trunking (RF channel instantly reverts to pool of available RF channels) on the system. This feature shall allow reconfiguration of the trunking protocol as necessary and as future system operations dictate.

3.3.2.15 System / Site Controller

A primary system / site controller shall be provided, and shall consist of the necessary hardware and software to provide overall monitoring and control of the trunked radio system. The system shall be responsible for automatically making RF channel assignments and performing priority call queuing, late entry assignments, and data logging of system activity. The

system shall perform other unit and control activities as necessary to completely control the trunked radio system.

The system shall have the capability to receive requests for access to the system from field units (mobile, portable, RF control station) and from dispatch console positions via the control / signaling channel. It shall identify an unused RF channel and direct the signaling system to move the addressed unit or user group to the designated RF channel.

The system shall assign an RF channel in accordance with priorities and user-group assignment procedures established by the County.

System software / hardware updates and / or changes shall be completed while maintaining continuous communications and without forfeiting any features or functions required by this Scope of Work.

The trunked radio system shall be controlled by a primary-site controller (system controller). Failure of the system primary-site controller shall not cause the loss of any functions or features required by this Scope of Work. Records management and APCO Project 25/16 priority system access shall be maintained.

As an alternate to the System/Site Controller, Proposer shall describe system control capability and the reliability of their proposed architecture specifically addressing the intent of the operations and features as listed in this specification.

3.3.2.16 Network Manager

A network-manager interface shall be provided for control of the total trunked radio network by authorized personnel. The network manager shall allow data entry and retrieval from the system. Data retrieval shall include receiving control / signaling channel data and alarm messages from the various system controllers. Examples of data entry include altering system parameters, removing channels from operation, regrouping radio units, disabling radios, etc. The network manager shall be password protected from access by unauthorized personnel. The network-manager shall be a web-based application that allows the

system manager to access the trunked network from any computer with web access.

3.3.2.16.1 Database

1. A database shall be provided that will store system user profiles, such as user group access, priority levels, dynamic regrouping plans, authorization codes, interconnect access, etc. Additionally, whenever a field unit is turned on and the unit is within RF coverage range of the system, the unit's discrete address and user-group selection shall be recorded into the system database.
2. Whenever a field unit is on and is in RF coverage range of the system, any change of user group selection for the field unit shall automatically update the system database with the unit's ID (discrete data signaling address) and current user-group selection.
3. The database shall permit user-defined sorting of calls by units, groups, time of day, duration of call, channel, site and priority.
4. The database shall be continuously backed up. This backup database shall act as a "hot standby" database that is automatically kept current. Should there be a failure with the primary database; the backup database shall automatically be activated for system access.
5. Every 24 hours, the database shall be automatically backed up and stored on devices external to the 821-MHz trunked control system, such as to a compact disk (CD). Sufficient storage media shall be provided for storing data over a two-year period.
6. If unattended, fully automatic backup capability cannot be provided, Proposer shall specify the system's backup

capabilities and limitations, and any user involvement that might be required.

7. The database shall have sufficient capacity to store all system profiles, as well as the capacity to store 45 days of system activity for report generation.

3.3.2.16.1 System Diagnostics

Sufficient hardware and software shall be provided to monitor and test the trunked radio system. The diagnostic system shall continuously test all RF repeater stations, site controllers and other critical hardware and software functions. Should any abnormalities be found during a test sequence, the abnormality shall be logged in plain language (not coded characters).

At a minimum, the log shall include the type of problem encountered, the date and time, and the channel(s) or equipment where the problem occurred. Additionally, the diagnostics system shall activate audible and visible alarms to notify the system supervisor of the problem.

If a failure results in a loss of transmitter power or high VSWR on a repeater station, combiner or antenna system, the system controller shall automatically remove that repeater station from the system until such time that the fault is corrected. If interference is received on a radio channel, the system controller shall automatically remove that channel and associated receivers from the system until such time that the fault is corrected. When a repeater station or a radio channel is removed from service, an alarm shall be sent to the system supervisor.

3.3.2.16.2 System Alarms

Alarm-status information shall be accessible from the network manager terminal or web-based application. The system supervisor shall be able to ask for and receive alarm conditions concerning the base-station repeaters and controllers. The system shall be capable of having alarms printed to a plain language printer and/or stored electronically in a plain language text file (as they occur). A printer shall be included with the system supervisor terminals.

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- A remote-alarm-indication subsystem shall be provided to capture diagnostic and alarm reports, as well as summarize traffic operations.
 - At a minimum, the following trunked system alarms shall be logged and displayed:
 - Transmitter power / VSWR.
 - Control / signaling channel data integrity.
 - Working channel integrity.
 - Proper trunking operation of each channel.
 - System interference reception.
 - Miscellaneous alarms.

All individual system alarms must appear at the dispatch center and the radio maintenance facility. The network monitoring and control system and 821-MHz trunked radio network-manager terminals or web-based applications are to be installed at the above facilities in the same manner.

3.3.2.16.3 *Report Generation*

The network manager shall be capable of generating management reports to provide the necessary information for management personnel to review the reports and make decisions regarding staff resource allocation and altering system size, and to evaluate the operational effectiveness of the various components of the trunked radio system. The reports shall include at least one month of system activity.

3.3.2.16.4 Network Manager Terminal

The network manager terminal or web-based application shall allow an operator at the terminal to perform the following tasks:

- Inquire about the status of alarms.
- Inquire and make changes to the priority level of assignments of any and all units in the system; the priority shall be assigned on an individual basis, by user-group assignments, or both.
- Inquire about dispatch call-loading information.
- The terminal shall display the real-time activity of the prime-site controller at a designated location within the system.

3.3.2.17 Reliability / Redundancy / Backup

A minimum of two trunking system failure modes shall be provided to minimize the loss of communications system features and functions.

As an alternative to the Reliability/Redundancy/Backup operations listed in this specification, Proposer shall provide information for the County to properly evaluate the Reliability/Redundancy/Backup features offered by their system design specifically addressing the intent of the operations and features as listed in this specification.

3.3.2.17.1 Failure Mode One

Due to operational requirements and system loading, a failure that would cause the system to revert to conventional (non-trunking) operation would degrade the system to an unacceptable level. For this reason, it is required that the system shall continue to trunk and provide all features, including radio coverage and APCO 16 features, in the event that the primary-system controller or remote-site controllers fail. Therefore, redundant system and site controllers and automatic switching facilities are required.

If the primary system or site controller fails, the system shall automatically switch to a backup system or site controller for trunking control. During

this mode of operation, the system shall continue to provide all features and functions specified in this document.

The system shall not be “OFF THE AIR” for longer than ten seconds (maximum) during the system adjustment.

3.3.2.17.2 *Failure Mode Two*

Should the trunked radio system central controllers fail to the point that APCO 16 trunking can no longer be maintained, then the trunking system shall revert to what is commonly known as a “failsoft” mode of operation.

During this mode of operation, a signaling message shall be continuously transmitted by the system repeaters to notify the mobiles, portables, and RF control stations that the system is in a failsoft mode. This signaling shall also ensure that the mobile and portable radio shall not go into failsoft mode when they are out of RF coverage range of the system.

This system shall not be “OFF THE AIR” for longer than 15 seconds (maximum) during the failsoft system adjustment.

While the system is operating in the failsoft mode, the receiver / voting system shall continue to function, and the system shall continue to operate in simulcast mode without any reduction in coverage.

3.3.2.17.3 *Other Reliability Requirements*

The system shall have the capability of assigning a minimum of four trunked repeater stations to perform as the control / signaling channel. When a new control / signaling channel is assigned, radio units shall automatically search for and acquire the new channel. The control / signaling channel shall periodically be rotated between trunked repeater stations. In the event that the control / signaling channel fails, the failure shall be detected and one of the remaining stations shall be automatically assigned as the control / signaling channel.

A monitoring device shall be provided at each RF site to monitor control / signaling activity, forward and reflected transmitter power, and up to eight

other alarm inputs to be used as the County sees fit. The alarms shall automatically be reported as described in Section 1.12.16.3.

3.3.2.18 System Alignment / Diagnostics / Test Equipment

To facilitate system alignment, optimization, troubleshooting, and repair of the communications system, a centralized diagnostic panel / rack shall be provided at the prime site. This rack shall include a switch panel that will enable or disable RF transmitters and other equipment operating in the system.

A patchable jack field shall be provided for all audio / data input and output lines of each major piece of equipment to facilitate monitoring, injecting test tones, and isolating interconnection circuits. The jacks shall include “normalled-through” contact arrangements, and shall be wired in this manner for most-often-used circuits. A sufficient quantity of patch cords shall be supplied.

As an alternative to the System Alignment/ Diagnostics/ Test Equipment operations and equipment listed in this specification, Proposer shall provide a description of the proposed system’s alignment procedures, diagnostic capabilities, and the test equipment provided.

3.3.2.18.1 System Alignment / Optimization

Sufficient alignment control and test equipment shall be provided with the communications system to allow proper alignment and optimization of the trunked simulcast system. The equipment shall allow for injecting a test tone that is swept across the audio bandwidth of the communications equipment and sent to the transmitters under alignment. A test receiver shall be remotely located in the test area, and the received test audio shall be brought back to the central maintenance facility.

A storage oscilloscope shall be so connected so that the x-axis corresponds to the frequency of the test tone and the y-axis corresponds to either the amplitude of the returned audio or the relative phase of the returned audio and test tone. A method of permanently capturing the oscilloscope patterns shall be provided. This shall be by photographic or graphic printing methods.

Adjustments in audio level and audio phase delay for all trunked simulcast RF channels shall be made from the central maintenance facility.

Automatic simulcast realignment upon any microwave loop switch action shall be provided.

3.3.2.18.2 Alignment Test Equipment

The alignment and optimization equipment shall be permanently installed in a rack at the central maintenance facility. The equipment complement shall include all necessary equipment, software and hardware necessary to perform trunked simulcast system alignment and optimization.

3.3.2.18.3 Spare Parts Inventory

Proposer shall furnish with the response an itemized listing, with purchase costs, of spare parts, sub-assemblies, plug-in boards and components that should be kept in stock in order to maintain the communications system at a fully operational and functional level.

Proposer shall provide contract pricing for replacement parts ten (10) years beyond system acceptance.

3.3.3 Mobile Data System Requirements

Fulton County wishes to utilize approximately (150) P25 mobile radios in packet data mode for text applications. These computer communications include messaging, database query, dispatch, and warrants. Proposers are requested to propose all packet data infrastructure elements to enable this capability. Proposers will state the slowest data bit rate that concurrent active mobile clients may experience on their system, and under what circumstances these rates may occur. Proposer shall quote either a replacement of or any required upgrade to the existing Motorola Premier Mobile Data Computer System including server and client software. The proposed system should support three (3) host application connections using IP over Ethernet.

3.3.4 Fire Station Alerting System Requirements

The Fire Station Alerting System will be supplied with a server/application for use by twenty-four (24) dispatch console positions. There shall be and fifteen

(15) fire station units. The system shall be NFPA 1221 compliant. There shall be a graphical user interface that provides control and status of station units. The station units shall have a minimum of four (4) DPDT control relays and four (4) opto-isolated external status inputs. The station units shall include a response button that can be used for manual acknowledgements and a reset button.

3.3.5 Channelization

3.3.5.1 Radio Channels

The County has fourteen 800 MHz channels for trunked simulcast voice communications. Proposers must present a valid FCC 800 MHz design.

Proposer shall describe how their proposed system will operate on the public safety spectrum in the 700 MHz band to accommodate future channel expansion.

3.3.6 Radio Communications Coverage

The proposed 800 MHz communication systems shall utilize the nine existing sites and eight proposed sites to provide coverage of Fulton County. Successful Proposer shall provide both talk-out and talkback RF communication propagation predictions at 95% area reliability.

Successful Proposer shall provide equipment to meet coverage reliability.

Proof of coverage-performance compliance shall be determined through the coverage acceptance test plan. Should the Successful Proposer's system fail to meet the coverage reliability outlined in this specification, the Successful Proposer shall provide additional equipment to meet coverage reliability. Procurement and installation of additional equipment will be the Successful Proposer's responsibility.

3.3.6.1 System Parameters

The prime voice radio system design shall be a trunked simulcast system.

3.3.6.2 Unit Configuration

Subscriber radio units operating in this system shall be moving, parked or traveling on any street, road (paved or unpaved) or highway at any time within the coverage area. For mobile radios, vehicular antennas are to be center mounted on each vehicle roof, unless specifically noted elsewhere in this document for any particular vehicle or class of vehicles.

For the purposes of evaluating portable coverage, Proposer must consider that users will be equipped with whip antennas.

3.3.6.3 Propagation Signal Level and Reliability

In accordance with their coverage predictions submitted, Proposer shall be required to demonstrate the 95 percent coverage reliability predicted in their proposal as it covers Fulton County via the RF coverage acceptance plan.

3.3.6.4 Coverage Area Requirements

Portable radio RF coverage shall be based on the portable units in motion, up to 65 mph or stopped, operating on streets, roads and highways within the required coverage area.

Portable radio RF coverage shall be based on the portable units operating outdoors and while inside light and medium buildings. The losses associated with in-building coverage shall be light density (e.g., residential) type structures, and medium density (e.g., shopping centers, light commercial) type structures. Building clutter / foliage losses used in the calculations shall be Proposer's corporate standard using Land Use Land Clutter (LULC).

The County shall be divided into grids so that a statistically valid test can be performed.

3.3.6.5 Coverage Maps

Proposer shall include separate composite coverage maps in its responses for each of the following configurations:

- Portable talk out and talk back while the portable is operating outside.
- Portable talk out and talk back while the portable is operating inside an

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- 8 dB (light) attenuation building.
 - Portable talk out and talkback while the portable is operating inside a moving vehicle.
 - Portable talk out and talkback while the portable is operating inside a 12 dB (medium) attenuation building.
 - Mobile talk out and talkback while the vehicle is traveling on local streets, roads and interstate highways.
 - Mobile data talk out and talk back maps depicting reliable data speed of 96 kbps.
 - FCC 40 dBu contours associated with the system design.
 - Any areas within the coverage contours shown on a map that are predicted to have a reliability of less than the reliability applicable to that map shall be clearly marked on the map.
 - A description of how Proposer calculated the coverage shall be included in the response. List the coverage model(s) used (for example – Okumura, Longley-Rice, etc.).

All operating parameters and factors pertaining to the coverage commitment for a specific map shall be shown for that map (preferably on the map).

The following minimum information shall be clearly defined for each map and each site:

- The base / repeater RF power output.
- The base / repeater antenna gain and directivity.
- The transmit ERP.
- The effective receiver sensitivity and BER threshold for the coverage contour.
- The base / repeater antenna height above ground, specifying the antenna height at the center point and the antenna's overall length.
- The base / repeater antenna height above average terrain.

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- Base / repeater site elevation AMSL.
 - The mobile and portable antenna type and gain or loss.
 - The mobile and portable RF output power.
 - The configuration of field units (for example – talk out to portable inside medium density buildings) and the environmental loss factors utilized.
 - Simulcast offset delay.
 - Foliage loss / standard deviation.
 - Building loss / standard deviation.
 - Moving factor.

3.3.6.6 RF Coverage Acceptance Criteria

3.3.6.6.1 General

The County's acceptance of the RF coverage portion of the system shall be based on successful passage of the RF Coverage Acceptance Test.

A detailed RF Coverage Acceptance Test Plan (RFC-ATP) shall be included in Proposer's response. The RFC-ATP shall reflect the system proposed and include (at a minimum) the following items:

- A brief description of how the test shall be conducted.
- County manpower requirements.
- A list of mobiles and portables in the system to be supplied by the County for the actual data gathering.
- How long the test shall take (approximate time).
- An explanation of the methodology of data gathering.
- An explanation of how the results shall be tabulated and documented.
- An explanation of why the methodology of data gathering and presentation of the results to the County shall "prove" that the coverage reliability requirement of this document shall be met in

general and in the defined special RF coverage areas.

The Successful Proposer's RFC-ATP shall incorporate the following minimum criteria:

- The County shall be divided into grid squares.
- All grids shall be tested.
- Both computer automated tests and audio quality tests shall be performed throughout the County demonstrating 95-percent coverage as proposed by Successful Proposer's coverage maps.
- Testing points shall be chosen by the County and, to the extent possible, should not cluster adjacent grid test points together.
- Successful completion of the test shall occur when 95 percent or more of all grids pass the audio test.
- A written test plan must be submitted and approved by the County prior to performing the test.
- No greater than four adjacent grids shall fail in any part of the County. An adjacent grid shall be defined as grids having common sides or apexes.

The tests shall be based on aforementioned portable-radio configurations. A calibrated mobile-radio-test setup shall be configured to simulate operations other than portable in vehicles. The calibrated test-radio configuration shall be verified by an independent means acceptable to the County both before and immediately following the tests. Test equipment shall remain in the possession of the County for the duration of the test.

3.3.6.6.2 Automated RF Testing

The test instrumentation used to record signal strength measurements shall provide a method of correlating the location and the signal level measurement, such as a GPS receiver. The test instrumentation shall be capable of operation in a vehicle for talk-out tests, and at the fixed equipment sites for talkback tests.

A test route shall be developed by Successful Proposer and approved by the County. Continuous data shall be recorded throughout the test route. Transportation shall be provided by the County to any test locations not generally accessible by car. The testing procedures will only consider accessible grids. The test shall be statistically significant for the required reliability.

3.3.6.6.3 Voice Quality Tests

For each radio configuration, at least 95 percent of the test locations shall provide a voice quality rating of DAQ 3.4 or better for both talk-out and talkback messages.

The test evaluation team(s) shall be made up of two County representatives and one Successful Proposer representative. If the test messages meet or exceed the test criteria, as agreed by a majority of test evaluation team, the grid is considered to have passed. If the test messages do not meet the test criteria, as agreed by a majority of the test evaluation team, the grid failed.

Separate portable radio talk-out and talkback tests shall be conducted for selected buildings, outdoors and in moving vehicles. Mobile radios shall be configured to emulate the use of the dipole antenna configuration operating in light and medium buildings. The tests conducted using the modified mobile radios shall be performed either at a fixed location or in a moving environment at the County's discretion.

The County will provide test messages representing commonly used dispatch language for the fire, Emergency Medical Services (EMS) and law enforcement. Proposer and the County must mutually agree on the test messages. The test messages will be no longer than 10 seconds in length. Test messages will be drawn at random and read and evaluated. Once used, the test message will be discarded so as not to be used again.

DAQ	Table 3.3.6.6.3-1: Subjective Performance Description
1	Unusable. Speech present but unreadable.
2	Understandable with considerable effort. Frequent repetition due to noise / distortion.
3	Speech understandable with slight effort. Occasional repetition required due to noise / distortion.
3.4	Speech understandable with repetition only rarely required. Some noise / distortion.
4	Speech easily understood. Occasional noise / distortion.
4.5	Speech easily understood. Infrequent noise / distortion
5	Speech easily understood.

3.3.6.7 Coverage Performance

Successful Proposer shall guarantee RF coverage performance in accordance with the requirements in this Scope of Work, section 3.3. If the RF coverage performance of the system supplied by the Successful Proposer does not meet the requirements of the Scope of Work, the Successful Proposer shall modify or otherwise cause the system to meet the requirements of this document at no cost (direct or indirect) to the County.

Successful Proposer shall submit a plan to meet such requirements that is satisfactory to the County, in the County's sole discretion. This plan shall become an enforceable part of the written contractual agreement between the County and the successful Proposer.

3.4 RADIO EQUIPMENT REQUIREMENTS

3.4.1 General

This Scope of Work contains performance criteria and requirements upon which Proposer shall base its proposal for an 800 MHz P25 Phase 2 simulcast trunked radio communications network that shall support voice and data operations. It shall be the responsibility of Proposer to verify completeness of the material list, and the suitability of the devices to meet the total requirements of this Scope of Work.

For digital solution, base stations shall employ digital emission for public safety voice communications. A digital system is based on the use of radio equipment providing true digital emission without the use of an analog modulating subcarrier. Analog voice shall be converted to a digital form within the radio equipment using an IMBE voice coder (vocoder) device. A digital trunked radio system is specified to achieve consistent voice quality across the coverage area. Additionally, the County expects that the performance and quality of encrypted voice over the digital system will be identical to that of clear voice.

3.4.1.1 Equipment Layout

The location and position of all equipment shall be in accordance with good ergonomic engineering practices such that optimum functional efficiency will result. All equipment shall be arranged and installed in a coordinated fashion. Consideration shall be taken during the arrangement of equipment to ensure that each piece of equipment's intended function will not be impaired due to the influence of adjacent equipment or other environmental factors. Sufficient space and clearance shall be provided such that service and maintenance of each piece of equipment can readily be performed. Equipment layout diagrams shall be provided by Proposer and approved by the County, prior to installation.

3.4.1.2 Equipment Mounting

To maximize space utilization and facilitate equipment maintenance, Proposer shall install the fixed equipment in open 19-inch self-supporting racks. If the supplied equipment requires a cabinet for FCC certification, the equipment shall remain completely contained in a self-supporting indoor cabinet-style enclosure. Proposer is reminded to ensure that installation of all equipment is performed in accordance with local building codes.

3.4.2 Repeater Station

3.4.2.1 800 MHz Digital Trunked Repeater Station

This section defines the requirements for continuous-duty 800 MHz digital trunked repeater base stations for the digital operations.

- The station shall be equipped with full transmitter and receiver shielding.
- The station shall be microprocessor controlled so that frequencies, options and upgrades can be software programmed.
- The station must be capable of operating within an ambient temperature range of –30 to +60 degrees centigrade at a 90-percent relative humidity at 40 degrees centigrade.
- The repeater station shall be configured for operation within a simulcast radio system.
- The trunked repeater station and / or 800 MHz radio system shall be equipped with an automatic Morse Code identifier(s) and shall operate to meet FCC requirements during all modes of operation. The station identifier shall be programmable as to frequency and interval.

3.4.3 Antenna Multicoupling System

An antenna multicoupling system shall be provided at each RF site. The transmission line, combiners, multicouplers and accessories are specified herein. Proposer shall include with its response the antenna type, antenna heights (centerline AGL), antenna mount type, antenna side-arm type and length, and antenna orientations for all transmit and receive antennas.

3.4.3.1 Transmitter Combiners

Factory-tuned transmitter combiners shall be supplied for combining transmitters at each trunked simulcast RF site. Each combiner shall be field expandable utilizing a “building block” design.

3.4.3.2 Antennas

800 MHz antennas shall be supplied with mounting brackets, mast and all other suitable mounting hardware for mounting on a communications tower in accordance with EIA/TIA 222F standards. Base-station antennas shall be high-quality, long-life and suitable for public safety applications. The antennas shall be commensurate with coverage requirements. All brackets, masts, clamps and hardware shall be of hot-dipped galvanized steel or a quality-grade stainless steel.

3.4.3.3 Transmission Lines

All 800 MHz transmit lines should be Andrew Model, LDF5-50A, LDF6-50A, or LDF7-50A jacketed foam Heliax™ or equivalent as required to meet coverage requirements. All lines should be installed with appropriate surge suppressors, grounding kits, hoisting grips, cable hangers and connectors. Jumpers and connectors shall be provided to connect all RF infrastructure to antennas.

3.4.4 System / Site Controller

The system / site controller shall perform the control and signaling functions for the 800 MHz trunked communications system. It shall be capable of operating over a temperature range of +10 to +40 degrees Celsius, from a nominal 120-VAC, 60-Hz power supply. The unit shall be mounted in a freestanding 19-inch rack frame or self-contained equipment cabinet, and shall be provided in a fault-tolerant configuration with duplicate components, including a backup power supply. All peripheral equipment that provides self-diagnostics and alarms shall be included. If not located at the prime site with a generator, an uninterruptible power supply shall provide four hours of backup power in the event AC power is lost.

The system / site controller shall be a computer / processor with software specifically designed for the proposed trunked radio system.

3.4.5 800 MHz Trunked Network Manager

The network manager shall perform the management and user interface functions for the 800 MHz trunked communications system. The unit shall be mounted in a standard 19-inch rack frame or self-contained equipment cabinet. All peripheral equipment that provides self-diagnostics and alarms shall be included. An

uninterruptible power supply shall provide four hours of backup power in the event AC power is lost.

3.4.6 Simulcast Equipment

As an alternate to the Simulcast Equipment listed in this specification, Proposer shall provide a description of their systems' simulcast operation as well as its' frequency/amplitude/phase control capability.

3.4.6.1 Simulcast Operation

To provide the required radio coverage, the communications system shall be configured with transmitter sites that shall operate in simulcast trunked and conventional modes. Simulcast specifically refers to the transmission of identical RF carrier signals from multiple, geographically separated sites at exactly the same time. This is especially important to ensure intelligible audio quality in overlap areas (areas where a field-unit radio is in range of more than one transmitter site).

This mode of operation requires highly specialized equipment to control transmitter frequency and synchronization throughout the simulcast system.

The trunking system communications paths via the digital microwave system shall be optimized for the most efficient use of the microwave channels. Simulcast-control equipment shall be located at the prime site.

3.4.6.2 Precision-Frequency Source

A precision-frequency source shall be redundant, and shall be provided at each simulcast site to stabilize frequency synthesizers in the 800 MHz trunked repeater stations, and to provide critical synchronization of simulcast transmission equipment. The primary precision-frequency source shall be an "off-the-air" GPS-frequency-locked-stable source, and the secondary precision-frequency source shall be an "atomic" type, rubidium or other frequency-locked-stable source. The redundant-frequency sources shall be capable of maintaining the proper frequency stability and synchronization of the system upon failure / loss of the primary GPS reference signal. The redundant-frequency source must be capable of maintaining the simulcast system without degradation for a period of at least 96 hours. Proposer shall describe in detail the operation of the proposed frequency source and its redundancy capabilities, and justify the technical

suitability of the source to meet simulcast system requirements during normal, abnormal or loss of GPS reference signal.

3.4.6.3 Amplitude and Phase-Delay Equalization Equipment

Amplitude and phase-delay equalization equipment shall be provided to minimize simulcast overlap distortion. Equipment shall be provided for each transmit channel, and shall have sufficient adjustment range to provide “over” and “under” adjustment of at least 10 percent of the range. The equipment may be an integral part of the microwave channel equipment, or it may be separate, standalone equipment mounted in separate equipment racks. The equipment must be installed in a way that affords ready access for servicing and adjustment. Amplitude and phase-delay equalization for all remote RF sites shall be capable of adjustment from one central location (prime site) without manual intervention at the remote sites.

3.4.6.4 Audio Distribution Equipment

Audio distribution equipment shall be provided as necessary to allow for proper distribution of audio signals to and from the multiple simulcast sites. The equipment shall be rack mounted in a way that affords ready access for servicing and adjustment.

3.4.7 Site Equipment

Successful Proposer shall include requested communication towers, shelters and equipment to accommodate infrastructure equipment at designated prime and proposed remote sites. It is the Successful Proposer’s responsibility to propose site layout, design and construction services for communications towers and shelters required to support their proposed system. If the County is able to find an existing tower structure instead of a planned new structure, Proposer will modify their proposal and/or contract appropriately.

Site design standards shall meet or exceed existing installation standards (i.e. Harris Site Grounding and Lightning Protection Guidelines AE/LZT 123 4618/1, Motorola R56 Standards and Guidelines for Communications Sites or equivalent). At a minimum, site equipment at new tower sites shall include towers, foundations, buildings, fencing, gravel, grounding, utilities, generators, ice bridges, lightning protection and lighting.

Successful Proposer shall provide Fulton County a specific quote to bring existing sites up to the current industry installation standards required for Proposers' warranty.

3.4.7.1 Communications Towers

The structure should be designed to meet minimum wind speed as defined by EIA/TIA standards for the Fulton County area. Ice loading shall be considered at ½ inch. All fabricated tower members shall be "hot dip" galvanized after fabrication per ASTM Standard A123. Hardware shall be galvanized per ASTM Standard A153 and B695. Other types of zinc coating are not acceptable.

The tower shall include all foundations, hardware and lights to meet FCC and FAA requirements. The following additional materials shall be provided with the tower structure and incorporated into the tower design as required by EIA/TIA 222F: climbing ladder, safety device, transmission line support ladders, antenna mounts as well as grounding materials. Tower designs should be stamped by a professional engineer that is registered in the State of Georgia and who is qualified to design communication towers and foundations. The tower should accommodate the County's proposed equipment and up to three future co-located PCS or cellular providers. Successful Proposer shall describe the design parameters of the proposed towers.

3.4.7.2 Equipment Shelter

Shelters should be specifically designed to house RF communications equipment providing a secure environment for the proposed equipment. The shelters should have enough space to accommodate the proposed equipment for the County and include 50 percent more space for future expansion. Shelters shall meet or exceed all local and state regulations and national codes. The shelter shall have a flat roof. The shelter shall be constructed of concrete, steel or other material that would supply the same integrity (fire, bullet and vandal resistant). The shelter shall be rated for 100 mph wind and include a ten (10) year warranty. The foundation for the shelter shall meet or exceed manufacturer's specifications and shall set on 4 concrete piers at a minimum.

3.4.7.2.1 Exterior

The exterior finish of the shelter shall be a stone aggregate, color to be reviewed and approved by the County. There shall be a 3' door (1.5 hour

fire rating and bullet resistant) that includes a deadbolt lock and hydraulic closure. Near the door shall be a 100-W high-pressure sodium light with photocell. A concrete pad shall be supplied at the entrance to the shelter. The minimum size of the pad shall be 3' 6" x 3' 6".

3.4.7.2.2 *Interior*

The interior shall be insulated with a minimum R-11 rating. The interior walls shall have an FRP (fiberglass reinforced plastic) finish. The floor shall be tiled with 1/8" thick vinyl composite tile (gray preferred). There shall be cable ladders to provide a continuous path to the cable/waveguide feed-thru plate. A fire extinguisher and first aid kit shall be supplied and mounted to the wall. Standard ceiling lighting with a wall switch located by the door shall be supplied. A 2' x 4' telephone board, at a minimum, shall be supplied on the wall above where the telephone conduits enter the shelter.

3.4.7.2.3 *Electrical*

The shelter shall contain an electrical system suitable for servicing the current and the proposed equipment plus a 50 percent increase in load. A surge arrestor should be included. The electrical system shall be configured for the back-up UPS proposed by the Successful Proposer. There shall be (1) dedicated 20-amp breaker for each duplex outlet. The AC units, lighting and other electrical components for the shelter shall be on unprotected power. There shall be standard unprotected duplex outlets supplied on each wall. All electrical work shall conform to the most recent National Electric Code (NEC 2004 or later).

3.4.7.2.4 *Entry Ports*

Entry ports shall be provided for the following:

Waveguide/cable entry plate – The plate shall have 4" ports. It shall be located so as to allow the transmission lines to exit the building and continue along on the cable bridge to the antenna support structure.

Electric and telephone – There shall be floor openings supplied for the entrance of the electrical and telephone conduits.

Transmission-line surge protector ground cables – A non-conductive port shall be provided below the waveguide entry plate to facilitate the lightning surge-protection ground wires to be connected to the external ground bar.

3.4.7.2.5 *Grounding*

Provide for a grounding system inside the shelter that complies with the NEC 2004 (or equivalent) specifications. This shall include a halo ground system. There shall be drops for the following points/equipment at a minimum:

- Cable ladders
- Telephone backboard (connected to punch blocks by others)
- Electrical panels
- Waveguide entry plate
- AC unit(s)
- UPS
- External ground ring

A ground bar shall be supplied on the exterior of the shelter and located under the waveguide entry plate.

3.4.7.2.6 *Air Conditioning*

Redundant air conditioners with lead/lag controller shall be provided. Wall air conditioners shall be provided to regulate the internal temperature of the building. They shall be located on one wall of the building. A heat/cool thermostat shall be provided to control the temperature in the shelter.

3.4.7.2.7 Alarms

The shelter shall be equipped (at a minimum) with a smoke alarm, low-temperature alarm, high-temperature alarm and door-open alarm. These alarms shall terminate on a panel near or on the telephone backboard. When an alarm is triggered, it shall provide a form C dry closure.

3.4.7.3 Power Backup

Successful Proposer shall include generators and fuel tanks at each site that are capable of maintaining power to the site for 72 hours upon commercial power failure. In addition, redundant site Uninterruptible Power Supplies (UPS) shall be provided that can maintain the operation of the site at full load for 30 minutes until the generator comes on line. The UPS should be auto-switch type with make-before-break switching.

3.4.8 Equipment Surge Protection Devices

3.4.8.1 Control and Power Line Surge Devices

All communications equipment shall be furnished with non-load-bearing (voltage sensitive) power line and control line (if leased of outside lines) transient and surge protection devices. All low voltage wires and any lines that connect to any RF equipment must have Ferrite beads. In addition, all telephone lines must have surge protection and spark-gap connectors. All T1's not in the microwave system shall have T1 surge protection.

3.4.8.2 Coaxial Transmission Line Surge Devices

Coaxial surge protection equipment for all Proposer-furnished coaxial transmission lines entering the equipment building shall be supplied. The protectors shall incorporate bulkhead mounting, and shall be PolyPhaser Corporation series or equivalent.

3.4.9 Balance of 800 MHz Product Line Discount

Successful Proposer shall provide a Balance of Product Line discount for other products that are compatible with the proposed 800 MHz system.

For evaluation purposes, the discount levels shall be categorized as follows:

- Base stations, including firmware upgrades, options and accessories.
- Base-station antennas and transmission-line products.
- Microwave radios, multiplex, including options and accessories.
- Microwave antennas, waveguide, including options and accessories.
- Stationary storage batteries and chargers, including options and accessories.
- Network and system management software and hardware, including options and accessories.
- Test equipment, tools, software and programming devices.

The discount levels shall remain in effect for one year beyond system acceptance. Increases or decreases made in subsequent years shall be at the same percentage

rate as Proposer's GSA contract changes in effect for that year, for a total period of five years beyond system acceptance.

Fulton County and its' municipalities will have the option of purchasing items from Proposer at these rates.

3.4.10 Logging Recorder Output

Successful Proposer shall provide equipment to connect digital trunked and conventional resources to Fulton County's logging recorder. The communication system shall be provided with logging recorder audio outputs for monitoring dispatcher / radio traffic on a conventional radio-channel / trunked-user-group basis and on an operator-position basis. Channel / user group audio shall consist of transmit and receive audio for a particular radio channel / user group irrespective of selected channel status. Operator position audio shall consist of the operator's transmit audio and selected receive audio. The recorded audio outputs shall be free of any control and function tone signals. A minimum of 60 trunked user group audio outputs shall be provided. Proposer shall propose optional incremental expansion of recorder audio outputs. Proposer shall be responsible for this interface connection. Equipment must be compatible with NICE WorldNet logging recorders.

3.4.11 Digital Microwave Network

The requirements stated herein represent a functional specification for a new digital microwave communications network to support the following:

- The upgrade of the 800 MHz trunked simulcast radio system as specified herein.
- System maintenance circuits.

- The existing microwave network will remain in place for two to three years, to accommodate the County's 800 MHz analog to digital system transition.

Successful Proposer is required to design the digital microwave system with sufficient capacity to accommodate the requirements of the aforementioned communications systems. Any new microwave system, required to support the migration to a new 800 MHz system, should have the capacity to accommodate a minimum of fifty percent 800 MHz RF system growth beyond the stated requirements. Successful Proposer shall be responsible for delivery of the microwave system and installation,

optimization, and performance verification of the complete network. Wherever feasible, a loop design is preferred. System shall utilize existing and proposed microwave sites.

3.4.11.1 Microwave Network Configuration

Successful Proposer shall propose a cost-effective digital microwave system maximizing network reliability and availability. Digital facilities provide stable, reliable and predictable transmission routes that greatly simplify simulcast optimization and maintenance. Monitored hot standby radios shall be required for spur or non-loop paths. A space-diversity-type system shall be provided.

3.4.11.2 Frequencies

The RF paths determined for the digital microwave network shall utilize Federal Communications Commission (FCC) Part 94 frequencies assigned for full-period service. Frequencies in the 6 GHz or 10 GHz band are preferred to be utilized in the design of the digital microwave paths. To the greatest extent possible, consideration shall be given to minimizing differences in product lines and types.

Applications for frequency coordination and FCC licensing for the microwave radio paths shall be prepared and filed by Proposer. The results of the required frequency engineering analysis and the applications for FCC authorization shall be transmitted to the County for review prior to filing with the FCC. Proposer shall be responsible for the cost of microwave frequency coordination.

3.4.11.3 Performance Objectives

The digital microwave paths shall be designed for an annual one-way, per-path availability of 99.999 percent for 10^{-6} BER.

3.4.11.4 Service Channel

Order-wire communications shall be designed into the microwave network for all stations. Digital service channel equipment shall provide for party line telephone and data communications service at each site, and shall include the required voice-and-data bridging networks, switches and circuits. Communications shall occur on a party-line basis.

3.4.11.5 Network Monitoring and Control System

A microwave-integrated network fault-management-and-control system shall be provided to efficiently manage the operation of the entire radio / microwave network. The client / server-based system shall provide management of network components from a single workstation.

3.5 EQUIPMENT INSTALLATION REQUIREMENTS

3.5.1 General

Throughout the entire project the Successful Proposer shall designate a local project manager (PM) who has responsibility for delivering the project on schedule and within scope. The PM will be dedicated to the project and will work directly with the County's project manager.

The equipment installation required by this Scope of Work includes the following described items, as well as other attachments, hardware, software and procedures as may be required to ensure a completed installation that is in accordance with the standards of good engineering practice, all federal, state, and local regulations and codes, and all building codes and ordinances in effect at the sites delineated in this Scope of Work.

Specific installation practices set forth herein shall be followed unless the Successful Proposer feels they are not the best available practices or do not conform to code, in which case Proposer shall so state this in the written response.

Successful Proposer shall install the equipment and connect the units to commercial / emergency AC power and uninterruptible power sources. All wiring is to be installed in appropriate conduit.

Proposal prices shall include installation hardware, brackets, braces, fasteners of all kinds, wiring, ancillary devices, and procedures and services required to install and / or interface components to provide a complete operating system, which fulfills the requirements of this Scope of Work.

Successful Proposer is required to adhere to FCC rules in all matters pertaining to the work.

The installation work shall be approved by the County prior to commencement of a particular phase of work on a site-by-site basis. Successful Proposer shall

provide descriptions and layout drawings showing the proposed installations at each site at least 30 days prior to beginning work at the site. No work shall commence without written approval from the County.

Rack mounting shall be accomplished by a combination of floor and top mounting. Successful Proposer shall propose the recommended method and provide an option for any other recommended method. The County shall select the preferred method prior to contract award. Standard rack height shall be 84 inches in height.

Successful Proposer shall be responsible for delivering, storing, placing, handling and disposition of materials. All aspects of the installation shall be planned and executed in a professional manner.

Access to the sites shall require prior coordination with the Fulton County project manager.

3.5.1.1 System Staging

Successful Proposer shall stage all fixed equipment. The equipment for each site shall be made operational and shall be factory tested prior to installation in the field. The County, at its option, shall supply representatives to witness the staging and testing of the equipment. All equipment must be functional within the staged system prior to delivery acceptance.

3.5.2 Cutover Plan

Successful Proposer is to describe a cutover plan in the response. This plan shall include a chronological chart (Gantt-type format) with the tasks to be accomplished and the time for achievement of each task shown. A smooth operational transition from the existing systems to the new trunked radio system, new high performance data system and digital microwave system is the goal.

The existing communications systems shall remain operational during the cutover phase. Successful Proposer shall provide a phased implementation plan that will ensure that no current dispatch function is negatively impacted or impaired during system cutover to the new communications system.

3.5.3 Grounding

All equipment that can be electrically grounded without impairing performance shall be grounded. This shall include all metal conduit trays, racks, chassis, shelves, antennas and transmission lines in accordance with this Scope of Work.

All grounding shall be done in accordance with the National Electric Code and the National Electric Safety Code.

3.5.4 Radio System Installation

3.5.4.1 Main Distribution Frame

Successful Proposer shall supply and mount a Main Distribution Frame (MDF) for interconnection of all audio, control, microwave and telephone circuits. The MDF shall consist of a plywood backboard, painted with flame retardant paint and mounted in each equipment room at each site, space permitting. Otherwise, the MDF may be rack-mounted or frame-mounted, but cable lengths must be adequate to permit wall mounting in the future, should space become available. Industry Type 110 connecting blocks, or equivalent, shall be mounted on the board, rack or frame to facilitate interconnection of equipment. All connecting blocks shall be appropriately labeled for each circuit connected.

3.5.4.2 Repeater Stations

The repeater stations shall be placed to provide reasonable access for servicing and maintenance, to ensure proper cooling, and to facilitate installation and servicing requirements.

3.5.5 Microwave System Installation

3.5.5.1 General

The microwave system installation shall include all of the equipment formally specified for the new digital microwave system, plus all other hardware, appliances and procedures required for a complete operating system. The microwave installation requirements shall be in addition to the other applicable requirements stated herein.

3.5.5.2 Equipment Installation

The microwave-radio equipment shall be installed in accordance with the technical parameters of the County's FCC license authorizations and all applicable requirements of Part 94 of FCC Rules and Regulations.

Successful Proposer shall furnish and install the necessary wiring, cabling and conduits necessary for connection of the microwave station equipment to AC and DC power and ground. Equipment racks shall be firmly bolted in place.

Successful Proposer shall align and optimize all electronic equipment.

3.5.6 Installation Coordination

Successful Proposer shall carefully coordinate all phases of the work with the County to minimize equipment downtime. The coordination efforts shall be between Proposer, the subcontractor, the County, the existing equipment maintenance shop and the telephone company. Conflict resolution shall be at the sole discretion of the County.

3.5.7 Existing Equipment Integration

Proposer shall be responsible for integrating all County-supplied equipment, including recording equipment, CAD hardware, etc., to provide a completely functional voice and data communications system.

3.6 PERFORMANCE VERIFICATION

3.6.1 General

System performance shall be verified in four phases:

Phase I. Technical Specification Compliance.

Phase II Equipment Function Operational Compliance.

Phase III. RF Coverage Compliance.

Phase IV. System Performance Period Compliance.

Phases I and II shall be satisfactorily complete before Phase III begins. Phase III shall be satisfactorily completed before Phase IV begins.

Successful Proposer shall provide all necessary technical personnel and test equipment to conduct the tests. Proposer shall coordinate with the County as to scheduling of the tests, and provide at least three weeks' notice prior to performing the tests.

It is recognized that a variety of testing procedures and equipment may be utilized to verify a particular specification in Phases I and II. Therefore, Successful Proposer shall be afforded latitude in Phases I and II provided the methods proposed are per the EIA / TIA testing methods, the manufacturer's testing procedures and acceptable to the County. All test results shall be recorded in a standardized format to be determined by the Successful Proposer. Each data sheet shall be signed by the Proposer and the County's representative. The format to be used for recording of test program data shall be submitted to the County for approval 30 days prior to testing.

3.6.2 System Acceptance Test Plan

A System Acceptance Test Plan (SATP) shall be submitted with the response for both the voice and data systems. These plans shall form the basis for a mutually-agreed-upon SATP between the County and Proposer for each technology.

Factory Acceptance Test (FAT) plans are not acceptable submittals. The SATP shall, as closely as possible, resemble the "real life" application of the equipment and shall include, but not be limited to:

Phase I: Technical Specification Compliance:

- Fixed-end equipment.
- Field equipment.

Phase II: Equipment Function Operational Compliance:

- Trunked radio system.
- Consoles / control stations.
- Field equipment.

Phase III: RF Coverage Compliance:

In addition to Successful Proposer-provided equipment, all existing County equipment to be modified and / or relocated shall be tested or demonstrated to be fully functional, both before and after modification and / or relocation.

Phase IV: System Performance Period Compliance.

3.6.3 Radio System

3.6.3.1 Phase I – Technical Specification Compliance

Following equipment installation, the following minimum tests shall be performed for each piece of equipment (including any modified and / or relocated existing equipment). Any equipment not meeting the requirements of this Scope of Work shall be repaired or replaced by Proposer without additional cost to the County. These tests shall be:

Base stations:

- Transmit frequency.
- Transmitter deviation normal speech, signaling and maximum.
- Forward and reflected power at transmitter output.
- Forward and reflected power at transmitter combiner output.
- Insertion loss of transmitter combiner.
- Receiver frequency.
- Receiver 12 dB SINAD sensitivity.
- Receiver multicoupler and tower-top amplifier gain / loss.

Antenna and transmission line tests:

All antennas and transmission lines shall be tested from the interior of the equipment buildings using Time Domain Reflectometry (TDR), and a TDR unit capable of producing a hard copy of the results. This method of measurement shall indicate any impedance discontinuities in the transmission line / antenna system. Additionally, swept return loss / VSWR measurements shall be made over the operating band of the antenna system using a Wiltron Site Master network analyzer at the input connector of the transmission line.

Successful Proposer shall provide suitable documentation of the test results. A printed copy of the results shall be provided to the County.

3.6.3.2 Phase II – Equipment Operational Functional Compliance

All equipment functions shall be demonstrated for all equipment specified in this document.

3.6.4 Phase III – RF Coverage Compliance Tests

Coverage tests shall be performed as specified in **Section 3.3.6**.

3.6.5 30-Day System Performance Period

At the successful completion of the system / equipment tests and the RF coverage tests, and after the required system loading is attained, Successful Proposer shall complete a consecutive, 30-day system performance period without a major failure.

3.6.6 Final System Acceptance

At the successful completion of all tests delineated in this section, and the successful completion of the 30-day system performance period, the systems will be accepted, upon which, the County shall provide Proposer-written confirmation that Final System Acceptance has been achieved. The warranty period shall commence upon the County's written confirmation of Final System Acceptance.

3.6.7 Project Schedule

Successful Proposer shall maintain a project schedule for the duration of the project. If the schedule requires revision due to any delays, the schedule revision shall be presented to the County for approval. Project meetings shall be held at a Fulton County facility at least bi-weekly to update project schedules and discuss project issues.

3.7 TRAINING

A detailed plan for all training must be supplied by Successful Proposer and approved by the County and cities at least 60 days prior to the communications system installation.

3.7.1 Voice System Dispatcher and Field Radio Users Training

Concurrent with the installation and prior to the performance period of the communications systems, Proposer shall provide on-site orientation and training for the County's dispatch and field radio personnel as to all aspects of the operation and functioning of the new communications systems. Personnel shall be trained in all available routine features and functions, as well as in the following areas:

- The configuration of the new system and its operational modes as well as differences between the new system and the existing system.
- Operational theory of control consoles, base repeater, voting system, RF control stations, mobile and portable equipment as well as trunking, conventional and failure modes of operation.
- Hands-on familiarization with all communications control functions and equipment.
- System manager terminals and report generation.

The County and cities reserve the right to videotape all training at its expense to provide a permanent training record and system operations record. Successful Proposer shall provide all training materials and supplies. A copy of any and all training material shall become the property of the County and cities. The training sessions shall be scheduled at times and locations designated by the County and cities. The training may be required on a 24-hour basis without extra cost to the County and cities.

The County and cities will provide space where training can be conducted. Live equipment is to be used in a "hands-on" environment. All supporting equipment shall be supplied by Successful Proposer.

Successful Proposer shall specify the amount of classroom and hands-on training that will be required to train approximately (3500) County and city personnel in their proposal. Successful Proposer shall specify the time required to train the County's personnel within a time frame commensurate with system implementation.

Successful Proposer shall specify the number of training sessions required. Each class size shall be limited to a maximum of 25 personnel. This information shall be supplied with the training plan and must be approved by the County and cities.

3.8 TECHNOLOGY REFRESH, MAINTENANCE AND WARRANTY

As part of their proposal, the Successful Proposer shall offer both hardware and software refresh services, providing a description of refresh programs and schedules to ensure upgrades are timely and relevant.

Successful Proposer shall offer at least a one (1) year warranty on all systems and components. This warranty shall include parts and labor. Also, as part of their proposal, the Successful Proposer shall provide all maintenance services, including parts and labor for one (1) year. In addition, the Successful Proposer will give an optional proposal to provide maintenance services, including parts and labor, for years two (2) through ten (10).

3.8.1 Warranty Period Maintenance

3.8.1.1 General

The warranty and maintenance period shall begin on the date of final system acceptance. Successful Proposer shall provide the necessary labor, parts, supplies, procedures, transportation, test equipment and facilities to maintain the new Successful Proposer-provided equipment, firmware and software to the level of factory performance and within requirements contained herein within the warranty period. The maintenance shall cover preventive maintenance, repair due to normal usage and emergency maintenance.

3.8.1.2 Warranty Maintenance Contract Term

All maintenance services shall be provided as part of the communications system, without additional charge to the County, for the warranty period of at least twelve (12) months following the date of final system acceptance.

3.8.1.3 Warranty Maintenance Personnel

Successful Proposer shall provide competent, experienced and highly qualified personnel acceptable to the County to execute required maintenance tasks during the warranty period. All maintenance personnel shall be trained and experienced in standard communications industry practices. Personnel who perform maintenance on the system shall have completed all required manufacturer-approved training for that equipment. Said training, or appropriate refresher courses, shall have been completed

within the previous year, and evidence thereof shall be provided to the County.

3.8.1.4 Warranty Maintenance Response Time

Successful Proposer shall provide replacement parts and materials and qualified personnel to service the fixed equipment at the site of work within two hours after notification of equipment failure. Fixed equipment shall not be out of service in excess of 8 hours after notification of equipment failure. Non-fixed equipment (mobile and portable radios, etc.) shall be picked up locally by the Successful Proposer at locations designated by the County and delivered back to the point of pick-up once repaired. Eighty percent of the time, non-fixed equipment repair periods shall meet a three-day turn-around period. The 80 percent shall be calculated monthly. For each month that the Successful Proposer does not meet the 80 percent requirement the warranty period shall be extended one month.

The warranty period maintenance shall be on a working-hour basis as follows:

Fixed Equipment	Twenty-four hours per day, seven days per week.
Non-fixed Equipment	Nine hours per day, five days per (i.e., mobile, portable, etc.) week (0821 hrs to 1700 hrs).

3.8.1.5 Availability of Replacement Parts

Successful Proposer shall certify that a stock of replacement parts for each item included in the equipment response is maintained and that the Successful Proposer is capable of replacing such parts, assemblies, modules and devices for each item of equipment included in the purchase, as well as updating all appropriate software. Successful Proposer shall also certify that a stock of replacement parts for each critical component to be supplied as part of the communication system shall be immediately available at all times during the initial warranty period. These parts shall be either in the Successful Proposer's stock and available for timely transfer to the communications system site to meet maintenance criteria, or stored at the sites. In addition, the Successful Proposer shall certify that all replacement parts shall remain available to the County for a period of five years following final system acceptance. Prior to final system acceptance, the Successful Proposer shall provide the County with detailed component

lists and item cost of all replacement parts for the communications system at each location, including catalog numbers and sources of supply.

3.8.1.6 System Warranty Maintenance Test Equipment

Successful Proposer's service shop shall provide all test equipment and parts required to support the County's maintenance requirements.

3.9 TECHNICAL PROPOSAL FORMAT AND CONTENT

The Technical Proposal shall include the appropriate and requested information in sufficient detail to demonstrate the Proposer's knowledge, skills and abilities to provide requested services.

The Technical Proposal shall be arranged and include content as described below:

Section 1 - Executive Summary

The executive summary shall include the following information:

- Provide the legal name of the entity responding to this proposal.
- Provide the business type of the entity responding to this proposal (i.e. Joint Venture, Partnership, etc).
- Include a brief statement of approach to the work, understanding of the project's goals and objectives and demonstrated understanding of the project's potential problems and concerns.

Section 2 – Project Plan

1. Name, address and telephone number of one (1) individual to whom all future correspondence and/or communications will be directed.
2. The Project Plan must address the management approach in completing the work identified in Section 3.3 Scope of Work.
3. Proposers must provide a project plan in their proposal which meets the minimum milestones or is otherwise realistic in addressing the functional two-phase requirements for implementation of the new APCO P25 radio and dispatch communication system. The project will occur in two (2) phases:

Phase 1: Upgrade and cutover of the existing nine site infrastructure to P25
Phase 2: Cutover of P25 infrastructure at eight new sites and final acceptance

Minimum Milestones	
Completion Month	Phase 1 Completion Deliverable
0	Contract Executed
1	Design Review
6	Equipment Manufacturing
7	Staging
9	Existing Site Modifications
10	Infrastructure Installation
10	Subscriber Upgrades
10	Console Upgrades
11	Training
11	Testing and Optimization
12	Cutover
12	Phase 1 Acceptance
Completion Month	Phase 2 Completion Deliverable
18	New site Construction Completed
20	Infrastructure Installation
21	Testing, Optimization
22	Cutover
24	Final System Acceptance

NOTE: The size and scope of this project is subject to design changes if the county enters into partnerships with other radio system owners. Such partnerships would result in scope changes and affect the deliverables and minimum milestones as listed.

4. The plan must prevent disruption of communication on the existing analog simulcast radio network and provide a smooth transition to the new Project-25 digital network.
5. It must address the sequence of events for the installation of the new network showing any effect the different stages of installation may have on the existing systems.
6. Any relocation or modification to existing equipment must also be addressed.

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7. At a minimum, the plan must identify all major tasks, when the major tasks will start and finish, planned reviews of work associated with each major task, project completion date, and any other information that will assist in the planning and tracking this project successfully. Describe methodologies including best practices and benchmarks to be used.

Section 3 – Qualifications of Key Personnel

1. Provide resumes for each of the key personnel proposed for this project with specific emphasis on the Project Manager.
2. All proposed key personnel must have at least a minimum of three (3) years of work experience in APCO P25 800 MHz Simulcast Radio Systems.
3. The Project Manager must have a minimum of five (5) years of experience in managing APCO P25 800 MHz Simulcast Radio System projects.
4. Each resume should be limited to no more than three (3) pages per person and be organized according to the following:
 - Name and Title
 - Professional Background
 - Current and Past Relevant Work Experience
 - Include two (2) references for each key personnel member on similar projects.

Section 4 – Relevant Project Experience

Identify three (3) projects where the Proposer has installed an APCO P25 Phase 2 TDMA 800 MHz Simulcast Radio System. Limit your response to one (1) page per project; please provide the following information for each project:

- The name of the project, the owner, year performed and the project location.
- A description of the project.
- A reference, including a contact name, addresses and phone number. This reference should be the owner's staff member who was in charge of the project for the owner.
- Bid Award/Initial Contract amount; Final Project Cost?
- Was this project a new system install or an upgrade of an existing system?
- Provide the date of the initial contract and the date of final system acceptance.

Section 5 – Availability of Key Personnel

- (1) Percentage of time key personnel will spend on this project
- (2) Current workload of key personnel
- (3) Percentage of time key personnel will be present onsite

Section 6 – Local Preference

Local Preference is given to businesses that have a business location within the geographic boundaries of Fulton County. The term business location means that the business has a staffed, fixed, physical place of business located within Fulton County and has had the same for at least one (1) year prior to the date of the business' submission of its proposal or bid, as applicable and has had held a valid business license from Fulton County or a city located within Fulton County for the business at a fixed, physical, place of business, for at least one (1) year prior to the date of the business' submission of its proposal or bid as applicable.

In order to receive the Local Preference points of ten (10) points the Proposer must meet one (1) of the following criteria, provide supporting documentation as required and certify under oath that it is eligible to receive the local preference points by signing and submitting Form H, Local Preference Affidavit located in Section 5 of this RFP.

The Proposer must indicate which one (1) of the following criteria they will utilize in order to receive local preference:

1. Business having a business location within the geographic boundaries of Fulton County.

The following supporting documentation must be provided:

- Copy of occupational tax certificate (business license) form Fulton County or a city located within Fulton County, or;
- Copy of a lease or rental agreement, or;
- Proof of ownership interest in a location within the geographical boundaries of Fulton County.

1. Businesses where at least fifty-one percent (51%) of the owners of the business are residents of Fulton County but the business is located outside of Fulton County.

The following supporting documentation must be provided:

- Provide the residential address of the business owner(s).
2. Businesses where at least fifty-one percent (51%) of the employees of the business are residents of Fulton County but the business is located outside of Fulton County.

The following supporting documentation must be provided:

- Provide a list of all employees name and address.

Failure to provide the required supporting documentation with your proposal submittal shall result in your firm receiving a “0” (zero) for Local Preference. In the event the affidavit or other declaration under oath is determined to be false, such business shall be deemed “non-responsive” and shall not be considered for award of the applicable contract.

Section 7- Service Disabled Veterans Preference

Service Disabled Veterans Business Enterprise Preference is given to businesses that are independent and continuing operations for profit, performing commercially useful functions, and which are owned and controlled by one or more individuals who are disabled as a result of military service who have been honorably discharged, designated as such by the United States Department of Veterans Affairs, and is located within the geographic boundaries of Fulton County. The Service Disabled Veteran Business Enterprise (“SDVBE”) must be certified as such by the County’s Office of Contract Compliance.

In order to receive the SDVBE Preference points of two (2) points the Proposer must submit a copy of their certification letter from the Office of Contract Compliance and certify under oath that it is eligible to receive the SDVBE preference points by signing and submitting Form I, Service Disabled Veterans Preference Affidavit located in Section 5 of this RFP.

Section 8 – Cost

The respondent with the lowest total cost will receive the full 18 points. For respondents with the second, third, fourth, etc., their total costs will be divided into the lowest cost and multiplied by 18 the total points allowed for cost.

The County has established the following formula to evaluate cost proposals for Request for Proposals (RFP):

Lowest cost submitted

Each successive cost \times Points allocated for cost in RFP = Cost proposal score

The County shall determine responsibility based on the following criteria:

Section 9 – Proposer Financial Information

It is the policy of the County to conduct a review of a firm’s financial responsibility in order to determine the firm’s capability to successfully perform the work.

If submitting as a Joint Venture, Partnership, Limited Liability Corporation or Limited Liability Partnership, the financials must be submitted for each entity that comprises the prime contractor.

The following documentation is required in order for the County to evaluate financial responsibility:

- (1) Provide audited financial statements for the last three (3) years, including income statements, balance sheets, and any changes in financial position.
- (2) The latest quarterly financial report and a description of any material changes in financial position since the last audited financial statement.
- (3) Proposer’s most recent Dun & Bradstreet, Value Line Reports or other credit ratings/report.
- (4) Identify any evidence of access to a line or letter of credit.

Section 10 – Disclosure Form and Questionnaire

It is the policy of Fulton County to review the history of litigation of each Proposer that includes bankruptcy history, insolvency history, civil and criminal proceedings, judgments and termination for cause in order to determine whether a firm’s business practices, legal practices and overall reputation in the industry is one that would be acceptable to perform work for Fulton County. The Disclosure Form and Questionnaire is provided in Section 5, Proposal Forms, Form D.

Section 11 – Past Performance

The references provided for Section 4, Relevant Project Experience shall be checked regarding performance.

3.10 COST PROPOSAL FORMAT AND CONTENT

The Cost Proposal shall be provided in a **separate sealed envelope**. The Cost Proposal shall include current information and shall be arranged and include content as described below:

Section 1 - Introduction

The Proposer shall include an introduction which outlines the contents of the Cost Proposal.

Section 2 - Completed Cost Proposal Forms

The Proposer is required to complete **all** of the Cost Proposal Forms provided

SECTION 4 EVALUATION CRITERIA

4.1 PROPOSAL EVALUATION – SELECTION CRITERIA

The following criteria will be used to evaluate the proposals submitted in response to this RFP:

Evaluation Criteria	Weight
Project Plan/Approach to Work	25%
Qualifications of Key Personnel	15%
Relevant Project Experience	25%
Availability of Key Personnel	10%
Local Preference	5%
Service Disabled Veterans Preference	2%
Cost Proposal	18%
TOTAL POINTS	100%