

SARPY COUNTY, NEBRASKA

RADIO SYSTEM UPGRADE REVIEW



tusa | Consulting Services
Raising the Bar in Radio Communications

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INTRODUCTION

Sarpy County, Nebraska, (the County) is part of the Omaha-Council Bluffs Metropolitan Statistical Area. The County covers 241 square miles and has a population of 169,331. Offutt Air Force Base is located within the County.

The County operates a consolidated 9-1-1 Public Safety Answering Point (PSAP) that serves the County Sheriff, Bellevue, La Vista and Papillion Police Departments, Bellevue and Papillion paid Fire Departments, and Gretna and Springfield volunteer Fire Departments.

The County's current radio communications system is comprised of three (3) 10-channel Motorola Smartzone simulcast sites. The County upgraded the system controller (7.11 Core) to the Motorola "Smart X" platform and replaced the radio dispatch consoles with Motorola MCC7500 consoles. Police radios use the IMBE vocoder for digital "encryption". Base station RF (radio frequency) equipment is the Motorola Quantar series. There are approximately 1,500 user radios on the system.

Sarpy County's Communications Department has been working with Motorola to develop a plan to finalize the radio system's upgrade by transitioning the RF base station infrastructure to the APCO P25 digital standard ("P25") and to simultaneously improve coverage across the County. As an option, the current NICE logging & recording system, the 800 MHz mutual aid network, and the 6-site UHF simulcast fire paging systems would also be upgraded.

Tusa Consulting Services (TCS) has been retained by the County to:

1. Conduct an existing conditions analysis
 - Inspect the current system
 - Verify equipment is at end of life
2. Evaluate the Motorola P25 Proposal
 - Provide a comprehensive review of coverage maps
 - Assess the lifecycle costs of the proposal
 - Review and provide recommendations for the final Motorola contract

➤ *The following report addresses the above tasks.*

1. EXISTING SYSTEM CONDITION ANALYSIS

a. Inspect the Current System

On November 9, 2015, TCS inspected the Papillion and Bellevue base stations sites. (The third site, KPTM, and the current Bellevue site will not be used in the proposed configuration.) The sites are in very good physical condition. All equipment is clean and all connections are neatly labeled. The sites lacked the typical “haywire” that is seen in many systems that are maintained by third-party contractors. It was evident from the condition of the sites that the County’s Communications group takes a great deal of pride in maintaining the radio system.

One important “feature” regarding the sites was that equipment configurations and connections are made in such a manner as to be capable of modifications without major rework. TCS was advised that all connections are thoroughly documented; this will contribute to a much more manageable transition to the new base station and controller equipment.

The Papillion site will be reused in the new system design. The new equipment will be installed in the shelter at the base of the monopole, allowing the equipment Courthouse basement to continue to operate. Antennas will be reconfigured.

On November 10, 2015, TCS visited the County PSAP and monitored operations. The dispatch operators handle all incoming 911 calls and dispatch all agencies within the County, including the Sheriff, Police, Fire and EMS. Transmissions from the field (Sheriff’s deputies) were noticeably noisy in many cases. When the dispatcher switched to a digital channel to pass confidential information, the noise went away. It is expected that the P25 system with the AMBE+ vocoder will sound much better than the IMBE-based audio, and definitely better than the noisy analog channels.

User Input

An important part of any system assessment is to interview the people who use the radio system on a regular basis. They are most able to provide system performance feedback.

On November 20, 2015, TCS met with representatives of the following agencies:

- Lt. Steve Young, Papillion PD
- Capt. Rolly Yost, Sheriff’s Office
- Mark Trapp, Sheriff’s Office
- Deputy Chief Jeff Jones, Papillion FD
- Chief Mark Elbert, Bellevue PD
- Chief Robert Lausten, La Vista PD (telephone interview 12/3)
- Assistant Chief Steven Betts, Bellevue FD (Questionnaire input 12/3)

- Chief Rod Buethe – Gretna FD (also covered Springfield FD for Chief Lutz) - telephone interview 12/17

The general consensus is that the system has performed well for many years. Specific issues reported are typical of legacy systems that were not designed with the portable user in mind.

Issues:

- Need for portable coverage in hospitals, schools, large buildings (such as Walmart)
- Improved radio features and capabilities (need for neighboring system to share talkgroups, routing of emergency alarms)
- Improved portable coverage in central/western portion of County
- Improved interoperability

2. Verify Equipment is at End of Life

The remaining end-of-life challenges are with the Smartnet/Smartzone Central Controller and the Motorola Quantar base stations at the tower sites. Motorola introduced a “bridge converter” in 2009 called “Smart X” that allows a Smartnet/Smartzone system to interface to a P25 platform and associated software. However, this does not eliminate the need for the Smartnet/Smartzone Central Controller that is no longer supported by Motorola.

New Quantar equipment orders were cut off in 2011. Motorola will make “...commercially reasonable efforts” to support the equipment for 7 years after the announcement (only 3 years left). Quantar power supplies are a major maintenance issue and parts are becoming difficult to find. Many Quantar users have resorted to finding spare parts on Ebay or purchasing used equipment as parts sources... not a good scenario for public safety radio systems.

In 2010 Motorola provided this advisory to its customers:

**Quantar Base Station / Quantar Receiver / ASTRO-TAC
Satellite Receiver (All Bands-UHF/VHF/800/900)
Intent to Cancel**

Product Information:

Quantar Platform Cancellation –All bands, system types, and options are impacted:

- T5365 or C99ED/001C (Quantar Base Station/Repeater)
This includes High Power Booster, SECURENET, and Data Base Station configurations
- T5367 (Quantar Receiver)

- T5589 (ASTRO-TAC Satellite Receiver)
- Software and Hardware Upgrades to existing units are NOT being cancelled at this time

Replacement Product:

The Quantar Base station, Quantar Receiver, and ASTRO-TAC Satellite Receiver will be replaced by the G-Series Base Station and Receiver. The MTR3000 station is also an alternative solution for certain Analog Conventional, and Digital (MOTOTRBO) Trunking applications.

Regional Impact:

The Quantar Base station/receiver and ASTRO-TAC Satellite Receiver (all bands-UHF/VHF/800MHz/900MHz) cancellation is effective in ALL regions (North America, Latin America, Asia Pacific, Europe, Middle East, Africa, and Israel) where product models and corresponding hardware options and accessories are sold.

Service Impact: Commercially reasonable efforts will be made to provide aftermarket product support via the Customer Fulfilment Center for up to 7 years.

TCS was recently advised Quantar support might be extended through 2020.

The proposed new Motorola GTR8000 base stations support Linear Simulcast using CQPSK modulation, and APCO 25 Phase II (with receiver diversity), which the Quantars are not capable of. With the newer radios having much more software upgrade flexibility, the software-defined GTR's are expected to have an extended life cycle.

The XTS/XTL 1500/2500/3000 series of portable and mobile radios will be reaching end-of-life in the not-too-distant future. These radios are not capable of P25 Phase II operation. The County has been phasing out this equipment.

3. EVALUATE THE MOTOROLA P25 PROPOSAL

In the revised November 11, 2015 proposal, Motorola offers to provide:

1. Equipment, licenses, and Professional Services for a Six (6) RF site design
2. Equipment, licenses, and Professional Services for a fault-tolerant redundant Microwave backhaul ring connecting the six (6) sites and a Springfield spur
3. Expand the usable Talk Paths from 9 to 13 [Phase II P25]

a. Provide a comprehensive review of coverage maps

Requirement: Consultant will evaluate Motorola's recommended tower sites compared to other viable radio sites in the County in regards to coverage and cost efficiency.

The current three-site Smartzone trunked radio system has served the County's needs well since 1994. However, public safety users now expect their portable radios to work everywhere (like their cellphones) and that places demands upon the system's infrastructure design. Additionally, the County has experienced continued population growth, especially in the central/western parts of the County. Prior to this, most of the population density was in the central/eastern part of the County where two of the three tower sites are located. The single western site, on the KPTM tower south of Gretna, cannot provide the signal density needed to support in-building coverage.

The County also needs to be able to interoperate with neighboring agencies, many of which have transitioned to P25 systems.

As the County transitions to the public safety interoperability-standard APCO 25 digital system architecture, the County is placing an emphasis on in-building performance improvement. The public safety standard for P25 system designs is the "portable-on-hip". Depending upon the geography and demographics, portable-on-hip designs can be based upon "on-street" coverage, "inside a residential structure" coverage, or a range of building types (residences, strip malls, schools, hospitals, etc.). Each type of building inserts a "loss" into the coverage calculations due to the density of the building's construction. As the location of tower sites is considered, the designer has to keep those building losses in mind. Typical design losses are: 6 dB for residential, 12 dB for commercial buildings, and 18 dB for schools, industrial structures, and so on. When considering a design that accommodates specific buildings, there is always a tradeoff: not every building can have a tower outside the door. Other solutions can be designed into the overall network architecture – passive repeaters, bi-directional amplifiers (BDA's), and/or distributed antenna systems (DAS). Sarpy County has provided Motorola with several specific targeted buildings and the design is expected to address in-building coverage for those buildings. A good example is the County office complex in Papillion; the on-site tower provides excellent coverage throughout the facility.

The coverage maps provided by Motorola in their proposals are based upon providing a signal that delivers a less-than 5% Bit Error Rate (BER) to a portable radio. Since digital portable radios are "modems" that convert the digital radio signal to voice, they require a low bit error so that the voice signal can be accurately "decoded". TCS typically assesses coverage by looking at both BER and raw signal levels. By focusing on BER only, the analysis is too "broad brush". TCS also wants to assess coverage outside of the County.

Sarpy County, NE – Radio System Upgrade Review

The following is an assessment of talk-out coverage using the worst-case Motorola 18 dB maps and the TCS maps plotted at signal levels of -70, -80, -90, and -100 dB.

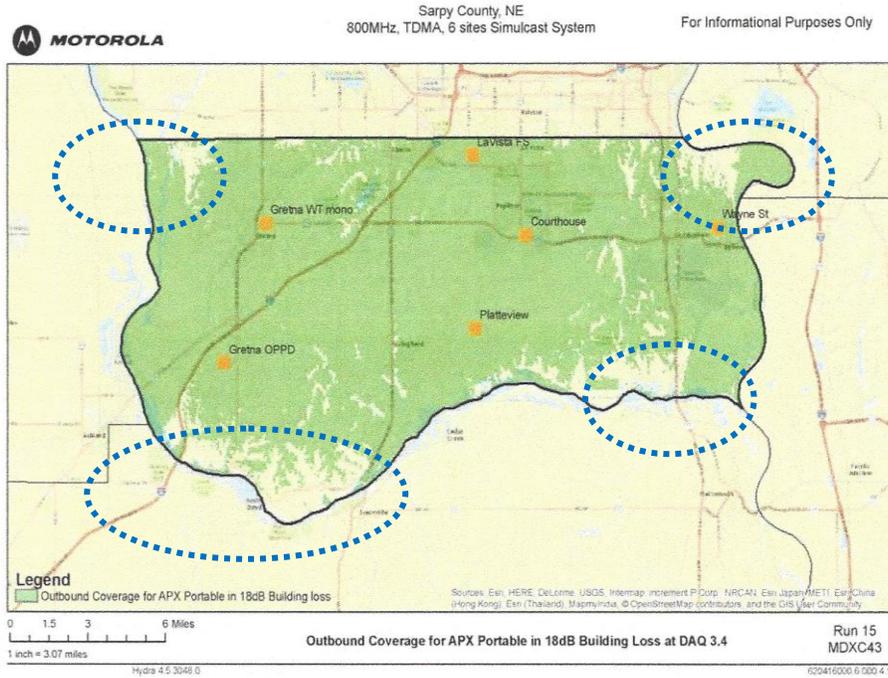
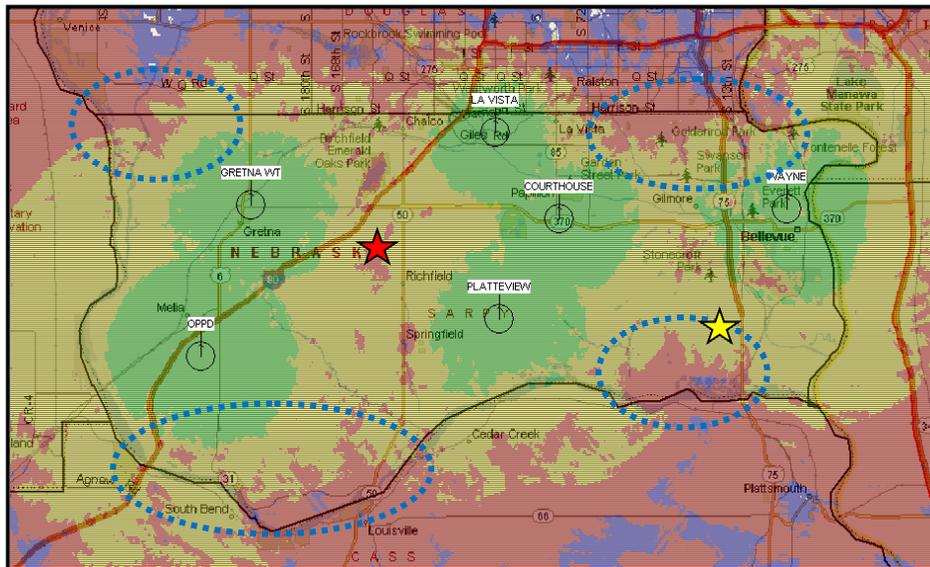


Figure 2-7: Portable In Building Coverage–18 dB Attenuation

BLUE circles – greater than 5% Bit Error Rate – 18 dB buildings



Green= -70 dBm - YELLOW= -80 dBm - RED= -90 dBm - BLUE= -100 dBm

★ ★ = Areas of additional analysis

The dotted BLUE circles highlight the areas where in-building portable radio coverage could be impacted. It can be seen that the Motorola and TCS maps generally complement each other.

Proposed System Design Observations

An initial, starting-from-scratch design effort would place additional sites in the southeast corner of the County in the vicinity of the intersection of 75 and 34, and south of 370 and just west of 50 in the west central part of the County (as shown by the YELLOW stars on the map above). This initial design process strictly looks at coverage versus budget impact. A designer then takes a look at the service area's population density to determine what sites are not needed based upon in-building penetration needs.

Additional information:

- ★ The population in the southeast is light and there are few, if any, buildings that would fit into the 18 dB loss category. Predicted signal strengths indicate a portable would work inside of a residential structure in this area.
- ★ The overlap from multiple sites in the 370/50 area should provide very good signal performance. Simulcast P25 sites actually provide a “reinforced” signal in overlapped areas.

Proposed P25 Site Locations

The proposed P25 design will retain one (1) of the three (3) existing sites, and add five (5) new sites. The following is a review of each site's capabilities:

1. **Wayne Street** (Bellevue) – this new system site (existing tower) will provide improved coverage to Bellevue, addressing coverage issues reported by the Fire Department.
2. **County Offices** (Papillion) – this existing site currently provides acceptable coverage in the center of the County and very good building penetration for the County offices. The monopole and equipment space are in good condition. It is expected that the P25 system will improve in-building coverage within the vicinity of this site.
3. **Platteview** – this will be a newly developed site (tower and shelter). The location will provide very good coverage to the central/south central part of the County.
4. **LaVista** – the County considered two candidates for this site designation. (1) An existing tower at the La Vista City Hall location would not support the

new antennas and microwave dishes; it would have to be replaced. (2) a new tower at the City-owned property at the new fire station is the preferred location since it will provide improved coverage to areas where coverage is an issue. A new sports complex is under consideration for the area which will be covered by this site.

5. **Gretna** – this site is proposed to be on an existing water tank. The site will provide coverage to Gretna (coverage in the schools is a current issue) and the northwest corner of the County. The County has not yet discussed the details of developing this site with Gretna. TCS was advised that the water tower does not have a suitable antenna mounting structure (known as a “candelabra”) on the top. This will be needed for the P25 antennas and the microwave dishes. Water tank installations typically require detailed architectural designs and an extensive review/approval process.
6. **OPPD Tower** – this site will provide very good coverage in the southwest corner of the County. This site is part of the ORION (Omaha Regional Interoperability Network) system and is a node for the regional 700 MHz HPD (High Performance Data) network. There is the potential that a fiber connection exists from this site to both Lincoln and the ORION offices in Omaha. This will be confirmed as the site acquisition process phase is initiated.

When assessing potential site candidates, it is important to factor in the needs of the microwave system as well as the P25 voice system. Tower height becomes more of a challenge when both systems have to be on the same tower. While there is a proliferation of cellular towers across the Country, it is very rare that one of these towers would be capable of accommodating the required antennas and dishes. And, lease costs for these towers are typically very high. Whenever possible, public safety organizations would rather develop their own sites; they can be designed to meet the specific requirements of the radio system and also provide a higher degree of site security. And the sites can be placed where needed. At the County’s option, the sites could support third-party antennas (cellular, etc.), for a fee.

Delivered Audio Quality

Digital radio system voice quality is subjectively measured by DAQ (Delivered Audio Quality). The range of DAQ is 1-5:

| | |
|-----|--|
| 1.0 | Unusable. Speech present but not understandable. |
| 2.0 | Speech understandable with considerable effort. Requires frequent repetition due to noise or distortion. |
| 3.0 | Speech understandable with slight effort. Requires occasional repetition due to noise or distortion. |
| 3.4 | Speech understandable without repetition. Some noise or distortion present. |
| 4.0 | Speech easily understandable. Little noise or distortion. |
| 5.0 | Perfect. No distortion or noise discernible. |

The DAQ level of 3.4 represents the “fine line” between a system that is over built (4.0) or underbuilt (3.0). By using 3.4 for a portable radio’s audio quality goal, mobiles typically would experience a 4.0 or better signal.

The TCS map shows there would be satisfactory portable-on-street coverage outside of the County borders; this helps in assessing the ability of the system to support mutual aid calls.

b. Assess the lifecycle costs of the proposal

Life-cycle cost analysis is used to determine the cost-effectiveness of available options.

The County has committed to modernize its radio communication network by upgrading Motorola’s network elements. Several steps have already been taken:

1. Transitioned to the Motorola “Smart X” system control platform which provides a cross-over capability between the legacy analog trunked network controller and a P25 infrastructure. Smart X allows for a smoother transition.
2. Replaced the manufacturer-discontinued CentraCom Gold Elite™ radio dispatch consoles with the Motorola IP-based MCC7500 console product.

The final step is to upgrade the RF infrastructure (the end-of-life Quantar base stations/repeaters at the tower sites). This will result in a fully-integrated, modernized P25 digital radio system.

Once the RF infrastructure is upgraded, these three (3) components will make up the overall “new” system:

1. MCC7500 Radio dispatch consoles
2. 7.16 Master Core
3. GTR8000 base stations/repeaters – APCO P25 Phase II

Motorola advertises that this infrastructure configuration will have long-term service capability due to its software-defined nature. The MCC7500 consoles, for example, are also being specified for the future “Long Term Evolution (LTE)” public safety broadband network (“FirstNET”). Since this planned future data-only network will operate in the 700 MHz band, the County’s proposed site configuration and microwave network will easily support a 700 MHz overlay.

Additional “life insurance” can be obtained by contracting for the Motorola “System Upgrade Assurance” (SUA) maintenance option which protects the system from any hardware obsolescence due to software upgrades. For example, the PC’s provided for the radio dispatch consoles might not be able to work when “Windows 15” comes along. Under the SUA program, those PC’s are replaced at no additional cost.

c. Review and provide recommendations for the final Motorola contract

TCS has had the opportunity to evaluate multiple RFP proposals from Motorola and to participate in contract negotiations in support of many Motorola P25 projects. We are very familiar with their contract offerings.

The following is a summary of TCS proposal review questions/recommendations:

1. Clarify reuse of the Quantars or provisioning of new GTR8000 transceivers for the 800 MHZ conventional system. Both scenarios are described. If the budget allows, it would be beneficial to upgrade to the GTR’s since Quantar support will be discontinued in 2018 (2020?). – Section 1.4.1
2. Dual receiver antennas for Diversity are being specified. This is a unique feature related to TDMA Phase II designs. It could become a tower real estate/loading issue. – Section 2.1.3
3. Motorola states “...sites selected by Sarpy County”. Motorola must warrant system performance with the proposed sites so they don’t try finger-pointing later if there is a coverage/performance issue. - Section 2.2
4. The proposed shelter sizes are 12x16 except for the Prime site at Platteview (12x32). 12x16 might be “tight” considering the County has other equipment at the sites. – Section 2.7

5. Training is not listed for the P25 infrastructure, only for the Microwave system. - Section 3.10
6. Motorola is proposing multiple non-Motorola third-party products:
 - a. Keysight
 - b. Weather Stations
 - c. NICE upgrade
 - d. Cameras

It needs to be made very clear, upfront, who will be installing this equipment and when, and how it will be tested and certified operational. The County should expect Motorola to take ownership of these deliverables as a “turnkey” provider and not abdicate responsibility to third-party vendors.
7. Will the “MotoMapping” product be purchased by the County? This could become “a project within a project”. - Section 2.8.2
8. The County should require the following prior to signing the Contract:
 - a. Resume of proposed Motorola Project Manager
 - b. Identify the proposed site design (A&E) firm and Construction Manager
 - c. Identify who will be installing the FNE equipment
9. A Responsibility Matrix should be developed jointly by the County and Motorola. It will clearly show who is responsible for the various deliverables, tasks, or subtasks in the project. For example, which entity would apply for building permits or electrical service for new site construction?
10. The proposed post-warranty Maintenance offerings should be reviewed prior to contract signing. Motorola’s P25 system maintenance is expensive and every offered feature should be understood. It is our experience that this is a very confusing process, even to Motorola! The post-warranty Customer Service Manager should be identified at the project kickoff meeting.
11. The County should review the Payment Terms proposed by Motorola. They typically load large payment percentages upfront. It is recommended to spread the payment percentages out across the tasks, especially holding as much as possible for the final task (delivery of As-Built documentation).
12. The Coverage Acceptance Test Plan proposed by Motorola should be reviewed prior to contract finalization. Specific testing methodologies should be followed in regards to the size of the tested segments within the County. For example, in urban areas, the test “grid” is approximately 400 ft. by 400 ft.; in suburban/rural areas, the test “grid” can be one (1) mile square. By contract, the vendor should guarantee a certain number of test “grids” meet or exceed the required signal level/bit error rate measurements.

SUMMARY

Sarpy County has retained Tusa Consulting Services to assess the current 800 MHz trunked radio system and to review the Motorola proposal to upgrade the final elements of the system to a full-featured APCO P25 Phase II system.

Existing Condition Analysis – TCS has examined the County’s existing base station, trunking controller, and site connectivity infrastructure. The equipment has provided a very long service life by industry standards. TCS does concur that, due to the system’s age, discontinuation of vendor support, and the lack of available spare parts, the system is at its end-of-life. TCS recommends that the County proceed with the project to replace the equipment at this time.

Motorola Proposal Evaluation -TCS has found no major issues with the Motorola proposal. The system design will replace all at-risk obsolete equipment and addresses the coverage requirements of the participating agencies within the County. Minor items such as shelter sizes and third-party equipment installations can be resolved prior to final contract execution.

Radio Frequency Coverage Assessment – TCS has reviewed coverage maps for the existing system and has discussed the current system’s performance with representatives of the user agencies. TCS developed coverage maps of the proposed system and compared them to the maps provided by Motorola. TCS believes that the proposed six-site system is a good compromise between cost and resulting coverage. The design should offer significantly improved coverage in the areas of concern cited by the users we interviewed. TCS supports the planned enhancement of the 800 MHz system from three to six sites as an appropriate way to provide improved radio coverage and to better meet user expectations in the future.

Life Cycle Cost Assessment – By incrementally acquiring replacements for end-of-life system components such as controllers and dispatch consoles, the County has kept its 800 MHz voice radio system operating reliably for an extended period of time without having had to undertake a wholesale replacement of the system. The project under consideration will complete the migration of the system from the 1990’s technology to Motorola’s latest ASTRO 25 public safety platform and will ensure the longest life-cycle currently known to be available. By choosing the Motorola System Upgrade Assurance (SUA) offering, the County can be assured that the system is kept current for the foreseeable future at a known cost, thereby avoiding expensive (and unexpected) incremental upgrades. A good example of the value of the SUA offering is the County Communications Center in Johnson County (JCCC), Kansas, which is part of the Metropolitan Area Regional Radio System (MARRS). Motorola recently implemented a system software upgrade across the regional system that required the replacement of more than 50 PC’s used at the JCCC. This was done at no cost to the County under the SUA agreement.

It is important to note that this system upgrade will also position the County to be aligned with other similar systems within the eastern Nebraska region, or the State. A critical element of regional system operational success is that all systems operate under one software version. This requirement is a critical component in the successful operation of regional networks such as MARRS in the Kansas City Metropolitan Area. Both the State of Nebraska and the Douglas County/OPPD ORION systems currently have SUA agreements in place with Motorola. The State and ORION require that all of their connected systems maintain current Motorola SUA agreements as a condition of their participation. TCS recommends that the County purchase the Motorola SUA option.

Proposed Radio Sites - It will be important to finalize any required new-site agreements so that those sites do not become a roadblock in the project schedule. Once the County has made the decision to move forward with the Motorola proposal, the site acquisition process should be started immediately. Five (5) of the six (6) sites in the new design will need some level of site-specific “use agreements” in effect. The five sites will require construction work, from placement of new shelters at existing towers (or water tanks), through development of an entirely new shelter/tower compound. Delays related to site acquisition and construction are the primary causes of schedule slippage in large radio system projects such as the one being contemplated by Sarpy County. TCS recommends that the County initiate the site acquisition task as soon as the contract with Motorola is in place.

SARPY COUNTY CAPACITY AND COVERAGE

PRICING REVIEW

DECEMBER 2015



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CAPACITY AND COVERAGE EXPANSION PROJECT PRICING

| Description | Price (\$) | Price 2016 |
|--|------------------------|-----------------------|
| Project as Scoped in Proposal | | |
| Equipment, System Installation, 1 st year Warranty | \$9,375,788.00 | \$9,375,788.00 |
| 2015 Estimated Project Incentives | | |
| System Discount 10% (trade-in, licensing credit, system discounts) Requires a December 2015 contract, staging with shipment | -\$817,578.80 | -\$817,578.80 |
| 12/1/2015 Order Incentive Requires a December 2015 contract, staging with shipment | -\$1,200,000.00 | 0.00 |
| Sub Total with 2015 Incentives | \$7,358,209.20 | \$8,558,209.02 |
| Existing Software Upgrade Value | | |
| Software upgrade value | -\$227,000.00 | -\$227,000.00 |
| Grand Total with Incentives and Upgrade Credit | \$7,131,209.20 | \$8,331,209.02 |

| 10 YEAR EXTENDED SERVICES OFFERING | Price (\$) | |
|--|-----------------------|-----------------------|
| SUAll as Scoped in Proposal | | |
| 10 Year SUAll Program <i>Based on SUAll (2 Year SUA Program)</i> | \$2,630,300.00 | \$2,893,330.00 |
| Post Warranty Maintenance | | |
| First Year Included in Project Cost | \$0.00 | \$0.00 |
| Years 2-10 Services (Matches Existing Services) - Tech Support - Infrastructure Repair with Advanced Replacement - Dispatch | \$2,158,303.00 | \$2,558,303.00 |
| Subtotal | \$4,788,603.00 | \$5,451,633.00 |
| Discount for multi-year at main contract | -\$212,000.00 | -\$212,000.00 |
| Total | \$4,576,603.00 | \$5,239,633.00 |



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| OPTIONAL PROJECT ITEMS | Price (\$) | |
|--|----------------------|---------------------|
| Contract Pricing Based on Adding to Main 6 Site System | | |
| NICE Project | \$166,253.00 | \$166,253.00 |
| <i>Upgrade to Full Inform</i> | | |
| <i>Redundant Logger @ Prime Site</i> | | |
| MCC7100 Console | \$112,882.00 | \$112,882.00 |
| <i>2 MCC7100 Positions</i> | | |
| Trailer Generator | \$104,000.00 | \$104,000.00 |
| <i>100Kw Diesel Cummins mobile trailer</i> | | |
| Paging UHF | \$92,000.00 | \$92,000.00 |
| Weather Stations | \$45,000.00 | \$45,000.00 |
| Extreme Switches | \$29,000.00 | \$29,000.00 |
| <i>Extreme Summit X440 24 Port</i> | | |
| <i>Qty. 6 (each RF site + Communication Center DC)</i> | | |
| Radio Programming (1 touch) 90.00 Per Radio (not in | | |
| total) | | |
| Discount for Adding ALL Options to Main Contract | -\$228,000.00 | \$0.00 |
| Radio Upgrades - require purchase with 6 site main contract | | |
| Sheriff's Radio Flash Upgrade | | |
| <i>150 Portable; Add Bluetooth microphone kit</i> | \$36,000.00 | \$36,000.00 |
| <i>150 Portable; Add Bluetooth/TDMA/GPS/OTAP flash</i> | \$164,100.00 | \$164,000.00 |
| <i>50 Mobile; Add TDMA, OTAP</i> | \$46,050.00 | \$46,050.00 |
| Sub Total | \$246,150.00 | |
| Discount for 2015 Main Contract and FLASH Upgrades | -\$123,075.00 | \$0.00 |
| Total FLASH Upgrades for Sheriff | \$123,075.00 | \$246,150.00 |

| Pricing Summary | | |
|---|------------------------|------------------------|
| Sub Total Project | \$14,959,676.00 | \$15,622,706.00 |
| <i>System Equipment, Installation & options</i> | \$10,171,073.00 | |
| <i>Software & Hardware maintenance Services (10 Years)</i> | \$4,788,603.00 | |
| Total Discounts Based on Incentives with December 2015 Contract/Ship | -\$2,807,653.80 | |
| Total Discounts for January 2016 Contract/Ship | | -\$1,044,578.80 |
| Total Project + 10 Year SUA and Maintenance | \$12,152,022.20 | \$14,578,127.20 |
| Differential for CSA Signature in December 2015 versus January 2016 is equal to \$1,763,075.00 | | |



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NOTES:

1. Contract for CSA in December required for pricing lock,
2. Contract can be rescinded based on “non-appropriation” of funds as listed in the CSA
3. Price lock does not mean the scope cannot change. Motorola and the customer will log changes to the contract via the defined change order process.



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