



To: Mr. David Corliss, Lawrence City Manager
Mr. Craig Weinaug, Douglas County Administrator

From: Scott W. Ruf, Director, DGCO Emergency Communications

Date: April 20, 2012

Re: P25 800 MHz Digital Radio Project

The overarching goal of Douglas County Emergency Communications is to provide highly efficient, effective and interoperable public safety communications for city and county police, fire and EMS agencies and the citizens they serve. The Public Safety Radio System provides public safety two-way radio communications for Police, Fire, EMS, Public Works, and other county agencies that depend on reliable communications day-to-day and during crisis events. Replacement/upgrading of the existing Motorola network complies with our mission and goals by maintaining the County's capabilities to address homeland security issues and manmade / natural disasters through interoperable communications for all public safety agencies.

Over the years public safety radio communications has developed from a conventional voice radio system to a much more advanced system of voice and data technologies, supported by networks that deliver unprecedented levels of interoperability, capacity, coverage, bandwidth, and flexibility. Douglas County's current system is an aging system fast approaching its end of life that simply cannot deliver in today's advanced systems and technologies. State and federal mandates and changes have made it necessary for Douglas County to pursue alternatives to our current system that will greatly expand our capabilities and ensure that emergency responders can communicate as needed , on demand, and as authorized at all levels of government and across all disciplines.

The most pressing among existing problems and not unique to Douglas County is a lack of interoperability among public safety agencies. Public safety personnel from different agencies frequently lack the ability to communicate with one another, or with their counterparts in neighboring jurisdictions. A lack of interoperability within a region can severely hinder the ability of public safety agencies to provide a coordinated response to natural disasters, catastrophic accidents, or even routine public safety emergencies.

The ECC and 911 Advisory Board over the past year has worked to address concerns about increased radio coverage, the security of radio frequencies, and the ability for the Police

and Fire Departments to communicate with each other. As a result of these concerns, ECC and 911 Advisory Board solicited solutions to convert from an analog to a digital radio system, which for the first time will allow the public safety agencies in Douglas County to coordinate over the air the efforts of multiple agencies responding to an emergency.

Challenges & Limitations of Current System

The Public Safety Radio System is the mission critical system in the event of a man-made or natural disaster. The system must be renovated and upgraded to comply with existing laws and changes in technology. Given the current pace of technology, systems that were designed and installed as little as 10 years ago are now considered obsolete. Douglas County's system was installed in 1999 with an additional channel added to the system in 2004.

In short, the Douglas County Public Safety Radio System is getting old, is increasingly difficult to maintain, some vital terminal equipment can no longer be acquired, repaired, or maintained, and reliable spare equipment is hard to find. Critical trunking controller equipment is no longer supported and replacement equipment is essentially cost prohibitive. Analog technology is steadily being replaced with more flexible digital technology. The system is also at/close to capacity so the addition of Fire/EMS departments could overload the trunking system giving users a system "busy" which poses a threat to first responder safety.

In addition to the aging out of the system and its technology are the operational constraints resulting in limited capacity and lack of expandability. Capacity limits due to outdated usage requirements of the system could mean that personnel may not be able to get the system access they need. A lack of expandability means that problems with coverage, system load, and channel congestion cannot be easily addressed.

The current 800MHz radio system utilizes analog technology for the backbone transmitters and uses a mix of analog and digital handheld equipment. Although agency users can acquire analog radios, this legacy hand-held equipment is in its final period of support. Newly acquired radios use digital technology or a hybrid of both analog and digital. This move is consistent with the FCC transitioning from analog to digital television transmission in February 2009.

Analog radio works well. However, analog two-way radio has reached the limits of innovations. Some enterprises are finding they need more than the fundamentals that analog two-way radio delivers. Licensed channels are becoming crowded and more capacity is required. There is the need for more flexible ways to communicate with users both inside and outside our organizations.

Digital radio provides a powerful, flexible platform that DGCO can adapt to meet these needs and more. By migrating from analog to digital two-way radio communications, DGCO can fill immediate needs and build a strong technical foundation for adding new functionality in the future. Police, fire and emergency medical operations are more complex today than ever

before. With the introduction of new responsibilities such as community oriented policing and advanced life support emergency medical services, public safety personnel are taking on significant new duties and responsibilities placing more diverse requirements on our communications system.

A lack of interoperability is another critical operational constraint in Douglas County's system. This is caused by agencies using incompatible equipment, different frequency bands (in DGCO law enforcement and public works use 800 MHz and all fire/EMS use VHF), and unique operational protocols. Yet, the changing requirements of public safety have placed a greater emphasis on joint operations and task forces, thus the need for communications interoperability.

Other challenges associated with the radio system are the physical location and size of the Emergency Communications Center itself. The need to expand the system and increase its capacity is paramount we must also do the same in the dispatch center. In order to maintain acceptable service levels we must expand the center from six dispatch positions to eight (layout includes for future growth of up to 10). Failure to also grow the capacity and capabilities of the dispatch center will greatly hinder our ability to safely serve our public safety agencies and the community. It will also require us to revisit the issue within 2-4 years of upgrading the radio system costing significant amounts of money to achieve what can easily be achieved in a cost effective and efficient manner as part of this project.

System Overview

The current DGCO system is a 6 channel, 4 site (Lecompton, Stratford, Baldwin City & Eudora) analog 800 MHz Analog Trunked System for all DGCO law enforcement and public works departments. LDCFM and the rural township fire departments all operate on the same 4 site system but in the VHF radio spectrum. The system was installed and functional in September 1999 as a 5 channel, 3 site system. In 2004 a fourth channel was added to accommodate increase radio system usage. Finally, in fall of 2011 we added new 50' tower in Eudora to accommodate public safety concerns related to areas of Douglas County and Eudora with regard to system coverage issues. This location is strictly to expand coverage to the low lying areas of Eudora and the County along the river.

The DGCO ECC is currently set-up with 6 dispatch/call-taker positions and KU Public Safety has 3 dispatch/call-taker positions. We serve as each other's support and back-up if needed. Although I cannot speak directly for KU, DGCO ECC is poorly designed and has no easy way to expand to accommodate new technology and growth.

In addition to the aging out of the system and capacity issues the third is coverage. The County as well as areas of all three incorporated cities has coverage issues and "dead spots" where communication abilities are extremely limited. There is currently no interoperability between law enforcement and fire agencies.

Proposals

At the direction of the Douglas County 9-1-1 Advisory Board¹ I was tasked with soliciting proposals from qualified radio communication vendors who design and sell P25 800 MHz Digital Simulcast Radio Systems. Three vendors were contacted all of which have existing, open contracts through WSCA (Western States Contract Alliance), State of Kansas or other local government contract within the State of Kansas. Contacted for review and budgetary proposals were Cassidian Communications, Motorola Solutions, and Tait Communications.

All vendors were given an initial meeting outlining what DGCO is wanting and needing moving forward. They all had opportunities to meet with myself and members of the P25 committee group (members of user agencies, Jim Denney, and ECC Director) to ask questions and solicit information about current system, challenges, and future needs. They were also allotted time and given access to all DGCO radio sites and infrastructure to include the LEC, ECC and existing and proposed tower sites.

The vendors were given little direction on system design as we wanted to be able to review proposals that were designed as the best solutions for DGCO moving forward. The only requirements imposed on the vendors and were expected were the following:

- a. A redundant system via microwave or similar solution
- b. A standalone system for DGCO
- c. A partnership and tie in to Johnson County's radio system/network
- d. A partnership and tie in to Kansas State DOT System

Outside of these few requirements each vendor was tasked with designing and proposing options and solutions that best met the current and future needs of DGCO with regards to a new radio system infrastructure.

¹ Advisory Board Members: Sheriff Kenneth McGovern, LPD Chief of Police Tarik Khatib, LDCFM Chief Mark Bradford, Kansas University Chief of Police Ralph Oliver, Wakarusa Township Chief Chris Moore

Proposal I – Cassidian Communications

After an initial face-to-face meeting with the regional representative from Cassidian Communications, outlining needs and exchanging information there was no follow-up by representative. After numerous phone calls and emails attempting to follow-up with them and set-up tours of facilities and receiving no response it was assumed that there was no interest by Cassidian to pursue the project for DGCO and communication and any further attempts to contact them were terminated.

In March 2012 the regional Cassidian representative contacted DGCO about the project and their interest in submitting a proposal. They were given all necessary information and access the other vendors were provided in the fall of 2011. The only change to the request was that the 911 Advisory Board had already reviewed and recommended that the solution be an expansion of the KDOT system. After follow-up meetings and reviewing needs Cassidian did not believe they could provide a suitable solution based on our requirements.

As of the writing of this memo no proposal has been submitted for review.

Proposal II – Motorola Solutions

Motorola Solutions was the only vendor to provide solutions based on the requirements set forth to all vendors. In their proposals Motorola took into account items as outlined as critical to the success of any system upgrade to include, but not limited to:

- a. Portable coverage, County-wide, with focus on the communities in the County as well as City of Lawrence.
- b. Utilization of existing structures such as water tower locations.
- c. The desire to improve the process for Fire Station Alerting.
- d. The specific needs of each agency and how it handles calls both jointly and autonomously.
- e. The specific needs of both Dispatching Agencies, Douglas County ECC as well as Kansas University Public Safety

Option I – Standalone System

The proposed standalone system consists of an (8)-channel (4) site ASTRO25 simulcast system with scalable master site. The master site will be located at Flair Tower (proposed). The simulcast system consists of (4) simulcast RF sites and (1) simulcast prime site, which will be co-located with one of the simulcast RF Sites. The following sites are being proposed for the simulcast system:

- Flair tower (proposed prime site location)
- 1901 Stratford
- Lecompton

- Globe

The system will also include two dispatch sites with MCC7500 IP based consoles. The two dispatch locations are the following:

- Douglas County ECC (increase to 8 positions from 6)
- Kansas University Public Safety (increase to 4 positions from 3)

The system includes a microwave network to provide Ethernet site links for inter-site connectivity.

Option II – KSDOT

In this option the proposal consists of the same components except that the system is designed using KDOT's Salina Master Site located at 2025 E. Iron Street, Salina, Kansas. This option explores the advantages of joining the State Network as a simulcast cell. Although there are tradeoffs there are advantages as well.

- Day to day management, maintenance and monitoring of Master Site is done by KDOT.
- Reduced staffing costs
- Reduced maintenance costs
- High level of redundancy
- Local tech support
- Back-up coverage scenario for system failures
- Direct connection both locally and statewide with no loss of features
- Capacity of system is seamless with no PTT collisions, Statewide roaming and PTT ID as well as console priority on the MCC 7500

Service and Maintenance

- Motorola has 3 service centers within a 40 mile radius of Douglas County including one locally.
- Engineering and Systems integration offices in Lenexa, KS staffed with local engineers, design and system integration personnel.
- Local service and sales team.

Proposal III – Tait Communications

Tait Communications submitted a proposal for a standalone option only. They do offer solutions for a KDOT/Johnson County solution, but due to technical issues and additional negotiations with other vendors to make the solutions work are unable at this time to provide a budgetary proposal for those options. In their proposal Tait took into account items as outlined as critical to the success of any system upgrade to include, but not limited to:

- a. Portable coverage, County-wide, with focus on the communities in the County as well as City of Lawrence.
- b. Utilization of existing structures such as water tower locations.
- c. The specific needs of each agency and how it handles calls both jointly and autonomously.
- d. The specific needs of both Dispatching Agencies, Douglas County ECC as well as Kansas University Public Safety

The proposed standalone system consists of an (8)-channel (4) or (5) site trunked simulcast system with scalable master site. The master site will be located at 1901 Stratford. The simulcast system consists of (4) or (5) simulcast RF sites and (1) simulcast prime site, which will be co-located with one of the simulcast RF Sites. The following sites are being proposed for the simulcast system:

- Baldwin tower site
- 1901 Stratford (master site)
- Lecompton
- Globe site
- Eudora site

The system will also include two dispatch sites with AVTEC Scout VoIP based consoles. The two dispatch locations are the following:

- Douglas County ECC (increase to 8 positions from 6)
- Kansas University Public Safety (increase to 4 positions from 3)

Service & Maintenance

Tait Communications is located in Houston, Texas. They have not confirmed or identified a local or regional service provider. They have discussed options and emphasized the importance of having those components in place for successful implementation and support of the system.

Justification & Recommendation

The investment (approx. \$7M) in the new P25 800 MHz Digital Radio System provides new and upgraded infrastructure to the personnel and agencies that desperately need it using modern technology and capabilities; this project removes and replaces the noncompliant portions of the existing DGCO radio infrastructure to provide a P25 standards based, AES encrypted capable, 800 MHz LMR system to a new, updated system; adds additional capacity to support the other components agencies require of the system and share those components; the ECC will continue to look for other cost effective technology as part of its strategic outlook.

As previously stated Douglas County's current radio system infrastructure is aging out and in need of replacement. Our current system has reached its limits and is not capable of growth now or in the future. With emerging and alternative technologies becoming available and necessary, coupled by state and federal authorities mandating interoperability and the migration to new spectrums there are little choices for us moving forward and the need to replace our radio infrastructure is necessary.

The question was presented with regard to the need/requirement for the City of Lawrence to have to invest in infrastructure costs associated with sites outside the City and in support of the other cities and county. Due to the proposed design and build out of the system as an autonomous cell or expansion of the KSDOT Radio System the proposed site locations (Flair & Globe) as well any upgrades to existing sites (i.e. Lecompton & Stratford) is a small part of the project. The real cost associated with this project is the need to expand to 8-channels and the technology associated with this expansion. This expansion is needed to accommodate public safety (LPD & LDCFM) and public service agencies (Public Works, Streets, Sanitation) from the City of Lawrence as well as the rural township fire departments (less than 2% of system usage). Lawrence Police, LDCFM and Lawrence Public Works account for over 80% of system usage and communication resources. The upgrade of the system to accommodate all the users and the technology needed to meet the need today and in the future as well as the building in of redundancies are the major factors driving the size and scope of the project.

It is the recommendation of myself in consultation with members of the P25 committee and the 9-1-1 Advisory Board to move forward with the proposal by Motorola Solutions in partnership with Kansas DOT. We believe this is the best and most efficient proposal providing Douglas County with the capabilities to fully utilize existing and new technologies in designing a system that will serve the ever-growing demands of our public safety users, providing greater interoperability and scalability taking us far into the future. The following are a few reasons for this recommendation:

- Motorola is one of only a few vendors in the country and state that has implemented a digital simulcast radio system in a county of comparable size;
- By using Motorola we will be able to expand/upgrade some already-existing infrastructure, preserving the County's prior investment;

- The County and many of the cities already own/utilize electronic equipment that is compatible with Motorola components;
- Including all necessary equipment, services and construction on one contract enables the County to hold Motorola accountable for entire system-wide success should any individual aspect of it fail.

This recommendation and the estimated project cost of \$7M is made based on our review of the current and future needs of all public safety as well as public service agencies in Douglas County. We have presented the best solution for Douglas County so that the decision-makers at all levels of county and city government can meet their obligation to make use of technology to ensure the public's safety and improve services to their citizens.