Utah Communications Authority

2017 Strategic Plan

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DELTAWRX
management consultants

UCA 2017 Strategic Plan
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Section 1 - Introduction

1.1. Background

In 1997, the Utah Communications Agency Network (UCAN) was created by the Utah State Legislature to provide statewide, two-way, public safety radio coverage for its stakeholders. UCAN was created as an independent state agency that was managed by the UCAN Board, which initially comprised 15 members representing five State agencies and 10 local agencies. Since 1997, the makeup of the Board has been increased to 27 members to provide for representation of the diverse radio system and public safety answering point (PSAP) stakeholders.

The UCAN radio system was initially planned to cover the needs of five counties: Weber, Morgan, Davis, Salt Lake, and Utah. After Salt Lake was selected to host the 2002 Winter Olympics, Summit and Wasatch Counties were added to the system, since they contained Olympic venues. Tooele County requested and was consequently added to the system as well.

The Olympics provided significant funding to expand coverage and traffic handling capacity beyond what was initially planned. From the original eight-county footprint, the system has been expanded to also cover Cache, Rich and Washington counties, as well as most of Box Elder County. Additionally, the 800 MHz trunked system has been expanded to provide coverage on most of the major highways in the state and today supports more than 22,500 mobile and portable radios.

UCA's public safety radio systems support more than 6,000 VHF radios and more than 22,500 800 MHz radios.

In the 2014 General Session of the Utah State Legislature, House Bill 155 created the Utah Communications Authority (UCA). HB 155 provided that, as of July 1, 2014, UCAN shall be consolidated with the Utah 911 Committee and renamed the Utah Communications Authority. With this consolidation, UCA assumed the operations of UCAN and the responsibilities of the Department of Technology Services (DTS) Radio Shop, and now manages all State owned public safety wireless resources, including the microwave, VHF and 800 MHz systems.

The VHF radio system was the original state public safety wireless communications network throughout Utah. Though much of the VHF system has been replaced by the 800 MHz system, the VHF system still provides radio communications in the southern portion of Utah, where there is insufficient coverage from the 800 MHz system. In these areas, the UCA VHF system and local VHF systems are the primary means of public safety communications for state and local agencies; it is estimated that the VHF systems support somewhere between 6,000 to 10,000 mobile and portable radios. Many of the local agencies in this area would like to migrate to the 800 MHz system, but are unable to afford the user fees and more expensive trunked radios that would be required to operate on the 800 MHz system. Other agencies are satisfied with the VHF system and do not desire to migrate to the 800 MHz system.

Since 2000, the UCA 800 MHz system, which uses Motorola's SmartZone OmniLink trunked radio technology, has taken on an increasing portion of the state's public safety communications and today supports more than 22,500 user radios. While the system has proven very reliable over the years, Motorola has discontinued support for much of the existing 800 MHz trunked radio equipment and no longer manufactures some of the replacement parts needed for the system. To date, UCA has been able to obtain used replacement parts from third parties on the secondary market in order to maintain the 800 MHz system in good working order.

1.2. UCA's Strategic Planning Efforts

In 2016, the UCA Board conducted a planning retreat to discuss the strengths, weaknesses, opportunities and challenges of the Authority and to identify the needs of the organization going forward. After an extensive discussion, the UCA Board reached consensus on the following Vision and Mission of UCA:

Vision Statement

Everyone in Utah has access to emergency services through a reliable public safety communications network and every first responder has the ability to communicate when and where needed.

Mission Statement

To provide and support mission critical public safety communications throughout Utah by collaborating with our stakeholders.

We will accomplish our mission by focusing on our core competencies and honoring our core values.

Our core competencies are:

- Expertise and resources to support public safety communications statewide
- Broad representation of stakeholders
- A statewide forum for collecting, sharing and disseminating information

Our core values are:

- Trust
- Partnership
- Service-orientation
- Integrity
- Fiscal Responsibility
- Innovation

* * * * *

In order to ensure that effective public safety communications will continue to be provided to the state's EMS, fire and law enforcement personnel for the foreseeable future, UCA has prepared this strategic plan to guide the maintenance and long term viability of the VHF and 800 MHz radio communications network and the 911 system in the coming years.

Section 2 - Current Radio Systems

Wireless voice radio communications are an essential tool for public safety first responders in Utah. Over the years, a variety of state and local systems have been developed to provide real-time communications capabilities between dispatch and field personnel. A brief overview of the public safety radio systems and technologies currently utilized in the state is provided below:

2.1. VHF System

The framework of the state's VHF high-band system was initially developed in the 1970s to support the Utah Department of Transportation (UDOT) and the Utah Highway Patrol (UHP); the system was further developed throughout the 1980s and 1990s to eventually provide coverage throughout Utah for state users. In parallel, many local agencies developed their own VHF systems to address individual needs and worked with the state to provide interoperability among state and local users.

While the VHF system has been the primary system for most agencies since the 1970s, during the past 10 to 15 years more than 200 agencies have migrated to the 800 MHz system in order to take advantage of the improved features, capabilities and capacity that trunking technology provides. Today, the UCA VHF infrastructure provides coverage from approximately 70 radio towers and supports what is estimated to be between 6,000 to 10,000 mobile and portable users, primarily in the southern portion of the state. Some of the local agencies in this area would like to migrate to the 800 MHz system, but are unable to afford the user fees and more expensive trunked radios that would be required to operate on the 800 MHz system. Other agencies own and maintain their own VHF systems, which meet their current needs, and do not desire to migrate to the 800 MHz system.

Analog Conventional Channels

The state VHF system continues to utilize the same basic technology (analog, FM radio) that was deployed in the 1970s, which has proven reliable and cost effective for many users. All of the state's VHF channels operate on analog, conventional base stations, which are relatively inexpensive and easy to deploy. Conventional user equipment (mobile and portable radios) for the system is much less expensive than the radios required for the 800 MHz system, which makes it difficult for many rural users to justify migrating to the 800 MHz system, even when it is available to them.

Recent and Planned Upgrades

Much of the VHF system has been in place for more than 20 years and most of the base stations need to be replaced. To ensure that the VHF system remains reliable, UCA is using funds allocated by the legislature in FY2015-16 for a modernization program that will see up to 75% of the VHF base stations replaced by the end of 2018.

By the end of 2018, 75% of UCA's VHF base stations will have been replaced with new equipment.

Interoperability channels

The VHF system also incorporates national interoperability channels into the network to support communications between agencies that do not otherwise share common radio channels. These channels can be programmed into any VHF user radio and can serve as a common "meeting place" for VHF users. There are a limited number of these channels available, but they can be used to effectively coordinate operations where the interoperability channels have been deployed.

2.2. NEXEDGE VHF System

The Emery County Sheriff's Office has taken the lead in developing a VHF trunking system using Kenwood's proprietary NEXEDGE technology that covers Carbon and Emery Counties. This system has many of the advanced trunking features of a Project 25 (P25) system, such as digital transmission and multiple talk groups, but costs less than a corresponding standards-based P25 system. Unfortunately, NEXEDGE and P25 use different technologies, so NEXEDGE and P25 radios are not compatible with one another.

2.3. 800 MHz Trunked System

A substantial portion of public safety wireless voice communications in the state takes place on the UCA 800 MHz trunked system, which has been deployed over the past two decades. This system was initially planned in the mid to late 1990s to improve interoperability among public safety agencies, alleviate channel congestion and provide economies of scale to radio users. In general, the 800 MHz system has been very reliable and greatly enhanced the communications capabilities of its users.

Motorola SmartZone/OmniLink

The foundation of UCA's 800 MHz radio operations is a Motorola SmartZone OmniLink 800 MHz trunked radio system that was originally developed with grant funds to provide communications capabilities along the Wasatch Front. The system was initially planned to cover the needs of five counties (Weber, Morgan, Davis, Salt Lake and Utah), however, Summit and Wasatch Counties were added to the system after Salt Lake was selected to host

the 2002 Winter Olympics. Tooele County requested and was consequently added to the system as well.

The Olympics provided significant funding to expand coverage and traffic handling capacity beyond what was initially planned. From the original eight-county footprint, the system has been expanded to also cover Cache, Rich and Washington counties, as well as most of Box Elder County. A concerted effort has been made to provide 800 MHz coverage on most of the major highways in the state and today the system supports more than 22,500 mobile and portable radios from more than 160 radio sites.

The 800 MHz system supports the majority of public safety communications in Utah.

800 MHz Conventional Channels

In portions of the state where there are a limited number of users, conventional 800 MHz channels have been deployed to provide basic communications capability for 800 MHz users. These conventional channels can be deployed more economically than a trunked channel, yet still provide a way for 800 MHz users to communicate with one another, though with fewer advanced features. The limitations of these conventional channels make them unsuitable to be the only communications solution in areas where significant radio traffic can be expected.

800 NPSPAC Interoperability channels

Like the VHF system, the 800 MHz system has incorporated national interoperability channels (NPSPAC channels) into the network to support conventional non-trunked communications and provide limited backup capabilities for the trunked system. These interoperability channels are deployed at approximately 25 radio sites throughout the state.

2.4. Backhaul Network

To connect the radio sites with the radio switching equipment and dispatch radio consoles, UCA maintains an extensive network of microwave radio links, which is supplemented by services leased from third party network providers. This network provides point-to-point communications between sites, so that radio traffic can be routed to the correct radio tower and field users, and provides some data and internet connectivity for state and local agencies.

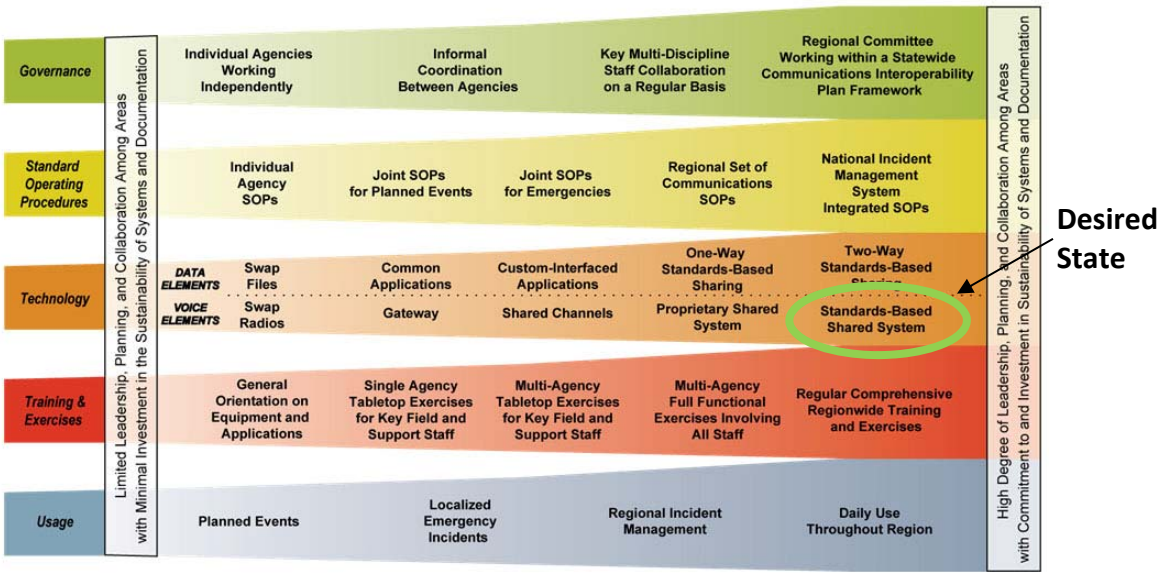
Section 3 - Interoperability Issues/Use Cases

This quote from the US Department of Homeland Security's SAFECOM program describes the challenges that Utah still faces with its public safety communications network:

> "Emergency responders - emergency medical services (EMS), fire-rescue personnel, and law enforcement officers - need to share vital data or voice information across disciplines and jurisdictions to successfully respond to day-to-day incidents and large-scale emergencies. Many people assume that emergency response agencies across the Nation are already interoperable. In actuality, emergency responders often cannot talk to some parts of their own agencies - let alone communicate with agencies in neighboring cities, counties, or states."
>
> (https://www.dhs.gov/sites/default/files/publications/interoperability_continuum_brochure_2.pdf)

The SAFECOM Interoperability Continuum (Figure 1) identifies a framework for judging the interoperability capabilities of an organization in various areas that include governance, technology and usage. The left side of the continuum depicts the lowest level of interoperability and right side depicts the highest level of interoperability.

Figure 1: SAFECOM Interoperability Continuum



For voice interoperability, Utah's various state and local public safety users operate throughout the continuum. Exclusive users of the UCA 800 MHz SmartZone OmniLink system as well as users of the NEXEDGE VHF system operate on "Proprietary Shared Systems", which is towards the right side of the continuum (higher degree of interoperability), when they interact with other users of the same system. Users of the VHF system are in the center of the continuum as they utilize "shared channels" to communicate with other VHF users. Users communicating between the VHF and 800 MHz systems find themselves further to the left (limited degree of interoperability) as they utilize a variety of methodologies including swapping radios and gateways.

Utah's VHF and 800 MHz radio systems are not directly compatible with one another, and a third system, which uses Kenwood's proprietary NEXEDGE technology in the VHF spectrum, is being deployed in Carbon and Emery Counties that is incompatible with the majority of VHF user radios deployed in the state. Multiband mobile and portable radios have made it possible for users to operate on both UCA's VHF and 800 MHz systems, but the multiband radios currently in use will not work on the NEXEDGE system. These three disparate systems present ongoing challenges for groups of first responders that do not operate on the same radio system.

Ultimately, UCA would like to migrate all state and local public safety users to the far right side of the SAFECOM continuum by deploying a single, ubiquitous "Standards-Based Shared System" which would provide seamless, effortless and integrated communications across the entire public safety user community. However, UCA understands that both the VHF and 800 MHz systems will remain in place for the foreseeable future. Additionally, local agencies may expand the third system/technology (NEXEDGE VHF) being deployed in Emery and Carbon Counties to support additional users.

Below, we give examples of how the various types of radio systems are deployed in Utah and the interoperability issues faced by each type of user in a region.

3.1. Counties with 800 MHz Trunking and VHF Systems

In areas where the UCA 800 MHz SmartZone OmniLink system and the VHF conventional system both provide sufficient coverage, interoperability between users is typically accomplished by permanent or temporary cross-band patches or gateways. For example, in Utah County, the Fire and EMS paging and dispatch channels and the Utah County Sheriff's Office VHF channels are patched on a full-time basis to corresponding talk groups on the UCA 800 MHz System. Because both the VHF and 800 MHz system provide adequate coverage throughout the county, users of either system can communicate with users on the other system, regardless of their location in the county. In addition to dedicated patches, many PSAPs have the ability to create temporary or ad-hoc patches between VHF conventional resources and 800 MHz talk groups.

Patches between the VHF and 800 MHz systems can provide some interoperability enhancements, but the patches can also present problems of their own, as multiple resources from each system must be managed effectively to work together. For example, a single 800 MHz talkgroup can provide seamless coverage to a user throughout the Richfield dispatch area (which includes Garfield, Juab, Kane, Millard, Piute, Sanpete, Sevier and Wayne Counties), but a VHF user may need to switch among eight different VHF channels/sites to maintain communications throughout the County. Patching the eight+ VHF channels to a single 800 MHz talkgroup is possible, but can result in channel congestion and contention if multiple VHF users are operating on different channels at the same time.

Gateways, patching and multiband radios can improve interoperability between disparate systems, but are not as effective as operating on the same radio system.

3.2. Counties with only 800 MHz Trunking

In areas of the state where very limited or no VHF infrastructure exists, responders communicate exclusively using the UCA 800 MHz SmartZone OmniLink System. End-user radios are programmed with a number of interoperability resources that allow for both on-network and off-network communications between users.

If a VHF user responds into a northern Utah 800 MHz area, the VHF user will have very limited ability to communicate with users on the 800 MHz system. In this case, it might be possible to provide the non-800 MHz user with a portable radio from a radio cache that operates on the UCA 800 MHz system. Alternatively, users that operate primarily on conventional VHF systems could purchase multiband VHF/800 MHz trunked radios to work on the 800 MHz system. In some cases, a VHF interoperability channel, if it is available, could be patched to an appropriate talkgroup on the 800 MHz system to facilitate communications between the VHF and 800 MHz users. However, it is unlikely that the few limited interoperability channels/patches that might be available in this case would be sufficient to meet the needs of responders to a large scale emergency.

3.3. Counties with only VHF Conventional Systems

In areas of the state where no 800 MHz trunking infrastructure exists, responders communicate utilizing a network of VHF conventional channels maintained by UCA as well as locally maintained VHF channels. End-user radios are also programmed with a number of shared channels and interoperability frequencies that allow for communications between users and the local PSAPs.

If an 800 MHz user responds into the area, that user may have no ability to communicate with other responders in the local area. In certain areas of the state, UCA has deployed 800 MHz conventional analog repeaters that can be patched to local VHF resources allowing the 800 MHz user to utilize their portable or mobile radio to communicate with VHF users. In areas where this 800 MHz conventional capability does not exist, the 800 MHz user is typically provided with a VHF mobile and/or portable radio that is programmed for the local area, or a dual band radio that will work on both the VHF and 800 MHz systems.

3.4. Counties with NEXEDGE Systems

Carbon and Emery County are in the process of deploying a proprietary Kenwood NEXEDGE VHF trunking system based on the NXDN Common Air Interface. While NEXEDGE trunking systems provide a lower cost alternative to P25 based systems, NEXEDGE trunking radios are not compatible with the existing 800 MHz SmartZone or any P25 based trunking systems. Interoperability between VHF conventional and VHF NEXEDGE trunking users in these counties is accomplished by utilizing shared VHF conventional channels.

In order for 800 MHz users to communicate with users in these counties, either the 800 MHz system will have to be expanded to cover the counties so that gateways between the NEXEDGE and 800 MHz system can be established, or the 800 MHz users will have to be issued a VHF radio that will operate on either conventional VHF interoperability channels or the NEXEDGE system.

SAFECOM "strongly urges public safety agencies … to select and implement P25 standards compliant equipment. No other available technological solution ensures compatibility and provides critical digital communications interoperability with established P25 standards compliant solutions."

http://www.npstc.org SAFECOM_P25_Position_Paper_1405.pdf

3.5. County with both UCA and Private Systems

UCA has developed the capability for certain users to communicate with some of the major ski resorts on the Wasatch front. This capability was developed primarily for the UDOT Avalanche Safety Office and enables UDOT personnel to communicate directly with resort personnel using multi-band portable radios. Control stations and gateways are deployed and configured to enable secure end-to-end communications between the proprietary systems operated by the resorts and the UCA VHF and 800 MHz networks.

Section 4 - System Needs and Recommendations

The UCA VHF and 800 MHz communications network has served state and local agencies well over the past two decades. In order to maintain the reliability and effectiveness of these systems, UCA must address the following issues:

4.1. Replace Obsolete 800 MHz system with P25 system

Motorola has announced that it will discontinue support in 2017 and 2018 for a significant number of the components of the existing 800 MHz trunked radio infrastructure; consequently, replacement parts to support the system are becoming increasingly difficult to obtain. As the 800 MHz system continues to age, failures of the system may become more common and users of the system will begin to experience more frequent and prolonged communications outages. Repairs of the system will be more difficult and costs to maintain the system will rise.

To address these issues, UCA needs to replace the current proprietary trunked system with a standards-based, P25 trunked radio system. The P25 standard has been widely adopted by local, county, tribal, state, and federal agencies, and is recommended by the US Department of Homeland Security (DHS).

By replacing UCA's proprietary 800 MHz system with a standards-based, P25 system, Utah's first responders will be in the mainstream of public safety communications and will enjoy the benefits of an effective and reliable radio system for decades to come.

4.2. Maintain Existing VHF System

The VHF system should be maintained to support the public safety users that have not migrated to the 800 MHz system. The VHF system has proved cost effective and reliable over the years and many users in the most rural parts of the state still rely on it for their day-to-day public safety communications.

UCA is currently using funds allocated by the legislature in FY2015-16 for modernization program that will see up to 75% of the VHF base stations replaced by the end of 2018. UCA would like to replace the remaining 25% of the base stations after 2018 in order to standardize the system equipment and maintain the reliability of the entire system. UCA will consider providing any requested coverage enhancements on a case-by-case basis.

4.3. Maintain System Backhaul Network

The backhaul network that connects the UCA system makes public safety wireless communications possible in the state and enables radio communications to be relayed between the dispatch centers and the radio towers. The network, which is comprised primarily of microwave radio links that are supplemented by circuits leased from private telecommunications companies and regional internet service providers, also provides data connectivity for mission critical applications (e.g. CAD-to-CAD interfaces) in some of the 911 dispatch centers throughout the state. The network also provides some backup Next Generation 9-1-1 (NG911) service to the centers, but the primary NG911 services are, and will continue to be, provided by the private telecommunications companies.

To support the P25 system, the existing microwave radio system must be maintained and upgraded to support native IP/Ethernet connectivity. Additionally, as radio sites/towers are added to improve coverage and increase interoperability, the network will need to be expanded to connect the new sites to the rest of the system. Where practicable and cost effective, UCA will connect the sites to the system with circuits leased from private providers.

4.4. Replace Radio Consoles

To communicate with public safety field personnel, emergency dispatchers utilize more than 220 radio consoles deployed in 58 public safety answering points (PSAPs) and dispatch centers throughout the state. Like the 800 MHz system, these radio consoles are approaching the end of their operating life and will no longer be officially supported or maintained by their manufacturer beginning in 2018. Additionally, the existing radio consoles do not provide P25 functionality and will not directly interface to a P25 radio system. In conjunction with the acquisition of the P25 radio system, the radio consoles should be replaced with consoles capable of interfacing with both the VHF and new P25 800 MHz radio systems. Interfaces between new consoles and the NEXEDGE system in Carbon and Emery Counties will likely need to be provided via NEXEDGE control stations.

4.5. Improve Interoperability Where Practicable

There are multiple technology solutions that can be used to improve interoperability where a single system supporting all users does not exist. These methods include patching radio channels thru consoles (i.e., gateways), sharing common interoperability channels or using multiband/multi-mode radios. These can all be deployed in various ways to improve interoperability but, unless a single system is utilized, limitations on interoperability will still exist. UCA should work with its stakeholders to provide cost-effective interoperability improvements where practicable.

4.6. Improve Coverage of 800 MHz System

Ultimately, the best technical solution for Utah would be to have statewide coverage on the UCA 800 MHz system. This would provide users of the 800 MHz system with the ability to operate throughout the state on a single network using a single radio with the advanced trunking features they have come to expect. Additionally, a statewide 800 MHz system would provide a platform for improved interoperability with local VHF systems, the UCA VHF system and the NEXEDGE system in Carbon and Emery Counties. While funding the replacement of the existing 800 MHz sites is UCA's immediate priority, the Authority would like to implement additional 800 MHz sites as funding becomes available in the future.

Section 5 - One-Time Costs

This section contains an estimate of the one-time costs required to upgrade the existing 800 MHz system to a P25 standards-based system. While costs for fixed network equipment, site improvements and consoles have been included, personnel costs associated with the implementation and maintenance of the new systems have not been included. Each of the costs are presented in a range, from low to high, that estimates the prices UCA may see from vendors during a competitive procurement.

5.1. Replace Existing 800 MHz System with P25 System

Below are the estimated costs to replace the 800 MHz radio equipment at the existing sites to make it P25 compatible. This will not significantly expand the existing coverage of the 800 MHz system, but will replace the fixed radio equipment that has become obsolete.

	Estimated One-Time Cost (Millions)	
	Low	High
P25 System Upgrade	**$104**	**$140**

5.2. Radio Site improvements

In addition to replacing the 800 MHz radio equipment, there are improvements needed at the radio sites to maintain the reliability of the systems. Many of the sites are more than 20 years old and, consequently, the shelters, towers and other facilities are in need of significant maintenance or must be replaced. Below is an estimate of the costs required to put the sites in good working order:

	Estimated One-Time Cost (Millions)	
	Low	High
Site Improvements	**$21.5**	**$28.0**

A brief description of each of the components of the site improvements is included below:

- Equipment Shelter: the facility that houses the radio and networking equipment, typically a prefabricated structure that protects electronic and other equipment from the elements.
- Generator: a device with a motor that powers an electric generator to produce electric power in the event that commercial power is lost. Generators typically include a fuel tank and run on diesel, gas, natural gas or propane fuel.
- Tower: a steel structure that holds the radio receive and transmit antennas. UCA primarily utilizes lattice towers that range from approximately 30 feet to 300 feet tall.
- Site Improvements: alterations to the site location that make construction of the site possible. This can include road construction, site grading, drainage and fencing, etc.
- Electrical Improvements: electrical components such as grounding, upgrade of utilities, installation of equipment power, backup DC power plants, etc.

5.3. Site Connectivity (Microwave, T1s, Fiber)

Below is an estimate of the costs to upgrade the connectivity at approximately 25 of UCA's radio sites. This would primarily include upgrading the microwave equipment at existing sites.

	Estimated One-Time Cost (Millions)	
	Low	High
Site Connectivity Improvements	**$2.4**	**$3.1**

5.4. Radio Consoles

Below is an estimate to replace the more than 220 dispatch radio consoles that are currently installed in the 911 dispatch centers throughout the state. This does not include any additional consoles that 911 centers may wish to install.

	Estimated One-Time Cost (Millions)	
	Low	High
Radio Consoles	**$14.2**	**$18.5**

5.5. Project Management

This section includes the estimated cost of project management services for the system procurement and installation.

	Estimated One-Time Cost (Millions)	
	Low	High
Project Management	**$8.4**	**$11.0**

5.6. User Equipment for State and Local Agencies

With the transition of the radio system to the P25 standard, the mobile and portable radios used by local and state agencies will have to be upgraded to support the P25 standard. Some of the mobile and portable radios can be upgraded with simply a software upgrade, while other radios (older, lower tier radios, etc.) will need to be replaced. Historically, local and state agencies have been responsible for providing their own user equipment, so UCA will need to coordinate the upgrade of the system with agencies so that P25 radios are in place when the new system is implemented in their area.

Although this strategic plan does not include costs for user equipment (since agency mobile and portable radios are not part of UCA's budget), UCA stands ready to help agencies identify and obtain grants or other sources of revenue that might assist our first responders in replacing their obsolete radios.

Section 6 - Administrative Division

In the coming year, UCA's Administrative Division will undertake the following initiatives:

6.1. Succession Planning for UCA

Due to the number of tenured employees, the mission critical deliverables and the unique skill set required of the employees, it is critical that UCA ensures that there is a plan for succession and training, and that adequate funding is available to hire employees and train them under tenured staff.

To address the need for skilled radio technicians, UCA will explore recruiting at colleges that have wireless communications (radio frequency/RF) programs, including at out-of-state colleges such as Idaho State University. UCA will also consider the services of a professional recruiter that could identify experienced candidates from the wireless communications sector.

6.2. Assessment and Reorganization of the Divisions

During 2017, the Authority will fill the positions that have been allocated within the UCA budget, including: (1) one IT Specialist, who will ensure that UCA's networks and data continue to be secure and reliable; (2) two additional Radio Technicians (for each for Cedar City and Price); and (3) one Radio System Manager to administer all radios in the system.

In addition to the budgeted positions, there is a strong need to add a Deputy Director to the staff. Currently, the Executive Director is spending an inordinate amount of time administering the day-to-day operations of the Authority (primarily dealing with personnel issues), which has limited the Authority's ability to focus on strategic goals, relationships with customers and legislators, and policy analysis. In fact, the Authority suffers from a lack of leadership hierarchy and unity of command structures across all divisions.

This organizational deficiency has placed unnecessary and onerous burdens upon the Authority and its staff - and one could make a compelling argument that it was a contributing factor to past employee misconduct. If approved, the needed staff would be added in a phased manner, beginning with the Administrative Division and then working through each of the other divisions.

6.3. Co-Locate Staff in a Single Facility

UCA would like to consolidate its Salt Lake valley staff in a single location in Salt Lake City, which will allow increased collaboration between Divisions, better supervision of personnel and easier accessibility by customers.

While UCA is grateful that DPS has provided office space in the Calvin Rampton Complex for the 911 Division for the past several years, DPS is no longer able to accommodate the Division and the 911 Division will need to be relocated to a new facility. Consolidation will provide a long-term solution for the 911 Division and enable it to collocate with the rest of the UCA staff.

In the coming year, UCA plans to research potential locations for a centralized facility that would support its staff along with the costs associated with such a move. The Board will be apprised of efforts in this area, with a goal of relocating UCA's staff within the next two years. Ultimately, consolidation of the UCA team will enhance the sense of unity, common interest and purpose of the staff and foster esprit de corps among the staff members and the Board.

Section 7 - 911 Division

The 911 Division and Utah's PSAPs are uniquely positioned to create a true statewide 911 network, which has been mandated by the legislature, and to make Utah one of the first states to migrate to GIS based NG911 call routing. The 911 Division has identified five key components that are needed to achieve this statewide implementation:

- Rules and polices recommendations
- Emergency Services IP Network (ESInet)
- Customer Premise Equipment (911 phone system)
- NG911 GIS based call routing
- CAD Aggregator.

7.1. Administrative Rules and Policies

The current Administrative Rule 174 requires clarification to effectively guide the 911 Division and Committee in fairly and equitably making grant recommendations. Further, Rule 174 has been challenged as being out of date and contrary to current Utah law and UCA's legal counsel concurs with this opinion. The current administrative rule makes it difficult for the 911 Division to make objective recommendations to the Director on grant applications for equipment and software. The 911 Division, in conjunction with the 911 Advisory Committee, has drafted updated Rules and policies to replace Rule 174 that address the shortcomings of the current rule and provide the guidance necessary for consistent grant recommendations. Updating Rule 174 is the highest priority of the 911 Division in the first half of 2017.

7.2. Statewide Emergency Services IP Network (ESInet)

For the past five years, the 911 Division and CenturyLink have been working closely to migrate all Utah PSAPs to the ESInet, which is the future of 911. The completion of this migration is expected to be completed by the end of 2017, or the middle of 2018 at the latest. The 911 Division will continue to support and encourage this effort. Once migration to the NG platform is complete, we will be able to fully take advantage of the cost and technology benefits this new platform will afford, such as text-to-911 service, GIS based routing and receipt of data analytics.

7.3. Customer Premise Equipment (CPE) - 911 Phone Systems

Multi-Node Systems

Out of the 33 Primary PSAPs in Utah, listed below are the current established multi-nodes:

Greater Wasatch Multi-Node includes the following agencies: Valley Emergency Communications Center hosting a server, Weber Area 911 Communications hosting the second server with Salt Lake City Police Department Communications, DPS/Salt Lake Communications, Unified Police Department Communications and Bountiful City Police Department running off of this system as remote agencies.

Wasatch Back multi-node that includes: Summit County Sheriff's Office with a server, Wasatch County Sheriff's Office with a server and Park City Police Department running as a remote system (Summit and Wasatch are in discussions to join the Davis County multi-node).

UCAP (Utah County Area PSAPs) multi-node includes: Utah Valley Special Service District Communications hosting a server, Springville Police Department hosting a server with Provo Police Department, Orem Police Department and Pleasant Grove Police Department running as remote systems.

Davis County Multi-Node includes: Davis County Sheriff's Office hosting a server, Layton City Police Department hosting a server with Clearfield City Police Department running as a remote. This group has intends to have discussions with DPS/Box Elder Communications, Summit County Sheriff's Office, Wasatch County Sheriff's Office and DPS/Vernal Communications to move a server from Davis County Sheriff's Office to Summit County Sheriff's Office in an effort to gain a more geographically diverse system.

Recently approved multi-node: Dixie Multi-Node to include St. George PD hosting a server and DPS/Cedar Communications hosting a second server with St. George EOC as a remote; Kane County Sheriff's Office, Beaver County Sheriff's Office and Garfield County Sheriff's Office to intend to discuss joining this multi-node in the future.

Stand-Alone CPE Systems

Rich County Sheriff's Office , Logan City Police 911 Communications, DPS/Box Elder Communications, DPS/Vernal Communications, Tooele County Sheriff's Office, Millard County Sheriff's Office, Garfield County Sheriff's Office, DPS/Richfield Communications, Juab County Sheriff's Office, Beaver County Sheriff's Office, Emery County Sheriff's Office, Grand County Sheriff's Office, DPS/Price Communications, San Juan County Sheriff's Office, Kane County Sheriff's Office, and Sanpete County Sheriff's Office.

Opportunities for Cost Savings

By joining the Dixie multi-node system along with St. George Communications, DPS/Cedar Communications saved approximately $45,000 over what it would have cost to utilize stand-alone equipment. Additionally, it has been estimated that approximately $700,000 more could be saved if Utah's sixteen stand-alone CPE systems joined with already existing multi-node systems, and interoperability would be improved as well.

To provide this interoperability, enhanced connectivity will be required between the stand-alone centers and the multi-node systems. The 911 Division will work with stand-alone centers to research the costs for the 10 Mbps to 30 Mbps connections that will be required.

UCA will review the current practice of purchasing stand-alone systems and regionally hosted systems vs. other options that could include UCA hosted systems, as well as the potential cost savings and interoperability that could come from such a solution.

7.4. GIS Based NG911 Call Routing

Current 911 call routing is done via a local Master Street Address Guide (MSAG), which is handled at the local level. These MSAG tables usually take into account only the coverage area of individual PSAPs and often have invalid address points, road names and road segment ranges. With the move to an NG911 environment, we must also move to a geographical information system (GIS)-based routing solution. A GIS-based routing solution uses X, Y (and where available a Z) coordinates to more precisely provide a caller's location. There are many advantages to a GIS based routing solution, some of which include more precise locations, validated address points, accurate road names and the ability to immediately route calls via a polygon drawn in a mapping system. While the benefits of GIS-based call routing are clear, implementation will require some changes in process at the local PSAP level and input from the local GIS department. Due to the extensive mapping and road centerline cleanup work already completed by the AGRC, Utah is positioned to be the first state to make a full migration to GIS based routing. The 911 Division has formed a GIS sub-committee made up of representatives from the AGRC, the 911 Advisory Committee, CenturyLink, and Frontier Communications to identify the steps needed to complete this migration. Based on our initial conversations, the Division feels that this migration will be completed within 18 months.

7.5. CAD-to-CAD Integration

During the 2015 general session, the Utah legislature enacted §63H-7a-303, which created the CAD Restricted Account. One of the provisions in this statute was to create a shared computer aided dispatch system via a data sharing platform. This CAD-to-CAD data sharing platform was initiated between many Utah PSAPs via an existing software module in the Spillman CAD system, which is used by the majority of the PSAPs. While the current CAD-to-CAD system works, there are some inherent issues with its use. First, the Spillman

CAD-to-CAD system requires a one-to-one connection with each connected PSAP. This means that, for a single PSAP to connect with all other PSAPs on a statewide basis as required by law, 33 individual connections would be required. Each of the other 33 PSAPs would need similar connections to the other PSAPS. This approach would be costly and does not take into account those agencies that do not use Spillman CAD, nor would it address agencies that choose to purchase a different CAD in the future. Second, not all Utah PSAPs are currently connected to the CAD-to-CAD sharing platform. Third, the current CAD-to-CAD solution does not allow for the transmittal of any additional data that may be associated with a CAD call.

It was determined that a more effective CAD data sharing solution should be explored and an RFI was developed to determine whether a solution existed or could be developed that would allow each PSAP to have a single connection to a centralized system for the transmittal of CAD data to any or all PSAPs in the State. The 911 Division issued an RFI for a CAD aggregator in early November 2016 with the responses due December 15th, 2016. The 911 Division has selected a sub-committee of individuals to review the five responses that were received. The sub-committee consists of members of the 911 Division, three members of the 911 Advisory Committee, two UCA Board members and a representative from the Salt Lake Valley Emergency Communications Center. Members of the Utah Department of Emergency Management, Statewide Information & Analysis Center and the Department of Transportation have also been invited to participate in the discussion.

The goal of the sub-committee is to: 1) identify whether any vendor is capable of connecting the CAD systems in Utah at a reasonable cost and 2) to assist with the drafting of an RFP to acquire the solution, if so authorized by the Board.

7.6. Summary

The 911 Division has a lot of work and some challenges to contend with in the next few years; however with the support of Director Edmunds and the Board we see these challenges as opportunities. These opportunities will allow Utah to take its place at the forefront of the 911 industry, and for the UCA to join a very elite group of states at the cutting edge of 911 governance.

Section 8 - Interoperability Division

8.1. Division Overview

The mission, vision and strategic goals of the Interoperability Division are described below:

Mission

To achieve interoperable communications, the Utah Communications Authority Interoperability Division will provide a strategic framework that will help develop and support communications, partnerships with state, local, tribal, and federal public safety entities through the efficient development and use of communication resources, policies, procedures, training, and exercises.

Vision

Fiscally sustainable, interoperable statewide voice and data network that enables responders in Utah to effectively communicate across disparate systems during normal activities or during any type of event or disaster, as they discharge their duties to protect lives and property.

Strategic Goals

The following strategic goals represent the priorities for delivering Utah's vision for interoperable and emergency communications.

Governance

- Facilitate a forum to discuss interoperability strategies, goals, and solutions

Standard Operating Procedures (SOPs)

- Create, formalize, and maintain SOPs for interoperable communications for multi-jurisdictional incidents
- Establish a written SOP for interoperability channels

Technology

- Upgrade current radio technology

Training and Exercises

- Incorporate communications processes into all training and exercises, including PSAPs, COMLs, COMTs, and AUXComm
- Support training for newly developed and adopted SOPs
- Conduct additional COML and COMT training
- Conduct Incident Dispatcher Training
- Develop training curriculum for radio system expansion to address additional footprint and impact on PSAPs and communications centers

Usage

- To encourage the proper use of interoperable channels during incidents and planned events supporting multiple disciplines and agencies

Outreach and Information Sharing

- Provide outreach and education in support of public safety interoperable communications

Life Cycle Funding

- Identify and recommend sustainable funding mechanisms to support public safety communications

8.2. 2017 Initiatives

In the coming year, UCA's Interoperability Division will work to complete the following initiatives:

Identify and Address Interoperability Challenges

The communications landscape in Utah presents unique challenges for emergency responders as they perform their duties to protect lives and property. The Interoperability Division has recently updated the State Communications Interoperability Plan (SCIP) with governance, goals, and initiatives essential to improving daily operations and disaster response. This, coupled with the National Emergency Communication Plan (NECP), creates the framework for the UCA interoperability Division to engage with stakeholders to address the state's interoperability challenges.

The Interoperability Division will hold monthly technical advisory committee meetings to facilitate these discussions and work to complete the goals and initiatives of the SCIP and the NECP. Through these engagements, efficient and cost effective solutions to interoperability challenges will be determined.

Continue to Monitor Developments of FirstNet Program

Much has been discussed in the past year about the buildout and operation of the national broadband LTE data system that FirstNet plans to deploy. Some leaders in the state have questioned whether the FirstNet system will eliminate the need for the state's VHF and 800 MHz land mobile radio (LMR) radio systems and whether additional investments in the LMR systems should be made. The FirstNet system being planned will not meet the critical voice communications needs of Utah's first responders for the foreseeable future and that the LMR systems in the state must be properly funded to ensure that EMS, fire and law enforcement personnel continue to have effective radio communications.

UCA is awaiting receipt of the State Plan draft for Utah that will be developed by FirstNet and its selected vendor, once their contract is awarded. While the initial draft plans to the states were expected in the first half of 2017, ongoing litigation by an unsuccessful bidder is likely to push the timeline for receipt of plans well into 2018 or beyond. Once Utah's plan is received, UCA will review the plan and provide feedback to FirstNet and, ultimately, the Governor, who will make the decision whether or not to opt-in to the FirstNet plan.

Regarding the relationship between the FirstNet LTE system and public safety LMR systems, FirstNet itself has stated:

> "First responders currently use land mobile radio (LMR) networks for mission critical voice communications. When the nationwide public safety broadband network (NPSBN) is launched, it will not replace their LMR systems. The network is expected to initially transmit data, video, and other high-speed features, such as location information and streaming video, as well as non-mission critical voice. Public safety entities will continue to use LMR networks for their mission critical voice needs."
>
> (http://www.firstnet.gov/network/lmr)

In the coming years, the LTE system may provide an improvement over the commercial data services that are currently being utilized by public safety users, but UCA strongly feels that an upgraded LMR system is the only viable alternative for mission critical voice services in Utah for the foreseeable future. UCA has and will continue to participate as a stakeholder in the development of FirstNet and will address the viability of the FirstNet network in future updates to this plan.

Communication Unit Leader and Communication Technician Training

One of the key roles of the Interoperability Division is to manage the training and certification of Communications Unit Leaders (COMLs) and Communications Technicians (COMTs). There are currently a large number of agency personnel across the state that have taken the classroom portion of the COML and COMT training but have not been certified. Without certification they will not be considered qualified to work a "real world event" as a COML or COMT. The Interoperability division, through a technical assistance request from the Office of Emergency Communications (OEC), is planning a communications exercise in the second quarter of 2017. This exercise will provide certification of 12 COMLs and 12 COMTs in Utah. Subsequent exercises will be planned throughout the year to allow others to complete the certification process.

Provide Communications Support for the State Emergency Operations Center (EOC)

The Interoperability division is responsible to provide support to the State EOC by serving as the Emergency Services Function 2 Lead on the State Emergency Response Team (SERT). The Interoperability division provides this support by participation in the monthly SERT training meetings and participation in disaster recovery exercises throughout the year.

Section 9 - Conclusions

In summary, we believe that implementation of the recommendations outlined in this Strategic Plan will ensure that UCA maintains modern, effective and reliable radio and 911 systems throughout Utah for decades to come. This should directly improve the effectiveness and safety of local and regional field personnel and enhance the delivery of public services to the citizens of Utah. We look forward to working with UCA's stakeholders to make this plan a reality.