

# Utah

## State Interoperability Executive Committee



## Radio Interoperability Initiative



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## Document Revisions

<b>Rev</b>	<b>Date</b>	<b>Changes</b>
1.0	10/25/08	Original draft
1.1	10/27/08	Dropped governance and other controversial issues and increased focus on current model vs. future model. Dropped 'three strategy' model in favor of a focus on interoperability funding methodology.
1.2	10/28/08	Modified document with minor clarifications. Grammar corrections.
<b>1.3</b>	<b>12/08/08</b>	<b>Focused funding on telephone surcharge. Re-aligned from multiple technology options, to multiple funding levels.</b>

## Executive Summary

Utah's public safety communications infrastructure stands at yet another crossroads. Over the past decade, challenges of technology, spectrum, funding, and governance have lead to a series of necessary heroic efforts to ensure our first responders have the means to communicate.

When the Public Safety Telecommunications Section transferred to the Department of Administrative Services in 1992, the newly re-established organization was unable to convince the Director of the Division of Information Technology Services (ITS) of the urgent need to provide trunking technology in the 800MHz spectrum –particularly in the region of the Wasatch Front. The Wasatch Front region was split into a myriad of different services and spectrums, making effective radio communications difficult at best. Not only was the simplistic conventional radio system unable to handle the volume of traffic required every day, but the differing spectrums and technologies raised serious challenges to interoperability between agencies.

With the state seemingly unwilling or unable to address the urgent need for improved communications, an intergovernmental Task Force was established to study the issues. The group was made up of state, local and city representatives. A consultant was hired to assist in the study. Ultimately in 1997, the Utah Legislature created the Utah Communications Agency Network (UCAN). All agencies which are served by UCAN are members of a board which provides direction for the agency. From among that membership, a fifteen-member executive committee serves as oversight to the agency, with the Executive Director reporting to the Executive Committee.

Starting with basically nothing, UCAN worked with agencies to establish user fees, pool grant funding, and set up an \$18M bond in order to establish the 800MHz trunked network that our Wasatch Front first responders enjoy today. When Utah received the bid for the 2002 Winter Olympics, additional funding was obtained to add to the initial effort to meet the needs of serving the public safety and Olympic communications needs with one system. That system was left as a legacy to the agencies who participated in developing UCAN. The system has expanded and now serves in about 12 counties in Utah. With the assistance of sporadically available federal funding, as well as a spectrum trade with Sprint/Nextel, the UCAN network has been able to refresh certain elements of its infrastructure, though much of the network is now approaching ten years of age. It is estimated that current UCAN infrastructure would now cost close to \$70M if it had to be built from scratch again.

To date, the successes of Utah's public safety radio communications infrastructure has required efforts that are nothing short of heroic to keep it moving forward. But with the pending FCC 'narrowband' requirement, aging infrastructure that is now approaching 'end-of-life' (factory parts and/or support no longer available), and interoperability issues along the border of 800MHz radio coverage, we need more than heroic effort. **We need legislative action to establish an on-going funding source sufficient to ensure our**

**state's radio infrastructure can not only remain viable, but also make the necessary move to the next generations of technology.** User fees must be reduced (if not eliminated) to ensure all agencies and localities can afford to participate in the same technology –ensuring critical interoperability between responding units.

## **Background**

### **History of the State's Radio Communications Network**

**1960-1980s:** Public safety agencies utilized analog radio systems operating in the 44-47 and 150 MHz frequency range. The FCC isolated this radio spectrum for use by governmental agencies to provide public safety communications.

**Early 1990s:** 150 MHz spectrum became overused and several agencies along the Wasatch front moved to UHF systems operating in the 460 MHz spectrum to avoid congestion and gain better structure penetration.

**1993:** Intergovernmental task force of more than 50 public safety communication and technology experts established. Given the task of evaluating and recommending the technology needed to meet Utah's long-term public safety radio communications needs during the next 25 years. The task force members concluded that a fully interoperable radio communications system could be met with 800 MHz trunked radio technology. It was to be a statewide system serving all public safety agencies, phased in over a period of years.

**1995:** When Salt Lake City was selected to host the 2002 Winter Olympics, Federal and State public safety administrators recognized that antiquated conventional communications systems in the region were inadequate to handle the impending public safety requirements and utilized the Utah Communications Agency Network (UCAN).

**1997** Utah Legislature passed H.B. *187 State and Local Public Safety 800 Megahertz Project*. This legislation established the Utah Communications Agency Network (UCAN), an independent state agency responsible for providing governmental public safety communications services and facilities. UCAN was tasked with the implementation of a statewide 800 MHz trunked radio communications network in support of public safety.

**1999:** UCAN began construction of the 800 MHz radio system, at which time Salt Lake City and Salt Lake County were already operating on an independent 800 MHz trunked radio system along with separate conventional VHF 150 MHz and UHF 460 MHz systems. The City of Ogden was also operating on a conventional UHF 460 MHz system. The balance of state public safety agencies operating outside the populated

Wasatch Front region were operating on independent conventional VHF 150 MHz radio systems.

**2002:** When Salt Lake City hosted the Winter Olympics, UCAN had successfully consolidated all public safety agencies operating in the Wasatch Front and “Back” regions under a single 800 MHz trunked radio network except Salt Lake City and Salt Lake County, which continued to operate independent 800 MHz trunked radio systems. Despite a near 1000% increase in public safety communications during the Winter Olympics the UCAN communications network exceeded performance expectations, garnering national recognition for the state’s interoperable capabilities.

After the Winter Olympics, public safety agencies with statewide jurisdiction encouraged UCAN to expand 800 MHz coverage into other regions of the state as defined by UCAN’s legislative mandate. That has taken place with the cooperation and partnership of local agencies who desire to join. However, expanding the UCAN communications network under the current cost-recovery model into the more rural areas of the state might have a significant impact to UCAN user rates due to the fact that there are currently not enough potential subscribers in less populated areas of the state to offset the cost of network expansion.

**2004:** DPS-UCAN cooperatively installed (using a federal grant) a Motorola *Omni-Link* audio bridge that provides interoperability between the UCAN network, Salt Lake City, the Statewide Repeater System (SRS), and a majority of PSAP dispatch centers in the state.

**2005,** The Department of Technology Services (DTS) was formed with the passage of the Utah Technology Governance Act (H.B. 109), bringing the State Radio Shop and radio communications services (except UCAN) under the direction of the State Chief Information Officer (CIO).

**2007:** Governor Jon Huntsman, through Executive Order, establishes the Utah *Statewide Interoperability Executive Committee* (SIEC) encouraging communities and public safety entities in the state to implement a long term statewide interoperability strategy involving all federal, state, and local government public safety entities’ operating in Utah to unify around common interoperability standards and objectives.

**2008:** Attempted legislative actions:

- Building block funding request by DTS for new narrowband compliant radios (\$700,000 one-time) – not approved by Appropriation Subcommittee.
- HB 292 – Legislative taskforce to address statewide narrowband and interoperability issues, bill passed, not funded.

## National Interoperability

The *National Emergency Communications Plan* (NECP) is a strategic plan that sets goals and identifies key national priorities to enhance governance, planning, technology, training and exercises, and disaster communications capabilities. The NECP provides recommendations, including milestones, to help emergency response providers and relevant government officials make measurable improvements in emergency communications over the next three years.

### NECP Goals

The U.S. Department of Homeland Security (DHS) defined a series of goals that establish a minimum level of interoperable communications and a deadline for Federal, State, local, and tribal agencies to achieve that minimum level. These goals provide an initial set of operational targets that will be further defined by the Office of Emergency Communications (OEC) through a process that engages Federal, State, and local governments; the private sector; and emergency responders.

**Goal 1:** By 2010, 90 percent of all high-risk Urban Areas designated within the Urban Area Security Initiative (UASI) are able to demonstrate response-level emergency communications within one hour for routine events involving multiple jurisdictions and agencies.

**Goal 2:** By 2011, 75 percent of non-UASI jurisdictions are able to demonstrate response-level emergency communications within one hour for routine events involving multiple jurisdictions and agencies.

**Goal 3:** By 2013, 75 percent of all jurisdictions are able to demonstrate response-level emergency communications within three hours of a significant event as outlined in national planning scenarios.

The vision of the NECP is to ensure that emergency response personnel at all levels of government and across all disciplines can communicate as needed, on demand, and as authorized, through improvements in communications operability, interoperability, and continuity nationwide.

The *Statewide Communications Interoperability Plan* (SCIP) is a strategic plan that sets goals and identifies key statewide priorities to enhance governance, planning, technology, training and exercises, and disaster communications capabilities. The SCIP also recommends a funding strategy for regional and statewide communications projects. The SCIP was developed and published by the Utah Statewide Interoperability Executive Committee (SIEC). The SIEC is a statewide committee with federal, state, and local government representation, created by executive order, for the purpose of facilitating common regional and national objectives. The U.S. Department of Homeland Security requires an alignment of state and regional objectives with objectives identified in the NECP.

## **SCIP Goals**

The Utah SIEC defined specific goals that establish a minimum level of interoperable communications for public safety entities operating in the region. These goals provide an initial set of operational targets that will be further defined by the SIEC through a process that engages Federal, State, and local governments; the private sector; and emergency responders.

1. Promote and establish regional and statewide standard operating procedures for communications interoperability.
2. Secure long term sustainment funding.
3. Promote enhanced communications interoperability through a migration of core systems to IP based infrastructure and standards based P25 air interface technologies.
4. Promote and implement the expansion of overlapping statewide VHF and 800 MHz coverage.
5. Coordinate interoperable communications with neighboring states and regions.
6. Promote and implement common channel naming and programming standards.
7. Develop a statewide strategy to address a catastrophic loss of communications assets.
8. Develop a statewide strategy for communications interoperability with major public and private transit systems.
9. Incorporate *National Incident Management System* (NIMS) compliant emergency communications training and exercise into regional and statewide training and exercise programs.
10. Promote increased spectrum efficiency.
11. Provide predictable system management and governance.
12. Provide predictable system maintenance.

The vision of the SCIP is to ensure that emergency response personnel at all levels of government and across all disciplines can communicate as needed, on demand, and as authorized, through improvements in communications operability, interoperability, and continuity statewide.

## Current Funding Models

**Federal:** In order to consolidate funding and facilitate public safety radio interoperability, the federal government requires that all radio funding for those agencies that fall under the Department of Justice (DOJ) umbrella, be funded by the DOJ. As a result, the DOJ makes all funding decisions. Each agency (including, but not limited to, the Federal Bureau of Investigation (FBI), United States Marshal Service (USMS), Department of Homeland Security / Border Patrol, Drug Enforcement Agency (DEA), Alcohol Tobacco and Firearms (ATF), etc. provides justification when requesting their funding from DOJ. Either way, all decisions and funding for radio equipment and standards fall outside of the local area agency's control. All decisions fall under each agency's headquarters personnel and DOJ. As a result, the FBI is issued 150 to 180 MHz radios. DEA is issued 450 MHz range radios. Even within the same department and funding head, the regional FBI office reports they cannot presently communicate with one another at this time.

**State:** The State Legislature funds 100% of the DTS public safety radio infrastructure. UCAN's user fee revenue is derived from: 30% State, 68% local government, and 2% non-government. [Reference: UCAN FY 2009 Budget] State agency users maintain multiple radio systems in order to communicate with local users in areas of operation. End-user equipment refreshes are not usually funded in any specific way, relying most often on re-directing general fund budgets, or obtaining grant monies.

**Local Government:** Local government agencies typically derive their radio funding (infrastructure if they provide their own, and end-user devices) from the general fund of their tax base. Infrastructure benefits from the higher tax base in more densely populated areas. Duplication of networks exists because of the lack of available funding in sparsely populated areas. Unable to support a financial business case, rural agencies can only participate in the UCAN 800 MHz trunking technologies if the larger Wasatch Front agencies agree to subsidize the region with their own user fees. This has not been the case to date, since all geographic growth to date has been a cooperative effort with shared grant funding (for example) that has allowed the current UCAN rate to remain intact.

## Future Funding Models

<b>Type</b>	<b>Pro</b>	<b>Con</b>	<b>Notes</b>
<b>Subscriber Fees</b>	<ul style="list-style-type: none"> <li>• On-going source of revenue</li> <li>• User fees based on actual use</li> <li>• Members pay for the right to govern themselves</li> <li>• Self-sustaining as long as fee covers depreciation, allowing technology refreshes</li> </ul>	<ul style="list-style-type: none"> <li>• User fees become an issue for smaller agencies</li> <li>• Smaller stand alone networks are often not interoperable</li> <li>• Funding inequities create technology inequities</li> </ul>	<ul style="list-style-type: none"> <li>• Current state model</li> </ul>
<b>Legislative Appropriation</b>	<ul style="list-style-type: none"> <li>• Ongoing funding source</li> <li>• Reduce or eliminate user fees</li> <li>• Encourages standard technology platform for interoperability</li> <li>• Ubiquitous fees for all non-state agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Limited availability</li> <li>• No guarantee from year to year</li> <li>• Competition for funding may create inequality to access technology</li> <li>• Doesn't promote self-governance via body of rate payers</li> </ul>	<ul style="list-style-type: none"> <li>• Recurring line item for appropriation</li> <li>• Subscriber fees for local and federal</li> </ul>
<b>Surcharge</b>	<ul style="list-style-type: none"> <li>• Ongoing funding source</li> <li>• Reduce and even-out all user fees</li> <li>• Ensure standard technology platform for interoperability</li> <li>• Growth with population</li> </ul>	<ul style="list-style-type: none"> <li>• Perceived as "tax"</li> <li>• Regulatory and governance issues</li> </ul>	<ul style="list-style-type: none"> <li>• Must be enacted by an executive or legislative body</li> </ul>
<b>Federal Grant Funds</b>	<ul style="list-style-type: none"> <li>• Quick up-front money</li> <li>• Good for one-time projects</li> </ul>	<ul style="list-style-type: none"> <li>• No or little spending allowed for on-going costs</li> <li>• Not a reliable source</li> </ul>	<ul style="list-style-type: none"> <li>• Should never be considered primary source of funding</li> </ul>
<b>Bond Funds</b>	<ul style="list-style-type: none"> <li>• Quick up-front money</li> <li>• Good for one-time projects</li> </ul>	<ul style="list-style-type: none"> <li>• Measures hard to pass (except for UCAN, which already had bonding authority)</li> </ul>	

## Challenges and Solutions

### Challenge: FCC Narrowband Mandate

FCC Docket No. 99-87 establishes a January 1, 2013 deadline for migration to 12.5KHz technology for licenses below 512MHz. This affects all public safety agencies that operate in the VHF (150 MHz) and part of the UHF (450MHz) spectrum.

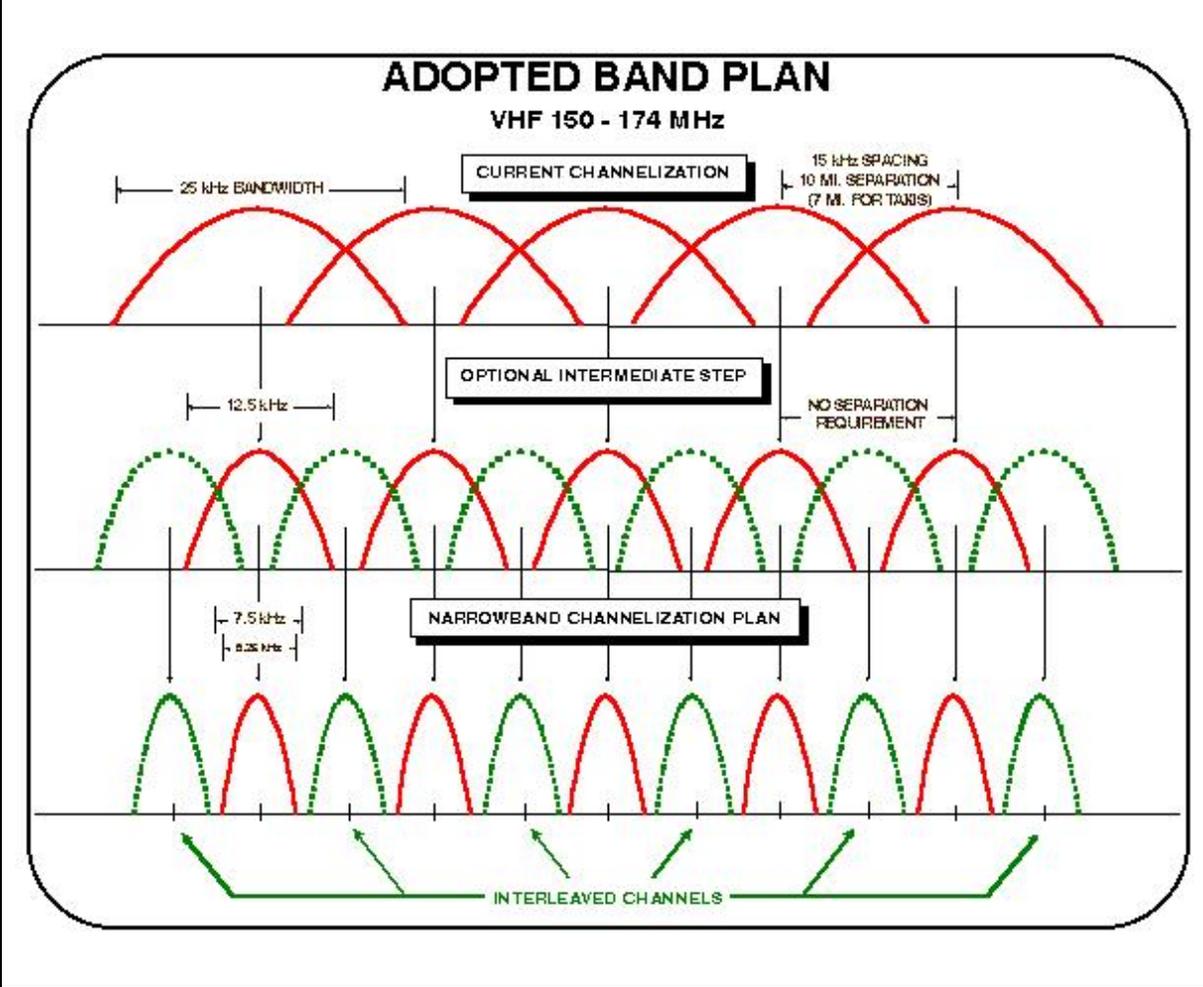
Most public safety agencies within Utah use 150MHz or 800MHz infrastructures. Many agencies stand ready to execute individual plans to migrate to narrowband operation, but individual agency migration will negatively impact interoperability with surrounding agencies that are not ready to migrate to narrowband. It is unlikely that these agencies will wait until the 2013 deadline to make the switch to narrowband operation, since they have already invested in the necessary technology. **All agencies need to make the step to narrowband simultaneously to ensure interoperability.**

The State Interoperability Executive Committee (SIEC) has a standing Narrowband sub-committee that is working to create solutions to the migration challenges. They are identifying effected license holders and obtaining data relative to migration readiness. This report provides a high-level visual representation of statewide readiness in Appendix A: "FCC Narrowband Readiness".

There are two types of agencies that are lagging behind in narrowband conversion –both due to available funding: Rural counties who rely heavily on volunteer fire/EMS/Search and Rescue, and State agencies.

Agencies which hold FCC licenses that fall within the spectrum subject to the FCC mandate need to file for a license modification to bring them into compliance with narrowband. The license modifications can be accomplished immediately, even if the agency is not ready to migrate yet. Failure to bring licenses into narrowband designation may endanger the primary status of the license holder on that frequency(ies).

"Refarming" is the informal name of a notice and comment rule-making proceeding (PR Docket No. 92-235) opened in 1992 to develop an overall strategy for using the spectrum in the private land mobile radio (PLMR) allocations more efficiently to meet future communications requirements. A minimal strategy would be to relicense current frequencies right where they are. A more optimal strategy is outlined in SIEC Policy Action 05-2008 "Narrowband Engineering Best Practices". The practice of refarming is a pro-active approach to selecting more optimal frequencies with more optimal channel spacing to reduce co-channel interference and maximize transmitter and receiver performance. Narrowbanding affords twice as much spectrum as before, but we will leave most of the spectrum potential untapped if everyone simply relicenses on the same frequency they had before. (See chart below)



## Proposed Solutions for Narrowband Mandate

- Notification Letter (complete)** notifying all public safety agencies within Utah of the urgency to immediately modify their FCC licenses to ensure primary status.
- State Award Frequency Coordination Bid (complete)** to one or more of the frequency coordination bodies authorized to coordinate public safety frequency spectrum. The award should be statewide to allow all local government agencies to use it for the coordination efforts.
- Obtain Legislative Funding for State Agencies** to replace their non-compliant wideband radios with narrowband radios.
- Set a Migration Date Within the Next Two Years** for all state and local government to transition to narrowband operation in the VHF spectrum. The SIEC Narrowband Committee should produce a regional plan that outlines how and when the entire state will be transitioned.

## Challenge: Funding

UCAN and DTS recover their operating costs almost exclusively through user fees. Federal and local government agencies, for the most part, operate from within a budgeted allotment. These incongruent funding sources tend to move against the interests of the public safety community of 1<sup>st</sup> responders, who are continually attempting to align funding sources with business models, neither of which are usually optimized to meet public safety's needs.

Rural areas of the state cannot afford the rates that must currently be levied to recover the costs of connecting them to a central technology. Their limited funding keeps them from being able to use trunking technologies as well as the installation and maintenance of even 800MHz conventional stations that would at least allow Wasatch Front agencies the ability to be interoperable should they deploy into a rural region. State and other Wasatch Front agencies that utilize the newer trunking technologies are often unable to use their radio equipment in these rural areas due to lack of compatible infrastructure.

If the state can create and fund a central technology platform that is not **completely reliant on** ~~on~~ ~~and~~ ~~is~~ ~~not~~ ~~completely~~ ~~reliant~~ ~~on~~ ~~user~~ ~~fees~~, then agencies throughout the state could afford to participate in a shared, interoperable technology. It is unlikely that an agency would choose to invest in an expensive, incompatible infrastructure, if a central platform was available at **a reasonable** ~~little or no~~ cost. Agencies would still be responsible for their own end-user devices, and infrastructure that is tied to the central platform could be owned and managed in a wide variety of ways. For instance, if the core components of the current OmniLink system (or future IP-based system) were fully funded, UCAN would be able to use the savings in depreciation and maintenance expenses to grow or enhance their current coverage footprint.

## Proposed Solutions for Funding

In order to achieve and maintain statewide interoperability between all agencies within Utah, a centralized funding source must be established to finance a central technology platform that all public safety agencies have access to.

**Develop a recurring funding source** that will provide a well-defined central technology platform, and the necessary connections to it. This will allow local agencies to own and implement their own communication infrastructure, while ensuring that infrastructure is compatible with what the rest of the state is doing. **The SIEC suggests a telephone surcharge. This manner of revenue is similar in method and management to that of the state**

911 surcharge. The 911 surcharge has been nationally successful in helping to ensure the safety of our citizens, but it does not cover the emergency communications that need to occur after the call is received by a dispatcher.

**Option #1: Telephone Surcharge**

The current 911 funding model provides for communications from an endangered citizen to a dispatcher, but without the dispatcher’s ability to communicate with 1<sup>st</sup> responders, the dispatcher cannot direct help to the citizen. We have funded only half of the emergency communications need.

The State of North Dakota has established a telephone surcharge that is capable of sustaining, operating, and refreshing its statewide emergency communications infrastructure. Oversight is provided by a common committee similar in structure to Utah’s SIEC. A centralized funding mechanism can be utilized to ensure interoperability through the exercise of common oversight..

**Option #2: Direct Appropriation from the Legislative General Fund**

~~Prior to Hurricane Katrina, the state of Louisiana operated a statewide communications infrastructure that was completely reliant on user fees. After Hurricane Katrina, the Legislature quickly executed a new funding model that provided the necessary interoperability elements between first responder agencies. The state recognized (too late) it’s role in providing interoperability elements that individual agencies seldom see as a priority. According to Louisiana’s Rex McDonald, Director of Communications and Information Technology:~~

*~~“Until Hurricane Katrina we utilized user fees to support the maintenance of a State Radio system. However, we were only able to attract State Agencies and a very few local users. Since then we have changed to a General Fund appropriation and are bringing all State and Local users on a new 700 Megahertz system to be completed in the next 18 month. The southern half of the State is already complete.”~~*

~~Note: When times are tough—like now—this would tend to lower public safety funding on the Legislative priority totem pole.~~

**Option #3: Recreational Assessment or Impact Fee**

It is a common misperception that rural emergency communications are not as important as more populated regions. The fact of the matter is that in many of our highly recreated regions of the state, the local citizenry are not the ones requiring rescue response. These brave citizens typically volunteer their time as well as their sparse tax dollars to save the lives of those living along the Wasatch Front, as well as other states citizenry. A revenue source derived from recreational licensing would

~~more accurately align use to response. The challenge with using this source exclusively is that revenues would tend to fluctuate greatly.~~

## **Proposed SIEC Initiative**

### **Current Model**

#### **Technology**

Public safety entities operating in Utah generally use either VHF or 800 MHz spectrum. Agencies in the heavily populated Wasatch Front region generally use radios designed to operate in 800 MHz spectrum while agencies in less populated rural counties generally use radios designed to operate in VHF spectrum. Radio equipment designed to operate in either band of spectrum are incompatible with radio equipment designed to operate in the other band of spectrum. This incompatibility is currently addressed by patching radio channels from one band of spectrum to radio channels from the other band of spectrum which establishes a temporary link between systems. This solution only works where overlapping radio coverage between VHF and 800 MHz systems exist. Without overlapping radio coverage systems cannot be patched together in a way that allows first responders operating on one system to communicate with first responders operating on the other system.

The State of Utah and UCAN currently provides interoperability between VHF and 800 MHz radio systems utilizing a large capacity audio bridge (Omnalink) . Functionality of the current interoperability solution is limited by the fact that overlapping radio coverage between VHF and 800 MHz systems exists in less than 50% of the state's geography.

#### **Funding**

The current funding model for Utah's emergency communications radio network consists of a mixture of federal, state, and local government dollars. The two state agencies charged with providing public safety radio communications recover their costs via user fees, while the federal and local government agencies which own and manage their own infrastructures cover their costs within fixed annual budgets.

- **UCAN**  
The Utah Communications Agency Network (UCAN) serves over 16,000 users throughout Northern Utah. It was originally constructed during the period of 1997-1998 1999-2001 with a mixture of grant funds and a bond. It was further enhanced with grant funding available for the 2002 Winter Olympics. UCAN's user fees allow it to recover operating costs, and as the number of users has steadily increased over the years, has allowed for a modest amount of retained earnings, debt service and technology refreshes.

UCAN Fee Per Agency Type	Monthly
State and Federal Government	\$28.00
Local Government	\$23.25
Non-Government Entities	\$28.00
Search & Rescue and Volunteer Fire (50% full rate)	\$11.63

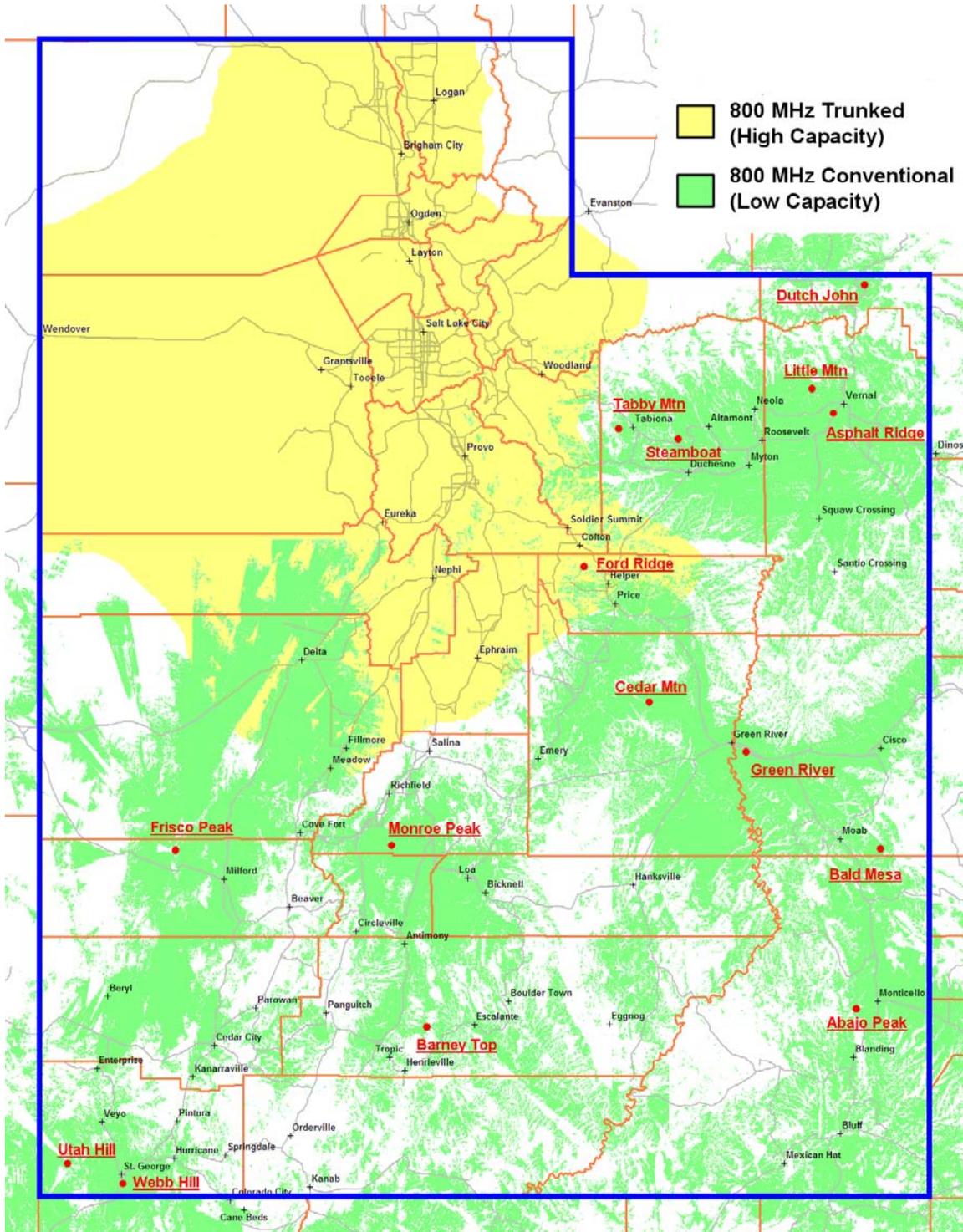
- DTS**  
 The State of Utah, Department of Technology Services (DTS) provides statewide public safety radio services to state agencies and recovers costs through a \$14.69 per month user fee. There are currently 2,877 state radios paying user fees. Local users of this service do not pay a fee which is why the state fees could be perceived as higher without that support.

**Limitations of Current Model**

Each agency adequately covers or recovers their current operating expenses, but the ability to expand –or even to refresh current networks is frequently diminished or non-existent. Further, the fiscal ability for these various communications systems to be *interoperable* is highly limited. In 2006, the state Legislature created a recurring block fund to assist with interoperability issues. The OmniLink initiative provides \$650,000 annually to help cover circuit costs which connect all public safety dispatch centers in the state, but still falls short of what is needed for critical communications interoperability. **With recent budget constraints, that annual amount is about to be reduced by the Legislature.** UCAN continues to support the audio switch at their cost.

**Over the last two decades, communications technology has changed from high-powered, wideband, low frequency transmitters located in remote regions with sparse coverage, to higher frequencies, lower power, narrower bandwidths, and delivers more technology (voice/data). This migration is not dissimilar to what most people have seen with the cellular industry. Two decades ago, cell phones didn't work well inside buildings, and required large 'bag phones' to handle the enormous battery required to maintain relatively high-powered transmissions to mountaintop locations. While private industry has significantly improved technology and infrastructure by collecting fees from a much larger customer base, the public safety community has seen a much smaller increase in the number of users, but is expected to operate virtually everywhere.**

# Current 800 MHz Statewide Coverage



# Future Model

## Technology

The Utah SIEC promotes the adoption and implementation of enhancement objectives as described in the SAFECOM interoperability continuum and National Emergency Communications Plan (NECP). System migration to IP based infrastructure technology will improve design efficiency and may provide significant cost savings for interconnectivity between systems and resources. The migration to IP based infrastructure is also required to support standards based P25 air interface technology objectives. The Utah SIEC also promotes expanded VHF and 800 MHz radio coverage in the state with a minimum of 80% overlapping coverage. High capacity 800 MHz trunked system coverage is recommended in large population centers and along major transportation routes in the state.

## Funding

The funding model of the future will adequately cover costs for existing systems to include: depreciation, capital, retained earnings, operations, expansions, and interoperability. The ‘heroic efforts’ mentioned in the executive summary have brought us to where we are, but we would be remiss if we continue to assume heroic efforts will always be successful as our critical communication infrastructures age and diminish their relative coverage footprints as geographic populations increase and radio spectrums move to higher frequencies, lower transmit power, and narrower frequency bandwidths.

Following the success of the 911 funding model, **Utah’s SIEC proposes a surcharge on all phones within Utah.** The charge would collect revenue that would then be directed toward communications interoperability solutions by the SIEC. Currently, our emergency response capabilities are only half funded by the 911 surcharge. A citizen calling in an emergency can reach help thanks to the revenue collected by the 911 surcharge, but what good does that accomplish if the dispatcher cannot then reach the necessary 1<sup>st</sup> responder unit on the radio?

### **The funding mechanism of the future will consist of the following elements:**

- A revenue stream that matches the growth of the population the radio system is expected to serve.
- Reduce ~~or eliminate the use of~~ user fees which require agencies in populated regions to subsidize rural agencies with too few users to recover infrastructure costs. **User fees should be set to the lowest-possible common denominator.**
- Enough flexibility to respond to the ever-changing needs of interoperability between disparate systems.
- **Focus on interoperability**

- A portion of the collected fee would remain where it is collected –at the county level, similar to 911.
- Oversight by a non-partisan committee (SIEC) which can weigh the merits of multiple agency requests for funding, and ensure national and statewide priorities and specifications are met. Such oversight should include:
  - Infrastructure upgrades
  - New Infrastructure
  - Coverage expansion
  - Technology upgrades

**Required Funding Levels**

A SIEC Task Force established estimated costs for a reasonably efficient statewide public safety communications system. The table below illustrates the cost and proposed revenue stream required to implement and operate a statewide interoperable public safety network. The revenue is derived from anticipated income from approximately 2.9 million telephones within the state of Utah; The Operational Costs assume an estimate of \$6.5M in state (UCAN/DTS) and \$2.5 million in non-state costs.

**Proposed System Costs**

Item	Annual \$
Infrastructure*	\$8,269,000
Planning/Engineering	\$635,000
Operating	\$9,500,000
<b>TOTAL ANNUAL</b>	<b>\$18,404,000</b>

\* Seven Year Depreciation

**Telephone Surcharge on 2,900,000 Telephones**

Surcharge	Annual Revenue	System Costs Covered
50 Cents	\$17,400,000	95%
40 Cents	\$13,920,000	50%
30 Cents	\$10,440,000	20%

If capital purchases which are in excess of the annual revenue are required, DTS has limited capital authorization. Additionally, UCAN has legislative authority to bond. With the strong revenue stream made available through the telephone surcharge, repaying bonds for capital outlay is a good fit.

## Benefits of Future Model

The funding solution described in this document will ensure 1<sup>st</sup> responders throughout all of our communities have sufficient abilities to communicate with each other.

SIEC oversight of a centralized fund will ensure alignment with federal, state, and local government emergency communication plans, while ensuring all agencies are given the flexibility they need to own their own infrastructure or partner with each other to form communications solutions that can be governed in whatever way they collectively see fit.

Efficient and cost-effective solutions will survive and grow, while inefficient methods and technology will remain stagnant with **limited** ~~less~~ ~~or no~~ funding.

Tomorrow's funding model will operate in a public forum, common to all 1<sup>st</sup> responder agencies. Decisions that effect one-another will be made collectively. Even as the SIEC would serve a role in ensuring interoperability objectives are met, local government agencies would still be free to use their own funding mechanisms to fund systems they feel are appropriate –regardless of any SIEC standards. Local government agencies should not be expected to support initiatives that remove their ability to self-govern themselves or their communications assets.



## **References**

FCC Frequency Refarming

[http://wireless.fcc.gov/services/index.htm?job=operations&id=private\\_land\\_radio](http://wireless.fcc.gov/services/index.htm?job=operations&id=private_land_radio)

## Appendix A

### FCC Narrowband Readiness

Reg	County	End-User Equipment	Infrastructure
<b>I</b>	Box Elder		
	Cache		
	Rich		
	Weber		
	Davis		
	Morgan		
<b>II</b>	Tooele		
	Salt Lake		
	Utah		
	Summit		
	Wasatch		
<b>III</b>	Juab		
	Sanpete		
	Millard		
	Sevier		
	Piute		
	Wayne		
<b>IV</b>	Beaver		
	Iron		
	Washington		
	Garfield		
	Kane		
<b>V</b>	Duchesne		
	Daggett		
	Uintah		
<b>VI</b>	Carbon		
	Emery		
<b>VII</b>	Grand		
	San Juan		
<b>STATE</b>	DPS		
	DOT		
	UDC		
	DNR		
	DOH		
	TAX		
	DHS		

## Appendix B

### Statewide Radio Counts

#### Statewide Total Estimates for Radio Counts

Based on statistical data and other measurement criteria

[www.ojp.usdoj.gov/bjs](http://www.ojp.usdoj.gov/bjs)

8509

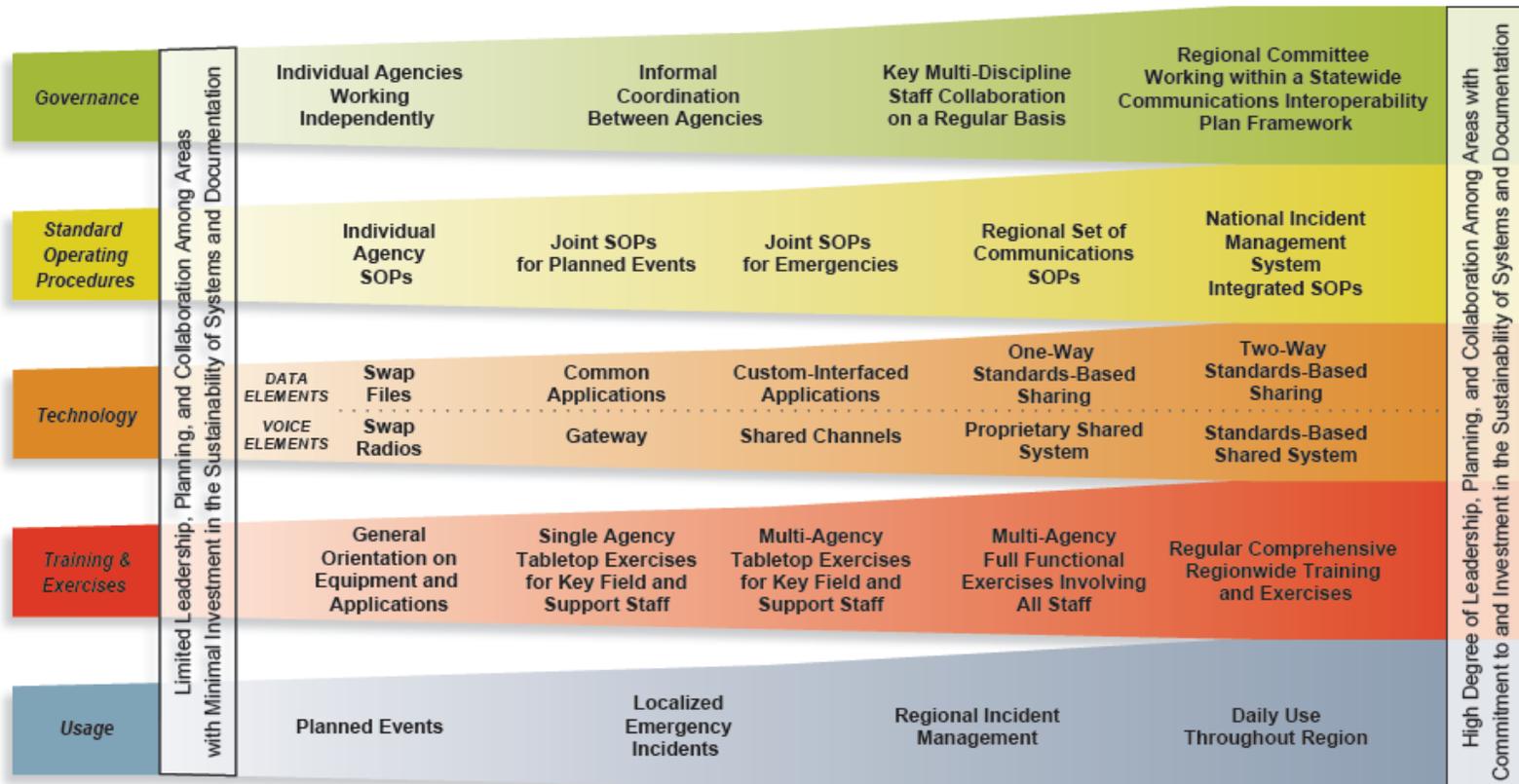
16228

County	Name	Estimated VHF	Estimated 800 MHz
Beaver County	Total Estimated Radio Count	78	0
Box Elder County	Total Estimated Radio Count	406	50
Cache County	Total Estimated Radio Count	607	418
Carbon County	Total Estimated Radio Count	174	0
Daggett County	Total Estimated Radio Count	26	0
Davis County	Total Estimated Radio Count	162	1620
Duchesne County	Total Estimated Radio Count	142	0
Emery County	Total Estimated Radio Count	99	0
Garfield County	Total Estimated Radio Count	68	0
Grand County	Total Estimated Radio Count	85	0
Iron County	Total Estimated Radio Count	351	0
Juab County	Total Estimated Radio Count	293	0
Kane County	Total Estimated Radio Count	64	0
Millard County	Total Estimated Radio Count	586	0
Morgan County	Total Estimated Radio Count	24	40
Piute County	Total Estimated Radio Count	76	0
Rich County	Total Estimated Radio Count	27	0
Salt Lake County	Total Estimated Radio Count	610	8102
San Juan County	Total Estimated Radio Count	129	4
Sanpete County	Total Estimated Radio Count	476	0
Sevier County	Total Estimated Radio Count	579	0
Summit County	Total Estimated Radio Count	23	230
Tooele County	Total Estimated Radio Count	38	382
Uintah County	Total Estimated Radio Count	244	0
Utah County	Total Estimated Radio Count	287	2873
Wasatch County	Total Estimated Radio Count	13	131
Washington County	Total Estimated Radio Count	1072	0
Wayne County	Total Estimated Radio Count	183	0
Weber County	Total Estimated Radio Count	129	1291
State of Utah	Department of Corrections	225	1666
State of Utah	Department of Health	212	90
State of Utah	Department of Natural Resources	279	221
State of Utah	Department of Transportation	881	766
State of Utah	Department of Public Safety	1041	906
State of Utah	Division of Facilities Maintenance	6	107
State of Utah	Miscellaneous	61	400
<b>TOTALS</b>		<b>9,756</b>	<b>19,297</b>



## Appendix C

### SAFECOM Interoperability Continuum



## Appendix D

### Homeland Defense Regional Summaries

#### Region I Summary

Bryan Low, Logan City PD



Region I is located in the northern end of the state and is comprised of six counties: Davis, Weber, Morgan, Box Elder Cache, and Rich. The approximate size and population of the six counties are:

- Davis      Population 238,994      304 square miles
- Weber      Population 196,533      575 square miles
- Cache      Population 91,391      1,164 square miles
- Box Elder      Population 42,745      5,723 square miles
- Morgan      Population 7,129      609 square miles
- Rich      Population 1,961      1,028 square miles

The two primary technologies used for public safety radio communication in this region are trunked 800 MHz and conventional VHF. Davis, Weber, and Morgan counties utilize the 800 MHz UCAN system. Cache County is in the process of migrating from VHF to 800 MHz. Box Elder and Rich counties remain on VHF.

The agencies in Box Elder County have requested information regarding the 800 MHz network and there is some interest, by at least one of them, to move to 800 MHz when funding becomes available. The public safety agencies in Rich County will remain on VHF at this time.

Every county but Morgan has at least one Public Safety Answering Point (PSAP), or dispatch center within its boundaries.

## Region II Summary

Darin Watrous, South Jordan City PD



Region II is located in the northern Wasatch front area of Utah, composed of the counties of; Salt Lake, Utah, Tooele, Summit, and Wasatch. The approximate size and population of the five counties are:

- Salt Lake      Population 898,387      807 square miles
- Utah            Population 386,536      2,140 square miles
- Tooele          Population 40,735      7,287 square miles
- Summit         Population 29,746      1,882 square miles
- Wasatch        Population 15,215      1,209 square miles

Region II is comprised of high mountain area, which is a heavily populated urban environment. The Region II economy includes residential, commercial, industrial, and agricultural components.

Region II communication systems funding for public safety and radio infrastructure comes primarily from public resources provided by the individual government entities within the region. Additionally, there are numerous federal and state grants, which have been awarded for this purpose as well.

Public safety in the region is on 800 MHz frequencies on the UCAN system with some fire paging, public works, and forestry service using the 150 MHz range with individually owned and maintained network of mountain top repeaters. As could be expected with this geography, funding, and size, there are areas in this region where no public safety radio coverage is available.

Public safety answering points (PSAPs) with 911 or enhanced 911 are in Salt Lake, Tooele, Wasatch, Utah, and Summit Counties. Most public safety responders in the region have only 800 MHz capability. Most Dispatch centers have the ability to patch frequencies for interoperability when on a working incident that involves numerous agencies. All counties within Region II are actively working toward narrow band capabilities to meet the 2013 FCC deadline.

This Region will continue to operate on 800 MHz purely because of the population and geographical size of these areas. Some agencies within these counties do maintain formerly used VHF or UHF systems as back ups. According to most department heads these agencies will continue to operate on 800 MHz with the ability to maintain a Back-up radio system.

Currently most of the Salt Lake County public safety entities meet on a monthly basis to develop a countywide interoperability solution in the event of a primary communications failure.

## Region III Summary

Forrest Roper, Millard County SO



Region III is located in the central and west central portion of Utah, composed of the counties of; Juab, Millard, Piute, Sanpete, Sevier, and Wayne. The approximate size and population of the six counties are:

- Juab                      Population 9500              3,500 square miles
- Millard                    Population 12,500            6,500 square miles
- Piute                      Population 1,350             760 square miles
- Sanpete                  Population 24,000            1600 square miles
- Sevier                     Population 18,000            1900 square miles
- Wayne                    Population 2500              2460 square miles

The region's geography is composed of mountain, high valley, and high desert basin. The economies of the counties within this region are dependent on agriculture, mining, tourism, power generation, and limited manufacturing.

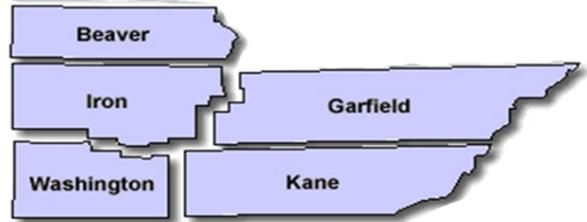
The ability of the counties within Region III to fund Public Safety and infrastructure such as radio communications through the usual form of property taxes is limited, as the majority of the land in this region is Forest Service or Bureau of Land Management. Conversely, but for the same reason, the level of public safety services and communication abilities required during specific seasons are drastically increased, with portions of three National Forests and several National Parks or National Recreation areas included in this region.

Public safety in the region is on VHF frequencies in the 150 MHz range with individually owned and maintained networks of mountain top repeaters (with the exception of Sevier County). As could be expected with this geography, funding, and size, there are areas in this region where no public safety radio coverage is available. Public safety answering points (PSAPs) with 911 or enhanced 911 currently function in: Juab, Millard, Sanpete, and Sevier counties. The Sevier County PSAP, operated by Utah DPS, covers Wayne and Piute counties in addition to Sevier. Most public safety responders in the region have the ability to use shared or common frequencies when assisting or operating in another county. All counties within Region III are actively working toward narrow band capabilities to meet the 2013 FCC deadline.

Although VHF is used as the primary means of communication throughout the region, 800MHz is used extensively by the Gunnison Prison facility in Sanpete County. 800MHz coverage is widely available in Juab and Sanpete Counties.

## Region IV Summary

Jeff Dial, St. George City Dispatch



Region IV is located in the southwest region of Utah and is composed of Beaver, Iron, Washington, Garfield, and Kane Counties. The approximate size and population of the six counties are:

- Beaver            Population 6,294        2,590 square miles
- Iron                Population 40,544       3,298 square miles
- Washington      Population 126,312     2,427 square miles
- Garfield          Population 4,534        5,174 square miles
- Kane                Population 6532         3,992 square miles

The region's geography is composed of mountain, high valley, and high desert basin. Region IV has perhaps the greatest of Utah's terrain elevation challenges, with ranges from 2,350 ft to 12,173 ft. The economies of the counties within this region are dependent on agriculture, mining, tourism, and manufacturing.

Nearly 50% of the population of the five counties is within the St. George and Cedar City's boundaries. These two densely populated cities would like to make use of trunking technologies, and are having difficult times attempting to find available VHF channels to handle current radio traffic –much less the rapid population expansions that drive up the need for more radio dispatched emergency services.

As populated as St. George and Cedar City are, the rest of the regions' sparse population make it difficult to justify the installation of high tech/cost radio infrastructure, yet Utah's citizens flock to the region year round, causing a high level of law enforcement and EMS activity on their behalf.

UCAN has established a stand-alone 800MHz trunked site in the St. George City valley, and there is some other limited 800MHz conventional coverage in the region, but currently no agencies in the region utilize 800MHz as a primary means of communication. St. George City and the agencies that it dispatches for are currently investigating the possibility of joining the UCAN system.

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## Region V Summary

John Laursen, Uintah County



Region V is located in Northeastern Utah. It is comprised of Daggett, Duchesne and Uintah Counties.

- Duchesne      Population 15,701      3,238 square miles
- Daggett      Population 947      698 square miles
- Uintah      Population 27,955      4,477 square miles

Our terrain varies from a desert type elevation of 4,251' to the highest point in Utah, King's Peak at an elevation of 13,528'. Our current population is experiencing explosive growth due to oil and gas production. Currently the latest population for Duchesne (17,000) and Uintah (30,000) counties are only rough estimates. Daggett County has a large influx of tourists (up to 3 million visitors) during the summer months with a somewhat constant population of about 1,000.

The region has property owned by the U.S. Forest Service (Ashley National Forest and Ashley National Recreation Area), Bureau of Land Management, National Park Service (Dinosaur National Park Service), U.S. Fish and Wildlife Service (Ouray National Wildlife Refuge), and the Ute Indian Reservation. Land ownership in the three counties is mostly by the government (Daggett 90%, Duchesne 72%, Uintah 72%).

Currently our public safety departments are ready to transition to the narrow band of VHF. Our paging channels are not affected by this mandate in Uintah County, however both Duchesne and Daggett pagers will have to be replaced with pagers that have the narrow band capability.

With the terrain, it is not economically feasible or practicable to install the 800 MHz system for local public safety daily operations. We do have the 800 MHz footprint however which has been utilized to communicate with other agencies which have the 800 MHz radios when they are in our areas.

The mountain top repeaters, microwave system and central dispatch systems are owned and maintained by the State of Utah. The Uintah Basin Consolidated Dispatch Center is utilized by public safety agencies in the Region. Each agency that is dispatched by the Center is assessed fees on a yearly basis.

There are areas in the region that have no communications at all (no radio, telephone or data signals). The State of Utah is working with the local agencies to provide coverage in those areas; however it is long and costly process.

## Region VI Summary

Bret Mills, Emery County SO



Region VI is located in the central and west central portion of Utah, composed of the counties of Carbon and Emery. The approximate size and population of the two counties are:

- Carbon            Population 19469        1,479 square miles
- Emery             Population 10,698        4,452 square miles

The region's geography is composed of mountain, high valley, and high desert basin. The economies of the counties within this region are dependent on agriculture, mining, tourism, power generation, and limited manufacturing.

The ability of the counties within the South East Region to fund Public Safety and infrastructure such as radio communications through the usual form of property taxes is limited, as the majority of the land in this region is Forest Service or Bureau of Land Management. Conversely, but for the same reason, the level of public safety services and communication abilities required during specific seasons are drastically increased, with Manti-LaSal National Forests, two National Parks, and seven State Parks or Recreation areas are included in this region.

Public safety in the region is on VHF frequencies in the 150 MHz range with individually owned and maintained networks of mountain top sites. As could be expected with this geography, funding, and size, there are areas in this region where no public safety radio coverage is available. Public safety answering points (PSAPs) with 911 or enhanced 911 currently function in: Price and Castle Dale. The Price PSAP, operated by Utah DPS, covers Carbon, Grand and parts of Emery and San Juan counties, The Emery County PSAP covers Emery County and acts as a backup for the Price PSAP. Most public safety responders in the region have the ability to use shared or common frequencies when assisting or operating in another county. All counties within the South East Region are actively working toward narrow band capabilities to meet the 2013 FCC deadline.

Limited 800 MHz and Omni link connectivity exist in a few areas in the region. The counties within the South East Region intend to continue to operate on their existing frequencies and to change these channels to VHF Narrow Band and expand their VHF communication system as monies become available to fill dead spots along key areas of the Region and add 800 MHz coverage in other locations as monies become available.

## Region VII

### Summary

Bruce Bushore, San Juan County SO

Region VII is located in the southeast portion of Utah, composed of the counties of Grand and San Juan. The approximate size and population of the two counties are:



- Grand                      Population 8,999                      3,682 square miles
- San Juan                      Population 14,265                      7,820 square miles

**Grand County** runs from Green River to just south of Moab and borders Colorado to the east. There are mountains to the south, canyons all around, desert areas, dense populated area and interstate highways. Moab is the largest city, population of 5,000, and has its own police force as well as Grand County's Sheriff's Office. Moab is home to many events such as the Jeep Jamboree and several mountain biking events. There are several areas for rock crawling, hiking and boating. There are other smaller communities in Grand County, Thompson, Castle Valley and Spanish Valley. Spanish Valley is a suburb of Moab and split partly in San Juan County

There are large portions of the county that belongs to Federal and State agencies such as BLM, Forest Service, National Parks, State Parks, etc. Utah Highway Patrol is responsible for I-70 and Highway 191 which run through Grand County

All Emergency Services except Law Enforcement are done by volunteers, EMS, Search and Rescue and Fire. All traffic is coordinated through the Sheriff's Office. All is currently done on the VHF band (150-170 MHz). County Fire and EMS have made the change to narrowband. Other local agencies have not changed.

**San Juan County** borders Grand County to the north, Colorado to the east, and Arizona to the south. The population is sparse. There are mountains in the northern areas, desert to the south and canyons all around. The major population areas are Monticello and Blanding.

Spanish Valley is split partly in Grand County and San Juan making mutual aide between Grand and San Juan very important during emergencies. Mexican Hat and Bluff border the Navajo Reservation, Montezuma Creek and Monument Valley are on the Navajo Reservation. White Mesa is 12 miles south of Blanding and is part of the Ute reservation. Law Enforcement is dispatched out of Towaco Colorado and EMS and Fire come from Blanding.

With so many Agencies this means a lot of communicating between Navajo PD, BIA, other Federal Agencies and San Juan County Sheriff's Office. There are large portions of

the county that belongs to Federal and State agencies such as BLM, Forest Service, National Parks, State Parks, Navajo and Ute Reservation, etc. Lake Powell is partly in San Juan County although most of the calls are handled by Park Service it is still part of the Sheriff's Office's responsibility.

As with Grand County all San Juan County Emergency Services except Law Enforcement are done by volunteers, EMS Search and Rescue and Fire. All traffic is coordinated through the Sheriff's Office. Most are currently done on the VHF band (150-170 MHz). EMS on the Navajo Reservation is done with UHF (450-470 MHz). All county Fire, Law Enforcement and EMS has made the change to Narrow Band. There is limited 800MHz coverage from a base station on Abajo Peak.

## Appendix E

### Approaches to Funding From Other States

#### Minnesota

Currently has a \$0.65 surcharge for all phones (similar to 911). They just received legislative approval to increase that fee \$0.10/year for the next three years, until they reach \$0.95 total.

#### Louisiana

According to Rex McDonald, Director of Communications and Information Technology:

*“Until Hurricane Katrina we utilized user fees to support the maintenance of a State Radio system. However, we were only able to attract State Agencies and a very few local users. Since then we have changed to a General Fund appropriation and are bringing all State and Local users on a new 700 Megahertz system to be completed in the next 18 month. The southern half of the State is already complete.”*

January 2007 – Passage of HB57

- Established funding mechanism in State Treasury for communication interoperability
- Mandate to establish an all-hazards emergency alert system
- March 2007 – Passage of BA 7 funding for \$9,804,444
- SB 788
  - Permanently establishes in law, the statewide interoperability group
  - Appoints a Director of Interoperability
  - Creates the Office of Interoperability the Governor’s Office of Homeland Security and Emergency Preparedness
- HB 1
  - \$34.2 million supported and appropriated by the Governor and Louisiana Legislatures
    - \$21.2 million for infrastructure enhancements
    - \$3.7 million for subscriber units
    - \$8.4 million for system maintenance
    - \$900K for executive staff and other system acquisitions
- 700 MHz System Users
  - 23,036 local agency's (73.8%)
  - 8,191 state agency's (26.2%)

## **Kansas**

*“Most all state agencies in Kansas have radio equipment budgets within their agency. KDOT, who is the largest purchaser of radio equipment, has money that comes from their maintenance funds. They did use homeland security grants for the P25 project, but all other equipment comes from budgeted money that is allocated each year. They also recoup money from the lease program that is available to agencies, and those costs and details can be found on KDOT’s website.*

Craig Srna  
State Telecommunications

## **Florida**

The public/private partnership for the Statewide Law Enforcement Radio System (SLERS) has a unique funding strategy. For providing the services in the contract, M/A-COM was paid a \$40 million advance payment. In addition, the company receives the ongoing proceeds from a motor vehicle and vessel registration surcharge (approximately \$15-\$18 million annually) less certain stipulated expenses incurred by the State. This revenue stream to M/A-COM provides the system infrastructure (towers, antennas, system equipment, system maintenance, radio consoles for dispatch) and 800 MHz service.

In return for the conveyance of various State tower and tower site assets, M/A-COM extended \$25.5 million in credits to the State for radios and accessories. In addition to these credits, M/A-COM provided credits equal to like-for-like replacements for 6,000 radios formerly used by the State.

The M/A-COM contract provides for revenue sharing in two ways:

- For the initial term of the contract (20 years), the State receives 15% of all net revenues received from third-party tenants on towers conveyed to M/A-COM from the State. After the initial term, the State receives 50% of all net revenues received from third-party tenants on towers conveyed to M/A-COM from the State for an additional 30 years.
- For any third-party subscribers of the radio system, the State receives 5% of the gross revenue.

Joint Task Force agencies must provide radios for their users and the remaining dispatch center facilities, equipment, and expenses. There is no charge to the Joint Task Force agencies for use of the system.

[http://dms.myflorida.com/cits/public\\_safety/radio\\_communications/statewide\\_law\\_enforcement\\_radio\\_system\\_slers/funding](http://dms.myflorida.com/cits/public_safety/radio_communications/statewide_law_enforcement_radio_system_slers/funding)

## **South Dakota**

*“The State of South Dakota has a statewide radio network that has around 14,000 state, local, federal, and tribal users. As of right now, the system operations are generally funded through an annual appropriations approval built into the base for our Bureau. Downside is that we rely on special appropriations or grant funding for expansions and upgrades. Local users are responsible for procurement and support of their own radios with the stipulation that they comply with a programming scheme that includes common talkgroups.”*

Jeff Pierce, BIT Engineering

*Ours is 100% funded by general funds from the Legislature... That doesn't work very well for growth / expansion.*

Jim Edman, Deputy Commissioner - BIT

## **Nebraska**

*“In Nebraska we have used a combination of homeland security grants, general funds for the purposes of frequency spectrum purchases, capitol construction funds for the tower infrastructure and then revolving funds for “operating” costs.”*

Jayne L. Scofield  
IT Administrator, Network Services  
Office of the CIO

## **South Carolina**

*“Last year the SC legislature provided funding to cover 33% of the user fee funding for only public safety first responders and State agencies.”*

George Crouch  
Wireless Technology Manager  
Division of the State Chief Information Officer

## Appendix F

### Estimated Cost Breakdown for Proposed Initiative

Infrastructure	Cost
UCAN Migration Phase 1	17,177,028
UCAN Migration Phase 2	13,530,000
800 MHz Trunked Expansion Option	16,186,000
800 MHz Conventional Expansion Option	
VHF P25 System Migration (7.x)	3,988,000
Microwave Connectivity (new and expand)	2,000,000
Site Development	5,000,000
<b>Estimated Infrastructure Totals:</b>	<b>57,881,028</b>
<b>Recurring System Costs</b>	
Site Lease	2,000,000
Electric Power	200,000
Backhaul Circuit (Connectivity)	1,500,000
<b>Estimated Recurring Totals:</b>	<b>3,700,000</b>
<b>End User Device Replacement</b>	
Local Government move to 800MHz	19,000,000
State Agency End User Upgrades	3,123,346
Interoperability Grants for Local Government (3 year total at \$1.5M annually)	4,500,000
<b>Estimated Device Totals:</b>	<b>26,623,346</b>
<b>System Development</b>	
Planning and Engineering Costs	200,000
Frequency Coordination	310,000
Consulting Fees	125,000
<b>Estimated Planning Totals:</b>	<b>635,000</b>
<b>GRAND TOTALS</b>	
	<b>88,839,374</b>