November 6th, 2014

Executive Director Stan Hilkey
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Denver, CO 80215

The Honorable John Hickenlooper
Governor, State of Colorado
136 State Capitol
Denver, CO 80203

and

The Colorado Joint Budget Committee
136 State Capitol
Denver, CO 80203

The Consolidated Communications System Authority (CCSA), established through HB 12-1224, was rescinded through SB14-127 and the new Public Safety Communications Subcommittee (PSCS) was created. The last formal meeting of the CCSA was June 26th, 2014 and the first meeting of the PSCS was conducted July 10th, 2014. The Directors are taking on the tasks of the CCSA and PSCS to "advise the Governor and the General Assembly on the development, maintenance, upgrade, and other operation of the system" head on in the three committees of Education and Outreach; Financial Sustainability; and Technical Sustainability; established early in 2013. The three CCSA committees moved forward to the PSCS as it established itself. Countless hours of volunteer time has been poured into the thoughts, discussions, presentations, considerations and documentation you will be presented. All at the cost and on the time of the Directors, members, guests and the agencies they represent. To that end we are submitting to you the 2014 Annual Report closing out the actions of the CCSA and beginning the actions of the PSCS which will include information for the Colorado Statewide Digital Trunked Radio System (DTRS), with a message for the Administration and all the elected officials of Colorado to know that the DTRS is no longer the only focus of the new subcommittee and we are committed to creating partnerships with all the various public safety communications systems so that we can strive to insure interoperability between all public safety first responders and providing more in depth reports on those "other communications system" in future reports . Because of 2013 legislation a needs assessment and business plan will be completed regarding statewide radio communications in 2015 and is not incorporated in this report. Public Safety communications is at a crossroads - and serious and difficult decisions lie ahead. The model used in the past decade is no longer sustaining critical tools needed by the first responders of Colorado.

Annual investments must be made to maintain and sustain this public safety lifeline, as the prospect for a Nationwide Public Safety Broadband Network (NPSBN) is years away and the possibility of this resource providing reliable mission critical voice capabilities is still a dream.

Since inception the DTRS has not charged users a fee to operate on the system and this continued ability to operate at no cost to many agencies and political jurisdictions has created a sense of entitlement regarding State and local radio communications. This is a misconception and an issue that must be dealt with as part of an overall funding scheme. There are no miracle funding cures that do not have shortfalls and potential discomfort for elected officials asking constituents for money through fees or taxes, and a multifaceted income model will need to be developed and instituted. The PSCS will work closely with the chosen consultant to provide a business plan that addresses the misconception and the needs of Public Safety throughout Colorado.

Some additional future public safety communications related challenges that have been identified include:

- The development and implementation of a National Public Safety Broadband Network (NPSBN), which will initially provide enhanced data transmission capabilities for first responders
- Build a strong relationship through becoming a partner with all jurisdictions that provide local radio communications for Public Safety and understand their challenges with operability and interoperability with neighboring jurisdictions
- Replacement of outdated Microwave backhaul infrastructure supporting the DTRS and other Public Safety needs. Repair or replacement of existing antenna towers supporting the DTRS and other Public Safety needs.
- Filling gaps in radio coverage with new radio communications sites as identified in the assessment and business plan.

We remain available to provide further information or testimony as needed regarding the current financial needs of the DTRS and look forward to working closely with the CCNC, the JBC, the Colorado House and Senate, and the Governor's office to brainstorm, identify, and develop ongoing funding scenarios in order to ensure that the DTRS remains a viable and effective public safety wireless interoperable communications tool. Respectfully submitted on behalf of the PSCS,

Robert E. Ricketts

PSCS Chair

Kurt C. Schlegel

PSCS Vice Chair

Public Safety Communications Subcommittee

Annual Report

State of and Potential Funding Sources for Public Safety Communications in the State of Colorado

November 10, 2014

Submitted By:

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Executive Summary

Mission critical interoperable communications are essential for safe and effective public safety response to daily calls for service as well as for large-scale natural or man-made incidents. The State of Colorado and the local governmental entities deploy numerous two-way land mobile radio (LMR) systems that serves state, local, federal, and tribal public safety and first responder agencies. Information contained in this report has been obtained from various members of the Public Safety Communications Subcommittee (PSCS), as well as from conversations with some system owners, operators and users from around the State of Colorado. It is intended to provide a brief explanation of some of the accomplishments made during 2014 as well as making some initial or continued recommendations for consideration.

2014 became a turning point for public safety interoperable communications through legislation that established a Public Safety Communications Subcommittee (PSCS) under the Homeland Security and All-Hazard Advisory Committee. The Executive Director of Public Safety has become the lead State employee as a champion for all of public safety interoperable communications. Legislatively, the Consolidated Communications System Authority (CCSA) that was formed in 2012 was rescinded and replaced by the newly formed PSCS. One of the common deliverables for both committees was to provide and annual report.

The CCSA was originally tasked with only looking at the future needs of the assets of the State of Colorado on the Colorado Digital Trunked Radio System (DTRS). The DTRS now is only **one** of the various systems to be looked at by the PSCS for future interoperable communications. Though there are the varying shapes and sizes of systems across the State of Colorado, they **all** face the same issues and priorities:

- Regular LMR equipment maintenance
- System Upgrade Assurance (SUA) program
- Acquisition of additional interoperability resources (e.g. Inter Subsystem Interface [ISSI])
- Repair and replacement of an aging microwave backhaul system
- Repair and replacement of aging radio tower sites

- Hardware upgrades necessitated by improvements in technology (e.g. repeaters and consoles)
- Radio Technicians and Support Staff

The PSCS has only been in operation for a short period of time, being established in June 2014. CRS §24-33.5-716 as amended, established the PSCS and also reorganized the structure of the committee. This restructuring took some time to fill all of the representative directors from the various organizations and appointments by the Executive Director of the Department of Public Safety.

Though the committee has been in existence only a short period of time, they have continued many of the tasks started by the CCSA as well as beginning to address the tasks as directed by statute. We recognize that the committee has several responsibilities to accomplish, which cannot be obtained this year as the committee is a fledgling startup.

The Public Safety Communications Subcommittee now has an identified funding stream to support its operations (e.g. outreach and educational materials, postage, etc.). Since this is an appointed, volunteer group of dedicated public safety professionals that is tasked with specific duties in support of public safety communications, the continual funding of an operational budget through the Department of Public Safety will be needed to continue the work that has been initiated.

Public Safety interoperable communications is dependent on resolving some key hurdles:

- Agreements or processes to establish agreements, regarding the responsibilities of, usage, maintenance, and a sustainable funding source, for interoperable communications for public safety no matter what system is used;
- Fragile trust relationships between the different system owners regarding governance;
- Lack of radio coverage;
- Usage and loading concerns among the different systems; and
- Resource allocations for interoperable communications

Hurdles can be overcome through efforts of dedicated public safety personnel in conjunction with other stakeholders, such as the Executive Director of the Department of Public Safety.

Some significant improvements have begun as an outcome of the investments made in 2014 budget process by the State of Colorado and by local government owners. Some of the improvements are, but not limited to:

- Completion of the upgrade of the DTRS system software to version 7.14.
    - One key aspect of this upgrade was the ability to implement Inter Subsystem Interfaces (ISSI).
- ISSI projects began between the North Central Region and the State to connect the DTRS to the Harris system core within the Denver Metropolitan area.
- ISSI projects also began between the Front Range Communications Consortium (FRCC) system and the City of Westminster system.
- ISSI projects began between the FRCC system and the DTRS system.

To continue these improvements and to meet the other needs that have been described above, immediate action and a reliable source of funding is needed to sustain interoperability between all of the various systems in order to eliminate their vulnerabilities, such as radio site overloading and lack of radio coverage.

Introduction to Public Safety Interoperable Communications

The infrastructure of Public Safety communications is comprised of:

- Radio sites (aka radio towers) that are spread out across the state and that house radio repeater equipment,
- Master sites which control the operations of the radio sites,
- Dispatch centers that interface to allow radio console positions to directly connect to the network, and
- Backhaul links ("transport links") that interconnect the sites to each other and to the master sites and dispatch centers.
- Interfacing equipment that connects disparate radio systems.

The technology used in public safety communications involves VHF, UHF, 700 megahertz (MHz) and 800 MHz analog and digital voice trunking as defined by the APCO/TIA[1] Project 25 standards for public safety voice communications. One key note to this is that not all public safety communications are up-to-date with the Project 25 (P25) standard. The standard is a **recommended** set of standards that provide for interoperability between different systems and different manufacturers.

The major manufacturers for the public safety communications across Colorado include, but are not limited to:

- Motorola Solutions
- Harris Corporation
- EF Johnson Technologies
- Tait Communications
- Kenwood Communications
- Airbus DS Communications (Formerly Cassidian Communications)

Most if not all of these manufacturers supply P25 capable equipment. The need as well as the expense is the issue for many agencies to transition to the P25 standard.

The backhaul links that provide the interconnections primarily use point-to-point microwave technology, fiber optic cable and even telephone line (T-1) for some links. During a typical month, one system alone facilitates approximately 8.3M calls between public safety users that operate in 95%[2] of the state that it serves.

The ownership of public safety communications systems is extremely diverse and below is just some of the owners of systems, infrastructure and joint partmentships:

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[1] APCO is the Association of Public Safety Communications Officials, International and TIA is the Telecommunications Industry Association that adopted P25 in its Suite 102 of standards.

[2] The State of Colorado's advertised "baseline" coverage criteria for DTRS are 95% coverage reliability to a mobile (vehicle-mounted) radio on state highways. Local governments have provided many enhancements to these criteria and many have their own "baseline" criteria.

- State of Colorado's Governor's Office of Information Technology (OIT);
- City and County of Denver;
- City of Lakewood;
- City of Aurora;
- City of Westminster;
- City of Arvada;
- Counties of Gilpin and Clear Creek;
- Regional partnerships of counties and municipalities that own infrastructure have been formed into the Consolidated Communications Network of Colorado, Inc. (CCNC);
- Northern Colorado Regional Communications Network (NCRCN);
- Pike's Peak Regional Communications Network (PPRCN);
- Front Range Communications Consortium (FRCC);
- City of Pueblo; and
- County of Pueblo.

For the most part, regardless of ownership, usage of the network for interoperability is ubiquitously open to all authorized users[3], and statewide access is available to all user agencies independent of their jurisdiction[4].

Public Safety Communication System Governance

The governance of communications systems takes several approaches. Some are governed by individual governmental entities, such as a municipality or county. Others form partnerships where the various

[3] Authorized users must be: i) from a public safety and public service agency from a State, Tribal, County, and Local government; federal agencies; special districts; and EMS provider; and ii) eligible under Title 47 of the Code of Federal Regulations (CFR) Part 90 Private Land Mobile Radio Services §90.20 Public Safety Pool. Access to an individual system is dependent upon approval of the manager/owner of the system.

[4] Exceptions to this statement do exist wherein, by explicit agreement; certain owners allow visiting, out-of-jurisdiction users to access selected statewide mutual aid channels and talkgroups instead of those users' home talkgroup.

owners of infrastructure come together to manage their respective system(s), work with other surrounding agencies and systems to promote interoperability. Many of these partnerships have been identified previously in this report, but as is demonstrated here, there is no one guiding path yet established.

With the formation of the PSCS and the requirement to develop a business plan for all of public safety communications, there is now some basic direction to proceed as a course of action.

Governance will be one of the many hurdles to overcome, given the fact that Colorado is a "home rule" State, whereby governmental entities have control of their own jurisdictions. Only through a concerted effort to establish agreements, partnerships and trust can we overcome this massive hurdle.

The current status of governance and funding for public safety interoperable communications are uncertain and both need investment and action to avoid jeopardizing the sustainability of the "system of systems" long-term operations. State, County and Local entities face a never ending uphill climb to secure the necessary funding to maintain and sustain their systems. Governance is divided between several organizations, regions, and entities. This can lead to conflict between system owners and users which then leads to a trust factor, where one system owner does not trust the other system owner.

Trust can take different forms, such as the fear that equipment or resources from one entity will be taken away by another; one entity will be the sole governing entity; or an entity will create such an overload on another's system as to cause it to fail. Barriers need to be broken, trust needs to be established and a common set of expectations should be utilized.

The sustainability and future potential of public safety communications is jeopardized by the lack of:

- A committed source of reliable funding for operations, maintenance, sustainment, and on-going capital improvements for all systems;
- Staff that are dedicated solely to working collaboratively with all of the users and owners to plan interoperable technical enhancements and to recommend collaborative efforts to governance and funding issues;

- A definite buy-in and understanding by political, appointed or elected officials of the constant need to provide public safety communications to first responders across the State so that they may not only communicate locally (operable) but also can communicate regionally (interoperable) when disaster strikes and multiple agencies respond.

Interoperability verses Operability

Interoperability and operability often become intertwined with each other and at times misconstrued. This then tends to lead to a misconception that there are system issues and we cannot communicate with another public safety agency.

Operability, as it relates to public safety communications, means the equipment that is used by a particular entity functions on a **day-to-day basis without failing** or losing communications with those on the same system.

Interoperability, again as it relates to public safety communications, means can the equipment **interconnect or be used to communicate with an entity on another system** or in another area of the state.

Public safety communications must first be **operable** before they can be interoperable. They have to have adequate equipment which is maintained and serviceable. An ongoing sustainment plan must be developed to fund the required maintenance, replacement and upgrades to equipment to ensure operability. They must not have coverage gaps in communications, but if they do it is to be extremely minimal. Operability must be the starting point for any entity that provides services to the public. They must be able to communicate within their respective jurisdictions, regardless of size or terrain.

Once the operability is obtained, then entities are able tolook at **interoperability**. Interoperability needs to be obtained so that we, as public safety providers of all disciplines, (Law Enforcement, Fire, Emergency Medical Services, etc) can communicate with one another in times of crisis and in a mutual, coordinated effort to protect the public we serve.

Interoperability may be obtained by interconnecting the various systems, forming partnerships, sharing resources and infrastructure. Sounds easy, but it is not. Agreements need to be formed, ground rules

on usage need to be established, equipment needs to be sustained, and training of personnel needs to be on-going and up-to-date.

2014 Accomplishments

2014, as previously mentioned, was a transitional year from the original CCSA to the PSCS. The following list of accomplishments is intended to present what has been achieved, even though there was that transition.

Under C.R.S. § 24-37.5-506 (2.5) (a) (I) that was enacted in 2014, funding has been set aside from fiscal year 2013-2014 and each fiscal year thereafter until 2024-2025 fiscal year in the amount of $3.5 million to be placed into the Public Safety Trust Fund for use by the Governor's Office of Information Technology (OIT) to replace legacy DTRS equipment and hardware. In addition, beginning in the 2017-2018 fiscal year and continuing until the 2024-2025 fiscal year and additional $3.7 million is to be appropriated and placed in the Public Safety Trust Fund for DTRS System Upgrade Assurance.

Both of these were previous recommendations from the CCSA that were achieved. It must be noted that this funding was **only to upgrade and maintain the DTRS portion** of Public Safety Communications in Colorado. It does not address any other system in the State.

In 2014, Colorado State Patrol received funding that allows for better /more reliable interconnection to another non-DTRS systems through ISSI. Other funding for ISSI was also provided by the North Central Region, FRCC and the City of Westminster. It must also be noted that an ISSI connection requires a connection on each side. Funding needs to be secured / appropriated by system owners to facilitate this type of connection for the remaining systems in the State.

Work has begun by the Executive Director to hire the allocated employee under Senate Bill 14-127. The process is still on-going at the time of this writing.

Work has also begun to hire a consultant / consulting firm to take on the task of the needs assessment and business plan development as stipulated in SB 14-127.

Virtually all of the Directors of the PSCS as established in SB-14-127 have been seated and are working to meet their responsibilities under statute.

The PSCS has begun to promote interoperable communications across the State of Colorado by two initial steps:

1. Creating partnerships with those other organizations and entities that represent the wide array of users.
2. Continuing the work of the CCSA, through maintaining and Outreach and Educational subcommittee to provide interoperability information to others.

Current Recommendations

Current LMR systems must be supported and maintained now and through the foreseeable future, even past the 2024-2025 fiscal year. Land Mobile Radio (LMR) is currently considered to be "Mission Critical Voice" (MCV) throughout the industry due to it fulfilling the basic key elements as outlined by NPSTC in the following:

Direct or Talk Around: This mode of communications provides public safety with the ability to communicate unit-to-unit when out of range of a wireless network OR when working in a confined area where direct unit-to-unit communications is required.

Push-to-Talk (PTT): This is the standard form of public safety voice communications today - the speaker pushes a button on the radio and transmits the voice message to other units. When they are done speaking they release the Push-to-Talk switch and return to the listen mode of operation.

Full Duplex Voice Systems: This form of voice communications mimics that in use today on cellular or commercial wireless networks where the networks are interconnected to the Public Switched Telephone Network (PSTN).

Group Call: This method of voice communications provides communications from one-to-many members of a group and is of vital importance to the public safety community.

Talker Identification: This provides the ability for a user to identify who is speaking at any given time and could be equated to caller ID available on most commercial cellular systems today.

Emergency Alerting: This indicates that a user has encountered a life-threatening condition and requires access to the system immediately and is, therefore, given the highest level or priority.

Audio Quality: This is a vital ingredient for mission critical voice. The listener MUST be able to understand without repetition, and can identify the speaker, can detect stress in a speaker's voice, and be able to hear background sounds as well without interfering with the prime voice communications.[5]

MCV has been and will continue to be the primary method for first responder communications (both operable and interoperable) requiring a long term plan for funding and sustainability, even well past the current statutorily enacted dates.

Technology, even in LMR and communications is ever evolving. Thus the need for a replacement and upkeep cycle. How do we, as a State, fund or set aside funding for the ongoing cycle to keep public safety communications current so that the best possible service is provided to our citizens? Here are some recommendations that were presented in the CCSA 2013 Annual Report and that are still viable options still:

- **Reallocation of an existing tax set to sunset**

  The State of Colorado has some ongoing as well as some "sun-setting" funds that could be made available and repurposed for capital improvements to, and ongoing maintenance of, the DTRS. The repurposing of such a fund, or combination of funds, may be among the most viable of options to provide for the ongoing maintenance and sustainment of the DTRS, however, to be considered viable, such a fund would need to align with DTRS goals and to the benefits it provides to public safety agencies and ultimately the citizens and industries that consume public safety services.

- **Redirection of Existing, or New, Lottery Funds**
- **Statewide Retail Sales Tax**
- **Fee on In-State Vehicle Registrations**
- **Traffic Ticket Surcharge or Additional Criminal Fines**

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[5] Mission Critical Voice Communications Requirements for Public Safety, National Public Safety Telecommunications Council, Broadband Working Group

- **Gasoline Tax**

The process for establishing any additional revenue generating taxes or fees may be difficult and politically challenging, however the PSCS recommends that the Colorado Legislature begin work to establish a dedicated and reliable funding source that will generate sufficient funds to sustain, maintain, and upgrade public safety communications systems, as needed.

The current Public Safety Trust Fund established under C.R.S. §24-37.5-506, as amended, only addresses one governmental entity and only one system. Thus it does not fully apply to the other public safety systems or owners.

Current State & Recommendations: Public Safety Communications Statewide

Current public safety communications statewide is made up of several varying forms of systems. Systems that operate in the VHF, UHF, 700 MHz and 800 MHz frequency bands through various commercial vendors' equipment are spread across the State. Though there are these varying types of systems, they can eventually be meshed into a "system-of-systems" allowing for local needs to still be the focus.

There have been steps taken to mesh the networks, but the process is intensive and expensive. The intensity comes from again funding and governance issues. Some of these are:

- Who is going to fund each end of the connection? Each end has to be funded and configured by the respective system owner and their vendor.
- Who will be responsible for the maintenance and sustainability of the connection?
- What are the expectations of interconnectivity, such as uptime, reliability, coverage?
- Why do I need to connect to your system anyway?

In order to answer these and the countless other questions that arise, agreements need to be formed. This too becomes labor intensive as each side attempts to protect their investments and their users.

Conclusion

Though there has been some action taken in 2013 to begin addressing public safety communications issues in Colorado, only a small portion has been touched. Public Safety / First Responders need to be able to communication with each other, no matter what system they use, what manufacturer they select or what frequency band they operate in to communicate. This is the true bottom line issue facing Colorado.

Without a means of sustainability for the life of a public safety communications system for both daily operability and critical situation interoperability, public safety will not be providing the best service to the citizens of Colorado.

Acronym List

APCO	Association of Public Safety Communications Officials
CCNC	Consolidated Communications Network of Colorado
CCSA	Consolidated Communications System Authority
DTRS	Digital Trunked Radio System
FRCC	Front Range Communications Consortium
ISSI	Inter Subsystem Interface
JBC	Joint Budget Committee
LMR	Land Mobile Radio
MCV	Mission Critical Voice
MHz	Megahertz
NCRC	Northern Colorado Regional Communications Network
NPSTC	National Public Safety Telecommunications Council
OIT	Governor's Office of Information Technology
P25	APCO's Project 25 Standards
PPRC	Pikes Peak Regional Communications Network
PSCS	Public Safety Communication Subcommittee
SUA	System Upgrade Assurance
TIA	Telecommunications Industry Association
UHF	Ultra High Frequency
VHF	Very High Frequency