State of Colorado

Public Safety Radio System-Wide Business Plan Report

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Executive Summary

The state of Colorado (State) recognizes that it is critical for state, local, tribal, and federal public safety personnel across Colorado to have radio communications systems that meet their needs for daily and emergency operations. The current landscape of public safety radio communications includes the statewide Digital Trunked Radio System (DTRS) as well as numerous other radio systems that serve regional or local areas. The State selected Federal Engineering (***FE***) to assess the governance and funding of DTRS and statewide interoperability and to make recommendations as to the best approach to improve governance and funding to meet current and future user needs.

As the culmination of our investigations, analysis, and recommendations, ***FE*** presents this *Public Safety Radio System-Wide Business Plan Report (Business Plan).* It identifies the recommended business goals and objectives, cost projections, financial activities, governance models, and administrative items related to statewide public safety communications and interoperability.

The companion to this report is the *Public Safety Radio System-Wide Needs Assessment Report (Needs Assessment)*, which communicates the user needs for the operability and interoperability of DTRS and other radio systems. It also provides recommendations to enhance those systems as required to meet users' needs and the costs and implementation plans to realize those recommendations. Due to the background information contained in the *Needs Assessment*, ***FE*** suggests reading the *Needs Assessment* prior to reading this *Business Plan*.

Measuring Interoperability

The term "operability", as it relates to public safety communications, describes the ability of a radio system to meet the operational needs of those who use it on a daily basis while the term "interoperability" refers to the ability to provide communications between disparate systems when needed and authorized. The measurement of the degree to which interoperability has been achieved in an area, such as the state of Colorado, is the Interoperability Continuum, developed by the Department of Homeland Security's SAFECOM program and shown in Figure 1. The Continuum includes "lanes" for the following components of interoperability:

1. Governance
2. Standard Operating Procedures
3. Technology
4. Training and Exercises

5. Usage

The right side of the Continuum shows desired levels of interoperability (i.e., those that agencies should strive to achieve).

Role of the Business Plan

The *Needs Assessment* addresses many of the Continuum lanes and provides recommendations primarily aimed to improve the technology of DTRS and statewide interoperability. This *Business Plan* addresses the important Continuum lanes of Governance as well as of Life-Cycle Funding and Outreach and Information Sharing. Neither of the latter two are represented on the continuum despite both being generally recognized as being as important as those shown.

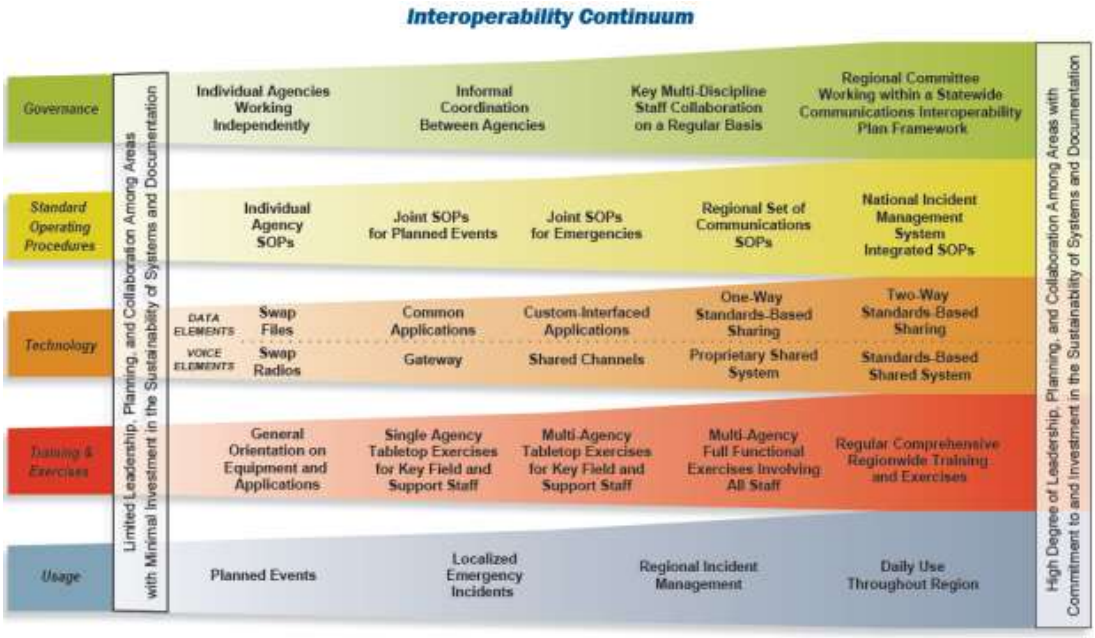

Figure 1 – DHS-SAFECOM Interoperability Continuum

Current Status of Public Safety Communications Governance in Colorado

Governance of public safety communications involves the collaborative planning and management by the various systems administrators of an overall interoperability strategy. Within the state of Colorado, there are several groups currently involved in that effort.

A key group is the newly formed Public Safety Communications Subcommittee (PSCS), established by Senate Bill 14-127 as an advisory subcommittee to the Homeland Security and All-Hazards Senior Advisory Committee (HSAC). The HSAC is part of the Colorado Department of Public Safety's (DPS) Division of Homeland Security and Emergency

Management (DHSEM). The PSCS has representative membership from across the State as well as many duties, but its primary purpose is promotion of interoperable communications among public safety organizations throughout the state. In Colorado, the PSCS holds the duties and responsibilities of a Statewide Interoperable Executive Council (SIEC).

Supporting PSCS is the Office of the Statewide Interoperability Coordinator (SWIC), which manages the policies and programs of statewide communications interoperability as set by the PSCS and as documented in a Statewide Communications Interoperability Plan (SCIP).

The HSAC also supports nine Regions across the State for the purpose of regional emergency management planning. Each of these nine Regions has a public safety communications subcommittee tasked with coordinating local communications issues. The level of commitment to, and activity by, these HSAC regional communications subcommittees varies across the state.

The mission of the Consolidated Communications Network of Colorado (CCNC), a private 501(c)(3) corporation, is the management of the DTRS for public safety radio operability and interoperability among first responders across Colorado to better serve the State's citizens. When formed in 2002, the CCNC was the only statewide public safety communications governance organization. The State now recognizes that while CCNC members are dedicated and its efforts have had positive effects, its purposes, duties, and membership significantly overlap those of PSCS.

Effective governance of public safety communications requires the attainment of several criteria including balanced membership, formal authorization, focus on public safety communications, regional input, effective leadership, funding, and other criteria. These criteria are described further in this *Business Plan,* but as demonstrated below in Table 1, there is no public safety communications governance organization in Colorado that currently meets all criteria and there is a significant level of overlap between the existing organizations.

Table 1 – Criteria of effective governance and existing public safety communications governance organizations in Colorado

Governance Criteria	HSAC Regions	PSCS	CCNC
Balanced Membership		✓	✓
Formal Authorization	✓	✓	
Charter		✓	
Public Safety Communications Focus		✓	✓
Shared Decision Making and Goals		✓	✓
Effective Leadership	✓	✓	✓
Regional Communications Boards	✓		✓
Transparency	✓	✓	✓
Outreach and Information Sharing		✓	
Funding			

The PSCS is the group that is closest to having all identified criteria but lacks:

- Its own regional boards (although it does leverage the HSAC Regional Committees' Communications Subcommittees for the purpose)
- The availability of and control over funding at a level that is sufficient to promote and enhance statewide interoperability.

This *Business Plan* also provides examples of how effective governance is implemented in other states.

Recommendations for Colorado's Public Safety Communications Governance

In order to provide Colorado with an effective public safety communications governance structure that collaboratively defines and plans statewide interoperability requirements and solutions, ***FE*** provides several recommendations detailed in Section 9 of this report, summarized here:

- The PSCS and the full Colorado public safety communications governance structure should be independently established legislatively in Colorado code and they should not be a subcommittee of the HSAC. Furthermore, the existing "sunset" date of the PSCS should be eliminated and the role of PSCS should be

expanded to incorporate new technologies (specifically public safety broadband wireless networks and Next Generation 9-1-1 services).

- The PSCS should seek to establish Regional Interoperability Committees (RICs) that are, preferably, outside of the existing All-Hazards Regions structure.
- The PSCS should have ownership of both the development of the SCIP and the overall plan for the technology roadmap for expansion or upgrades of the DTRS.
- The Office of the SWIC should continue in its role as the main interface between the PSCS and state, local, tribal and federal agencies.
- The PSCS should completely and formally absorb the duties of the CCNC to avoid duplication of efforts and possible conflicts between overlapping organizations.
- The PSCS should develop formal agreements that define the roles and responsibilities for the various state and local owners with regard to existing and new interconnections of equipment within DTRS.

Implementing these recommendations, as detailed in the body of this report, should lead to a fully effective structure for public safety communications governance in Colorado.

Current Status of Funding of Public Safety Communications in Colorado

Just as there are numerous owners of DTRS infrastructure and numerous systems other than DTRS, there are numerous sources of funding for public safety communications systems and interoperability in Colorado.

The state of Colorado, through the Governor's Office of Information Technology's (OIT) Public Safety Communications Network (PSCN) team, performs a significant amount of day-to-day management of DTRS. Likewise, they provide a significant amount of funding to deploy, maintain, upgrade and replace the DTRS infrastructure assets owned by the state of Colorado. Funding of the PSCN team is predominantly through user fees charged to State agencies (and only State agencies) for their use of DTRS as well as other State-owned radio systems.

PSCN has also received funding for specific projects from the State's general fund, including capital improvement and controlled maintenance projects, as well as through legislative initiatives such as House Bill 14-1203. The latter will provide significant monies toward the replacement of outdated infrastructure equipment and the upgrade of DTRS' entire software platform.

PSCN requested $55 million in general fund allocations over 5 years for replacement of the DTRS microwave network (which interconnects radio sites to each other) and, as described in the *Needs Assessment*, ***FE*** recommends a request for another approximately $115 million to improve coverage to the level identified as a requirement by users.

Local agencies fund the operation, maintenance, and replacement of the DTRS infrastructure assets they own via a number of sources including bonds, local general funds, 9-1-1 fees, usage fees, and grants. Owners and operators of other public safety communications systems ("non-DTRS systems") use these same varied sources.

Recommendations for Colorado's Public Safety Communications Funding

Establishing the balance between expending funds to solve problems and tolerating some existence of those problems is a challenge of government that certainly extends to public safety communications. The *Needs Assessment* describes many of these technical risks and the costs associated with addressing them. This *Business Plan* reaffirms those areas of risks and identifies several others, including:

- Coverage Risk – Additional funding (beyond the levels those already requested by OIT/PSCN for identified projects) of approximately $115 million is needed to meet the needs of users as identified through surveys and coverage workshops. Additionally, ***FE*** recommends that the PSCS should first work with its statewide users of DTRS to formally define the system's coverage requirement.

- Sustainability Risks – Some user agencies have left DTRS due to their uncertainty about the system's overall financial and governance stability and ***FE*** recommends that the state of Colorado reaffirms its commitment to DTRS by addressing the governance and funding recommendations included in this report. ***FE*** also recommends that PSCS minimize uncertainty in DTRS ownership by annually updating the DTRS infrastructure ownership list as discussed in the *Needs Assessment* and establish formal agreements to define the roles and responsibilities associated with ownership. Finally, some user agencies are considering leaving DTRS because of the high cost to replace DTRS-compatible subscriber radios and ***FE*** recommends the State establish a grant program to assist users (only those who can demonstrate an appropriate level of need) with the replacement of their DTRS-compatible subscriber radios.

- Interoperability Risk – As new systems other than DTRS are deployed and as the need for cross-jurisdictional and cross-discipline communications becomes more urgent, there is the risk that the necessary interconnections between DTRS and

those other systems will not meet user needs. ***FE*** recommends PSCS confirm those user needs and that the state of Colorado establish a fund available to agencies to support interoperability initiatives that are consistent with the goals of the SCIP.

- Governance Risk – Without funding for the governance structure, staff, and initiatives described in this report, the PSCS and the entire future of public safety communications governance may be unable to deliver on its mission. ***FE*** recommends that DPS continues to provide administrative support for PSCS and that the legislature provide the PSCS with an annual line item appropriation.

In this report, ***FE*** identifies numerous alternatives for funding to complete these recommendations. These include methods to pay for capital and operational expenses such as grants, bonds, 9-1-1 fees, other surcharges (tickets, tourism, vehicles, etc.), public-private partnerships, usage fees, and the leasing of unused tower space.

A comprehensive funding strategy is not something a third-party reviewer such as ***FE*** can recommend with any level of confidence. Agencies from across the State must determine their needs for the levels of improvement to DTRS and overall statewide interoperability. Once that is determined, ***FE*** recommends the PSCS and SWIC work with the Department of Revenue or Treasury to determine how much funding each strategy can raise.

Recommendations for DTRS Programmatic Support

As an additional topic of this report, ***FE*** analyzed the effectiveness of the two organizations that manage different aspects of DTRS. The Office of the SWIC, as summarized above, is an administrator for PSCS and it manages the policy aspects of DTRS and statewide interoperability. Meanwhile, OIT/PSCN manages the technology aspects of the system. Both of these organizations have a participative role in statewide public safety governance but their role in enacting decisions should not be viewed to imply that they are governance organizations. This redundancy and organizational separation can lead to duplication of efforts and, in a worst-case, conflicting activities by the two organizations. Also, our interviews showed that PSCN's current organizational structure within OIT is viewed by many as too removed from management and too different from the Information Technology organization's focus to be effective.

FE provides two alternatives to improve the effectiveness of the Office of the SWIC and of OIT/PSCN. One is to combine the two into a new division-level organization within the Department of Public Safety (along with, perhaps, other communications-related groups like Colorado State Patrol's dispatch operations). The other is to elevate PSCN's organizational location within OIT and to improve the role of coordination with the Office

of the SWIC. This report lists advantages and disadvantages of both options in order to begin a statewide dialogue on how to improve the current situation.

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1. Scope of Report

The purpose of this *Public Safety Radio System-Wide Business Plan Report (Business Plan)* is to clearly communicate the business goals and objectives, short and long-term cost projections, financial activities, and administrative items of the Digital Trunked Radio System (DTRS) and statewide public safety communications interoperability to the State, Joint Budget Committee, and other key stakeholders.

Federal Engineering (***FE***) developed this report according to the scope of work of a contract executed by and between ***FE*** and the state of Colorado, Department of Public Safety, Division of Homeland Security and Emergency Management. That scope of work directed ***FE*** to address the following topics in this *Business Plan*:

- Long-term funding strategies to expand, improve, modernize and sustain statewide radio communications, along with different cost-containment strategies
- Alternative governance models and opportunities to streamline and/or consolidate existing organizations with a stake in the DTRS network governance to improve efficiency, effectiveness, or contain costs
- Risk analysis on the shared ownership of current and future infrastructure for the DTRS network
- Recommendation on where technical and programmatic elements of the DTRS network should reside within the State's executive branch

FE completed this scope of work by drawing on multiple sources of information and insight including surveys, interviews, site visits, existing documentation, workshops, and coordination with other communications initiatives. We analyzed the information from all these sources and used it as the basis for the identification of needs, the development of recommendations, and the presentation of implementation costs and plans.

The following list maps the organization of the balance of this report:

- In Section 2, we describe our methodology for gathering and analyzing the data included in this report.
- In Section 3, we outline the critical components required for effective governance, and describe the current Colorado governance structure, including the multiple agencies, committees, and State positions that play a part in governance.

- In Section 4, we provide alternative governance structures and provide detailed descriptions of the structures found in two other states.

- In Section 5, we describe the funding needs for capital and operating/ maintenance areas, and explore funding strategies as well as potential funding sources.

- In Section 6, we review Colorado's unique shared ownership of the DTRS, and the effects of user agencies either withdrawing from DTRS or joining DTRS.

- In Section 7, DTRS programmatic elements are reviewed, including the roles of the Office of the SWIC and OIT/PSCN.

- In Section, 8 we analyze RF coverage policies.

- In Section 9, we recommend guidance for governance modifications and funding solutions.

2. Methodology

FE's methodology used to develop this report includes a number of steps from reviewing existing system documentation and governance structures/responsibilities, evaluating alternative governance structures, and analyzing potential funding sources, to developing recommendations to improve governance in the State, as well as identify potential funding to sustain the Digital Trunked Radio System and statewide interoperability. This methodology has been used effectively in hundreds of prior projects of a similar nature.

Project Initiation

On January 6, 2015, ***FE*** held a Project Initiation meeting with stakeholders from the Division of Homeland Security and Emergency Management (DHSEM). The purpose of the meeting was to confirm a common understanding of the project goals, objectives, and vision; items best understood through a close working relationship between the respective management teams and staffs.

Regular Project Status Reports

FE provided stakeholders from the Division of Homeland Security and Emergency Management with a bi-weekly project status report that described the progress and issues related to our data gathering and data analysis efforts. These reports were shared with members of PSCS and other stakeholders.

Existing System Analysis and Data Collection

FE took four distinct data collection approaches: requests for information, web-based surveys, stakeholder interviews, and collection/evaluation of representative governance and funding alternatives.

Further Requests for Information (RFI) were submitted by ***FE*** to specific agencies for:

1. Gathering information about funding options, through legislative liaison with the Governor's Office of Information Technology (OIT) and DHSEM
2. Identifying governance structures from data provided by PSCS and CCNC
3. Gathering site lease costs from OIT
4. Gathering information on DTRS organization elements through data from OIT and DHSEM

FE personnel conducted *Business Plan* stakeholder interviews during February and March 2015, with a number of entities including the regional all hazards subcommittees,

the Public Safety Communications Subcommittee (PSCS) the Consolidated Communications Network of Colorado (CCNC), DPS, OIT, and DHSEM.

Appendix A lists the agencies, departments, and other organizations that participated in the interviews, surveys, and requests-for-information (RFI's). It lists both the agencies that received requests to participate as well as those that did participate.

Governance Needs Analysis and Requirements Definition

FE developed the requirements for effective governance based on DHS-OEC / SAFECOM guidelines, analyzed the current governance within Colorado, identified gaps and overlaps, and discussed the requirements with the various State agencies and other organizations playing a part in the overall governance. This allowed us to gain input, recommendations, and a mutual understanding of the requirements before developing recommendations to fulfill those requirements.

Funding Needs Analysis and Requirements Definition

Based on the capital and operating/maintenance funding needs developed in the *Needs Assessment*, ***FE*** analyzed the State's existing funding for DTRS, and identified potential funding sources that Colorado should explore to ensure ongoing sustainable funding for the network.

DTRS Programmatic Elements and Membership Risks

As part of our interviews with OIT, DHSEM, and the governance bodies of PSCS and CCNC, we discussed the tasks involved with operating and planning of DTRS. We discussed improving the efficiency of these activities by modifying the organizational structure of the groups responsible for their conduct. We also investigated the ways in which other states have organized the groups responsible for the activities of managing their statewide systems.

Our discussions with these groups also involved a review of the risks and effects of user organizations leaving (ceasing to use) and joining (beginning to use) DTRS.

Coordination with SCIP and PSCS Annual Report

FE made special efforts to ensure that this report and its companion *Needs Assessment* are supportive of (and supported by) two other important documents:

1. The Colorado Statewide Communications Interoperability Plan (SCIP)
2. The PSCS 2014 Annual Report

We reviewed the current versions of these documents and attended the SCIP workshop held in April 2015.

Collaboration with *Needs Assessment*

As part of our tasking, the State commissioned ***FE*** to prepare both this *Business Plan,* addressing issues of governance, funding, and management of DTRS as well as statewide interoperability, and the *Needs Assessment*. We developed the two reports in collaboration as "companions" to each other; therefore, due to their differences in scope they remain separate, but often refer to each other for elaboration on certain points.

Summary of Methodology

Figure 2 is a summary of the project management and preparation (blue-colored), needs identification (purple-colored), and needs analysis (green-colored) tasks involved in the development of the *Needs Assessment*. The red-colored tasks are part of the methodology for the *Business Plan*.

This methodology was conducted between January 2015 and June 2015.

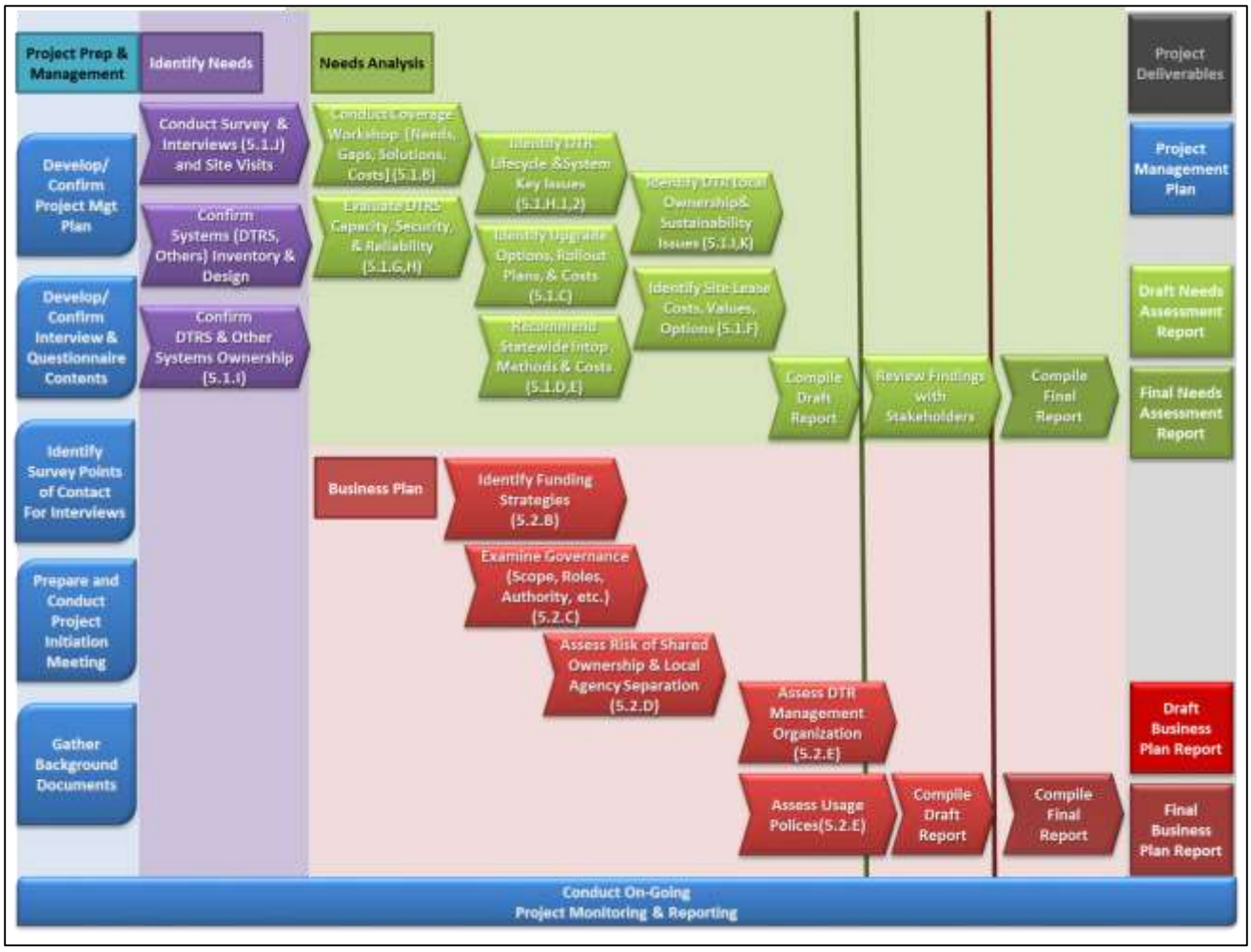

Figure 2: Summary of methodology

3. Colorado Governance Analysis

For many years, the Department of Homeland Security Office of Emergency Communications (OEC) has supported the SAFECOM Program[1], which *"works to improve multi-jurisdictional and intergovernmental communications interoperability"*. SAFECOM's membership "includes more than 70 members representing state and local emergency responders, and major intergovernmental and national public safety associations, who provide input on the challenges, needs, and best practices involving emergency communications."[2]

The SAFECOM Program developed the Interoperability Continuum, widely adopted and accepted as representing the key elements for achieving interoperable communications.

Figure 3 is the SAFECOM Interoperability Continuum. As a community, such as the public safety agencies in the state of Colorado, moves further to the right on each lane of this Continuum, they achieve a higher level of interoperability.

[1] According to www.dhs.gov/SAFECOM; accessed 5/26/2015
[2] Ibid.

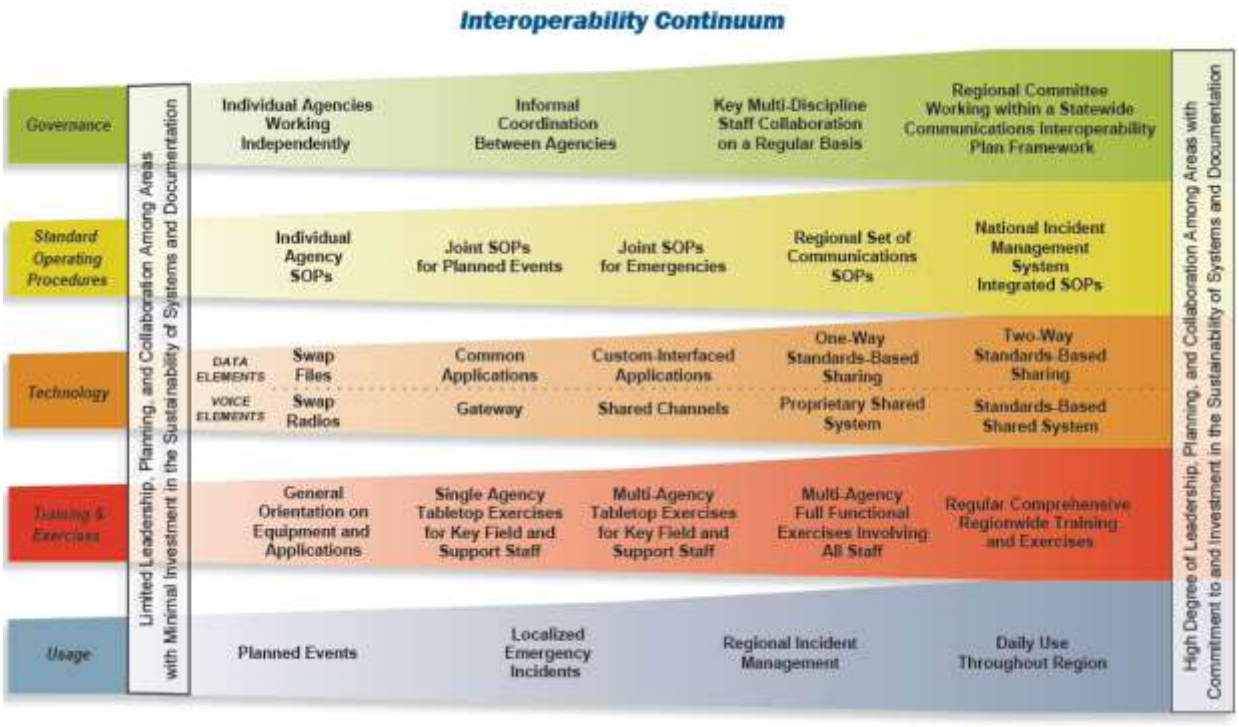

Figure 3 – DHS-SAFECOM Interoperability Continuum

For several years, the OEC has assisted states with developing their Statewide Communication Interoperability Plans (SCIP). In doing this, the OEC recognizes that, beyond the five original lanes of the Interoperability Continuum shown in the figure above, Lifecycle Funding and Outreach and Information Sharing should also be considered key factors for achieving interoperable communications statewide.

Each lane of the Continuum warrants focus and effort, but the Governance lane warrants the most because it is often the hardest to accomplish. Most states have a Statewide Interoperability Executive Committee (SIEC), but few states have effective governance. Governance is typically the hardest for states to accomplish because it involves coordination and compromise among a diverse group of stakeholders from across the state. However, effective governance facilitates development of all other lanes of the continuum.

This section of the *Business Plan* provides an overview of the elements necessary to achieve effective governance and documents the existing governance structure in the state of Colorado. While there are many key aspects to effective governance that should be consistent from state to state, every state is unique. Home rule, topography, and seven neighboring states are just a few of the items that make Colorado unique.

3.1 Criteria for Effective Governance

Establishing successful statewide governance requires the development and implementation of a number of key governance factors, such as the following:

Key Governance Factors

- **Balanced Membership**
- **Formal Authorization**
- **Charter**
- **Public Safety Communications Focus**
- **Shared Decision Making and Goals**
- **Effective Leadership**
- **Regional Communications Boards**
- **Transparency**
- **Outreach and Information Sharing**
- **Funding**

- **Balanced Membership –** Because the advancement of interoperable communications crosses all levels of government and the emergency response community's varied disciplines so must statewide governance. Membership must balance the needs of city, county, state, tribal and federal governments as well as police, fire, EMS, and other public safety service providers. It must ensure membership from every region of the state, locally elected officials, state associations and a balance of metropolitan versus rural participation. A balance in membership is essential for maximizing planning, containing costs, effectiveness of technology and ensuring standard operating procedures and training and exercise programs are in place.

- **Formal Authorization –** Statewide governance should minimally be established by a Governor's Executive Order. Optimally, the Statewide Interoperability Executive Committee (SIEC), its powers, its position in state government, and its budget are codified in state law. Formal Authorization informs all stakeholders statewide as to the importance of the mission and powers of the board and establishes its credibility. A codified state law reaffirms that interoperability and emergency communications planning and governance is an ongoing issue that must evolve with emerging technologies and operational changes.

- **Charter –** A formally authorized SIEC should be supported by a formal charter consistent with enabling state law or executive order. The charter will incorporate the parameters of the enabling legislation or order and will minimally describe the purpose of the group, powers, membership, logistics, desired outcomes and operating principles.

- **Public Safety Communications Focus –** The SIEC should be focused solely on establishing and enhancing public safety communications and interoperability and be independent from the broader and much more robust area of emergency management. Today's planning and operational environment emphasizes land mobile radio (LMR) systems, and rightly so, but the evolving public safety

communications ecosystem also includes broadband, Next Generation 9-1-1 capabilities, and public alert and warning systems and technology.

- **Shared Decision Making and Goals –** A shared vision and mission actively developed and promulgated among stakeholders is a critical foundation for accomplishing consensus goals and filling operability and interoperability gaps. The vision, mission, goals, and supporting initiatives are in Colorado's recently updated draft Statewide Communications Interoperability Plan (SCIP). The SIEC should take ownership in the SCIP, promote it, and actively seek to accomplish its goals by instituting its vision and allowing it to act as a guidance document for the State's governance of public safety communications.

- **Effective Leadership** – Effective governance requires effective leadership on two fronts. First, the SIEC chair must have a passion for enhancing operable and interoperable public safety communications. This individual should have established relationships across the state and across disciplines and should champion collaboration and consensus decision making. This individual should not play favorites to a particular discipline or level of government. The SIEC chair typically serves in that role in addition to a different job, usually as a technical or operational manager for public safety operations or communications. For this reason, there is the need for leadership on the second front of supporting the SIEC with a full-time, state funded Statewide Interoperability Coordinator (SWIC) and, often, their staff. The SWIC (or the Office of the SWIC), while not employed by the board, should work as the board's administrator, managing these day-to-day activities:

    - Operability, Interoperability and Public Safety Program Management
    - SCIP Implementation
    - Governance Development and Coordination
    - Policy Development
    - Grants Coordination
    - Outreach and Education

- **Regional Communications Boards (or Committees) –** In the realm of emergency management, it has often been said that "all events are local". Therefore, effective governance must provide local public safety agencies the ability to plan at the regional level and communicate needs to the state level. The creation of regional interoperability communications boards or committees

provides local control, bottom up governance and effective coordination with the SIEC.

- **Transparency –** Governance established by elected executives informs all stakeholders as to the methodology to be used for operable, interoperable, and public safety communications enhancements. For the SIEC to establish credibility it must be transparent in all its meetings and actions. Meetings should be open, allow for public comment, and follow state laws and rules regarding open meetings, confidentiality, and other such topics.

- **Outreach and Information Sharing –** Transparency must go beyond the meetings of the SIEC. Effective governance ensures that stakeholders at all levels of government and disciplines from across the state are informed of the board's activities and educated on the board's vision, purpose, powers and desired outcomes. Achievement of interoperability relies on diverse stakeholders cooperating across disciplines and jurisdictions. Inclusion of a broad spectrum of individuals, groups, and organizations can be beneficial to accomplishing statewide goals and objectives. Information provided to each stakeholder acts as a force multiplier for education and coordination and builds support for the decisions made by the governing body. Likewise, timely communication and information sharing by the stakeholders upward in the various organizations to appointed or elected leaders provides key data upon which decision-makers base evaluations. Stakeholders remain positive participants when kept well informed.

- **Funding –** The balanced membership of a SIEC will have participants from across the state. To ensure continued and stable participation, members travel costs should not be the burden of the government or organization they represent. Funding should provide for the administration, operation and implementation of the board's, governor's and legislature's vision for operable, interoperable, and public safety communications in the state. The board should maintain a budget for statewide public safety communications interoperability improvements which may include DTRS or other system enhancements, planning, developing standard operating procedures, training, communications exercises (planning and executing), outreach and information sharing, strategic technology reserve equipment, grants to local governments supporting statewide communications strategies and the sustainment of statewide and regional governance.

Successful governance structures are not hierarchical. Instead, states are better served with a flat, coordinated structure where a well-established governance body serves as the binding entity for statewide public safety communications operations and interoperability efforts. States must develop a statewide governance structure that incorporates and

respects the input of the local, regional, state, federal, and tribal entities. For this to happen successfully, the governance structure cannot be top-down or exclusive, but instead must be collaborative and inclusive of all stakeholders.

Successful statewide public safety communications operability and interoperability is a long-term process that is never fully complete. It is an iterative and continuously evolving process.

3.2 Statewide Interoperability Coordination

As part of an effective governance and interoperability program, the Statewide Interoperability Coordinator (SWIC) should provide critical control in program management, SCIP implementation, governance, policy development, grants coordination, and outreach and education to the State and user agencies.

The Department of Homeland Security's Office of Emergency Communications (OEC) included in the National Emergency Communications Plan (NECP) a requirement directing each state and territory to identify a central coordination point for interoperable public safety and emergency communications efforts. Many states and territories have elected to have the SWIC fill this role.

In an ideal situation, the SWIC is responsible for statewide interoperability and authorized through legislation, executive order, or established committee by-laws, to perform the tasks assigned throughout the state. This includes working with state, county, federal, tribal, and local municipalities to further the state's interoperability abilities.

The DHS OEC's *SWIC Roles and Responsibilities*[3] go a long way in defining the specific recommended duties of the SWIC, which include:

- The SWIC's role is one of high-level program management, including developing and delivering reports and briefings, coordinating interoperability and communications projects, assembling interoperability working groups to develop

[3] From *SWIC Roles and Responsibilities*, by DHS-OES, NCSWIC, February, 2013

recommendations and programmatic implementation, overseeing interoperability websites, managing the development and content of interoperability newsletters, working with legislators and governor's offices on interoperable communications legislation issues, and building relationships with those involved in the state's interoperability efforts.

- The SWIC assists with the implementation of the NECP and their Statewide Communication Interoperability Plans (SCIPs). The SCIP should be a statewide plan created to provide strategic direction to those responsible for interoperable communications. The SCIP should be locally-driven, multijurisdictional, multi-disciplinary, and address land mobile radio and broadband, at the state, regional, local, and tribal levels. SWICs should also educate the public safety community on the SCIP.

- SWICs should coordinate closely with these statewide governance entities and seek guidance and recommendations from the joint efforts of governance members, state agencies, and regional entities, establishing a Statewide Interoperability Governing Body (SIGB), or other formalized, statewide governance systems. Statewide governance bodies provide a unified approach across disciplines and jurisdictions that ultimately support funding, informed and effective decision making, and communications interoperability.

- SCIP Project Management tasks may include:

    - Leveraging all components of the statewide governance system to update the SCIP and obtain stakeholder input

    - Driving and coordinating SCIP implementation by developing timelines and project plans

    - Guiding the governance bodies in chartering and supporting working groups to develop outreach materials, presentations, and issue summaries

    - Escalating policy and grant recommendations to the State Administrative Agency (SAA), Director of the State Office of Homeland Security, or Governor's Office for consideration

    - Coordinating SIGB meeting schedules, agendas, and information dissemination to maximize integration and collaboration with other key governance bodies

  - Maintaining records, such as charters, meeting minutes, correspondence, current membership enrollment, recommendations reports, and interoperability websites
  - Providing program management support, including staffing, contracting, budgeting, and administrative tasks
  - Coordinating with federal partners on technical assistance related to SCIP implementation
  - Collaborating with OEC, the State Training Officer (STO), FEMA's Emergency Management Institute (EMI), and federally-approved instructors to offer Communications Unit (COMU) courses.

- SCIP Measurement tasks may include:
  - Measuring and communicating SCIP progress and results and update the plan as needed
  - Developing and assessing short- and long-term performance measures to show progress toward improved interoperability
  - Conducting and maintaining state and territory capabilities assessments

- SWICs serve as a member of the National Council of Statewide Interoperability Coordinators (NCSWIC). This is a national governance body established to assist state and territory interoperability coordinators with promoting the critical importance of interoperable communications and best practices within their states and nationally. The SWIC contributes to the development of standard operating procedures; voice and data technologies; training, exercises, and outreach and education materials; and federal public communications policies, plans, and services. This coordinated effort greatly enhances response capabilities by developing collaborative interoperable communications strategies at all levels of government.

  The DHS OEC facilitates two in-person NCSWIC meetings each year to build partnerships, discuss pressing issues impacting public safety communications interoperability, and share best practices and lessons learned. Additionally, NCSWIC meetings are an opportunity for the Regional Interoperability Committees (RIC), a subcomponent of the NCSWIC, to meet. RICs are aligned to the 10 FEMA Regions and address interoperability issues at the regional level.

- Grants Coordination and Policy Development tasks may include:
    - Coordinate with the SAA to monitor interoperable communications grant opportunities, review proposals for grant funding related to communications interoperability, and provide documentation to the SIGB for consideration of endorsement
    - Coordinate the compilation of state and territory investment justifications and grant applications for communications interoperability
    - Seek additional grant funding opportunities for state and territory interoperable communications efforts beyond those administered through the SAA structure
    - Align locally-awarded, non-state administered, interoperable communications grant funds (e.g., association grants for local disciplines or jurisdictions) to the SCIP
    - Write endorsement letters for approved projects on behalf of the SIGB for grant applications
- Outreach tasks may include:
    - Maintaining a database of stakeholders and resources across the state or territory
    - Liaising across different levels of government and all disciplines to build partnerships
    - Serving as the point of contact (POC) to the Federal Government and industry on state and territory interoperable communications issues
    - Providing state and territory governance entities with outreach and training support, including assistance with workshops and courses, for emergency responders
    - Communicating information regularly with stakeholders to ensure transparency
    - Attending national interoperability conferences and workshops; participating in the NCSWIC

3.3 Current Colorado Governance

Colorado's existing governance structure, as it relates specifically to interoperable communications, is a collection of coordinated and uncoordinated committees that are more affiliated by cross membership than by a clearly defined state structure. For the most part, governance has formed organically in Colorado, sometimes in a local municipality or county, in other instances around regional systems or joint ownership, but while there is governance, there are large governance gaps. Despite the major gaps, there are many qualified and committed individuals currently involved in the process and some foundational structures the State can build upon.

The following subsections document the core elements of Colorado's existing governance structure.

3.3.1 Homeland Security and All-Hazards Senior Advisory Committee

Under the Colorado Department of Public Safety (DPS) Division of Homeland Security and Emergency Management (DHSEM) exists the Homeland Security and All-Hazards Senior Advisory Committee (HSAC).

The HSAC is a 21-member committee appointed and chaired by the Executive Director of DPS. The HSAC's mission is *"to assist the state in becoming better able to prevent, protect, mitigate, respond, and recover from those threats and hazards posing greatest risk to Colorado."* The HSAC has the following responsibilities:

- Providing advice and counsel to the State Homeland Security Advisor
- Formulating recommendations on the State Homeland Security Strategy
- Reviewing grant funding applications
- Providing policy guidance to the new Division of Homeland Security and Emergency Management

DHSEM activities, with guidance from the HSAC, cover the five core areas of emergency management which are: Prevention, Protection, Mitigation, Response and Recovery. DHSEM supports all naturally occurring and man-made disasters such as flooding, tornadoes, wildfire, hazardous materials and acts of terrorism. In the five core areas of emergency management, as well as in each disaster type, public safety communications and interoperability is a consideration, but not the main focus.

3.3.2 Public Safety Communications Subcommittee (PSCS)

In June, 2014, Governor Hickenlooper signed into law Senate Bill 14-127 concerning statewide radio communications. Senate Bill 14-127 established the Public Safety Communications Subcommittee (PSCS) as an advisory committee to the HSAC. In the state of Colorado, the PSCS fulfills the duties and responsibilities of a Statewide Interoperable Communications Council (SIEC)[4].

The purposes of the PSCS, according to the law are:

- Promoting interoperable communications among public safety organizations throughout the state
- Representing the HSAC in matters concerning public safety communications and interoperability of communications systems
- Informing the HSAC on the development, maintenance, upgrade, and operation of the DTRS

The PSCS was also assigned the following duties by the legislature and governor:

- Supporting the Executive Director of DPS to perform a Needs Assessment and Create a Business Plan regarding statewide radio communications by June 30, 2015
- Presenting an annual report to the Joint Budget Committee in writing no later than each December 31 that includes operational and capital infrastructure needs to maintain the system
- Providing policy-level direction and promote efficient and effective use of resources for matters related to public safety communications interoperability
- Promoting cooperation among local, tribal, state, and federal public safety agencies, as well as nongovernmental organizations in the business of providing public safety in addressing statewide radio interoperability needs in the state

[4] Executive Order B-2015-003 officially recognized that the duties and responsibilities of a Colorado SIEC had been transferred to the HSAC and it therefore rescinded a previous Executive Order that created a separate SIEC in Colorado.

- Assisting public safety entities in the development of projects, plans, policies, standards, priorities, guidelines, and training for radio interoperability
- Coordinating with other communications oversight groups to ensure adequate wireless spectrum to accommodate all users
- Researching statewide interoperable communications best practices of other states, tribes, and municipalities
- Providing recommendations to the HSAC, when appropriate, concerning issues related to statewide interoperable radio communications for public safety in Colorado, which recommendations may relate to relevant topics including governance, standard operating procedures, technology, training, and funding

The PSCS requires at least 23 members that include the following representation:

- Two members representing public radio systems that are not part of the statewide DTRS
- One member representing the licensed ambulance or emergency medical service and the licensed hospital or trauma center
- Two members representing the nine All-Hazards regions
- Two members selected by the Colorado State Fire Chiefs' Association, one of whom represents a metropolitan fire department and the other who represents a rural fire department
- One representative of the Colorado Professional Fire Fighters or successor labor organization that represents firefighters
- One representative of Colorado's counties
- Five representatives of the Consolidated Communications Network of Colorado
- Two members representing the law enforcement agencies, one who is selected by the Colorado Association of Chiefs of Police and one who is selected by the County Sheriffs of Colorado
- Five members representing the following state government agencies/departments:

  - The Chief Information Officer of the Governor's Office of Information Technology
  - The Chief of the Colorado State Patrol
  - The Executive Director of the Colorado Department of Corrections Transportation
  - The Executive Director of the Colorado Department of Transportation
  - The Executive Director of the Colorado Department of Natural Resources
- Two members representing the two tribal nations in the state, one selected by each of the two tribal nations

In the short existence of the PSCS, its leaders have built their membership and establishing subcommittees and working groups to advise them. The PSCS has also begun working through their assigned duties per state law. As part of the coordination with other communications oversight groups, the PSCS exchanges input and direction with the SWIC.

The PSCS established three subcommittees and they are the Education and Outreach Committee, Technical Committee and Operations Committee. In addition to these subcommittees the PSCS is also in the preliminary stages of developing two working groups for Inter-RF-SubSystem Interconnection (ISSI) Planning and VHF/UHF Users.

The PSCS operates an outreach and educational program that offers an annual Radio Summit to provide technical and operational updates to users of DTRS and other systems as well as to elected officials and other interested parties.

3.3.3 All-Hazards Regional Committees

Working in conjunction with DHSEM are nine All-Hazards Regional governance committees, with Regions depicted in Figure 4. Their size, level of activity and functionality varies from region to region. While DHSEM's mission is statewide these groups share a similar mission, but on the local and regional level.

A main focus for these groups is how to Prevent, Protect, Mitigate, Respond and Recovery from all naturally occurring to man-made disasters. DHSEM supports the nine All-Hazards Regions with nine Regional Field Managers. They seek to assist the regions in implementing the state preparedness goals while acting as a liaison to bring local needs to the attention of the HSAC and DHSEM.

An emphasis is placed on tactical response and while public safety communications is a common thread from prevention through recovery, it is one of dozens of focus areas in emergency management activities. In discussions with the communications subcommittees of the All-Hazards Regions we learned:

- They operate at different levels of activity – some meet regularly (as often as monthly) and some have not met for a year or more.

- They mainly focus on operational methods of coordination such as informing each other of communications-related changes planned or made within the constituent counties or municipalities. They work to develop solutions that include adjusting their operational plans, for example, making more effective use of existing assets rather than deploying new technical assets, when possible.

- They seek direction as to how they can best engage with and support the PSCS organization. They are excited by the Charter of the PSCS as described above but are unsure of the deliverables that the PSCS and the All-Hazards Regions can and will expect from each other.

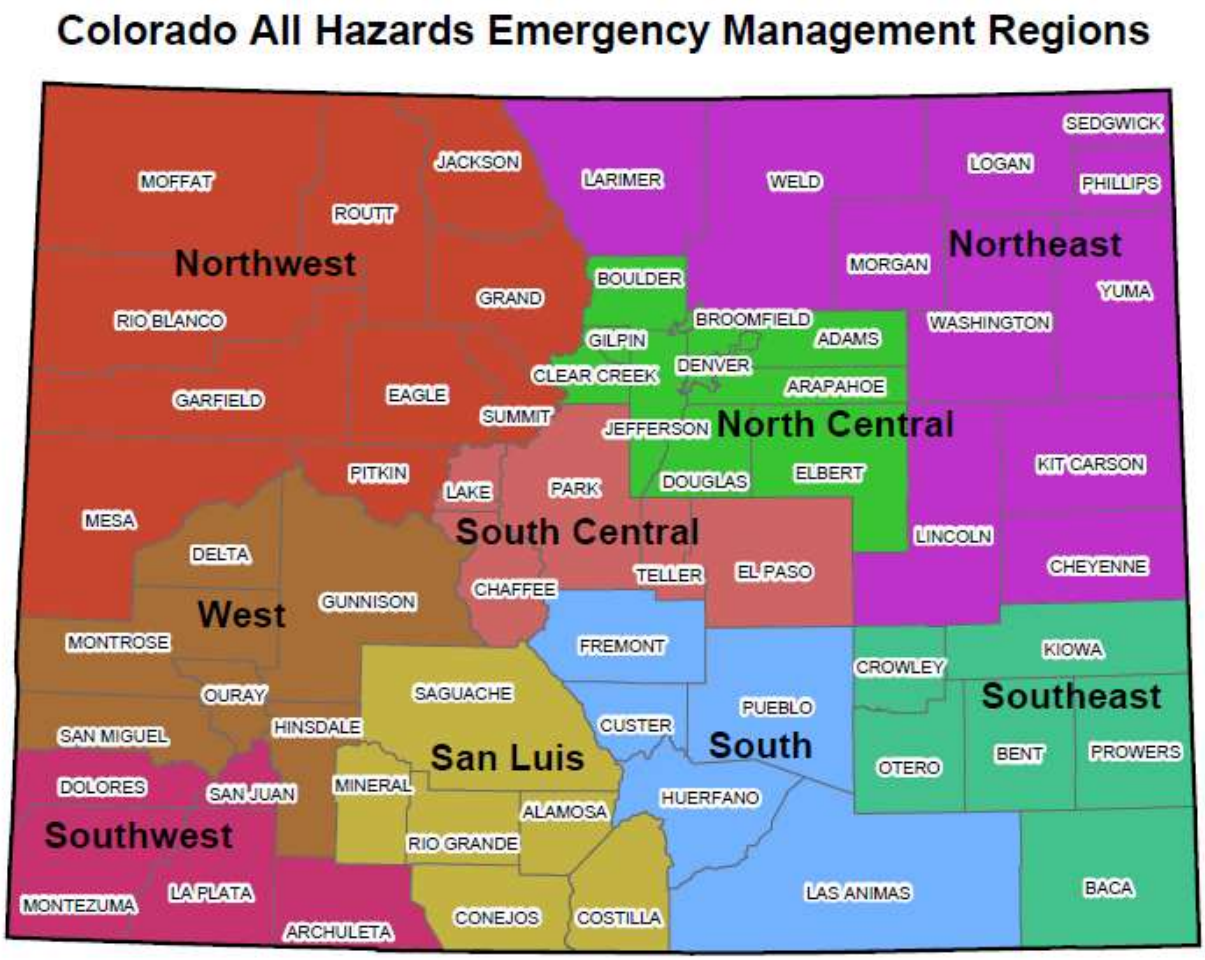

Figure 4 – All-Hazards Regions Map[5]

3.3.4 Consolidated Communications Network of Colorado

The Consolidated Communications Network of Colorado (CCNC) is a not-for-profit 501(c)(3) corporation founded in 2002, organized *"exclusively for the purpose of managing, promoting, and propagating the statewide radio network."*

The mission statement for CCNC[6] is:

[5] http://www.jeffersonmentalhealth.org/redpages/RED/DISASTER%20MENTAL%20HEALTH%20RESOURCES/Map.pdf; accessed 5/26/2015

[6] From *CCNC – Who are they?* As presented at Colorado Radio Summit, March 12, 2015

Our mission is to manage the Digital Trunked Radio System for public safety radio operability and interoperability among first responders across Colorado to better serve our citizens

The purpose of CCNC, as stated at the March 12, 2015, Radio Summit, is:

> *The Corporation is organized exclusively for the purpose of* **managing, promoting, and propagating the statewide radio network** *under and by virtue of the laws of the state of Colorado concerning nonprofit corporation and shall have and exercise all the rights, powers and privileges granted to such corporations by those laws, as amended from time to time, subject to the restrictions and limitations contained in these Articles.*
>
> *The purpose of the Corporation shall be* **to promote and support social welfare and public safety and lessen the burden to government** *through the support of the following activities and purposes.*
>
> *The Corporation will* **assist in the development of facilities, operational procedures, maintenance, grants, and training** *for the statewide digital trunking radio network throughout the state of Colorado and if needed the surrounding governmental bodies in contiguous states.*

Current functions of the CCNC were presented at the Radio Summit on March 12, 2015, and consist of the following:

- Help facilitate expansion of interoperability across all levels of government and frequency bands
- Serve as statutory members of Public Safety Communication Subcommittee (PSCS)
- Participate in regional user communications meetings
- Engage and educate Legislators on public safety communications issues
- Actively work to form partnerships with non-DTRS system users/owners
- Parallel functions as PSCS
- Develop and provide training upon request
- Technical resource assistance

- Dissemination of pertinent information of communications interest
- User agency approval for membership
- Review technical issues with partners to effectively manage resources and operation of the system
- Assist in the development of mutual resolution of differing opinions between member agencies/interoperability partners
- Strive to continue a system-of-systems approach, facilitating cooperation among ***ALL*** public safety communication systems.

Since the CCNC is not legislatively chartered, its board and members determine its scope and responsibilities. While CCNC works collaboratively with State governance organizations such as PSCS (and CCNC is on the board of PSCS), it is not part of the State structure and is not bound by State dictates.

DTRS has over 1,000 participating members from federal, state, county, special districts and local and tribal governments. The CCNC governance structure represents a full range of first responders, including police, fire, EMS, public works, road and bridge, school districts and hospitals. CCNC does not own the DTRS, its member agencies do.

CCNC offers two types of memberships. Primary CCNC members are organizations who use DTRS for day-to-day communications and/or that have made major investments in DTRS infrastructure. CCNC associate members are users and entities who use independent systems for day-to-day communications but rely on the DTRS for interoperability. Whereas primary members have voting rights, associate members do not.

The CCNC has a robust governance structure with a 36-member Board of Directors and a 13-member Executive Board. The CCN has the following five functionally-aligned subcommittees:

- Technical
- Operational
- Policy and Procedure
- Training
- Ad Hoc

The CCNC also has five geographically aligned subcommittees, known as the “CCNC Regions”, which are based on CCNC defined needs. Each of these five geographically-aligned regions supports a distinct set of Mutual Aid Channels (MAC) as described in the *Needs Assessment*. The CCNC regions are not, however, aligned with the nine HSAC regions.

Committee membership contains Primary and Associate members as well as regional representatives, police, fire, EMS and other stakeholder groups.

Figure 5 reflects the current structure of the CCNC.

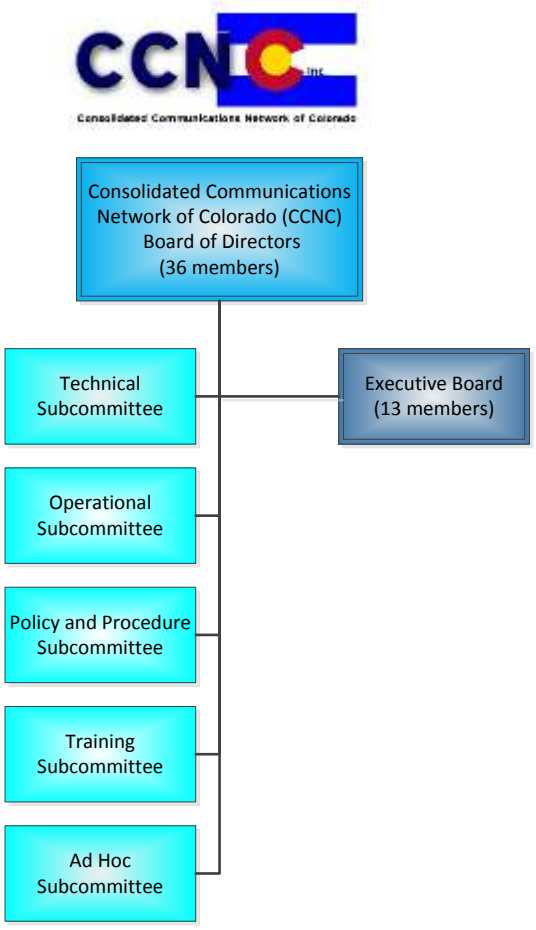

Figure 5 – CCNC organizational structure

3.3.5 Local Systems Governance

Many user groups of DTRS are part of local governance organizations that provide planning and management of system operation and funding at a local level. This most often occurs at the county level and counties such as Arapahoe, Douglas, Jefferson, Eagle, and Mesa have such groups. They define and address their operational needs locally, often collecting usage fees from agencies within their counties, and the technical and operational solutions they implement must be suitable for incorporation into the larger DTRS. For example, several counties set their own rigorous specifications for coverage and implement radio sites to meet those specifications. These efforts are often coordinated through CCNC as the individual agencies will inform others of their plans but no permission must be sought or obtained.

Also, as described in the *Needs Assessment* there are numerous radio systems in Colorado other than DTRS. Some of these systems are local to one municipality or other jurisdiction but many are regional and shared among many agencies. These shared systems include the Pikes Peak Regional Communication Network (PPRCN) and the Front Range Communications Consortium (FRCC). The former operates a network that is directly interconnected to the DTRS but retains a high degree of operational and technical autonomy. The latter is not currently interconnected to DTRS but work is under way to do so, with the support of OIT, via an ISSI gateway.

These and other local systems operate with their own governance structures of varying charter, size, and makeup. The degree to which these local governance organizations satisfy the criteria for effective governance as described above also varies; some have local government charters that grant them their authority and others are less formal in their establishment. Many, however, have responsibility for planning and expending funding according to the direction of the representative leaders from user agencies.

As noted, the PSCS has two director positions specifically allocated to representatives of systems other than DTRS. This promotes the statewide nature of the role of PSCS in coordinating interoperability beyond DTRS.

3.3.6 Organization of Colorado Governance

As noted in previous sections, governance of the DTRS, including interoperability is a collection of coordinated and uncoordinated committees that are more affiliated by cross membership than by defined structure. Figure 6 reflects the structure of the various departments and organizations that contribute to the governance.

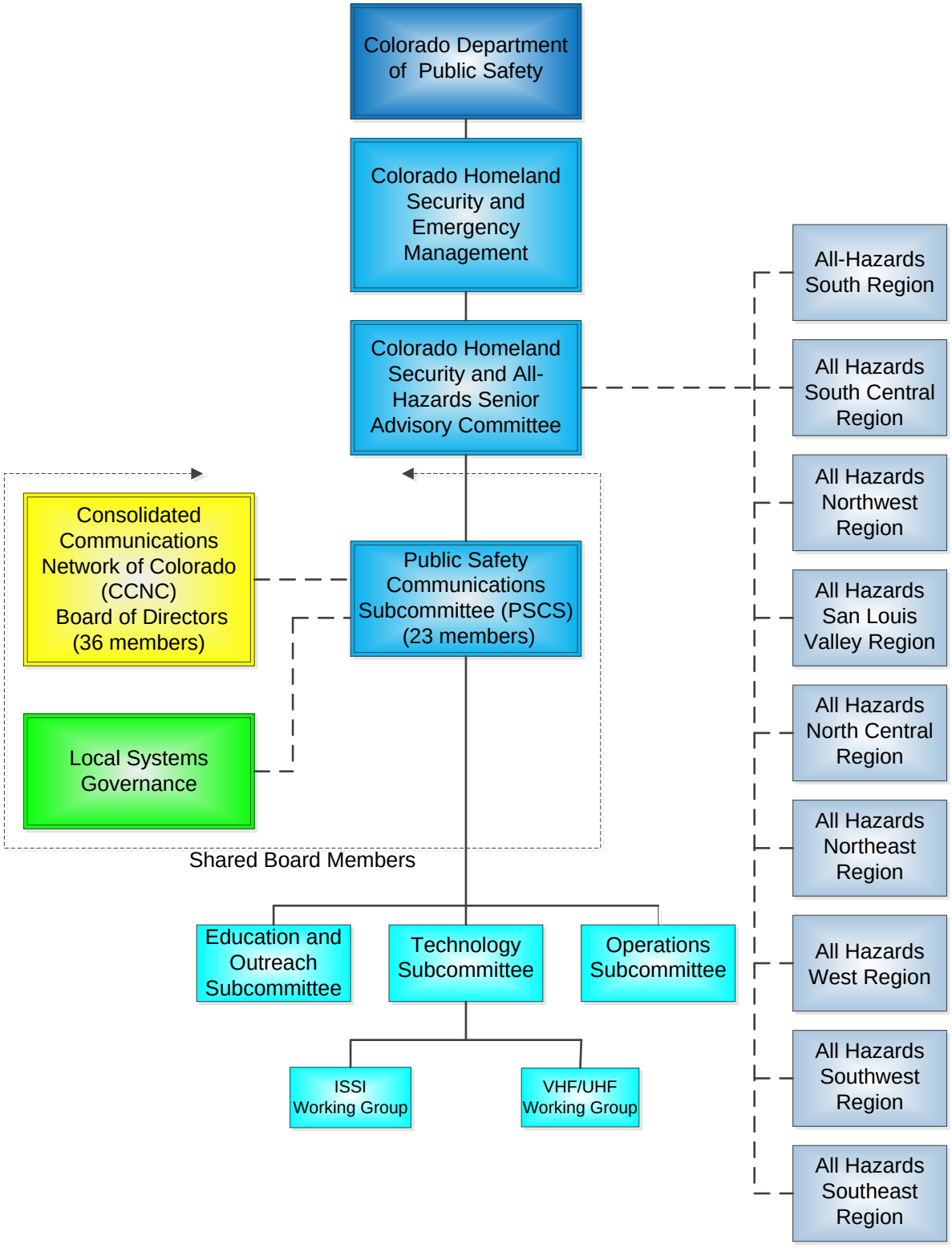

Figure 6 – Colorado governance structure

Not described in this section nor shown in Figure 6 is the Governor's Office of Information Technology (OIT) Public Safety Communications Network (PSCN) group. The PSCN is responsible for the deployment, operations, and maintenance of state-owned public safety communications systems and equipment. They have a significant role in public safety communications in Colorado and are an active participant in many of the governance structures described in this report but they are not, themselves, a governance structure. More about PSCN is included in Section 7 of this report.

3.3.7 Overlap in CCNC and PSCS Tasks/Responsibilities

Table 1 reflects the tasks and responsibilities assigned to CCNC and PSCS. Colored fonts have been used to highlight the fact that there are multiple tasks and responsibilities that overlap between the two organizations (i.e., if task/responsibility of PSCS is the same as or has significant similarity to one of CCNC, their listing is shown in the same color). Tasks and responsibilities shown in uncolored (black) text do not overlap.

Table 2 – CCNC and PSCS tasks/responsibilities

CCNC Tasks/Responsibilities	PSCS Tasks/Responsibilities
Similar Corresponding Tasks/Responsibilities	
• Help facilitate expansion of interoperability across all levels of government and frequency bands	• Promote interoperable communications among public safety organizations throughout the state
• Participates in regional user communications meetings • Reviews technical issues with partners to effectively manage resources and operation of the system	• Coordinate with other communications oversight groups to ensure adequate wireless spectrum to accommodate all users
• Engage and educate Legislators on public safety communications issues	• Present an annual report to the Joint Budget Committee in writing no later than each December 31, that includes operational and capital infrastructure needs to maintain the system

CCNC Tasks/Responsibilities	PSCS Tasks/Responsibilities
Similar Corresponding Tasks/Responsibilities	
• Actively works to form partnerships with non-DTRS system users/owners	• Promote cooperation among local, tribal, state, and federal public safety agencies, as well as nongovernmental organizations that are in the business of providing public safety in addressing statewide radio interoperability needs in the state
• Technical resource assistance	• Research statewide interoperable communications best practices of other states, tribes, and municipalities
• Dissemination of pertinent information of communications interest	• Assist public safety entities in the development of projects, plans, policies, standards, priorities, guidelines, and training for radio interoperability
Non-Overlapping Tasks/Responsibilities	
• Statutory members of Public Safety Communication Subcommittee (PSCS) • Parallel functions as PSCS • Develops and provides training upon request • User agency approval for membership • Assisting in the development of mutual resolution of differing opinions between member agencies/interoperability partners • Strive to continue a system-of -systems approach facilitating cooperation among ALL public safety communication systems	• Represent the HSAC in matters concerning public safety communications and interoperability of communications systems; and inform the HSAC on the development, maintenance, upgrade, and operation of the DTRS • Provide policy-level direction and promote efficient and effective use of resources for matters related to public safety communications interoperability; • Provide recommendations to the HSAC, when appropriate, concerning issues related to statewide interoperable radio communications for public safety in Colorado, which recommendations may relate to relevant topics including governance, standard operating procedures, technology, training, and funding

3.3.8 Summary of Colorado Communications Groups

Section 3.1 of this Report outlines the criteria (categories or factors) that would provide effective governance. Table 3 shows that none of the three groups involved with governance (HSAC, PSCS, and CCNC) meets all of the criteria needed for effective governance at the state level.

Table 3 – Criteria of effective governance and existing organizations

Governance Criteria	HSAC Regions	PSCS	CCNC
Balanced Membership		✓	✓
Formal Authorization	✓	✓	
Charter		✓	
Public Safety Communications Focus		✓	✓
Shared Decision Making and Goals		✓	✓
Effective Leadership	✓	✓	✓
Regional Communications Boards	✓		✓
Transparency	✓	✓	✓
Outreach and Information Sharing		✓	
Funding			

As Table 3 shows, none of the three groups have all of the criteria necessary for fully effective governance. The PSCS is the group that is closest to having all such criteria but lacks:

- Its own regional boards (although it does leverage the HSAC Regional Committees' Communications Subcommittees for the purpose)
- The availability of and control over funding at a level that is sufficient to promote and enhance statewide interoperability.

Also, Table 3 shows the high degree of overlap between makeup and focus of these three governance-related groups.

Section 9 of this report includes recommendations for addressing both the gaps and the overlaps in Colorado's statewide governance of public safety communications and interoperability.

4. Governance Alternatives

Having documented the Colorado governance in Section 3, ***FE*** provides examples and supporting documentation of governance structures in other states. In this section of this *Business Plan*, ***FE*** evaluates two other state governance structures. These states were selected based on their structure and effectiveness of their governance. The two states selected for analysis are Minnesota, and Texas and they were chosen because they represent different approaches to statewide public safety communications governance. Minnesota places greater emphasis on making decisions at the statewide level (with the support of regional boards) while the Texas model confers more authority and control to the regional level.

Colorado may wish to try to replicate the governance structure in one of these states or adopt elements from each in a hybrid approach. Governance in Colorado, ultimately, requires change to meet the criteria listed in the previous section and its ultimate governance model must meet the unique needs of Colorado, its elected officials, its public safety personnel, and its citizens.

4.1 State of Minnesota

The SIEC in Minnesota is called the Statewide Emergency Communications Board (SECB). This is a new name. In 2013, Minnesota changed from the Statewide Radio Board (SRB) to the SECB. This move was precipitated by the recognition that today, and even more so in the future, emergency communications is a convergence of land mobile radio, broadband data communications, and Next Generation 9-1-1. Thus, the title Statewide Radio Board was deemed limiting and changed to the Statewide Emergency Communications Board.

The SECB's only focus is public safety and emergency communications including, of course, interoperable communications. The SECB is codified in Minnesota law in Section 403.36 (403.382). The Commissioner of the Minnesota Department of Public Safety (DPS) convenes the SECB, but this duty is typically assigned to the department's Assistant Commissioner.

4.1.1 Membership

Minnesota's SECB comprises the following 21 members:

- The Commissioner of Public Safety
- The Commissioner of Transportation

- The State Chief Information Officer
- The Commissioner of Natural Resources
- The Chief of the Minnesota State Patrol
- The Chair of the Metropolitan Council
- Two elected city officials, one from the nine-county metropolitan area and one from Greater Minnesota (i.e., the area of Minnesota exclusive of the nine-county metropolitan area), appointed by the governing body of the League of Minnesota Cities
- Two elected county officials, one from the nine-county metropolitan area and one from Greater Minnesota, appointed by the governing body of the Association of Minnesota Counties
- Two sheriffs, one from the nine-county metropolitan area and one from Greater Minnesota, appointed by the governing body of the Minnesota Sheriffs' Association
- Two chiefs of police, one from the nine-county metropolitan area and one from Greater Minnesota, appointed by the governor after considering recommendations made by the Minnesota Chiefs' of Police Association
- Two fire chiefs, one from the nine-county metropolitan area and one from Greater Minnesota, appointed by the governor after considering recommendations made by the Minnesota Fire Chiefs' Association
- Two representatives of emergency medical service providers, one from the nine-county metropolitan area and one from Greater Minnesota, appointed by the governor after considering recommendations made by the Minnesota Ambulance Association
- The chair of the regional radio board for the metropolitan area
- A representative of Greater Minnesota elected by those units of government in phase three and any subsequent phase of development as defined in the statewide, shared radio and communication plan, who have submitted a plan to the Statewide Radio Board and where development has been initiated

4.1.2 Statewide Emergency Communication Board Powers

The following are the powers of the SECB as codified in Section 403.37 of Minnesota law:

General - In addition to any other powers specifically provided by law, the Statewide Radio Board has the powers necessary to oversee the planning, implementation, and maintenance of the ARMER system.

Planning - The board shall coordinate the statewide, shared radio and communication system project plan with local and regional plans and modify the plan as necessary to facilitate the implementation of the backbone of the statewide, shared radio and communication system.

System Architecture - The board shall define the backbone of the system, the timing and regions of system backbone development, the geographic scope of each region, and the standards for system backbone performance necessary to assure system-wide development that maximizes interoperability throughout the system**.**

Implementation - The board shall oversee the implementation of the plan and ensure that the system is built, owned, operated, and maintained in accordance with the plan.

Assignment of frequencies - The board shall oversee the assignment of frequencies to local users and to subsystems.

Cost apportionment - The board shall determine how capital and operating costs of the system backbone are apportioned to users, including the cost of additional participants.

Excess capacity allocation - The board shall determine how excess capacity provided in the system backbone design will be allocated**.**

System enhancements - The board shall coordinate the extent to which local governments, quasi-public service corporations, and private entities eligible to use the system may provide system enhancements at their own expense.

Technical standards - The board shall establish and enforce performance and technical standards for the operation of the system backbone.

Protocols - The board shall establish and enforce priorities or protocols for the system that facilitate statewide uniformity.

Integration - The board shall coordinate the integration of the statewide, shared radio and communication system among regions, adjoining states, federal entities, and to the extent permitted by law, with Canadian public safety entities.

Allocation of money - The board shall allocate money available to the Statewide Radio Board among regional radio boards or to local entities within a region to encourage local and regional participation in the system. This does not limit the authority of regional radio boards and local entities to individually or collectively seek funding of local and regional enhancements and subsystems to the system backbone.

4.1.3 Statewide Emergency Communication Board Charter

The SECB charter is also laid out in Section 403 of Minnesota law. The following are the Board's main duties:

- The SECB has overall responsibility for the statewide, shared radio and communication system project plan.
- The Commissioner of Public Safety shall implement the plan adopted by the SECB.
- The Commissioner of Public Safety shall contract with the Commissioner of Transportation to construct, own, operate, maintain, and enhance the elements of the backbone system defined in the plan.
- The SECB shall:
    - Develop and maintain a statewide plan for local and private public safety communications interoperability that integrates with the Minnesota emergency operation plan
    - Develop and adopt guidelines and operational standards for local and private public safety communications interoperability within Minnesota
    - Promote coordination and cooperation among local, state, federal, and tribal public safety agencies in addressing statewide public safety communications interoperability within Minnesota
    - Advise the commissioner of the Department of Public Safety on public safety communications interoperability and on the allocation and use of

funds made available to Minnesota to support public safety communications interoperability

- To the extent permitted by federal law, Federal Communications Commission regulations, and the National Telecommunications and Information Administration, develop guidelines and standards for the efficient use of interoperability frequencies on all frequency spectrums assigned to public safety users

- To the extent permitted by federal law and treaties with Canada, develop guidelines and standards that support interoperability with adjoining states and provinces of Canada along Minnesota's northern border.

4.1.4 Statewide, Shared Radio and Communication System Project Plan

As noted above, the SECB has overall responsibility for the plan for the statewide public safety radio system. Section 403.36 of Minnesota law identifies the following requirements as to what the plan must minimally include:

- Standards, guidelines, and comprehensive design for the system, including use and integration of existing public and private communications infrastructure

- Proposed project implementation schedule, phases, and estimated costs for each phase of the plan

- Recommended statutory changes required for effective implementation and administration of the statewide, shared trunked radio and communication system

- An interoperability committee to make recommendations on the statewide plan for local and private public safety communications interoperability and on guidelines and operational standards necessary to promote public safety communications interoperability within Minnesota

- A policy for the lease of excess space or capacity on systems constructed under the project plan, with priority given first to local units of government for public safety communication transmission needs and second to any other communications transmission needs of either the public or private sector

- The Statewide Radio Board must ensure that generally accepted project management techniques are utilized for each project or phase of the backbone of the statewide, shared radio and communication system consistent with guidelines of the Project Management Office of the Office of MN.IT Services:

- Clear sponsorship
- Scope management
- Project planning, control, and execution
- Continuous risk assessment and mitigation
- Cost management
- Quality management reviews
- Communications management
- Proven methodology

4.1.5 Local Government Plans

The foundation of public safety communications and interoperability is the Allied Radio Matrix for Emergency Response (ARMER) land mobile radio system. As shown in Figure 7, ARMER has a plan for 324 sites with 317 on the air as of March 1, 2015. ARMER is a Motorola P25, 800 MHz, digital trunked system with multiple simulcast zones and an interoperability solution using gateways. The ARMER plan, as adopted by the SECB, called for a minimum level of 95% mobile coverage on a county-by-county basis with high level in urban and suburban areas. Local units of government in Minnesota are allowed to migrate onto ARMER free of charge, but they must cover the cost to purchase their end user equipment, link into the system, system consoles and pay for their maintenance, warranty and operating costs.

A local unit of government that receives state funds for integration with the statewide, shared, trunked radio and communication system must have a plan approved by the SECB and must comply with the standards and guidelines contained in the project plan. The SECB must review and approve all local and regional planning initiatives for connectivity to the system to assure compatibility, interoperability and integration support with the system and plan standards. As part of the review, the SECB must require, and a county or local unit of government must provide, a detailed plan including a budget and detailed cost estimates.

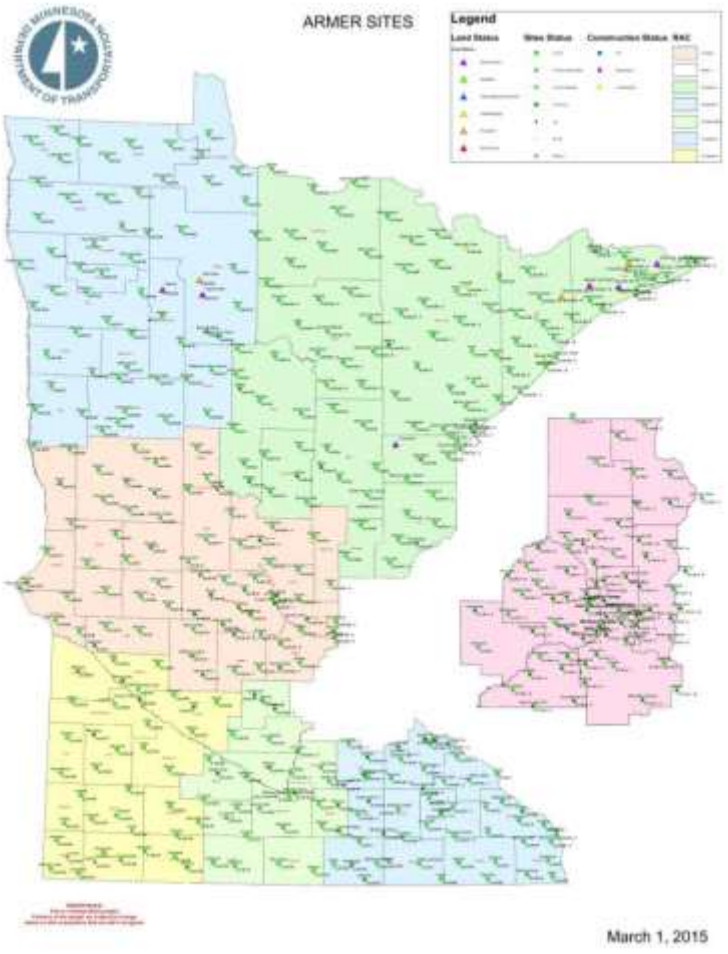

Figure 7 – Minnesota Statewide ARMER System – Radio Site Plan

As codified in Section 403.38 of Minnesota law, the SECB has the final authority over technical and operational standards necessary to provide for the development and implementation of the ARMER system that maximizes the integration of the public safety radio communication system throughout the state.

4.1.6 Statewide Emergency Communication Board Regional Governance

The SECB in Minnesota is supported by seven Regional Radio Boards (RRB) shown in Figure 8. Their establishment is codified in Section 403.39 (403.392) of Minnesota law. The law provides that two or more counties or a city and one or more counties within a region, by adoption of a joint powers agreement, may establish an RRB to implement, maintain, and operate regional and local improvements to the ARMER system. By amendment and approval of a tribal government, tribe's may also become a part of the regional governance and joint powers agreement. Membership in an RRB

shall include one county commissioner appointed by each respective county board party to the joint powers agreement and an elected official from any city party to the joint powers agreement, and may include additional members whose qualifications are specified in the regional joint powers agreement.

Figure 8 – Minnesota Regional Radio Board Regions

Before the establishment of RRBs across Minnesota, the SECB worked to establish Regional Advisory Committee's (RAC). The RACs were mainly developed by sheriffs, police chiefs, fire, and EMS personnel with a vested and common interest in enhancing interoperable communications. The RACs provided the SECB a direct link to the regions emergency responders and safeguarded regional governance in the event that a region's elected officials could not settle on a joint powers agreement and establish an RRB. The RACs have subcommittees, that vary slightly from region to region, but all the RACs act as intermediary between the SECB, RRBs and their subcommittees. The RACs make formal recommendations and send them to the RRBs for adoption.

4.1.7 Regional Governance Powers

A Regional Radio Board, as necessary for implementing regional and local improvements to the ARMER system has the following powers:

- Establish bylaws and other organizational procedures consistent with the terms of the joint powers agreement
- Apply for and hold licenses for public safety frequencies to be used in regional and local improvements, including a regional data system
- Set or adopt regional performance and technical standards, subject to review by the SECB, that do not interfere with the backbone or interoperability infrastructure administered by the SECB
- Enter into contracts necessary to carry out its responsibilities
- Acquire by purchase, lease, gift, or grant, property, both real and personal, and interests in property necessary for the accomplishment of its purposes and to sell or otherwise dispose of property it no longer requires
- Contract with the state of Minnesota, through the Commissioner of Transportation, for construction, ownership, operation, and maintenance of regional or local improvements to the ARMER system.

4.1.8 Governance Transparency

The Minnesota governance structure is open and transparent. It follows Minnesota's open meeting laws and strives to achieve consensus from all interested parties. The desire of the SECB, RRBs and RACs to include everyone who shares the common interest of enhancing interoperable communications in Minnesota strengthens its transparency.

4.1.9 SECB Outreach and Information Sharing

To obtain consensus and ensure transparency, the SECB, as supported by the DPS Division of Emergency Communication Networks (ECN) built a robust outreach and information sharing program. The ECN program includes the following:

- ECN website
- ARMER system tri-fold brochures
- Regional Interoperable Communications field staff (three)

- PowerPoint presentations
- E-mail listservs
- Communications through state associations
- Attending state associations annual meetings and conferences
- Testimony before legislators and briefs to governor's staff
- Press releases
- DVD video
- Presentation at RAC and RRB meetings
- Briefs to local radio service shops

4.1.10 Funding

Minnesota appropriates $1,000,000 to the SECB each year from the ECN operating budget for enhancing interoperable communications. This broad definition allows the board to fund member travel costs, system improvements, grant funds to local agencies and conduct an annual statewide interoperability conference. It also allows the board to hire consultants on a variety of technical and operational topics.

4.1.11 Overall Organization of Minnesota Public Safety Communications Governance

Figure 9 reflects the current Minnesota governance structure regarding public safety communications.

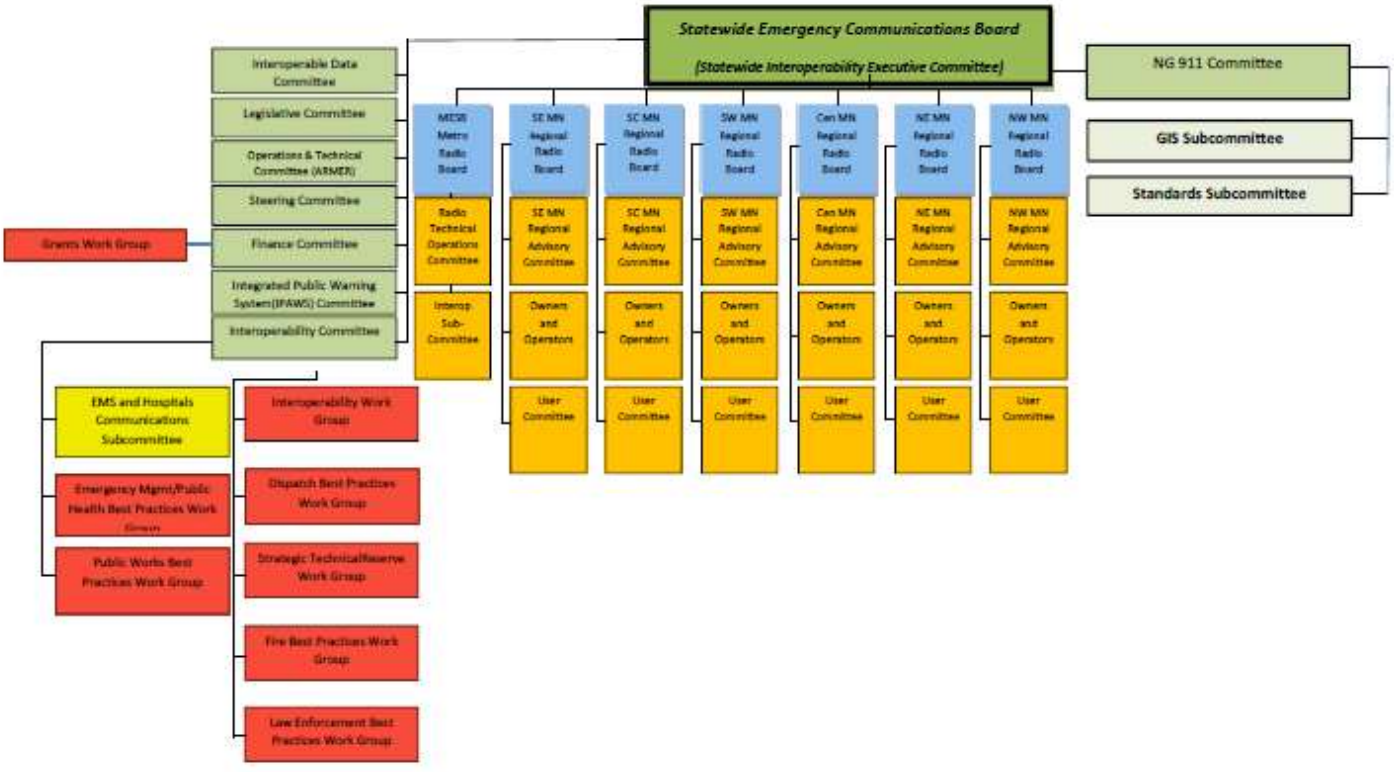

Figure 9 – Minnesota Governance Structure

4.2 State of Texas

4.2.1 TxICC Overview

The Texas Interoperable Communications Coalition (TxICC) is the SIEC in Texas. Previously the Texas Radio Coalition, TxICC is a voluntary collaboration between federal, state, local, tribal, and non-profit entities including government, first responders, emergency management, critical infrastructure security, public utility, and transportation agencies.[7] TxICC was formed in 2006, for the purpose of bringing together emergency response organizations for statewide planning, development and funding of a locally controlled statewide wireless interoperable public safety communications system.

TxICC is part of an elaborate governance structure in Texas that bridges the gap between the Governor's office and local emergency responders. TxICC has over 5,300 state and

[7] TxICC Revised Charter, November 4, 2014

local public safety agencies participating in its governance structure led by the TxICC SCIP Executive Council (SEC) which is the voting and oversight body of TxICC.

The TxICC is a member of the Governor's First Responder Advisory Council, which requires advising the Governor on interoperable and public safety communications issues. TxICC supports the Governor who is mandated in Section 421.096 to *"develop and administer a strategic plan to design and implement a statewide integrated public safety radio communications system that promotes interoperability."* In 2013, the TxICC amended its governance structure and oversight from just LMR to include all decisions related to statewide Long Term Evolution (LTE) broadband planning. The TxICC governance structure comprises the following four bodies:

- Texas SWIC
- TxICC SEC
- TxICC SCIP Steering Committee (SSC)
- TxICC SCIP Strategic Advisory Groups (SSAG)

Figure 10 shows the organization of TxICC:

Figure 10 – Texas Governance Organizational Chart

4.2.2 TxICC Leadership SWIC/Texas Public Safety Communications Service

The SWIC chairs the TxICC SSC and SEC and is also the Deputy Assistant Director for Law Enforcement Support and Public Safety Communications Service. The Assistant Director is responsible for 27 communications facilities, field support with deployable communications equipment, project management and implementation oversight of public safety communications systems and wireless communications shop operations. The Assistant Director has over 350 direct reports.

The TxICC Executive Leadership appoints the SWIC and with that appointment the SWIC has access to the Texas Homeland Security Director, the TxDPS Director, and the Governor's office. Interoperability and public safety communications recommendations are communicated from the SWIC to the State Executive Leadership who has final approval. As the chair of the TxICC and the SEC, the SWIC has the authority from the State and TxICC to convene SSAGs for issues related to interoperability as necessary.

4.2.3 TxICC SCIP Executive Council – Membership and Charter

The SCIP Executive Council (SEC) has a core of 30 ambassadors, but includes 85 total primary and alternate delegates. The 30 core ambassadors includes representation from:

- The 24 Councils of Governments (COGs)
- Three tribal delegates
- SWIC
- A state agency delegate; and
- A Strategic Advisory Group delegate

The SEC ambassadors and two alternates are elected to 2-year terms during annual Focus Group Sessions. A total of three representatives are elected to ensure each entity is routinely represented.

The following are SEC Eligibility Requirements:

- Active participation in the TxICC
- Appropriate knowledge of communications equipment, systems, and procedures
- Participation in routine LTE meetings and WebEx sessions
- Act as Regional PS LTE champion
- Attend LTE training programs

- Assist in the development of regional LTE Outreach and Education Programs
- Provide appropriate alternate if unable to participate in an event
- Identify and work with agencies within home region who may be interested in building a public safety broadband network

The SWIC may call an SEC meeting if and when appropriate, but the SEC will meet only annually at the SCIP Conference if the SWIC calls no other meetings.

The SEC provides oversight over the TxICC and in its capacity may approve and/or modify decisions, reports and recommendations developed by the TxICC.

4.2.4 TxICC SCIP Steering Committee - Membership and Charter

The TxICC SCIP Steering Committee (SSC) consists of federal, state, local, and non-governmental stakeholders vested with public safety responsibilities. The SSC includes membership-at-large that may attend any meeting and/or call. Texas believes the broad approach of the SSC allows members to build collaborative relationships at the federal, state, tribal and local levels; leverage resources where appropriate; and educate and update representatives from the Governor's Office, appropriate legislative committees, and the public regarding the State's communication interoperability efforts.[8]

The SSC acts in support of the SEC by reviewing and recommending goals and objectives to the SEC. This would include short term recommendations for enhancing public safety communications as well as long term strategies. The SSC also creates, reviews, modifies and recommends adoption of operating policies and procedures to the SEC.

With its broad and vast membership, the SSC acts as the communications conduit from the boots-on-the-ground responders to the SEC and back. This network of members enables the SWIC to effectively provide outreach and information sharing directly to thousands of responder agencies in Texas.

4.2.5 TxICC SCIP Strategic Advisory Groups (SSAG) – Membership and Charter

The TxICC Strategic Advisory Groups are convened as necessary and consist of an undetermined number of subject matter experts (SME). The SMEs are selected based on having expertise in a specific area related to public safety communications. These core

[8] TxICC Revised Charter, November 4, 2014

skill areas may include communications technology, funding, project management, policies and procedures, operational tactics and/or administration.

The SSAG members are typically selected from the ranks of the over 5,300 state and local public safety agencies, but in special circumstances the SWIC may go outside the pool and identify one or more specialists to work on a SSAG.

4.2.6 TxICC Purpose

The purpose of the TxICC is oversight of public safety communications interoperability in Texas and the development, monitoring, review and implementation of the Texas Statewide Communications Interoperability Plan (SCIP).

Representatives from federal, state, local, tribal, and non-profit entities including government, first responders, emergency management, critical infrastructure security, public utility, and transportation agencies are collaborating to “plan, develop, and secure funding for a statewide wireless interoperable public safety communications system.”

The public safety system will utilize the system-of-systems approach by seeking to leverage existing and future local infrastructure with the goal of leaving system control with local agencies.

Texas utilizes the U.S. Department of Homeland Security (DHS) SAFECOM guidelines and recommendations, including the SAFECOM Interoperability Continuum, as shown in in Section 1, Figure 3, as a guide to achieving the highest level of interoperability.

The TxICC was established to provide its members a forum to enhance both voice and data emergency and interoperable communications capabilities statewide and discuss any public safety communication initiative. The TxICC governance structure seeks to align state planning as articulated in the SCIP with local and regional projects.

In the long term, the TxICC seeks to oversee expansion, interconnectivity, shared use, and interoperability user training of land mobile radio systems; and assist with the planning and preparation for the Texas Public Safety Broadband Program.

4.2.7 TxICC Authority

The TxICC is appointed by the Governor as the governing body for the Texas SCIP. Responsibility will include, but not be limited to, making official recommendations to the Governor of Texas and the Director of Texas Department of Public Safety concerning public safety communications interoperability, technology, training, exercises, standard operating procedures, implementation, and funding.

The Texas Interoperable Communications Coalition is a member of the Governor's First Responder Advisory Council (Section 421.041) and thus designated by State law to advise the Governor on relevant communications interoperability issues. TxICC has authority regarding the following:

1. Evaluate the state of current and emerging communications interoperability capabilities across the state of Texas.
2. Create and update a plan for statewide emergency and interoperable public safety communications.
3. Make recommendations to Executive Leadership regarding implementation of the plan.
4. Make recommendations to Executive Leadership as to appropriate policies, procedures, and guidelines related to public safety emergency and interoperable communications.[9]

As directed, the TxICC or its designated representative(s) will review emergency and interoperable communications policies and plans and advise Executive Leadership as to their viability and compliance with the SCIP. Other duties of TxICC include:

- Making recommendations to help direct the use of funds allocated for capital improvements and operational upgrades to improve statewide public safety emergency and interoperable communications
- Working to identify and leverage sources of funding allotted through cross-discipline and cross jurisdictional coordination

TxICC members are appointed by their governing bodies and are authorized to participate in the planning and development of a statewide emergency and interoperable public safety communications system. They are directed to attend planning and other scheduled meetings, identify funding sources, and provide their governing bodies the planning, financial, and other information necessary to make the policy and spending decisions required to participate in implementing such systems.

4.2.8 TxICC Objectives

The objectives of the TxICC are to undertake the following tasks:

[9] TxICC Revised Charter, November 4, 2014

1. Conduct annual Regional Focus Group Sessions to better understand the current state of emergency and interoperable communications in the state of Texas.
2. Assign advisory groups to identify and recommend current and future technologies that will enhance emergency and interoperable communications capabilities in the state of Texas.
3. Create and update the Texas Statewide Communications Interoperability Plan.
4. Assist and advise Executive Leadership regarding management and implementation of the plan.
5. Assist and advise Executive Leadership with the creation of statewide best practices, policies, and procedures for emergency and interoperable communications to be incorporated into existing regional Councils of Governments (COG) interoperability plans.[10]
6. Assist and advise Executive Leadership to ensure that training programs on emergency and interoperable communications are created and made available to all authorized public safety practitioners.

4.2.9 TxICC Charter

The TxICC mandates are the following:

1. Ensure that local and regional plans align with the SCIP and thereby qualify for any grant funds managed by the state of Texas.
2. Work with federal, state, and local agencies to avoid duplication of effort, including coordination of procurement decisions
3. Coordinate with various regional and multi-regional organizations including tribal councils, COGs, and FCC-designated regional planning and review committees and keep these organizations updated on the TxICC's activities
4. Address tribal councils and regional non-governmental organizations not directly funded by DHS grants, and identify ways to coordinate activities through sharing of resources or technologies

[10] TxICC Revised Charter, November 4, 2014

5. Educate public officials to increase awareness and ensure success of emergency and interoperable communications initiatives

In fulfilling its scope the TxICC will include all public and not-for-profit emergency response and first responder organizations and address all levels of communication as defined in National Incident Management System (NIMS) guidelines: command, tactical, support, ground-to-air, and air-to-air.

This effort will address technological and operational components of emergency, interoperable and mutual aid communications for routine day-to-day events through unplanned multijurisdictional and multidisciplinary events.

The TxICC will focus on providing all public safety and critical infrastructure responders at all levels of government with the highest level of real-time, interoperable and/or emergency voice and data radio communications capabilities as funding allows.[11]

4.2.10 TxICC Guiding Principles, Decision Process, and Goals

The guiding principles of the TxICC are to recognize and respect that each region has unique needs and are along different points of the SAFECOM Interoperability Continuum. The TxICC seeks to work with each region to ensure the region's activities are not negatively affecting regional or statewide interoperable and public safety communications capabilities.

In conducting their activities the TxICC will:

1. Use a phased approach and not attempt to solve all problems at once
2. Identify matters within the TxICC's control and apply resources toward those matters rather than areas that are not within the TxICC's control
3. Work to coordinate regional and local strategies with the statewide strategy
4. Work to identify and maintain a balance between infrastructure and subscriber unit needs
5. Ensure the State takes a collaborative approach toward improving public safety emergency and interoperable communications

[11] TxICC Revised Charter, November 4, 2014

6. Speak with one voice when reporting externally

7. Maintain the sense of urgency that 9/11 brought to this issue

8. Work with Executive Leadership to keep the issue of communications interoperability in front of politicians as they are elected and administrations change

9. Work toward achieving and sustaining voice public safety communications and interoperability solutions across Texas in the short term (3-5 years) while planning for the National Public Safety Broadband Network[12]

4.2.11 Texas Regional Governance – Council of Governments

Interoperability efforts in Texas are bolstered and supported by perhaps the strongest regional governance of any state in the nation. As shown in Figure 11, there are 24 Councils of Government (COGs) in Texas that cover every county and major metropolitan area. The COGs regionally plan for everything from air quality to workforce development. Included in the continuum of regional activities are 9-1-1 and public safety communications.

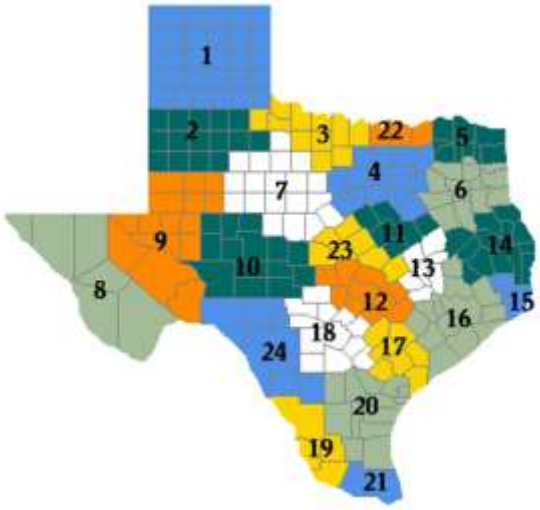

Figure 11 – Texas Councils of Government

[12] TxICC Revised Charter, November 4, 2014

Governed by Texas Chapter 391, the COGs have a broad mission of joining together and cooperating on improving “health, safety and general welfare of their residents,” as well as planning for future development of the region.

Taken from Texas Section 391.005, the powers of a COG allow the commission to enter into contracts. The commission may also:

1. Purchase, lease, or otherwise acquire property
2. Hold or sell or otherwise dispose of property
3. Employ staff and consult with and retain experts
4. Provide retirement benefits for its employees

Participating governmental units may also:

1. Employ staff and consultants
2. Apportion costs and expenses
3. Purchase property and materials
4. Add a governmental unit

As noted, the COGs are relevant to statewide interoperability because they are 24 of the 30 core ambassadors of the SCIP Executive Council (SEC). The COGs provide the SWIC office a direct pathway and means of partnership for enhancing interoperable and public safety communications on region-by-region basis.

4.2.12 Governance Transparency

Texas conducts open and transparent meetings that strive to achieve consensus from all interested parties. The transparency is strengthen by TxICC’s open members-at-large concept of the SSC and the inclusion of the COGs in the SEC.

4.2.13 TxICC Outreach and Information Sharing

The Texas SWIC oversees a broad outreach and information sharing campaign designed to educate stakeholders on the Texas SCIP, activities of the TxICC, and emerging state and national public safety communications issues. Through committee chairmanships, an annual report to the Governor, listservs and presentations across Texas, the SWIC and the SWIC office provide outreach and information.

The outreach and information sharing is also bolstered by the open membership to the SSC. SSC members are from all corners of Texas and are a conduit between local issues and state governance activities.

4.2.14 Funding

Texas established the dedicated Emergency Radio Infrastructure Account, funded through fees collected from court costs associated with conviction. The fund has generated in excess of $40,000,000, but to date no funds have been appropriated to state or local agencies for interoperability enhancements.

4.2.15 TxICC – Overall Organization

Figure 12 reflects the current governance structure in Texas.

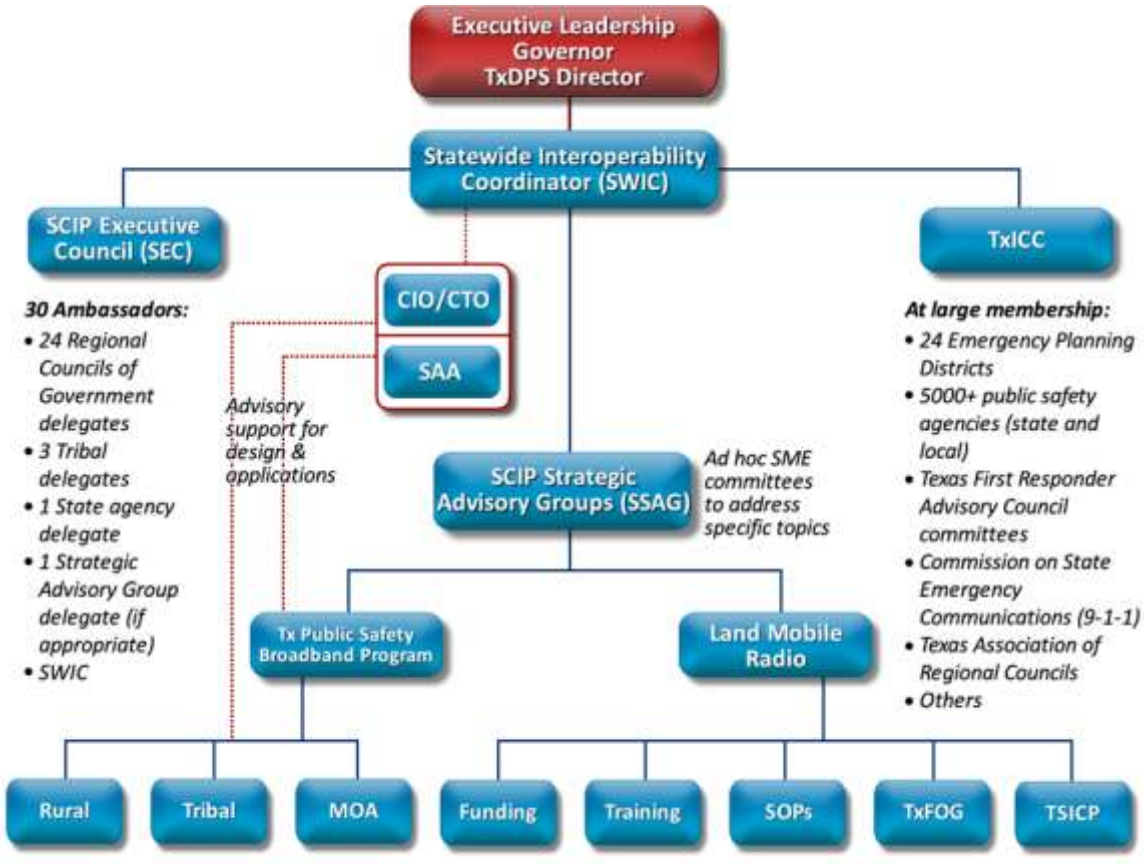

Figure 12 – Texas Governance Structure

4.3 Comparison of Alternative Governance Models

As can be seen from the descriptions above, the public safety communications governance structures of the states of Minnesota (SECB) and Texas (TxICC) have much in common and they both meet the criteria of effective governance as described in this report. They both have balanced membership, formal authorization, and a charter. They both have a focus on public safety communications and shared decision making and goals. They both rely on their versions of a SIEC and a SWIC to provide effective leadership. While Minnesota uses the RRBs for regional communications coordination, TxICC uses the state's Council of Governments. Finally, they both exercise transparency, conduct outreach and information sharing, and have oversight for the distribution of grant funding.

Despite these similarities, there are differences between Minnesota's SECB and Texas' TxICC, namely:

- The SECB has a focus on promoting statewide interoperability through the statewide radio system (ARMER), including its local enhancements, while TxICC has a focus on promoting Texas' SCIP.
- The SECB's principle activities are the collaborative planning (again, of the statewide radio system) while TxICC's principle activities are the coordination of regional efforts.
- The SECB draws upon local input via its dedicated RRBs (which have specific purpose on public safety communications) while TxICC uses the established regional COGs for local and regional input.
- The SECB is funded at a level of $1,000,000 per year and has used those funds for member travel, system improvements, technical expertise, and local enhancements while the TxICC has been funded at a level of $40,000,000 (to date) with the purpose of supporting state and local initiatives consistent with the SCIP (but funds have not yet been allocated for this purpose).

The governance model used in Colorado need not be exactly like that of Minnesota, Texas, or any other state. When evaluating the models presented here (and those of other states or regions), representatives from agencies across Colorado should evaluate which of the following they feel is a better fit to the needs, culture, and laws of the state:

- A model focused on planning of the statewide system (including local enhancements) or one focused on regional efforts and their support of the SCIP

- A model in which decision making is more centralized or more regional
- A model in which the governance structure has the power to issue binding direction or to provide advice and guidance
- A model that leverages existing regional organizations or that utilizes those with dedicated purpose to public safety communications
- A model that oversees a small or large amount of interoperability funding

Section 9 of this report presents ***FE***'s recommendations for governance in Colorado.

5. Funding Strategies

5.1 Funding Types

Consistent with other technology systems and projects, public safety communications systems require two forms of funding. The first is the upfront Capital Expenditures (CAPEX) for planning, acquisition/procuring and implementing the system. In the case of DTRS, CAPEX costs would minimally include, land, towers, backhaul, antennas, shelters and other equipment to get the system functioning, as well as equipment replacement and technology refreshment.

The second is Operational Expenditures (OPEX) for personnel, utilities, equipment replacement, and all other costs for maintaining the system and sites. Often, states lose sight of the costs to operate and maintain a system or expand the system to meet population growth or new operational challenges. The OPEX costs are equally important to the CAPEX costs as they ensure the investment that was made in the system infrastructure continues to perform to its intended capability and operational need.

The following are the most common OPEX costs:

- System operational costs (planning, engineering, and administration)
- Infrastructure maintenance costs for software and hardware
- Subscriber maintenance costs (support, maintenance, and programming)
- Site rental/lease fees and site utility costs
- Backhaul connection services provided by commercial services
- Training (initial and ongoing)
- Technology refreshment[13]

When procuring and operating any system both the CAPEX and OPEX costs must be budgeted. While CAPEX costs are often considered one-time cost for the lifecycle of the system OPEX costs are reoccurring year-over-year expenses.

The SAFECOM program at the Department of Homeland Security developed the graphic shown in Figure 13 to highlight the key steps in system lifecycle planning.

[13] Depending on the scope of the technology replacement, these costs may be considered CAPEX or OPEX

Figure 13 - System Lifecycle Planning Guide[14]

DTRS, like many statewide systems, is at multiple steps in the System Lifecycle. The development of this *Business Plan* assists in Step 1, *Planning*. OIT and local owners of DTRS infrastructure have been acquiring additional infrastructure for Step 3, *Implementation*. State and local DTRS owners have been maintaining DTRS as referenced in Step 4, *Maintenance*. The State and local owners have also recently funded a DTRS platform upgrade or *Refreshment*, Step 5.

DTRS is a technology system and as such, it will constantly evolve as technology changes, operational requirements change, and emerging technologies become available. DTRS will likely never be considered complete, but it will remain constantly evolving to meet the needs of the system users providing emergency services to Colorado residents.

5.2 Funding for DTRS and Other Systems

5.2.1 State of Colorado Funding Sources and Amounts for DTRS

As elaborated upon in the *Needs Assessment*, DTRS is the statewide, public safety, voice radio system that enables direct communications between public safety agencies across

[14] http://www.safecomprogram.gov/oec/oec_system_life_cycle_planning_guide_final.pdf

jurisdictional and regional boundaries. More than 1,000 local, regional, tribal, state and federal agencies use DTRS and the system supports over 75,000 subscriber radios. Approximately 18% of these users are from state government. The remaining 82% are local, regional, tribal and federal government agency users.

The state of Colorado, through OIT's Public Safety Communications Network (PSCN) team, is an owner of a significant amount of DTRS infrastructure. It currently has the following sources of funding for the operation, maintenance, and replacement of its DTRS assets:

- The General Fund Budget (a.k.a., the Long Bill) – the State's general fund budget provides funding to State departments such as OIT and the PSCN team; it provides funding for the on-going operations of departments and systems as well as for Capital Construction and Controlled Maintenance projects.

- Cost Sharing – through this source OIT charges the State-level agencies that use DTRS (and only State-level agencies) for their use of DTRS and other radio systems.

- Legislative Appropriations – provide sources such as House or Senate Bills that can direct funding for specific purposes.

- Table 4 shows the budget requested for FY2015-16 by PSCN for general operations and maintenance of DTRS as well as other radio systems they support and/or manage. At the time of the writing of this report, this request has not yet been approved through the passage of the Long Bill for FY2015-16.

Table 4 – OIT/PSCN FY2015-16 Budget (Long Bill) Request

Purpose	Amount
PSCN Operating Expense	$2,013,440
PSCN Personal Services	$4,185,258
PSCN Depreciation	$123,171
Service Strategy and Management	$1,071,314
FY2015-16 Overhead	$783,153
OIT Services Use of OIT Services	$23,634
Total FY2015-16 Request	**$8,199,970**

- This operating budget for PSCN includes an increase of $2.3 million over FY2014-15. This increase is provided by the following two sources: “a $1.1 million investment in the infrastructure (prior year decision item) and a reallocation from other services of associated overhead costs based on the weighted average methodology.”[15] According to representatives from OIT, future year budgets for their operations will be determined on a year-by-year basis and may or may not continue at the elevated level of FY2015-16.

- This budget for OIT’s PSCN is billed out to State agencies to cover their costs and those agencies receive appropriations to cover the expense of the services provided by OIT, including PSCN, through a single common policy line item called “Payments to OIT.” The amount each State agency is charged is a factor of the number of radios they use and the number of months for which they use those radios. The radios used by various State agencies include those on DTRS and other systems (including non-DTRS systems such as the State’s VHF Fire system). The state of Colorado calculated usage by State agencies at 152,636 radio-months (the use of one radio for one month is a radio-month) in FY 2015-16 and that each radio-month costs a State agency $50.40.

A recent and relevant example of a Legislative Appropriation as a funding source for DTRS is House Bill 14-1203,[16] signed by the Governor on May 2, 2014, which allocates state funds to maintain the infrastructure of DTRS. This funding consists of $3.5 million per year for 12 years, starting in FY2013-14 for the replacement of legacy equipment such as, but not limited to, end-of-life repeaters and dispatch center equipment owned by the state of Colorado. It also provides $3.7 million per year starting in FY2017-18 for 7 years for the procurement of platform-level (“system release”, referred to as “software upgrade assurance” in the bill) upgrades of DTRS.

The monies from HB14-1203 are to be spent for the purposes specifically designed by the legislation but they shall be held in a dedicated fund called the Public Safety Communications Trust Fund. The Public Safety Communications Trust Fund has been used to hold and distribute funding for various efforts to promote and enhance public safety communications across Colorado ranging from the Colorado Wireless Interoperable Network (CWIN) grant initiative mentioned above to more recent procurement of an assessment of and report on the microwave infrastructure that

[15] According to the *“Colorado General Assembly Joint Budget Committee FY2015-16 Staff Budget Briefing, Office of the Governor”*, November 19, 2014.
[16] Formally titled *“Concerning Funding to Maintain the Infrastructure for the Digital Trunked Radio System, and, in Connection There within, Making An Appropriation”*

supports DTRS. OIT's PSCN team informed ***FE*** that there are currently no significant levels of funds in the Public Safety Communications Trust Fund other than those appropriated by House Bill 14-1203 for the specific purposes mentioned above.

As noted, the state of Colorado also funds improvements to DTRS via other methods. Table 5 shows the funds currently requested by OIT's PSCN for future years for DTRS-related capital improvement and continued maintenance expenses. These amounts are separate from PSCN's operating budget as described above. The *Needs Assessment*, a companion to this report, provides more details on the projects for these funding requests.

Table 5 – OIT/PSCN Budget Requests for FY2015-16 through 2024-25

Purpose for Funding Request	Funding Source Requested	Requested / To-Be-Allocated Funding by OIT PSCN for DTRS Improvements (shown in thousands of dollars)					
		FY 2015 - 16	FY2016 - 17	FY2017 -18	FY2018 - 19	FY2019 - 20	Each Year FY2020 - 21 through 2024-25
Lease Purchase Payment for DTRS Software Upgrade	Requested Gen Funds Cap Improv	$3,637					
Legacy Equipment Replacement	HB 14 – 1203*	$3,500	$3,500	$3,500	$3,500	$3,500	$3,500
Software Upgrade Assurance	HB 14 – 1203*			$3,700	$3,700	$3,700	$3,700
Replacement of Site Towers (B Group, Phases 3)	Requested Gen Funds Controlled Maint.	$939	$1,073				
Replacement of Site Towers (C Group, Phase 2)	Requested Gen Funds Controlled Maint.			$1,284			
Replacement of Site Towers (D Group, Phase 1)	Requested Gen Funds Controlled Maint.				$1,532		
Replacement of Site Towers (D Group, Phase 2)	Requested Gen Funds Controlled Maint.					$1,476	
Site Rectifier (Power) Replacement – 150 Sites, 2 Phases	Requested Gen Funds Controlled Maint.	$586	$644				
Transmitter Site Analysis	Requested Gen Funds Controlled Maint.			$113			
Replacement of 5 Fiberglass Buildings	Requested Gen Funds Controlled Maint.				$48		
Microwave Infrastructure Replacement	Requested Gen Funds Cap Improv	$11,151	$11,194	$11,194	$11,194	$11,194	
	Totals	**$19,813**	**$16,411**	**$19,791**	**$19,974**	**$19,870**	**$7,200**

* Note: For each Fiscal Year, the funds described in HB14-1203 shall be appropriated by the General Assembly from the General Funds (or other Funds) to the Public Safety Communications Trust Fund.

5.2.2 Local Funding Sources for DTRS

As previously noted, the ownership of the DTRS is diverse and numerous local municipalities (including cities and counties) and regional partnerships also own significant amounts of the equipment used in the network.

Just as the ownership of DTRS is diverse, so is the environment of its funding. The local owners of DTRS infrastructure use a variety of means to purchase their assets including local-level general funds, bonds, and grants. A grant of particular interest is the Colorado Wireless Interoperable Network (CWIN) grant, active in the early and mid-2000s.

This grant was a statewide grant administered by the Department of Local Affairs using monies derived from Colorado's Energy and Mineral Impact Fund. These funds were distributed to local governments across the state to allow them to buy and construct radio sites to enhance DTRS coverage. Recipients of this grant were required to use their funds to pay for site deployment as well as site upkeep for a period of 5 years, at which point they were allowed to choose to retain ownership of the site or transfer ownership to the state of Colorado. Transfer of ownership to the State also transferred the responsibility of operations and maintenance to OIT's PSCN team. Likewise, retention of the sites by local governments also meant their continued operation and maintenance of the site at their cost via local sources of funding.

Funding for the operation and maintenance of locally-owned DTRS assets is, generally, expected to be provided by the local owner of the asset. These local owners also use a variety of methods to fund the operation, maintenance, and replacement of their DTRS assets. Those methods include user-fees imposed at the local level to meet local needs (e.g., by a county to users within that county to fund county-owned assets). Those methods also include general funds and the use of funds such as 9-1-1 funds.

Just as OIT/PSCN identified a need to replace legacy DTRS infrastructure equipment, local owners must do the same. This equipment set includes the same end-of-life repeaters and dispatch center equipment noted above. ***FE*** estimates (in the companion *Needs Assessment*) that the cost to replace all locally-owned legacy equipment is $17,527,000. No one funding source has been identified to support the replacement of this legacy equipment by all local DTRS owners and, as noted above, the funding for such replacements is generally the responsibility of each local owner.

Through the online survey and the interviews conducted in development of this report, the strong majority of local owners of DTRS assets stated they have plans to obtain the funding needed to upgrade and/or replace their assets; however, many cited that they plan to use federal grants to do so.

It is important that the state of Colorado OIT/PSCN and the local owners of DTRS, together, use the governance organizations described above (such as PSCS and CCNC) to coordinate their replacements and improvements of their DTRS assets. For example, the state of Colorado's OIT recently announced that it is investigating upgrading DTRS to system release Version 7.16 at some time in the second half of 2017. This is consistent with the provisions of Colorado House Bill 14-1203 which provides OIT with the funding as noted.

FE recommends that OIT continue their negotiations and other planning discussions with Motorola for this planned system-release upgrade but that the process is as collaborative as possible with other owners and users of DTRS. These discussions should represent the concerns and issues of local owners of DTRS assets through measures such as direct participation by PSCS and/or CCNC or by regular check-in sessions between OIT and these groups.

5.2.3 Other Funding Needs for DTRS

The *Needs Assessment* includes an analysis of the needs of users of DTRS and recommendations to address those needs. Its major finding is that the initiatives by OIT/PSCN as listed in Table 5 as budget requests for DTRS should be supported in order to maintain and improve equipment and system lifecycle and to address the unreliable microwave site-to-site backhaul system.

Additionally, the *Needs Assessment* identifies, as a Critical Priority, the improvement of DTRS coverage by the addition of approximately 109 new radio sites. ***FE*** estimated the cost of this expansion at $115,976,000. The *Needs Assessment* details the development of this cost estimate, including descriptions of its contents and caveats[17]. This amount of $115,976,000 is in addition to the amounts listed in Table 5 and, to meet the needs of

[17] This is a conservative cost estimate in that it includes the development of new radio sites for all 109 additional sites; each of which has been priced to include new access roads, communications equipment shelters, towers, and main and backup power. If the State identifies and uses existing sites, a reduction in the overall cost is possible.

users to address coverage gaps of DTRS, should be considered as an additional request for future funding.

The *Needs Assessment* also identifies other high- and medium-priority needs of DTRS users; however, those needs require additional investigations to determine the scope and costs of the improvements to address them.

5.2.4 Funding for Other Systems

As previously described, there are numerous systems other than DTRS in the state of Colorado. These include large systems that cover metropolitan areas such as the City and County of Denver, the city of Boulder, and, through the Front Range Communications Consortium (FRCC), the Counties of Weld, Adams, and Broomfield. They also include smaller municipal and county-level systems in smaller municipalities and in rural areas.

The funding for the capital deployment and the ongoing operations and maintenance of these systems are sourced from the local areas they serve. Respondents that operate systems other than DTRS that participated in ***FE***'s online survey noted the following:

- Most mainly use local general funds and federal grants to deploy their systems
- A majority also noted that they use local general funds to operate and maintain their systems.
- Several noted that they were considering using usage fees for the purposes of operations and maintenance.
- Several others requested that the state of Colorado provide funding to support and enhance interoperability between their systems, other local systems, and DTRS (i.e., not for funding for their local system but for interconnections between it and other systems including DTRS).

5.2.5 Site Lease Costs

DTRS Site Lease Cost Evaluation

FE performed an analysis on the data provided by Colorado OIT for the fiscal years 2012, 2013, and 2014[18].

The analysis of this data showed that in FY2012-13, a total site lease cost of $94,671 was incurred (an average of $7,889 per month); in FY2013-14 a total site lease cost of $101,413 was incurred (an average of $8,451 per month); and in FY2014-15 a total site lease cost of $105,946 was incurred (an average of $8,829 per month).

In discussions with OIT, Colorado also stated that these 3 years of costs did not include some one-time payments, or payments that did not fall within the 3-year report because some payments were made one-time while others are made every 5 years. OIT attempted to identify and provide all site lease costs, but due to the irregular cycles of lease payments, these costs could not be provided. Therefore the annual costs and per-month averages shown do not reflect the actual annualized amounts for site and space leases.

Because individual site leases were unavailable for review and evaluation, ***FE*** was unable to determine what specific leases covered (land, tower space, shelter space, utilities, etc.), nor were we able to determine if the site was on federal, state, county, city, or private land.

In 2010, the state of Colorado and CCNC commissioned a study that reflected the Total Cost of Operations of DTRS. This study documented costs for various site owners per year, and also provided for a forecast of site costs through 2015. Table 6 shows the site lease data for years 2012 through 2015. This table shows site costs per site, as well as an average for all sites for the year (where costs were identified).

Table 6 – Site Lease Costs per 2010 Study

Site Lease Holder	Site Name	2012	2013	2014	2015
Arapahoe County	Chevron	$36,441	$38,627	$40,945	$43,402
Arapahoe County Total		$36,441	$38,627	$40,945	$43,402
Ave. per Site per Month		$3,037	$3,219	$3,412	$3,617

[18] Site lease cost information was derived from the *"FY Total OP Expense"* spreadsheet provided by OIT. ***FE*** identified all costs associated with Appropriation Code 302 ("Leased Space"). Site lease costs for *"601 E 003*" were removed from this evaluation, as this location the office of OIT/PSCN and this location reflected the majority of costs, with $221,114 in FY 2013-14, $117,214 in FY2012-13, and $188,002 in FY 2011-12.

Site Lease Holder	Site Name	2012	2013	2014	2015
Eagle County	Beaver Creek	$32,884	$33,870	$34,886	$35,933
	Blowout Mt.	$7,345	$7,418	$7,492	$7,567
Eagle County Total		$40,228	$41,288	$42,379	$43,500
Ave. per Site per Month		$1,676	$1,720	$1,766	$1,813
Jefferson County	Thorodin	$33,075	$34,729	$36,466	
Jefferson County Total		$33,075	$34,729	$36,466	$0
Ave. per Site per Month		$2,756	$2,894	$3,039	$0
Kit Carson County	Bethene	$212	$219	$232	$232
Kit Carson County Total		$212	$219	$232	$232
Ave. per Site per Month		$18	$18	$19	$19
Larimer County	Crow Creek		$7,600	$7,800	$8,000
Larimer County Total		$0	$7,600	$7,800	$8,000
Ave. per Site per Month		$0	$633	$650	$667
Morgan County	Pawnee	$125	$125	$125	$125
Morgan County Total		$125	$125	$125	$125
Ave. per Site per Month		$10	$10	$10	$10
PPRCN	Badger Mountain	$2,634	$2,713	$2,795	$2,878
	Black Forest North	$14,163	$14,871	$15,614	$16,395
	Mt. Pittsburg	$11,246	$11,584	$11,931	$12,289
	Stanley Canyon	$8,603	$9,034	$9,485	$9,960
	Woodland Park	$20,695	$21,315	$21,955	$22,614
PPRCN Total		$57,341	$59,517	$61,780	$64,136
Ave. per Site per Month		$956	$992	$1,030	$1,069
State of Colorado	Anton	$1,000	$1,000	$1,000	$1,000
	Boyero	$3,444	$3,444	$3,444	$3,444
	Castle Mt.	$1,700			
	Cheyenne Mt.	$42,000	$48,216	$57,968	$57,968
	Cupola	$1,200	$1,200	$1,200	$1,200
	Dolores	$166	$170		$175
	Fort Morgan	$166	$170	$173	$173
	Greyhead	$1,900	$1,950	$2,000	$2,250
	Haswell	$500	$500		
	Idalia	$520	$530		
	Last Chance	$166	$169		
	Last Dollar	$1,800	$1,800	$1,800	$1,800
	Raspberry Ridge	$160	$166	$170	$174
	Reiradon Hill	$3,444	$3,444	$3,444	
	Sacramento	$520	$531	$541	$541
	Storm King Mt.	$1,000	$1,000	$1,000	$1,000

Site Lease Holder	Site Name	2012	2013	2014	2015
	Sunlight Peak	$525	$525	$525	$525
	Sunset Mesa		$166	$170	$174
	Water Dog	$160	$166	$170	$174
	Wilson Creek	$6,229	$6,416	$6,608	$6,608
	Yuma	$166	$169		
State of Colorado Total		$66,766	$71,732	$80,213	$77,206
Ave. per Site per Month		$278	$299	$446	$429

As documented, the average and actual per-site costs per month vary greatly. The multiple reasons for this include:

- Sites are in different areas – such as urban, suburban, rural, and mountaintop environments (with urban areas and mountaintop sites commanding higher lease costs).
- Many of the leases in remote/rural areas are very long term, and the lease rates were set decades ago.
- Many of the leases in remote areas are cooperative in nature, that is, they may be collocated with other governmental agencies (such as the Federal Bureau of Land Management, or Water Reclamation)
- There are variations in what is being leased, such as land only, tower, and/or shelter space.

It is not uncommon to see these variations in site lease costs for the reasons listed above.

Current Market Site Lease Costs

An analysis of current lease costs in the national market of radio sites shows that many factors determine the monthly lease rate for a site. In addition to the factors previously listed, the following also affect site lease costs:

- The difficulty in obtaining the appropriate land, which includes site acquisition, zoning, and permitting, as well as any environmental studies required (also, considerations must be made if the desired site is on federally-owned land)
- The demand for the site in the area – if there is a high demand for a site, this will influence lease costs
- The difficulty in constructing the site, which includes the ease of access road construction, any land clearing at the site, ability of construction equipment to

reach and maneuver at the site, availability of commercial power, and varying weather conditions

- Backhaul methods, including fiber to the site, leased lines, Metropolitan Ethernet, and microwave (for broadband systems, fiber, or microwave would be needed)

FE contacted the two largest radio tower companies in the U.S. and interviewed them to gather information about the amounts they charge for site leases. They stated that their average general lease rates (where tower space and shelter space is leased) are in the range of **$2,000** to **$2,400** per month. Monthly rates can be as high as **$4,000** per month for high-demand or difficult to construct sites. This cost is for collocation on existing sites.

Both tower companies interviewed by ***FE*** also have programs where they will "build-to-suit" sites for clients. In these cases the tower company would take responsibility for the site acquisition and construction, and provide tower and shelter space for the tenant, based on the State's definition of a site "search ring". This "search ring" is a small geographic area where a site could be placed, and provide the required RF coverage for the area.

The tower companies would seek additional tenants to place at these sites to meet their business models. Sites where existing commercial wireless service is unavailable but required would present an attractive opportunity for the tower companies. The tower companies are also willing to negotiate lease rates for anchor tenants, and would consider discounts for multiple site projects. The tower companies would need to review the site locations desired by the State to assess their interest and potential lease rates.

Reducing Current and Future Site Lease Rates (Cost Containment)

FE experience demonstrates that with multiple statewide and other large-scale public safety radio projects, the following strategies are effective for reducing the costs of current and future site leases:

- The State should consider use of federal land. As part of the State's planning for FirstNet, sites on federal land may be considered for part of the FirstNet network. If these sites are in areas that require additional DTRS coverage, the State should also consider use of these sites for improvements to DTRS.

- The State should consider use of existing utility sites. Utilities, such as power, water, or gas, may have existing land and/or sites that can be leveraged for State use. An agreement with utilities that allows State use of the utilities' land and/or site, as well as the utilities' use of other State sites should be considered to control costs.

- If site development requires an outright purchase of private property, the State then would need to determine if the State should construct the site (civil works, tower, shelter), or enter into a build-to-suit arrangement with a tower company to construct the site. Owning the land may provide a negotiation point with the tower company, resulting in low or no charges for use of the site (tower space, shelter space). Alternatively, the tower company may not be interested in a build-to-suit location that they did not select, and has a low potential for other users to collocate. Each location demands a site-by-site review.

- If the State leases land on private property, the State has the two options noted above for site construction.

- The State should consider use of local (city or county) public safety agency radio sites. Such local agencies may have towers/sites in the required areas that provide the desired coverage. Use of these sites is the preferred collocation approach. The State could provide interoperable channels at these sites, for use by the state, federal, or public safety agencies. Providing these interoperable services could offset all or some of the lease fees.

- The State may consider leasing space on State-owned sites to others to generate revenue, or offset other lease and operating expense. It is important to note that leasing space to others will require ongoing administration of the leases by the State. Alternately, arrangements with tower companies to represent the State for leasing State sites to others may be possible. The State and the applicable tower company would negotiate such an arrangement. At least two states we encountered currently use this model to lease their available tower and shelter space.

To best manage costs for site leases, multiple approaches can be used, and the approach(es) selected should be determined by site-specific needs.

Also, OIT identified an instance in which a local land owner required the state of Colorado to pay a per-trip fee to cross their land in order to access a nearby radio site (not on State land). (This land-owner's land contains the only road available to access that radio site.) These costs are simply for access, they are not lease payment for the land, tower, or shelter actually used by the radio equipment. OIT was able to negotiate the per-trip fee down from the land owner's original cost to $1,500 per trip. Given that OIT expects to visit that site at least three time per year (for reasons of maintaining the site and the radio equipment it houses), the state of Colorado will pay $4,500 per year to a land owner for the ability to access a radio site not on that same property.

For reasons such as this, the State may consider the use of eminent domain to acquire land for sites. While a brief review conducted by ***FE*** of current State Statutes found no limitations to prevent the use of eminent domain by the State, a detailed review by State legal council would be required to determine the specific use of eminent domain for State radio sites, especially considering Colorado's home-rule environment. Use of eminent domain might also apply to those unique sites that require access/easements through private land to gain access to the State site. However, the use of eminent domain should not be the first choice for State radio site land acquisition or easements, based on the adversarial relationships created.

5.3 Funding Strategies and Examples

Funding for the expansion, improvement/modernization, and sustainment of public safety radio/data communications systems has been approached in multiple ways. Each state is unique, and has selected the approaches that best fit the State's needs and political climate.

Section 5.1 discusses two funding requirements, CAPEX and OPEX, for Land Mobile Radio (LMR) systems such as DTRS. This section seeks to explain the types of funding strategies most typically used for both the CAPEX and OPEX funding requirements.

The methods described are exclusive of general fund budget which are sometimes used for CAPEX and often used for OPEX.

5.3.1 Examples of CAPEX Funding Approaches

Grants

The Federal Government currently operates several grant programs that state and local governments can use to offset a portion of planning, procuring and implementing LMR systems. The biggest federal grant program that can be leveraged by states for emergency and interoperability communications planning and procurement is the Homeland Security Grant Program (HSGP). In 2014, Colorado was awarded $3,979,000 under this grant.

Colorado's Division of Homeland Security and Emergency Management (DHSEM) oversees the process for distributing these funds to state and local agencies. It is important to note that while funds can be used for emergency and interoperability communications planning and procurement they are also highly sought after and critical funding streams for the five core elements of DHSEM activities.

Accessing federal grants can help states offset a portion of system CAPEX, but typically are a fraction of the funds needed to build or enhance a system. While federal grants can be a little boost to get a project moving, they are not meant to provide a steady stream of funding to supplement state budgets; grants are almost always restricted for a specific purpose/project for a set period of time. They are also subject for reduction or elimination as the federal strategies evolve. For example broadband data systems and cybersecurity have recently become more important issues than interoperable communications and federal levels of funding have followed in those areas.

The current federal grant climate includes streamlining, reductions, increased reporting and auditing, accountability and match requirements.

Bonds

Bonding for LMR systems has been by far the most common CAPEX funding methodology used by states. States have taken advantage of low interest rates and the ability to access large sums of funding for CAPEX. State finance agencies routinely sell general obligation bonds for a variety of state infrastructure projects, so utilizing this method is relatively seamless.

The process, however, to sell bonds often takes months and there are costs for bond advisors, bond insurance, bond counsel, and rating agencies. There are also some considerations for selling bonds such as what funding stream will back up the bonds, how many times debt coverage that fund must have, bond repayment precedence, interest rate based on the bond rating and while the risk is small, it is possible the bonds do not sell in the market.

It is also important to note inconsistency related to the ability to bond for portable and mobile radios or end user equipment. In some situations these pieces of equipment have not reached the threshold for years of service and in other cases they did. To be more clear, if the average portable radio lifecycle is 7 years and mobile radio is 10 years, bonding agencies and rating agencies may not wish to provide bonds for a repayment schedule longer that the expected life of the equipment. And because CAPEX bond sales of 10, 15 or 20 years are common and the costs of end user equipment is significant, system planning must consider this.

A number of states have used bonds to fund capital procurements for statewide radio systems.

9-1-1 Fees

Each state and the District of Columbia collect a 9-1-1 fee. Nineteen states collect fees at the state level, 10 at the local level and 22 at both the state and local level. Colorado cedes 9-1-1 fee collection to local units of government but does collect a 1.4% tax for prepaid services at the point of sale. Colorado is considered one of 23 states to utilize a hybrid approach for collecting fees ranging from 43 cents to a maximum of $1.50 per line per month. Year end 2012 and 2013 figures indicate the total funds collected in Colorado at an estimated $42,900,000[19].

At least two states have used 9-1-1 fees for LMR systems or equipment, but other states and many more local units of government are believed to use a portion of their 9-1-1 fees for LMR systems or equipment.

In Minnesota, all the 9-1-1 fees are collected at the state level and distributed to Public Safety Answering Point (PSAP) operators based on a formula in state law, but Minnesota collects more than it distributes to PSAPs and uses a portion of the fees collected for debt service on the bonds let for the procurement of the statewide Allied Radio Matrix for Emergency Response system (ARMER). The 9-1-1 fees in Minnesota also pay the bulk of the OPEX costs for ARMER.

Minnesota's use of the 9-1-1 fee was centered on the belief that public safety communications rests on the continuum of the beginning through the end of a 9-1-1 call event. The 9-1-1 fee in Minnesota is considered just that, a fee, not a tax and the revenue is deposited in a special revenue account that does not compete with the child and adult centric functions of state government.

The future clarity around the sustainment of 9-1-1 fees is cloudy at best. While, many citizens will continue paying monthly fees through carrier provided contracts, millions of Americans are shifting to prepaid plans, dropping landlines and using VoIP based phones all of which will have a dramatic impact on the future amount of 9-1-1 fees collected.

Public/Private Partnerships

This methodology has been used in many states, but unlike, grants, bonding or 9-1-1 fees which are relatively straight forward, Public/Private Partnerships are more complex because they can be anything a government wants them to be. The partnership can be of any size small, medium, or large. The South Carolina Palmetto 800 system, Florida's

[19] http://transition.fcc.gov/pshs/9-1-1/Net%209-1-1/NET9-1-1_Act_6thReport_to_Congress_123014.pdf

Statewide Law Enforcement Radio System (SLERS) and STARCOM21 system of Illinois are all Public/Private Partnerships, but all have varying levels of ownership, system administration and cost considerations.

The STARCOM21 system, with over 30,000 users, is the official statewide public safety radio network of Illinois and while Motorola owns and operates the system, the Central Management Service of Illinois is the state administrator for billing and collecting the monthly access fees.

South Carolina's Palmetto 800 radio system is a partnership between state government, local governments, public safety agencies, power utilities and Motorola. The state and local governments provide frequencies and the state, local governments and Motorola provide the infrastructure. Motorola operates the system, is responsible for updates and upgrades, and provides 24x7 Network Operations Center (NOC) services with an office in Columbia, South Carolina. Motorola manages the administration of usage fees and receives 100% of the usage fees collected.

Florida entered into a Public/Private Partnership with Harris Corporation to implement SLERS. In return for the conveyance of selected state-owned communications tower and tower assets, Harris extended $26,000,000 in credits to the state for radios, radio equipment, and accessories. The contract with Harris expires June 30, 2021, with a $1 buyback option for SLERS equipment and a $1 buyback option for state-owned towers in 2051. Florida has many more towers that are a part of the SLERS network. Florida leases these additional towers for SLERS coverage. Harris provides day-to-day system administration as well as administration of the usage fee program.

5.3.2 Examples of OPEX Funding Approaches

Traffic Ticket and Vehicle Surcharge Fees

In addition to the Public/Private Partnership, the state of Florida forged with Harris, they also codified a variety of different surcharges into state law. The state collects and transfers to Harris a one dollar fee on boat and vehicle registrations. Counties may impose a fee of up to $12.50 on a moving violation to support voice and data communications systems and another $3 surcharge for all "noncriminal moving violations" remitted to the SLERS trust fund.

Oklahoma operates a statewide radio system called OKWIN. They cover a portion of their OPEX costs by using a portion of the fees generated from the commercial driver's license fee. The Oklahoma legislature and governor also recently approved a $10 fee increase

on driver's licenses and state identification cards and a small portion of that fee increase has also been targeted to OKWIN OPEX.

As in most states, there are court costs associated with conviction. In Texas, conviction fees are collected and 5.5904 percent of them are to be deposited in to the Emergency Radio Infrastructure Account. The funds from this account were to be used for planning, equipment and governance related to interoperability enhancements (Texas Section 411.402). The funds generated since 2011 in this general fund account have never been allocated for state or local use and a portion of the fund balance was depleted for other "public safety" purposes.

System Usage Fees

A great number of systems require a usage fee or "pay to play" system whereby emergency response agencies pay a per-radio per month fee. These fees can raise large sums of money to cover some or all of a systems OPEX. States sometimes administer these usage fee programs and sometimes, as in the case of South Carolina, the vendor administers the fee program. These monthly fees are generally around $50 a month for statewide system access, but each state has varied levels of network access and price points for services or agency type.

Usage fees are extremely controversial. Proponents suggest it is the most logical way to pay the ongoing OPEX costs and the monthly fee requires subscribing agencies to have a vested interest in the system.

Opponents of usage fees argue that the cost inhibits small agencies from joining a statewide system and as a result interoperability is affected. Usage fees also require administration and some states have budgeted state employees dedicated to sending invoices, collecting fees and collecting past due accounts instead of using staff in a more important technical or operational system support capacity. States that collect usage fees also face the dilemma of whether or not to cut off critical public safety voice communications to a non-paying or past due agency.

Tower Leasing

At least three states encountered by ***FE*** have offered a portion of their excess tower space for lease. In both cases the revenue received from this arrangement is negligible in comparison to the total OPEX costs of their statewide systems. This revenue stream is small because most towers are usually quite full with little space to rent. Large cell carriers typically have their own infrastructure or lease sites from global tower companies.

Two states, Michigan and Pennsylvania, lacking in-house expertise, hired an outside vendor to manage tower site leases on the state's behalf, and shares revenue with the vendor.

States considering this funding stream should weigh how much revenue will be generated versus the cost to administer this program and how much excess capacity each statewide tower site should have for public safety system expansion because once the space is contracted for lease it is not available for public safety use for the contract duration.

5.4 Cost Containment Strategies and Examples

Land mobile radio systems are expensive and there is a correlation between the robustness, scalability, and effectiveness of a system and the level of risk exposure to its operators. There are risks when a system lacks the coverage, capacity, or other performance characters that users need. Likewise, there are risks when systems are improperly maintained or users improperly trained.

Some level of risk will always exist, but public safety communications systems must continue to evolve for operational tactics and emerging technologies. Thus the challenge in Colorado, as in most states, is how to utilize resources (fiscal, capital and personnel) in the most efficient manner to mitigate risk to emergency responders and Colorado's citizens and find the proper balance between public safety and cost.

Subsequent sections identify some methodologies for containing costs, and as a result, help mitigate risk.

5.4.1 Examples of Cost Containment Strategies

Effective Governance

As identified in Section 3, *Colorado Governance Analysis*, there are number of criteria to effective governance. Absent effective governance, which takes a group of stakeholders with unique needs and moves them to a common vision, mission and goals, a state (or other area of operation) is left to agencies or governments operating independently. While independence and local control are important, governance can bring agencies or governments together to accomplish a mission that no one single agency or government can afford to accomplish independently.

The bringing together of agencies through governance helps to contain costs by avoiding duplicative costs.

State Commitment

While the state of Colorado recently allocated funding to enhance DTRS, prior funding was inconsistent and fell short of that required to properly operate and maintain the system and expand DTRS to the originally stated coverage goals. This level of inconsistency makes it difficult for local units of government to trust that DTRS will be operable for their critical public safety needs in the long term.

As a result, local government units feeling uncomfortable with DTRS, opted to build their own systems, thus duplicating costs for local taxpayers and potentially affecting interoperability. Section 6, *Shared Ownership*, provides additional information on this topic.

Competitive Procurements

State and local agencies often have existing relationships with equipment vendors. Procuring new equipment or services directly through a vendor almost always results in a higher cost for the government agency.

Many states have state contracts with equipment vendors, but these contracts are not the best prices. Agencies procuring systems procured through a competitive process often receive a discounted price of as much as 20% to 40%. Vendors should honor these discounts for any local government agencies wishing to purchase like equipment, or services.

Eliminate Duplicate Systems

The most effective way to contain costs is to avoid duplicate costs. For example, if County A needs a tower in the northeast and neighboring County B needs one in the northwest, there is no need to build two towers. The towers can be shared. Costs can be mitigated in consolidated 9-1-1 centers and with shared LMR systems and deployable strategic communications assets. These are examples but there are many more components of LMR systems alone that eliminate duplication from city to city or county to county.

Shared Equipment and Resources

Agencies typically invest in cache radios and deployable communications assets for large scale incidents. These assets are expensive to maintain and require frequent training to keep personnel trained on how to use them. Deployable communications assets can be regionally based since their role is incident centric and not a part of day-to-day operations.

Shared, In-House Maintenance

Large systems like DTRS often require sufficient levels of maintenance and upkeep to warrant dedicated, in-house staff. The OIT/PSCN team is an example of just such an in-house team of technicians that support DTRS and other radio systems used by the state of Colorado. This group reduces the State's cost to operate and maintain DTRS by avoiding the need to contract private, for-profit companies (such as radio service shops). The OIT/PSCN team is also available on a contracted-rate, as-needed basis to local owners of DTRS to assist in the operations and maintenance of their locally-owned DTRS assets. By contracting with OIT/PSCN, local agencies lower their OPEX costs and they also help OIT/PSCN by ensuring a constant level of work so they avoid paying resources during non-busy times.

6. Shared Ownership

This section provides an overview of the ownership of DTRS and describes the possible causes and effects of an agency either joining or leaving DTRS.

6.1 Overview of DTRS Ownership

The ownership of the DTRS is diverse: the state of Colorado's Governor's Office of Information Technology (OIT) owns a significant amount of the equipment used in the network, as do numerous municipalities and regional partnerships. These local owners range from metropolitan-area counties, regional partnerships, and numerous smaller municipalities and county governments. For the most part, regardless of ownership, usage of the network is ubiquitously open to all authorized users, and statewide access is available to all user agencies independent of their jurisdiction[20].

Appendix A of the *Needs Assessment* includes a listing of the ownership of DTRS infrastructure assets of repeaters, master site controllers ("zones"), dispatch centers, and transport links. At a summary level, this list shows:

- There are 1,564 repeaters at the 215 radio sites in DTRS
  - Of those repeaters, the state of Colorado owns 744 (or 47.5%)
- There are five master sites ("zones") in DTRS with the following ownership:
  - The state of Colorado owns 3 master sites (Zones 1, 2, and 3)
  - The Pikes Peak Regional Communications Network (serving agencies in El Paso County) owns one master site (Zone 4)
  - Pueblo County owns one master site (Zone 6 (there is no Zone 5))
- There are 71 dispatch centers with a total of 382 dispatch console positions in DTRS (note that the number of dispatch positions per dispatch center varies widely - some centers have as many as 22 dispatch console positions while others have as few as 1)
  - The state of Colorado owns nine of those dispatch centers (or 12%) and 37 of the dispatch positions (9%)

[20] 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.

- There are 298 transport links in DTRS; 10 use optical fiber, 26 use leased circuits ("T1's"), and 262 use privately-licensed microwave paths
    - The state of Colorado owns (or leases) 177 (or 60%) of those transport links

Identifying ownership of these infrastructure assets was viewed as important for various reasons as identified and explained in the *Needs Assessment*. Of specific interest is the following reason: establishing ownership is the first step toward confirming that each DTRS infrastructure owner can accept responsibility for the obligations of ownership, and establish the necessary budget to deliver on those responsibilities. This issue of establishing ownership, and of its role in agencies' decision to leave or join DTRS, is a consideration discussed in this section.

6.2 Causes and Effects of Joining DTRS

As reported in the *Needs Assessment*, there are numerous public safety radio systems in Colorado other than DTRS. Some of these systems use frequency bands and technologies very similar to DTRS and some use different frequency bands (mainly VHF spectrum) and legacy technologies (such as conventional, analog channels). Quite often, these non-DTRS systems have not transitioned to DTRS for the simple reason that their frequencies and technologies (legacy or not) continue to adequately meet their users' needs.

DTRS, as the statewide system for public safety communications interoperability does, however, offer many advantages to agencies that have a need to change the public safety radio system they use. The *Needs Assessment* provides a full assessment of DTRS. Table 7 summarizes its performance.

Table 7: Summary of DTRS performance status

Performance Attribute	Summary of Current Status
Coverage	DTRS currently operates with 215 sites and provides the levels of coverage shown in our included coverage prediction maps and summarized in Section 3.3.3 of the *Needs Assessment*. According to our input from users who participated in the survey and the coverage workshops, there are significant gaps in coverage, especially in the western areas of the state.

Performance Attribute	Summary of Current Status
Interoperability	DTRS currently provides a high-level of interoperability between the field users and dispatchers of agencies that primarily use it for daily and special-purpose communications. As described in subsequent sections of this report, some methods to provide interoperability between users of DTRS and other systems already exist and others are in development.
Features	DTRS currently provides a set of user and dispatcher features that is highly compliant with the Project 25 standards for feature interoperability and that meets a significant portion of users' calling and security/management needs.
Capacity	DTRS is currently equipped with a varying number of channels per radio site with some metropolitan area sites having as many as 20 channels while most remote or rural sites have 5 to 6 channels. When measured at the month-level, the capacity of DTRS is well within typical design criteria and users had overall positive comments about capacity performance.
Reliability	DTRS is currently viewed by a majority of users as reliable; however, there were individual and specific concerns about backhaul. Additionally, no empirical data about outages at the component, site, or system level was available for analysis.
Backhaul	Site-to-site links in DTRS are currently served by varying technologies and equipment; however, the majority of the backhaul network is State-owned microwave that uses equipment that has aged beyond its manufacturer's supported lifecycle and that incurs outages beyond an acceptable level. Additionally, the backhaul network relies on a topology of spurs (as opposed to a ring), which leave sites at the end of a series of microwave hops susceptible to isolation (and outage).
Maintenance	The DTRS system is generally well-maintained and users, dispatchers, and management expressed general satisfaction on the topic. These same individuals did, however, report uncertainty on the schedule and process for requesting and receiving maintenance on both infrastructure and subscriber equipment. Also, the representative sites surveyed were found to be well maintained.
Training and Exercises	Through statewide and local programs, a majority of users reported satisfaction regarding the level of training received. Most users, dispatchers, and technical support personnel reported that they desire more regular exercises. They also requested that exercises include a focus on communications.

As is noted in Table 7, some users in remote or rural areas, especially in the western areas of the State, reported coverage gaps. (The *Needs Assessment* provides

recommendations and estimated costs to address the unmet coverage requirements.) The overall finding of the *Needs Assessment* is that DTRS meets most user needs.

In its role as the statewide interoperability public safety radio system, DTRS offers several methods to interconnect users from one agency to those of another. These too, are described in detail in the *Needs Assessment* but include the following:

- Mutual Aid Channel Talkgroups that support communications at a regional level between users within DTRS
- Console patches and gateways that support communications between DTRS and local/regional systems across the state
- Inter-RF-SubSystem Interface (ISSI) that supports communications between DTRS and major systems like the City and County of Denver

As seen from this discussion, there are numerous reasons for an agency seeking to change from the public safety radio system they use to join DTRS.

The effect of a user agency that joins DTRS is difficult to assess but includes the following factors:

- The location and size of their area of operation will determine their need for coverage.
- The number of users and the level of activity of those users will determine their need for capacity.
- The degree to which the users need to communicate to users outside of DTRS will determine their need for interoperability.

These needs may or may not be met by DTRS in its current configuration. If they are met by the existing DTRS, there will be little to no effect as a result of that agency joining DTRS. If the existing configuration of DTRS does not meet their needs, the *Needs Assessment* provides the following costs basis for expansions to DTRS to accommodate the types of expansions required[21]:

[21] Please consult the *Needs Assessment* for a full description of the considerations included in these estimated costs.

- To add a site for enhancing coverage – Approximately $869,000 for a site in the eastern plains and approximately $1,087,000 for a site in the western mountains

- To add a repeater (one channel) to an existing site for the sake of expanding capacity – Approximately $30,000

We do not provide costs to enhance interoperability between DTRS and a system other than DTRS because there are numerous available methods. These range from low cost solutions such as shared channels (for interoperability between users on the same system), to console patches (which can be relatively inexpensive extensions to existing dispatch consoles, to gateways, including ISSI interconnections (which cost hundreds of thousands of dollars but provide advanced features).

The following is a summary case study of an agency transitioning from use of a local system to DTRS[22]. That agency is Boulder County Sheriff's Office, which is currently taking steps to move from their legacy VHF conventional system (of 25 channels and 20 sites) to DTRS.

- Main Reasons for Joining DTRS – The desire to enhance interoperability with neighboring agencies that use DTRS such as the city of Longmont (which is within Boulder County) as well as neighboring Counties (such as Jefferson County). Also, existing legacy VHF equipment was aging; therefore, the County was facing costs to replace it.

- Effects of Joining DTRS:

    - Coverage – Boulder County plans to add at least two more sites to DTRS; however, the County expects to locate them at existing radio sites so the cost to deploy them will not include the costs for towers and shelters. Boulder County did not know the exact costs for those new sites but expected to use grants to pay for them.

    - Capacity – Boulder County is currently working with CCNC to determine the effect of their new use of DTRS but expects to add incremental quantities of repeaters/channels to DTRS sites at Gunbarrel and Lee Hill.

[22] This information is based on Boulder County's response to ***FE***'s Request for Information as well as an interview conducted by ***FE*** with a representative of Boulder County.

- Interoperability – Boulder County Sheriff will continue to need to communicate with the city of Boulder which operates a different VHF conventional radio system. Currently, the two systems use console patches for interoperability. To maintain interoperability as Boulder County transitions to DTRS, console patching will be expanded to include selected new DTRS talkgroups to be used by Boulder County.

6.3 Causes and Effects of Leaving DTRS

As noted, DTRS provides a high level of performance that meets many needs of many public safety agencies across the state of Colorado. There are, however, reasons for concerns that agencies may leave DTRS because of the effect that such departures have on the system.

In the outreach, surveys, and interviews ***FE*** conducted in the preparation of this report, two topics predominated as possible causes for leaving DTRS.

- Larger metro-area agencies cited uncertainty in governance and funding as actual and possible cause for leaving DTRS
- Smaller rural agencies cited subscriber replacement costs as possible cause for leaving DTRS

Evidence of the first possible cause (uncertainty) has been demonstrated by the Front Range Communications Consortium (FRCC). The users of this new system are within Weld, Adams, and Broomfield Counties, all of which operated as part of DTRS until 2014. At that time, these counties, and many of the agencies within them, deployed the FRCC system which uses technology very similar to DTRS but which is an entirely separate system. The main reason for leaving DTRS as cited by representatives from FRCC was uncertainty over:

- The funding levels the state of Colorado would obtain to support their portion of DTRS
- The funding levels that other local-owners of DTRS equipment would obtain to support their portions of DTRS
- The degree to which local entities would have a role in governance of DTRS as well as overall statewide public safety communications interoperability

For these reasons (as cited in interviews by FRCC representatives), FRCC was deployed in 2014 and users in Weld, Adams, and Broomfield Counties have transitioned to FRCC

from DTRS. As described in the *Needs Assessment*, the FRCC includes multiple subsystems (two countywide simulcast systems for Weld and Adams counties, each with 12 channels, as well as eight other stand-alone sites, each with three to six channels.

Many of these sites and channels were previously used within DTRS, but when FRCC was deployed they were removed from DTRS. This required that DTRS replace the coverage lost by building duplicate radio sites at three locations. OIT's PSCN team has or will cover these costs. They did not provide these costs for this report (however, costs were minimized through the re-use of existing radio towers and shelters). The result is that these three sites have collocations of DTRS and FRCC systems.

The deployment of FRCC produced what are expected to be short-term degradations to overall interoperability. Many users of FRCC retained the ability to communicate on the Mutual Aid Channel (MAC) talkgroups on DTRS, but users of DTRS have not been granted permission to use interoperability or mutual-aid talkgroups on FRCC. As described in the *Needs Assessment*, there is a plan to establish an ISSI interconnection between DTRS and FRCC pending agreements which allow FRCC to implement the necessary network-level connection to DTRS. Once established, this ISSI interconnection will support the sharing of mutual-aid talkgroups across the two systems. (FRCC also established an ISSI interconnection to the city of Westminster system to extend the coverage of the two systems for purposes such as prisoner transport)

As noted, the deployment of FRCC was undertaken mainly to eliminate uncertainty related to funding and governance. By deploying a local system, the users within Weld, Adams, and Broomfield counties have control over, and responsibility for:

- The funding to deploy and upkeep the FRCC system
- The plans for upgrades of the FRCC system
- The policies and procedures regarding the administration, maintenance, and use of the FRCC system

As described, these gains have come at the costs of replacement equipment for DTRS (to restore lost coverage) and of disrupted (for the short term) interoperability between users of FRCC and DTRS.

The other predominant cause cited as a possible reason to leave DTRS is the cost to replace subscriber radios. This concern was cited through the on-line survey and interviews, mainly by user agencies in more rural and remote areas of the state. They noted that they are currently operating on DTRS because the State provided the infrastructure (radio sites) that provides coverage in their area and that in the period

between 2005 and 2009, they received grants to procure DTRS-compatible subscriber radios. In this way, their cost to join DTRS was kept low, often to just 20% and 50% of the subscriber radios they needed to operate on the system.

Many of these remote and rural users of DTRS have very limited budgets with almost none dedicated to supporting or replacing public safety communications. As their DTRS-compatible radios approach their end of life, these user agencies face the financial challenge of buying replacements and they see two options:

- Purchase new DTRS-compatible subscriber radios that provide all the benefits of operating on the DTRS system, but that cost between $2,500 and $5,000 per radio (depending on configuration and options included)

- Discontinue use of DTRS, restore use of local legacy VHF systems (many of which still exist for purposes of backup or non-public-safety use), and purchase lower-cost, VHF conventional subscriber radios that cost between $800 and $1,200 per radio (depending on configuration and options included)

For an agency that operates 15 total subscriber radios, the difference between the two options can be approximately $30,000 (assuming average costs of a DTRS-compatible radio of $3,000 and $1,000 for a VHF radio). Several agencies noted that a difference of this level is high enough to make them question DTRS' technical benefits, citing that a majority of their daily-use needs would be sufficiently met by their legacy VHF systems. They recognized that interoperability would suffer, but that interoperability (for emergencies and special events) is only occasionally needed.

No agencies interviewed or surveyed directly stated that they had definite plans to leave DTRS for this possible cause but many cited it as a concern. They noted that they would need to provide financial justification for purchasing the significantly-higher-cost DTRS-compatible subscriber radios.

The effect of such agencies leaving DTRS is that direct interoperability with them (through the use of same-network, shared channels) would be lost. Interoperability with them would have to be established on a case-by-case basis using the available means of dispatch intervention (dispatchers manually repeating conversations), console patches, gateways, or cached radios.

6.4 Reducing the Risks

FE recommends the following actions in order to mitigate agencies leaving DTRS for the two possible causes of uncertainty and subscriber costs as described above:

- The needs as identified in the *Needs Assessment*; most notably those to improve DTRS coverage, backhaul, and equipment and system lifecycle; should be addressed so that DTRS better meets users' needs.

- The listing of ownership of DTRS infrastructure assets, as established in the *Needs Assessment*, should be updated on at least and annual basis by the PSCS or by the support they receive from the Division of Homeland Security and Emergency Management

- Agreements between the various owners of DTRS assets should be developed and executed in order to confirm owners of responsibilities for infrastructure deployment, upkeep, replacement, and other such topics[23]

- The system should be collaboratively governed by an organization that meets the criteria for effective governance as described above (which PSCS is very close to achieving) so that upgrades, expansions, and other significant changes to DTRS are planned with at least a 5-year vision, in a collaborative manner, and in support of the goals of the Statewide Interoperability Communications Plan

- Consideration should be given to establishing grants to be administered by PSCS that would provide financial support to local users to the degree that such funds promote or sustain interoperability (including continued use of DTRS) and the goals of the Statewide Interoperability Communications Plan

Section 9, *Recommendations*, discusses these recommendations in more detail.

[23] The Consolidated Communications System Authority (CCSA, the predecessor to the PSCS) established two frameworks for agreements in 2014 that are available for execution by owners of DTRS master sites and radio sites. Those agreement frameworks establish the obligations and responsibilities of ownership and interconnection of DTRS infrastructure assets.

7. DTRS Programmatic Elements

This section describes the organizations with roles in planning and operating DTRS as well as alternatives for reorganizing them to improve their collaboration and effectiveness.

7.1 Governance vs Programmatic Support

As described, there is a difference between the organizations that provide governance and those that provide programmatic support to statewide public safety communications interoperability. Public safety interoperability governance organizations draw on representation from across the area they serve to collaboratively plan sustainment of and enhancements to systems and initiatives. Programmatic support organizations work to enact and deliver on the deployment, operations, and maintenance of those plans. These two types of organizations support each other and often, as is the case in Colorado, members of the programmatic support organizations serve as representatives in the governance organizations.

As noted in Section 3, *Colorado Governance Analysis*, PSCS and CCNC are primarily governance organizations, which despite their overlaps, work collaboratively to set the direction for statewide public safety communications interoperability, including DTRS.

The Office of the SWIC and PSCN are primarily programmatic organizations that work to complete specific tasks related to operating and sustaining specific public safety programs such as the development of the SCIP and the operation and maintenance of DTRS.

7.2 Colorado Communications Programmatic Support Organizations

This section provides an overview of the Office of the SWIC (which provides policy management for statewide interoperability) and the PSCN (which provides technical management of DTRS and other statewide interoperability systems).

7.2.1 The Office of the SWIC

The Office of the SWIC, which is organized within the Division of Homeland Security and Emergency Management, controls communications and interoperability program management, SCIP implementation, governance, policy development, grants coordination, and outreach and education. In short, the Office of the SWIC provides management of public safety communications policy. Additionally, staff from the SWIC's office provide direct support to PSCS. Section 3, *Colorado Governance Analysis*, provides details about the Office of the SWIC.

7.2.2 OIT/PSCN

The Public Safety Communications Network (PSCN) is a group within the Governor's Office of Information Technology (OIT) responsible for the deployment, operations, and maintenance of state-owned public safety communications systems and equipment.

The PSCN team is responsible for all things directly, and in some cases indirectly, related to public safety two-way radio voice communications for state agencies in Colorado[24]. The safety of the citizens and first responders in Colorado is the top priority and primary focus for the 46 members of the PSCN team. The PSCN reports to the Network Operations Department, which reports to the Chief Technology Office, which reports to the Office of Information Technology, which reports to the governor.

The PSCN originally resided organizationally as part of the Colorado State Patrol (CSP, which is within the Department of Public Safety) but in the late 1990s it was moved to the Department of Personnel and Administration (DPA). This organizational change came about because other users of the systems overseen by PSCN expressed concern that PSCN provided a greater level of support to CSP than to their agencies. The DPA, as an independent department that does not significantly use radios, but which oversees other cross-departmental resources such as fleet (of motor vehicles), was seen as an alternative to let PSCN complete their mission without the perception of being biased toward any user agency. PSCN was again transferred to OIT in approximately 2010 as part of Colorado's IT consolidation.

The OIT, through the PSCN team, is statutorily required (C.R.S. 24-37.5-502) to serve the radio communications needs of all state departments, including the departments of public safety, transportation, corrections, and natural resources. The PSCN team directly supports and maintains the DTRS as a primary means of radio communication for all state agencies. Support and maintenance includes, but is not limited to, design, engineering, technical support, maintenance, monitoring, FCC and FAA licensing and compliance, and administrative support of all DTRS related operations at the state owned and managed zone master sites and radio transmitter (tower) sites.

Electronic specialists (members of PSCN's technical staff) are geographically and strategically stationed in shops across the state to ensure an immediate response to alarm notifications of any system component trouble or failure. Teams perform preventive

[24] Portions of this description of PSCN are taken from the Colorado Governor's Office of Information Technology's "*2013 – Public Safety Communications Network – 2014"* Report that highlights PSCN's FY2013-14 project accomplishments.

maintenance for all state owned and managed equipment at all state sites on a regular basis. According to OIT/PSCN, these electronic specialists are responsible for the service and maintenance of roughly 70% of the entire DTRS because they are contracted by local government agencies for support of locally-owned infrastructure.

Other responsibilities of PSCN include:

- Administration of the Public Safety Communications Trust Fund for the State, which is responsible for the acquisition and maintenance of the State public safety communications systems
- Charging State departments for use of the DTRS radio system, and to recover all costs for all material, labor, and overhead. Current State statutes also prohibit the State from charging municipality, county, city and county, or special districts for use of the DTRS
- Providing support, service, and maintenance for the network of VHF fixed base stations that provides agencies with a means of operable communications in some of the state's remote areas and areas with difficult terrain where DTRS coverage is not optimal or is unavailable.
- Delivering contracted support and maintenance of the Colorado Department of Transportation's Aeronautics Division-Automated Weather Observation System (known as AWOS) and the National Oceanic and Atmospheric Association (NOAA) weather radio transmitters located in Colorado.

7.3 Programmatic Support Concerns

The existence of these two different organizations that provide programmatic support to Colorado's public safety communications, as well as their current organizational alignments, raises concern over their ability to be as effective as possible.

Through interviews with DHSEM, OIT/PSCN, PSCS, CCNC, and user agencies of DTRS, ***FE*** heard the concerns summarized here:

- PSCN is organized at too low a level within OIT to receive any significant management attention.
- OIT, as an organization, is not a user of DTRS and while they undoubtedly strive for its success their mission is not disturbed if or when it does not succeed.

- OIT mainly provides IT services which are often outsourced or virtualized (placed "in the cloud") and which may or may not be considered critical to a department's mission. On the other hand, DTRS is a specialized technology, significantly different from IT technologies in that it is truly mission critical (requiring availability on the order of 99.999%) and cannot be virtualized. Also, some considerations are unique to public safety communications (and different from IT) such as its inherent reliance on civil work projects (to construct radio towers and shelters) and the requirement to license frequencies from the Federal Communications Commission.

- For these reasons, OIT management does not understand public safety communications and they are therefore somewhat reluctant to request additional funding for initiatives they do not understand. This requires that PSCN spend additional resources and time educating OIT management about the effect of unmet needs within DTRS and other systems.

- OIT has a set and limited number of Decision Items (capital budget requests) it can support per year and PSCN's requests are therefore in direct competition with others within OIT which, as described, may be better understood than those of PSCN.

- The existence of the two groups of the Office of the SWIC and PSCN could cause inefficiencies – the lack of knowledge of each other's activities and initiatives could lead to duplication or gaps in efforts.

- The organizational separation of the two groups could cause disconnection between policy (as set by the Office of the SWIC) and technical management (as conducted by PSCN). Without a common reporting structure or significant level of oversight, any difference in approaches to a situation could result in one organization's objectives not being met.

7.4 Programmatic Support Alternatives

In response to the concerns listed above, ***FE*** proposes two alternatives to improve the effectiveness and organizational alignment of the Office of the SWIC and PSCN. They are described here and then listed with their respective advantages.

The first alternative is to organizationally elevate PSCN within OIT and provide a greater degree of collaboration between its technical management activities and the policy management activities of the Office of the SWIC. In this alternative, OIT would be elevated to the same level as the Network Operations Department (i.e., the head of PSCN would

be a peer instead of a direct-report to the Director of the Network Operations Department). Also, the PSCN would have "dotted-line" reporting responsibility to the Office of the SWIC who, with collaboration of PSCS, would ensure that its efforts are consistent with the goals of the SCIP and the overall strategic plan for DTRS.

The second alternative is to create a new Division within the Department of Public Safety and to house both PSCN and the Office of the SWIC in that new Division. Reporting to the head of this new Division would be the SWIC and the head of the PSCN. Such a Division, potentially the Division of Emergency Communications, could also contain related organizations such as the Colorado State Patrol's dispatch operations.

Topic	Alternative 1 (Remain Separate but Elevate PSCN and Increase Oversight)	Alternative 2 (Combine Organizations into New Division Within DPS)
Organizational Prominence	Elevating PSCN within OIT would assist in their ability to promote the needs of public safety communications systems.	Establishing a Division of Emergency Communications would raise awareness of the importance of communications in public safety operations.
Organizational Alignment	Increasing the SWIC's ability to influence PSCN's activities would help ensure alignment between the two separate organizations; however, the oversight would still be on a "dotted-line" basis".	Establishing a common reporting structure for the two organizations would help ensure alignment of goals, programs, and outcomes. This would also allow that Director to resolve any conflicts between the SWIC's management of policy and PSCN's management of technology. Additionally, including related groups such as CPS dispatch operations would further align public safety communications at the state level.

Topic	Alternative 1 (Remain Separate but Elevate PSCN and Increase Oversight)	Alternative 2 (Combine Organizations into New Division Within DPS)
Organizational Support	Retaining PSCN within OIT would continue to be consistent with the Governor's direction to consolidate technology within OIT. It would also help continue the view that PSCN remains unbiased among all user agencies and departments it serves.	Moving PSCN to DPS, an organization that uses public safety communications as a critical tool in delivering on its mission and that inherently understands its importance, would promote internal support for PSCN's efforts. Also, DPS has front-line connections to first responder agencies across the state, thereby increasing the degree to which a Division of Emergency Communications could interact with statewide DTRS users.
Organizational Funding	Retaining PSCN within OIT would allow continued funding of their operation through their ability to charge State agencies for use of the system. It would also allow PSCN to continue to administer the Public Safety Communications Trust Fund, within the bounds of the funding sources used to fill it.	Establishing PSCN as a part of a Division of Emergency Communications would remove some of the competition it sees for funding via OIT's limited number of decision items. Also, funding requests for public safety communications initiated though DPS may receive more attention (due to their status as a mission-critical user) than those that come from OIT.

Each alternative has its advantages; however, either would provide significant improvements over the current situation in which organizational separation has the potential to cause inefficiencies and differences between the management of public safety communications policy and technology.

Both of these alternatives should be further evaluated by OIT and DPS, with input from PSCS, to determine which is likely to have the greatest positive effect on the sustainability of public safety communications and interoperability across Colorado.

8. DTRS Coverage Policies

This section provides recommendations for policies regarding public safety radio system coverage. The *Needs Assessment* addresses the topic of DTRS coverage; therefore, this section includes references to those details when appropriate.

8.1 Existing DTRS Coverage Policies

According to OIT, DTRS delivers the following level of coverage, *"Mobile (in vehicle) radio coverage provided to approximately 93%-95% of state"*[25]. This goal is consistent with PSCN's mission to *"serve the radio communications needs of all state departments, including the departments of public safety, transportation, corrections, and natural resources"*, all of whom require statewide coverage and all of whom travel on state highways (which also include interstate and U.S. highways).

Additionally, the "DIGITAL TRUNKED RADIO (DTR) SYSTEM PARTICIPANT AGREEMENT", as contained within the CCNC's Standard Operating Procedures (Revision 6, date 3/11/2009), expresses the following as coverage expectations for DTRS coverage:

> *"DTR Radio Coverage - DTR is designed to provide mobile radio communication coverage on major State highways to the Participant. However, the system is provided as is and neither CCNC nor the State of Colorado makes any guarantee, either express or implied, as to a specific level of coverage.*
>
> *DTR Portable Radio Coverage - Portable radio coverage is not guaranteed and will vary from location to location. The Participant is encouraged to conduct its own portable radio communications coverage test to determine the expected coverage level in its geographic jurisdiction. Additional coverage required beyond the mobile radio communication coverage on major State highways is the responsibility of the requesting Participant."*

[25] As stated in the Colorado Governor's Office of Information Technology's "*2013 – Public Safety Communications Network – 2014"* Report and on PSCN's website at http://www.oit.state.co.us/cto/dtrs

Finally, Section 13 of the same CCNC Standard Operating Procedures document states that *"Agencies may deploy Bi-directional amplifiers (BDAs) to improve coverage within buildings or in isolated geographic areas that have minimal system coverage."*

Together these statements constitute the coverage policies of DTRS.

8.2 Existing DTRS Coverage Performance

As identified in the *Needs Assessment*, ***FE*** conducted coverage predictions to determine that DTRS in its current configuration leaves significant coverage gaps, most notably in the western areas of the state. ***FE***'s analysis of DTRS shows that at the statewide level it provides mobile talk-in (from a radio mounted in a vehicle to the radio system) coverage from about 87% of state highways and talk-out coverage (from the radio system to a mobile radio mounted in a vehicle) to about 79% of highways. Note that a user requires both talk-in and talk-out coverage to have successful communications with the system. Therefore, the "net effect" is that DTRS provides statewide mobile coverage to 79% of state highways (with approximately 73% coverage in the western portion of the state and 84% in the eastern portion[26]). ***FE*** substantiated these coverage predictions and coverage percentages through iterative and collaborative coverage workshops with DTRS users from state and local agencies.

The *Needs Assessment* includes additional details about the recommended solution to address the difference between our coverage DTRS' current coverage performance and the coverage requirements of users.

8.3 Comparative Statewide Coverage Policies

8.3.1 Statewide Radio System Coverage Issues and Concepts

Most statewide public safety systems initially focus on mobile RF coverage within the state. Specific factors within each state, such as geographic size, terrain, the size and number of urban areas, the need for in-building coverage, and which state and local agencies will use the network, are also considerations when developing requirements for statewide coverage.

[26] For the purposes of this analysis, the "western portion of the state" includes the following Counties; Alamosa, Archuleta, Delta, Dolores, Eagle, Garfield, Grand, Gunnison, Hinsdale, Jackson, La Plata, Mesa, Mineral, Moffat, Montezuma, Montrose, Ouray, Pitkin, Rio Blanco, Rio Grande, Routt, Saguache, San Juan, San Miguel, and Summit. The "eastern portion of the state" includes all other Counties.

FE's investigations found that state agencies such as departments of Public Safety, Transportation, Natural Resources, and Corrections, for the most part, required that their statewide system provides 95% coverage for mobile radios operated within the geographically bounded area of the state. Additionally, this requirement included specific reliability, usually specified as a percentage (such as 97%), or as equating to a Delivered Audio Quality (DAQ) of 3.4. Table 8 shows DAQ definitions from the Telecommunications Industry Association (TIA) Telecommunications Service Bulletin (TSB-88).

Table 8 – Delivered Audio Quality Definitions

DAQ	SUBJECTIVE PERFORMANCE DESCRIPTION
1	Unusable, Speech Present, but unreadable
2	Understandable with considerable effort. Frequent repetition due to noise/distortion
3	Speech understandable with slight effort. Occasional repetition required due to noise/distortion
3.4	Speech understandable with repetition only rarely required. Some noise/distortion
4	Speech easily understood. Occasional noise/distortion
4.5	Speech easily understood. Infrequent noise/distortion
5	Speech easily understood

The use of portables also affects coverage requirements. Agencies use portable radios in urban areas, local municipalities who also use the system or anywhere there is a need to maintain radio contact while outside the vehicle. The use of portable radios, with their reduced power, requires a more robust radio infrastructure to obtain the required coverage. This equates to increased quantities of base station/repeater sites in a portable-based system. States address this in several ways:

- If the state is relatively small (such as Maryland – see example below), the state can achieve portable coverage throughout the entire state.

- Geographically large states with large urban areas (or specific areas otherwise identified as requiring portable coverage – such as Iowa – see example below) and non-urban areas require both portable and mobile coverage in those areas respectively.

- Where operations outside the vehicle require radio connectivity in non-urban areas, states have implemented vehicular repeaters to extend the portable's range in a mobile-based system.

In-building coverage may also be a requirement of a statewide radio system. The size and types of buildings require consideration in the radio system design. Best practices for in-building coverage include addressing this in multiple ways:

- List the buildings that require coverage to/from portables. A properly crafted Request for Proposal (RFP) can accomplish this during system upgrade or replacement.

- Implement bi-directional amplifier systems (BDAs), or distributed-antenna-systems (DAS) within an existing radio system. These are usually building-specific designs for buildings not otherwise provided coverage by the system.

- Developed and implemented state or county building codes mandating that plans for new construction or renovations to existing buildings include public safety communications considerations in the form of BDA or DAS systems.

8.3.2 Other Statewide Radio System Coverage Requirements

The following are coverage polices for statewide public safety radio systems that ***FE*** identified, offered here for comparison to DTRS coverage policies. The primary sources of information on this topic were the coverage-requirement sections of Requests for Proposals released for statewide radio systems.

8.3.2.1 Maryland Statewide Radio System

The geographical size of Maryland is 12,407 square miles and this specification is taken from their 2008 Request for Proposals.

> *"The system design shall be based on APCO Project 25 Phase 2 performance as required to provide the specified reliability throughout the coverage area as defined above. Portable radios shall be configured using a hip-worn radio in a belt loop case and speaker-microphone without antenna. The maximum output transmit power of a portable radio is limited to 3 Watts for determining the system coverage.*
>
> *The basic network coverage design shall be applicable to vehicles, aircrafts, railroad trains, and vessels traveling at speeds up to 150 MPH.*

At least 95% of all test locations within the State shall meet or exceed the coverage threshold for both voice and data."

8.3.2.2 Iowa Statewide P25 Phase 2 System – 2013

The geographical size of Iowa is 56,272 square miles and this specification is taken from their 2013 Request for Proposals.

"The state seeks 95% statewide coverage (not 95% county by county coverage). The 5% of areas not covered must be spread out through the state and cannot encompass a whole county or group of counties. The RF coverage requirement of 95% of the geographically bounded state with 97% reliability replaces all references to RF coverage requirements by county, region, and judicial district in the RFP."

8.3.3 Summary of Statewide Radio System Coverage Comparison

It is immediately apparent that the coverage specifications listed above, which may be considered the "coverage policies" of those states, are significantly more detailed than that of Colorado. The coverage policies of those states specifically address:

- Coverage specifications details such as an exact percentage of coverage reliability, the delivered audio quality (DAQ) level, and any requirements for building loss
- Service area details such as specific areas that require enhanced coverage
- User equipment details such as the type of subscriber radio, the location of the subscriber radio (at hip or at head level)

Although not shown above, these two statewide policies also described specific options for coverage extenders such as vehicle repeater systems. Additionally, these policies are binding requirements of the level of service the system must provide, not just guidelines or goals.

8.4 Coverage Policy Recommendations

As apparent from the preceding analysis, DTRS coverage policies lack details as well as stated expectations for the system's performance level. ***FE*** recommends that OIT/PSCN and PSCS address the coverage policy for DTRS in the following manner:

- The PSCN team should develop a detailed coverage specification for the state departments and agencies that use DTRS. This detailed specification should include the coverage, service area, and user equipment details as expressed by other states. It should also be developed in collaboration with the State departments and agencies served by PSCN.

- If the current DTRS configuration does not meet the state-level specification, PSCN should work to identify a plan to deliver the technical improvements to achieve it, including user agency input on the prioritization of any phases.

- The PSCN team should work with PSCS to establish guidelines for local coverage enhancements (coverage specifications for local areas as required by local agencies). These guidelines should establish when and how local user agencies can add sites or entire zones to DTRS to provide the local coverage enhancements they require. These guidelines should include technical requirements for the types of equipment that can be added and they should include interconnection agreements that describe the roles and responsibilities for issues like maintenance and upgrades of interconnected equipment. Any such technical requirements and user agreements should be reviewed and approved by PSCS (with possible review and comment by CCNC).

- The PSCN should also work with PSCS to establish guidelines for coverage extension methods such as vehicle repeater systems and bi-directional amplifiers. As with local coverage enhancements, these guidelines should establish technical parameters as well as agreements that define roles and responsibilities for operation and maintenance.

Taking these steps will provide a more definitive statement about the roles that State and local agencies have in delivering coverage across Colorado and will ensure a more collaborative, and therefore more widely accepted, view to DTRS coverage policies.

9. Recommendations

The passing of Senate Bill 14-127 was a positive step related to public safety communications planning in Colorado. The establishment of the PSCS has benefited communications interoperability planning as has the provision of funding for this study. The purpose of this *Business Plan*, and the companion *Needs Assessment*, is to obtain from ***FE***, an unbiased third party analysis of the current operating environment and recommendations on how to make it better based on our subject matter expertise and known best practices from across the country.

9.1 Governance Recommendations

Colorado has many qualified and passionate champions of public safety communications, but the correct regulatory framework has not been put in to place to allow the many dedicated state and local public safety communications champions to succeed. There is a struggle from state agency to state agency and a lack of trust between state and local governments.

Upon completing a thorough analysis of the Colorado public safety communications governance structure and conducting dozens of interviews with communications stakeholders, ***FE*** makes the following recommendations related to Colorado public safety communications governance.

1. Establish the PSCS and the full Colorado public safety communications governance structure as independent in Colorado code and not a subcommittee of the HSAC. The HSAC serves an incredibly important role in the state, but with its broad focus of Prevention, Protection, Mitigation, Response and Recovery for ***ALL*** naturally occurring and man-made disasters, public safety communications will not get the emphasis it needs. Public safety communications is prevalent in every incident and the ability to effectively communicate during any incident is critical for the effectiveness of the response. As a result, the PSCS and public safety communications warrants being independent from the vast considerations of Homeland Security and Emergency Management.
2. The PSCS structure and membership should be revisited with a view to expanding it to include broadband and 9-1-1 as subcommittees or through membership. Also, while the PSCS currently has a “minimum of 23 members”, stakeholders should be cautious about going beyond 23. A balance between, state, local and tribal, as well as, metropolitan versus rural, and police, fire and EMS must be maintained, but that balance, which can only come from Colorado

stakeholders, should be as streamlined as possible. PSCS and regional committees can be more inclusive, but the PSCS must be able to effectively govern.

3. The PSCS should seek to establish Regional Interoperability Committees (RICs). Establishing these RICs outside of the existing All-Hazard Regions structure is preferable for the reasons stated above. From rural areas, however, where the same people typically serve on multiple committees, it may be more efficient to leverage the All-Hazard Regions interoperability committees.

   Developing and sustaining RICs is crucial to the statewide effort. These committees truly allow the effort to be practitioner-driven from the bottom up. While the SIEC provides the State with high-level strategy, the intrastate regional bodies provide insight into that strategy from an operational perspective. The RICs play a pivotal local control role in developing appropriate SOPs, training opportunities, and tactical interoperability plans for the distinct requirements of their regions' disciplines and jurisdictions.

   While each regional area should be encouraged to develop a governance system that best fits its area's needs, the SWIC, working alongside each regional chairperson, should ensure that the RICs have adequate representation among law enforcement, fire, EMS, emergency management, and other relevant government agencies from each local entity (such as UASIs, counties, cities, tribal nations) within the planning area. This framework allows the SIEC to ensure that statewide communications interoperability strategic planning, coordination, collaboration, and build-out occur on a statewide strategic level. At the same time, this framework encourages operational and response planning and implementation at the regional level.

   The ***FE*** recommendation is to have effective RICs in some form so that regions can provide guidance to the PSCS and receive assistance from the PSCS. The boundaries of the regions may or may not be the same as used by the existing All-Hazards Regions. Regional Interoperability Committees should be formed locally based on what makes the most operational sense.

4. The PSCS owns the SCIP and works directly with the SWIC to coordinate the activities necessary to refine and update the SCIP on an annual basis and to implement the state vision and related SCIP goals.

5. The PSCS should be responsible for the future planning of DTRS, just as the SECB in Minnesota is responsible for the ARMER plan. ***FE*** makes this recommendation because DTRS is the statewide interoperable

communications system in Colorado and its mission is entirely consistent with the purpose of PSCS' existence. To be clear, OIT/PSCN as members of PSCS should have a continued role in DTRS planning as they should remain responsible, without overbearing oversight from PSCS, for the day-to-day operations and maintenance of DTRS. Any interoperability planning and DTRS enhancements should require the approval of the PSCS. ***FE*** also believes that moving the statewide DTRS planning from OIT to the PSCS will help to improve state-to-local relations because of local membership in PSCS.

6. The organization of OIT's PSNC team should be evaluated and changed according to one of the two alternatives described above in Section 7, *DTRS Programmatic Elements*. Either of these organizational changes would improve the overall visibility of public safety communications in the state as well as the alignment of the Office of the SWIC's role in managing DTRS policy and PSNC's role in managing DTRS technology.

7. Senate Bill 14-127 has a sunset date for the PSCS. This should be removed and the PSCS, with an amended scope should be permanently codified in law. Local government agencies must know that the Colorado legislature is fully behind interoperable communications, the PSCS, and DTRS. There is a real threat that local agencies will continue to move away from DTRS and every agency that does results in a loss of interoperability and increased costs for Colorado taxpayers.

8. The SWIC should be the main interface between the PSCS and state and local agencies, and tribal and federal government.

9. A fully functioning PSCS should formally absorb the duties of the CCNC. ***FE*** recognizes the CCNC is a 501(c)(3), independent from the state, and established at a time when no organization had authority to provide governance of DTRS or statewide interoperability. However, the PSCS Technical Subcommittee should take over the responsibilities and fill the gap the CCNC filled when the PSCS did not exist. This move would add credibility to PSCS and add clarity to the State public safety communications governance structure. Further, there is significant overlap between PSCS and CCNC members and consolidating the activities of the CCNC into the PSCS governance structure would give key stakeholders more time to work on solutions than attending meetings.

10. PSCS should work to enact the DTRS ownership agreement frameworks that were developed by its predecessor CCSA. These agreement frameworks

establish the roles and responsibilities for ownership of DTRS assets. By clarifying such expectations, state and local DTRS owners can eliminate the existing uncertainty regarding ownership of system infrastructure assets.

9.2 Funding Recommendations

As noted, funding is a function of risk and funding can be used to eliminate risk. In public safety radio communications, funding can be used to improve the robustness, scalability and effectiveness of a system and thereby eliminate risk to its users, operators, and the general public it serves. The challenge presented to Colorado for public safety communications, at the state and local levels, is to effectively balance the expenditures of funding (for capital, operating, and personnel expenses) against an acceptable level of risk. To help with this balance, ***FE*** offers the following analysis and recommendations regarding funding:

1. There is risk to users of DTRS that comes from needs that remain unmet such as the need for improved system coverage as identified in the *Needs Assessment*. ***FE*** estimated the cost of $115,976,000 to enhance DTRS coverage to meet user needs. Before taking any actions to improve statewide coverage, ***FE*** recommends the PSCS work closely with OIT/PSCN (and, potentially, CCNC) to agree upon a level of coverage the state should provide for state personnel.
2. Local user agencies that may leave DTRS due to uncertainty also pose a risk. As described above, this uncertainty arises when local agencies have no knowledge of or confidence in the overall funding and governance environment of DTRS. Regardless of the number of local agencies that use DTRS, the state of Colorado will operate the system to meet the needs of State agencies. The loss of local DTRS infrastructure simply means that the state of Colorado has to spend funds to address the gap caused by the removal of a departing local agency's assets. Thus, with the departure of any local agency, there will be new one-time and ongoing costs to replace and operate the assets removed. ***FE*** believes a strong affirmative action by the legislature and governor, by addressing the governance and funding recommendations set forth in this report, will eliminate that uncertainty, thus avoiding duplicative costs and at the same time enhancing interoperable communications.
3. Local user agencies may leave DTRS due to high costs of replacement subscriber radios. The costs to join DTRS were lowered in the mid-2000s through the availability of grants to help offset the first procurement of DTRS-compatible radios (which can be three to five times more expensive than radios

operating on legacy systems). Today, however, those radios are reaching end of life and there are no longer grants to offset the costs of replacing them with new versions of the more expensive DTRS radios. The choice for these users, who are often in rural or remote areas, is to stay off DTRS or leave DTRS and buy less expensive radios to operate on legacy systems. ***FE*** recommends establishing a grant program to assist users (only those that can demonstrate an appropriate level of need) with the replacement of their DTRS-compatible subscriber radios.

4. DTRS and the other public safety communications systems in the state of Colorado may fail to deliver the necessary level of interoperability required by their various users. As identified in the *Needs Assessment*, there are various methods to achieve the needed level of interoperability; however, that level must first be formally established and grounded in operational requirements. Once that requirement-setting task is complete, ***FE*** recommends Colorado consider reestablishing the Colorado Wireless Interoperable Network (CWIN) grant that was active in the early and mid-2000s. This grant should be available statewide for current DTRS members seeking to make enhancements to the system and to the owners and operators of systems other than DTRS seeking to establish interoperability with DTRS and each other. The grant could be administered by the SWIC's office, but grant awards should be determined by the PSCS based on the degree to which applications comply with the goals of the SCIP.

5. The risk of not knowing the ownership of all DTRS infrastructure assets and not establishing the roles and responsibilities associated with the ownership of those assets can increase costs because they can lead to equipment failures (due to deferred maintenance) and, as described above, the departure of user agencies due to overall uncertainty. ***FE*** recommends that PSCS with the support it receives from the Office of the SWIC, maintain the DTRS ownership list included in the *Needs Assessment* and establish formal agreements to define the roles and responsibilities associated with ownership.

6. There is the risk that governance will be unable to deliver on its mandate. Performing the tasks of governance requires the time of existing staff as well as, potentially, the hiring of additional staff (including within the Office of the SWIC and as Regional Interoperable Coordinators) and the contracting of outside resources for special-topic studies and projects. It also requires funds to cover travel and to prepare and deliver outreach and education. ***FE*** recommends the PSCS continue to receive administrative support from DPS and that the legislature provide the PSCS with an annual line item appropriation

from the general fund or from a funded Public Safety Communications Trust Fund.

Together, the funding of the solutions to mitigate these risks and enact these recommendations is estimated to be between $120 and $150 million. Much of this amount is CAPEX but some is OPEX for year-over-year operations and maintenance. A more precise number can be determined once the public safety community, legislature and Governor can define an acceptable level of risk for DTRS coverage, capacity and reliability.

This amount includes funding to provide 109 new radio sites at an estimated cost of $115,976,000 (and the corresponding OPEX costs), to assist with the replacement of locally-owned DTRS legacy equipment estimated at $17,527,000, to provide grant incentives to local government agencies seeking to join DTRS, and to support the operations of statewide governance efforts. This amount is above the funding requests already made by PSNC for initiatives such as the replacement of State-owned legacy equipment, the upgrade of the DTRS platform software, the replacement of the DTRS microwave system, and other planned capital improvement and continued maintenance projects.

Colorado is unique and thus funding strategy for public safety communications should be unique to Colorado. A funding strategy is not something a third-party reviewer such as ***FE*** can recommend with any level of confidence. State-specific funding organically evolves and becomes inclusive of many different considerations from emergency responders, residents, elected officials and, in some cases, external sources such as industry lobbyists.

It is highly unlikely that the level of funding called for above will come from federal grants or earmarks; however, they should be pursued to the degree that they support the recommendations listed above. This leaves a state such as Colorado with various options for securing the necessary CAPEX and OPEX funds to establish, operate, and maintain DTRS and statewide interoperability. These options include:

1. Secure bonds for CAPEX. This brings the requirement to cover the debt service on those bonds. There are many factors for determining the correct amount of revenue to service bonds and the State bond office can provide that guidance. One method may be to allocate general fund dollars for debt service on bonds. Alternately, there could be the institution of a fee or tax to cover that bonded debt service. Should the CAPEX debt service come from a fee or tax, ***FE*** suggests the state consider the 9-1-1 fee. Other states use this with success. However, Colorado should be cautious to ensure there will be adequate funding

for Next Generation 9-1-1 network services and not to divert funds being received by local governments for PSAPs. ***FE*** understands local governments in Colorado use locally collected 9-1-1 fees for public safety communications projects and the State does not currently collect a state-level wireless fee so this approach may be viable.

2. Enter into a Public/Private Partnership. Colorado may wish to define its state network needs and offer an RFP to vendors to provide that level of service through a partnership like those identified for the states of Illinois and South Carolina.

3. Develop or reuse a fund. Examples are the reuse of the Mining Trust Fund, or the development of new fund based on fees on marijuana, court or ticket surcharges, or new taxes on rental cars or lodging. The amounts raised from such sources would likely be sufficient for OPEX but not for large CAPEX amounts.

4. Collect usage fees taxes on tower leasing and registration. Many states collect usage fees and they are used with mixed results, but they do have the ability to raise enough funds to cover OPEX. Ticket surcharges and tower leasing may be nice add-ons, but where they are used they fall short of covering the OPEX of their systems. Also, OIT/PSCN currently charges other State agencies $50.40 per month per radio, and some local agencies pay their local operators of local DTRS infrastructure for DTRS access but that practice and the amounts vary greatly among counties. As per State law, OIT is prohibited from billing local users; however, it was suggested during the interview process that all local agencies pay a statewide access fee to offset statewide costs and to promote a vested interest in the network. ***FE*** recommends the PSCS, with input from CCNC, determine if adjustments should be made in this area.

5. Colorado may wish to continue sending money to state agencies for radio use and those agencies transfer the money to OIT or after determining what the state DTRS network assets will be, the legislature may wish to send the OPEX directly to OIT.

While there are several ways to raise money, the State must determine their needs for the levels of improvement to DTRS and overall statewide interoperability. Once that is determined, ***FE*** recommends the PSCS and SWIC work with the Department of Revenue or Treasury to determine how much each funding strategy can raise. Also, the PSCS, in conjunction with OIT/PSCN and the SWIC, should determine whether the OPEX for an

initiative will be paid using the same or different funding source as the CAPEX used to deploy it.

Regardless of the funding stream for CAPEX and OPEX, ***FE*** recommends public safety communications system revenue be deposited in a dedicated account such as the Public Safety Communications Trust Fund that does not compete year-over-year with education, transportation and health and human services programs. Public safety or “protection to its citizens” is the first responsibility of government and the critical need of public safety communications warrants such a designation.

The PSCS must continue to be the body that works with and for all levels of government to develop public safety communications system strategies that meet the needs of the citizens and emergency responders. The Office of the SWIC and OIT/PSCN, or any future versions of these organizations, must continue to ensure these critical systems are reliable and constantly meeting the needs of responders. Local governments must continue to express their needs and continue to buy in to the efficiencies that are achieved by all levels of government working together as a force multiplier to manage these critical public safety communications issues. Only through this collaboration between, the Governor, legislature, PSCS, state agencies and local governments can funding of these systems be contained and coordinated to ensure seamless operation, reliability and effectiveness for those needing and those delivering lifesaving emergency services.

Appendix A - Participation in Interviews, Requests for Information, and Surveys

Please see attached document Appendix A - Participation in Interviews, Requests for Information, and Surveys.pdf

Appendix A - Participation in Interviews, Requests for Information, and Surveys

This appendix lists the agencies, departments, and other organizations that assisted the development of the *Needs Assessment* and *Business Plan* through interviews, surveys, and requests-for-information (RFI's). It lists those agencies that were requested to participate as well as those that did participate.

Interviews:

Agency / Organization Invited	Participated?
OIT/PSCN Management	Yes
OIT Financial Management	Yes
OIT Legislative Liaison	No
DHSEM Management	Yes
DHSEM Financial Management	Yes
DHSEM Legislative Liaison	No
PSCS Officers	Yes
CCNC Officers	Yes
Northwest All Hazards Region Communications Subcommittee	No
Northeast All Hazards Region Communications Subcommittee	Yes
North Central All Hazards Region Communications Subcommittee	No
South Central All Hazards Region Communications Subcommittee	Yes
West All Hazards Region Communications Subcommittee	Yes
Southwest All Hazards Region Communications Subcommittee	No
San Luis All Hazards Region Communications Subcommittee	Yes
South All Hazards Region Communications Subcommittee	Yes
Southeast All Hazards Region Communications Subcommittee	No

Additionally, all user agencies that were invited to participate in the Survey were offered the opportunity to participate in an interview to express any concerns not covered by the Survey. Representatives from the following user agencies participated in such interviews:

- Eagle County
- Pueblo County
- Boulder County
- Larimer County

Requests for Information:

Agency / Organization	Participated?
ADCOM 9-1-1 / Adams County	No

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Boulder County	Yes
Chaffee County	Yes
City of Arvada	Yes
City of Boulder	Yes
City of Denver	Yes
City of Lakewood	Yes
City of Lamar	No
City of Westminster	Yes
Clear Creek County	No
Gilpin County	No
Pitkin County	No
PPRCN	Yes
Teller County	Yes

Surveys:

Invitations to participate in the on-line survey were sent to at least one point of contact within each county in Colorado, each major city in Colorado, and each State-level department that uses the DTRS. The invitation asked the points of contact to forward it to any and all users, dispatchers, technical service representatives, and managers of agencies that use public safety radio systems. The following table is a list of those agencies, including sub-department that participated in the survey. If multiple representatives from an agency responded, they are listed individually. Also listed are indications of the type of participant that took part in the survey (user, dispatcher, technical service, and management) as well as whether they use DTRS or system other than DTRS on a daily basis. Immediately following this table is a list of those departments that were invited to the survey but that did not participate in it.

Needs Assessment and Business Plan Survey Participants				
Index	**Agency Name**	**Sub-Department**	**User Type**	**System**
1	Adams and Jefferson County Hazardous Response Authority	N/A	Management	DTRS
2	Adams County	Office of Emergency Management	Management	Other
3	Adams County School District #14	Transportation	Management	Other
4	Adcom911	N/A	Technical Support	Other

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Index	**Agency Name**	**Sub-Department**	**User Type**	**System**
5	Alamosa County	San Luis Valley Emergency Preparedness and Response	Field User	DTRS
6	Alamosa County Public Health Department	N/A	Management	DTRS
7	Alamosa Police Department	Patrol Division	Field User	DTRS
8	Alamosa Police Department	N/A	Field User	DTRS
9	Alamosa Police Department	Department Head	Management	DTRS
10	Alamosa Fire Department	None	Field User	Other
11	Arapahoe County Public Airport Authority	Centennial airport	Field User	DTRS
12	Arapahoe County Sheriff's Office	Communications	Dispatcher	DTRS
13	Arapahoe County Sheriff's Office	OEM	Field User	DTRS
14	Arapahoe County Sheriff's Office	Telecom Unit	Management	DTRS
15	Baca County Sheriff's Office	Patrol	Field User	DTRS
16	Baca County Sheriff's Office	N/A	Field User	DTRS
17	Baca Crestone Ambulance/Baca Grande Fire Dept.	N/A	Dispatcher	DTRS
18	Bennett Fire Protection District	Admin	Field User	DTRS
19	Bent County OEM	N/A	Field User	DTRS
20	Black Hawk Police Department	PD	Management	Other
21	Black Hawk Police Department	N/A	Management	Other
22	Blanca Police Department	Costilla Co.	Field User	DTRS
23	Boulder County Sheriff's Office	Support Services	Technical Support	Other
24	C & C of Denver	Technology Services	Management	Other
25	Castle Rock Fire and Rescue Department	Operations Division	Field User	DTRS
26	Chaffee County Fire	N/A	Field User	DTRS
27	Chaffee County Office of Emergency Management	Emergency Management	Field User	DTRS
28	Chaffee County Search and Rescue - North	N/A	Field User	Other
29	Chaffee County Sheriff's Office	911 Communications	Dispatcher	DTRS
30	Chaffee County Sheriff's Office	Communications	Dispatcher	DTRS

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31	Cherry Creek School District	Telecommunications	Technical Support	Other
32	City of Arvada	Information Technology	Technical Support	Other
33	City of Boulder	Radio Shop	Technical Support	Other
34	City of Cortez	Communications Center	Dispatcher	Other
35	City of Glendale	Police Department	Technical Support	DTRS
36	City of Pueblo	IT	Technical Support	DTRS
37	Clear Creek Sheriff's Office	Radio	Technical Support	Other
38	CO Division of Fire Prevention and Control	Northeast Region	Management	Other
39	Colorado Department of Public Safety	Division of Homeland Security and Emergency Management	Field User	DTRS
40	Colorado Department of Public Safety	Division of Homeland Security and Emergency Management	Field User	DTRS
41	Colorado Department Of Transportation	TSM&O	Field User	DTRS
42	Colorado Dept of Public Safety	Colorado State Patrol	Field User	DTRS
43	Colorado DPS	CSP	Dispatcher	DTRS
44	Colorado Parks and Wildlife	Area 16	Field User	DTRS
45	Colorado Parks and Wildlife	Law Enforcement	Field User	DTRS
46	Colorado State Patrol	Alamosa Regional Communications Center	Dispatcher	DTRS
47	Colorado State Patrol	Alamosa Office	Dispatcher	DTRS
48	Colorado State Patrol	Alamosa Regional Communication Center	Dispatcher	DTRS
49	Colorado State Patrol	N/A	Field User	DTRS
50	Colorado State Patrol	Evidence Section	Field User	DTRS
51	Colorado State Patrol	Troop 2A	Field User	DTRS
52	Colorado State Patrol	MCSAP	Field User	DTRS

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Index	**Agency Name**	**Sub-Department**	**User Type**	**System**
53	Colorado State Patrol	Communications	Management	DTRS
54	Colorado State Patrol	Communication Center Alamosa	Dispatcher	DTRS
55	Colorado State Patrol	Castle Rock	Dispatcher	DTRS
56	Colorado State Patrol	Troop 5/C Gunnison	Field User	DTRS
57	Crested Butte Marshal's Department	Patrol	Field User	Other
58	Cunningham Fire District	Operations	Field User	DTRS
59	Del Norte Fire Department	Del Norte Fire Department	Field User	DTRS
60	Denver ARES	Denver CERT	Management	Other
61	DHSEM	DHSEM	Management	DTRS
62	Digitcom Electronics Inc.	San Luis Valley Regional Manager	Technical Support	DTRS
63	Douglas County Sheriff's Office	Radio Shop	Technical Support	DTRS
64	Durango Police Department	Operations	Field User	DTRS
65	Durango Police Department	Chief's Office	Field User	DTRS
66	Elbert County Communications Authority	N/A	Management	DTRS
67	Elbert County Sheriffs Office	Victim Advocates	Field User	DTRS
68	Elbert County Sheriffs Office	Detentions	Field User	DTRS
69	Elk Creek Fire District	N/A	Field User	Other
70	Englewood Fire Department	N/A	Field User	DTRS
71	Evergreen Fire	Dispatch	Dispatcher	Other
72	Evergreen Fire Rescue	Evergreen Fire Rescue	Field User	Other
73	Evergreen Fire Rescue	Administration	Field User	Other
74	Fairplay Police Department	Patrol	Field User	Other
75	Fairplay Police Department	N/A	Field User	DTRS
76	Fairplay Police Department	patrol	Field User	DTRS
77	Fairplay Police Department	N/A	Field User	DTRS
78	Florissant Fire Protection District	Florissant FPD	Field User	Other
79	Foothills Fire Protection District	Fire Department	Management	DTRS
80	Fremont County	Emergency Management	Management	DTRS

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Index	**Agency Name**	**Sub-Department**	**User Type**	**System**
81	Garfield County Emergency Communications Authority	Technical Operations and DTR System Administration	Technical Support	DTRS
82	Grand County	Grand County ETSA and East Grand Fire District	Management	DTRS
83	Grand Junction Police Department	Grand Junction Regional Communication Center	Dispatcher	DTRS
84	Grand Junction Police Department	Special Units	Field User	DTRS
85	Grand Junction Police Department	Patrol	Field User	DTRS
86	Grand Junction Police Department	Grand Junction Regional Comm. Center	Management	DTRS
87	Grand Junction Regional Communications Center	911/City of Grand junction	Technical Support	DTRS
88	Great Sand Dunes National Park	VRP	Field User	DTRS
89	Green Mtn Falls/Chipita Park FPD	N/A	Field User	DTRS
90	Gunnison County	Coroner	Field User	Other
91	Hale Fire & Rescue Dept.	Hale Fire & Rescue Dept.	Field User	Other
92	Hinsdale County Sheriff's Office	Hinsdale County Sheriff's Office	Management	DTRS
93	Hotchkiss Fire District	N/A	Management	DTRS
94	Huerfano County Communications	Huerfano Emergency Dispatch	Management	DTRS
95	Kiowa Fire Protection District	N/A	Field User	DTRS
96	KRH Consulting	Engineering	Technical Support	Other
97	Lake County Office of Emergency Management	N/A	Management	DTRS
98	Lakewood	Radio Communications Division	Technical Support	Other
99	Lakewood PD	Radio	Technical Support	Other
100	Larimer County	Technical Communications	Technical Support	DTRS
101	Larkspur Fire Protection District	Operations	Field User	DTRS
102	Littleton Fire Rescue	911 Fire Communications	Management	DTRS
103	Littleton Police	Communications/Records	Dispatcher	DTRS

Appendix A - Participation in Interviews, Requests for Information, and Surveys

Needs Assessment and Business Plan Survey Participants				
Index	**Agency Name**	**Sub-Department**	**User Type**	**System**
104	Littleton Police Department	Support Services	Field User	DTRS
105	Logan County Sheriff's Office	Patrol	Field User	DTRS
106	Logan County Sheriff's Office	Patrol	Field User	DTRS
107	Longmont Department of Public Safety	911 Communications Center	Technical Support	DTRS
108	Loveland Fire Rescue Authority	Fire	Field User	DTRS
109	Loveland Fire Rescue Authority	Operations	Field User	DTRS
110	Mesa County Sheriff	Law Operations	Technical Support	DTRS
111	Mineral County Public Health	EMT	Dispatcher	DTRS
112	Moffat County	Emergency Management	Field User	DTRS
113	Montezuma County Public Health Department	Emergency Preparedness & Response	Management	DTRS
114	Montezuma County Sheriff's Office	Sheriff's Assistant	Management	DTRS
115	North Central All-Hazards Emergency Management Region	Homeland Security	Management	DTRS
116	North Metro Fire Rescue	Admin	Field User	Other
117	Northeast Colorado Health Department	Emergency Preparedness & Response Program	Field User	DTRS
118	OIT	PSCB	Technical Support	DTRS
119	Ouray County	Emergency Managment	Field User	Other
120	Park County OEM	N/A	Dispatcher	DTRS
121	Pritchett Fire	Pritchett Fire	Field User	DTRS
122	Prowers County OEM	Prowers County Rural Fire	Field User	DTRS
123	Prowers County Sheriff's Office	N/A	Field User	DTRS
124	Prowers County Sheriff's Office	Administration	Management	DTRS
125	Pueblo Cnty. Sheriff's Ofc.	Emergency Svc.'s; Special Operations	Field User	DTRS
126	Pueblo County Sheriffs Office	Emergency Services Bureau	Management	DTRS
127	Rapid Response Paramedic Services, LLC	Special Event	Field User	DTRS
128	Red Creek Volunteer Fire & Rescue	N/A	Field User	DTRS
129	Rio Grande County	Emergency Management	Field User	DTRS

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Needs Assessment and Business Plan Survey Participants				
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130	Rio Grande County Sheriff	Rio Grande Search & Rescue	Dispatcher	DTRS
131	Saguache Public Health	EPR	Field User	Other
132	Salida Fire Department	N/A	Field User	DTRS
133	Salida Police Department	Patrol	Field User	DTRS
134	Salida Police Department	Patrol	Field User	DTRS
135	Salida Police Department	N/A	Field User	DTRS
136	San Luis Valley Medical Reserve Corps	N/A	Field User	DTRS
137	Sedgwick County Communication Center	Dispatch	Dispatcher	DTRS
138	SLV Regional All Hazards Coordinator	SLV EOC Chairman	Field User	DTRS
139	SLV RETAC	RETAC	Field User	Other
140	South Metro Fire	MetCom	Dispatcher	DTRS
141	South Metro Fire Rescue Authority	N/A	Management	DTRS
142	Southwest Teller County EMS	EMS	Field User	Other
143	Spanish Peaks Regional Health Center	Emergency Preparedness and Response	Field User	DTRS
144	Springfield Fire Department	Fire	Field User	DTRS
145	Sterling CO Police Department	Patrol	Field User	DTRS
146	Sterling Emergency Communications Center	N/A	Dispatcher	DTRS
147	Sterling Emergency Communications Center	Dispatch	Management	DTRS
148	Sterling Police	N/A	Management	DTRS
149	Teller County	Public Works - Fleet, TCSO - tech support	Technical Support	Other
150	Thornton	9-1-1 Emergency Communications	Management	Other
151	Timberline Fire Protection District	N/A	Field User	Other
152	Town of Fairplay	Police Department	Field User	DTRS
153	Town of Frederick	Frederick Police	Field User	Other
154	Tri-County Health Department	Emergency Preparedness and Response	Field User	DTRS
155	UHFD	N/A	Field User	Other
156	Upper Huerfano Fire Protection District	Fire fighter, EMT	Field User	Other

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Needs Assessment and Business Plan Survey Participants				
Index	**Agency Name**	**Sub-Department**	**User Type**	**System**
157	Ute Pass EMS	Emergency Medical Services 911	Field User	Other
158	Valley-Wide Health Systems, Inc.	HR	Field User	DTRS
159	Vernon Volunteer Fire	N/A	Field User	DTRS
160	Victor Volunteer Fire Department	N/A	Field User	Other
161	Walsh Ambulance Service	Administration	Field User	Other
162	West Metro Fire Rescue	Communication Center	Management	Other
163	Westminster PD	Patrol	Field User	Other
164	Westminster Police	Technical Services	Technical Support	Other
165	Westminster Police Department	Police	Field User	Other
166	Westminster Police Department	Patrol	Field User	DTRS
167	Westminster Police/Fire Department	Communications	Dispatcher	Other
168	Wiggins Rural Fire Protection District	N/A	Field User	DTRS
169	Woodland Park Police Department	Emergency Management	Field User	Other

The following agencies were invited to participate in the survey but did not respond.

- Archuleta County
- City of Aurora
- City and County of Broomfield
- City of La Junta
- City of Montrose
- City of Parker
- City of Ft. Collins
- Cheyenne County
- Colorado Department of Corrections
- Colorado Department of Local Affairs
- Colorado Department of Natural Resources
- Conejos County
- Crowley County
- Custer County
- Denver International Airport
- Dolores County
- Gilpin County
- Jackson County

Appendix A - Participation in Interviews, Requests for Information, and Surveys

- Kit Carson County
- La Plata County
- Las Animas County
- Lincoln County
- Montrose County
- Morgan County
- Otero County
- Philips County
- Pitkin County
- Rio Blanco County
- Routt County
- San Miguel County
- Southern Ute Tribe
- Summit County
- University of Northern Colorado
- Ute Mountain Tribe
- Washington County
- Weld County