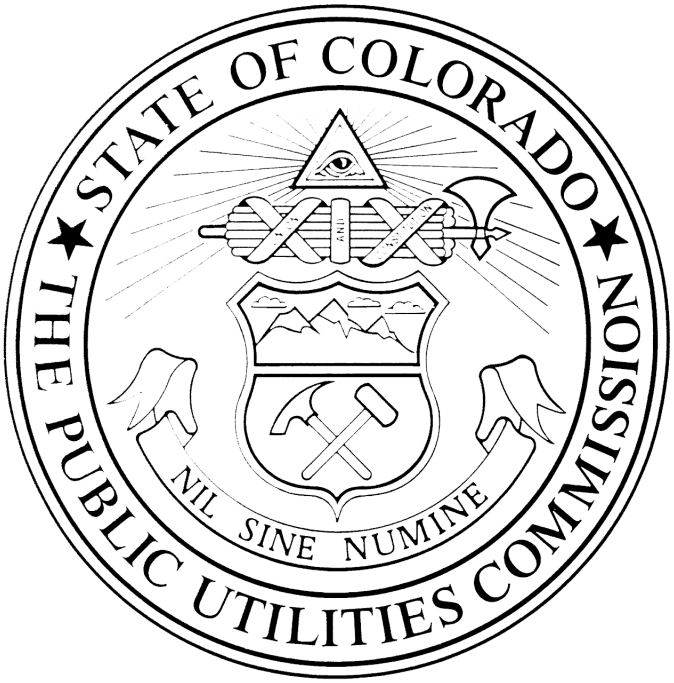
Report on the State of 9-1-1 Services in Colorado

2017-2018



Prepared by:

The Colorado Public Utilities Commission Staff

September 7, 2018

COLORADO
Department of Regulatory Agencies
Public Utilities Commission

Jeffrey P. Ackermann, Chairman
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September 7, 2018

The General Assembly
State Capitol Building
Denver, Colorado 80203

Dear Members of the Colorado General Assembly:

The purpose of the attached report is to fulfill the requirements of § 40-2-131, C.R.S., which requires the Commission to produce a report for the members of the General Assembly that provides an "overall understanding of the state of 911 service in Colorado…"[1]. The report goes on to specify seven topic areas that must be addressed in the report, at a minimum. The seven topic areas[2] are addressed specifically in each numbered section of this report.

Additionally, the statute requires that the report be developed in consultation with Public Safety Answering Points (PSAPs), 9-1-1 governing bodies, and statewide organizations that represent public safety. For a description of how this consultation was conducted, and how input from the stakeholders was incorporated into this report, see Appendix B.

9-1-1 technology is complex, as are the funding and governance issues that are involved in the provision of 9-1-1 service to the public. This complexity has resulted in jargon and acronyms that can make it difficult to follow for newcomers to the topic. The reader is encouraged to consult the glossary (Appendix A) as necessary.

The Commission is pleased to present this first edition of its State of 9-1-1 Report to the members of the General Assembly, and looks forward to presenting this material and providing the members with a deeper understanding of this critical service. 9-1-1 is the first service to be accessed by members of the public in an emergency, and it must be a strong first link in the public safety chain. The Commission looks forward to working with the members of the General Assembly in ensuring that Colorado has the most robust, effective, and efficient 9-1-1 system possible.

[1] § 40-2-131(1), C.R.S.
[2] § 40-2-131(1)(a)-(g), C.R.S.

Respectfully submitted,

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Executive Summary

The state of 9-1-1 service in Colorado is in transition. While communications capabilities available to the public have continued to advance, which increases consumer expectations of what 9-1-1 service should be capable of, adding new capabilities into the existing, legacy 9-1-1 system currently in place in Colorado is becoming more difficult. Colorado is in the first stages of a transition to an Internet Protocol (IP) based core 9-1-1 network, known as Next Generation 9-1-1 (NG9-1-1), which is capable of supporting additional services as desired by local 9-1-1 officials and the public.

A tariff proceeding is currently underway at the Commission for the provision of an Emergency Services IP Network (ESInet) for the delivery of 9-1-1 calls to Public Safety Answering Points (PSAPs)[1]. If approved, the deployment of an ESInet would represent the first step toward implementation of NG9-1-1. A great deal of additional planning and action needs to take place to continue the transition to NG9-1-1 even after the implementation of an ESInet, but it is a necessary first step.

In the meantime, the existing legacy 9-1-1 network must be improved and action must be taken to ensure that residents and visitors to the state have the most reliable service possible. This year, the Commission is initiating a proceeding to review a 9-1-1 Diversity Plan to be filed by the incumbent basic emergency service provider (BESP). This proceeding will be a collaborative process for identifying solutions, along with costs and timetables, for improving the resiliency and reliability of the existing 9-1-1 network.

In Section 4, this report identifies a number of specific vulnerabilities to be addressed. Potential solutions proposed by 9-1-1 stakeholders in the development of this report are also provided. Challenges identified in section 4 follow below. The order of the list should not be taken as an indication of priority.

1. **The Basic Emergency Service Network Lacks Reliability and Resiliency in Certain Areas.**
2. **Lack of Funding Accountability for Local 9-1-1 Surcharge Fees.**
3. **Actual or Perceived Lack of Funding Transparency for Prepaid 9-1-1 Surcharge Fees.**
4. **The 9-1-1 Surcharge Rate Threshold for Commission Approval Has Not Been Adjusted for Inflation in 28 Years.**
5. **User Expectations Are Outpacing System Capabilities and Funding Mechanisms.**

[1] See Proceeding 17AL-0487T. Note: A proposed settlement was filed in this proceeding on Aug 31, 2018.

6. **No Minimum Training Standards for Public Safety Telecommunicators.**
7. **Colorado's MLTS Statute is Out of Alignment with Federal Requirements.**

Unless otherwise stated in Section 4, the Commission neither endorses nor opposes the potential solutions offered by the 9-1-1 stakeholders that are outlined, but the Commission commends the stakeholders for their efforts and agrees that the challenges listed above must be addressed.

1. Commission Activity Regarding 9-1-1 Service

Commission Activity During the 2017-2018 Fiscal Year

During the 2017-2018 Fiscal Year, the Commission undertook the following activity regarding 9-1-1 service:

- Concluded four proceedings for applications or 9-1-1 surcharge applications filed by local 9-1-1 governing bodies pursuant to § 29-11-102(2)(b), C.R.S. Three of these applications were approved without change, and in one a settlement was reached for an amount lower than what was requested.
- Adopted new 9-1-1 rules (4 *Code of Colorado Regulations* 723-1-2130 through 2159).
- Initiated a proceeding in response to the filing of a tariff for Basic Emergency Service by Qwest Corporation d/b/a/ CenturyLink, QC[2].
- Initiated a proceeding in response to the filing of an application for certification as a Basic Emergency Service Provider (BESP) by Vesta Solutions, Inc. f/k/a Airbus DS Communications, Inc.[3] This proceeding was recently dismissed without prejudice[4].
- Concluded a formal complaint filed by Larimer Emergency Telephone Authority against Qwest Corporation d/b/a CenturyLink[5]. This proceeding was dismissed without prejudice following an unopposed joint motion requested its dismissal.
- Facilitated six meetings of the Commission's 9-1-1 Advisory Task Force, created pursuant to 4 *CCR* 723-1-2145.
- Filed an annual report to the Federal Communications Commission pursuant to the NET 911 Improvement Act of 2008[6].
- Participated in an annual data collection effort conducted by the National 9-1-1 Program[7].

In addition to the activity of the Commission listed above, Commission Staff was also very engaged in statewide and national activities regarding 9-1-1 service, including:

- participating on the board of the joint state chapter of the National Emergency

[2] See Proceeding 17AL-0487T. Note: A proposed settlement was filed in this proceeding on Aug 31, 2018.
[3] See Proceeding 17A-0695T.
[4] See Decision R18-0535.
[5] See Proceeding 16F-0955T.
[6] See https://www.fcc.gov/files/9thannual911feereportpdf
[7] See https://resourcecenter.911.gov/code/9-1-1ProfileDatabase.aspx

Number Association (NENA) and the Association of Public Safety Communications Officials, Intl (APCO);
- taking a leadership position on telecom and 9-1-1 related issues with the National Association of Regulatory Utilities Commissioners (NARUC);
- participating on the board of the Colorado 9-1-1 Resource Center, Inc.;
- facilitating meetings of the Colorado Training Standards Committee;
- representing Colorado in meetings of the National Association of State 9-1-1 Administrators (NASNA); and
- conducting numerous site visits and participating in local meetings throughout the state.

Concerning the new 9-1-1 rules adopted in 2017 and effective March 2, 2018, the primary effect of these rule changes were to:
- update and remove outdated language;
- modify definitions to be more technology neutral;
- consolidate the rules regarding applications for certification as a BESP into one section;
- allow for greater flexibility of billing units by the BESP;
- Implement new contingency planning requirements for the BESP;
- establish a collaborative process for the development of a statewide basic emergency service diversity plan;
- removed outdated technical standards and create a flexible process for those to be regularly updated without the need of additional rulemakings; and
- update the role of the Commission's 9-1-1 Advisory Task Force.

Commission Activity Planned for the 2018-2019 Fiscal Year

A proceeding to consider a tariff to provide an Emergency Services IP-Network (ESInet) as Basic Emergency Service by CenturyLink is expected to be completed before the end of 2018 or shortly thereafter[8]. A proposed settlement was filed by the parties on August 31, 2018, but as this is an active, litigated proceeding, this report cannot speculate on the conclusion of the proceeding. However, the outcome of this proceeding will likely determine the direction of the Commission's activities regarding the advancement of 9-1-1 service and implementation of Next Generation 9-1-1 (NG9-1-1) service.

Pursuant to 4 *CCR* 723-2-2143(d), each BESP and ALI provider must file a 9-1-1 diversity plan with the Commission. Pursuant to Commission Decision C18-0719, this plan is due November 2, 2018. Local 9-1-1 governing bodies and Public Safety Answering Points (PSAPs) will have the opportunity to intervene in the proceeding and negotiate regarding the details of that plan before it is approved by the Commission. It is anticipated that this proceeding will be concluded in the first half of 2019.

On August 8, 2018, the final rules for a federal grant program administered jointly by the National Telecommunications and Information Administration and National Highway Traffic

[8] See Proceeding 17AL-0487T.

Safety Administration were published[9]. The purpose of the funding is to assist states with the implementation of NG9-1-1 services[10]. Commission staff is anticipating providing a coordination role with local 9-1-1 governing bodies in the development of the grant application and administration of the grant funds.

Commission staff will also be completing annual reporting requests from the Federal Communications Commission and the National 9-1-1 Program. Additionally, Commission staff is aware of at least three local 9-1-1 governing bodies that are currently preparing applications for 9-1-1 surcharge increases. Commission staff will also continue to administer the Commission's 9-1-1 Advisory Task Force and facilitate its meetings and agendas, pursuant to 4 *CCR* 723-2-2145(a). Staff will also continue to participate in the activities of the Colorado Chapter of NENA/APCO, as well as the national organizations of NENA, APCO, NASNA, and NARUC.

2. The Current 9-1-1 Service Environment

Structure

9-1-1 service in Colorado exists in three domains, represented in Figure 2.1, below.

1. **The Originating Service Domain**: When a caller dials 9-1-1, the call is initially handled by the caller's telephone service provider, which delivers the call to the Basic Emergency Service Provider (BESP). The call may pass through one or more intermediate providers before reaching the BESP.
2. **The Basic Emergency Service Domain:** 9-1-1 calls are aggregated by the BESP from all of the Originating Service Providers (OSPs) and their intermediates and routed to a demarcation point for the appropriate Public Safety Answering Point (PSAP). Being the portion of the call flow handled by the BESP, this is the portion of the 9-1-1 call flow described in the Commission's definition of Basic Emergency Service.
3. **The Local Domain:** Once received from the BESP, 9-1-1 calls are then the responsibility of the local agencies, including the PSAP.

[9] https://www.federalregister.gov/documents/2018/08/03/2018-16567/911-grant-program?utm_campaign=subscription%20mailing%20list&utm_source=federalregister.gov&utm_medium=email

[10] See https://www.911.gov/project_911grantprogram.html

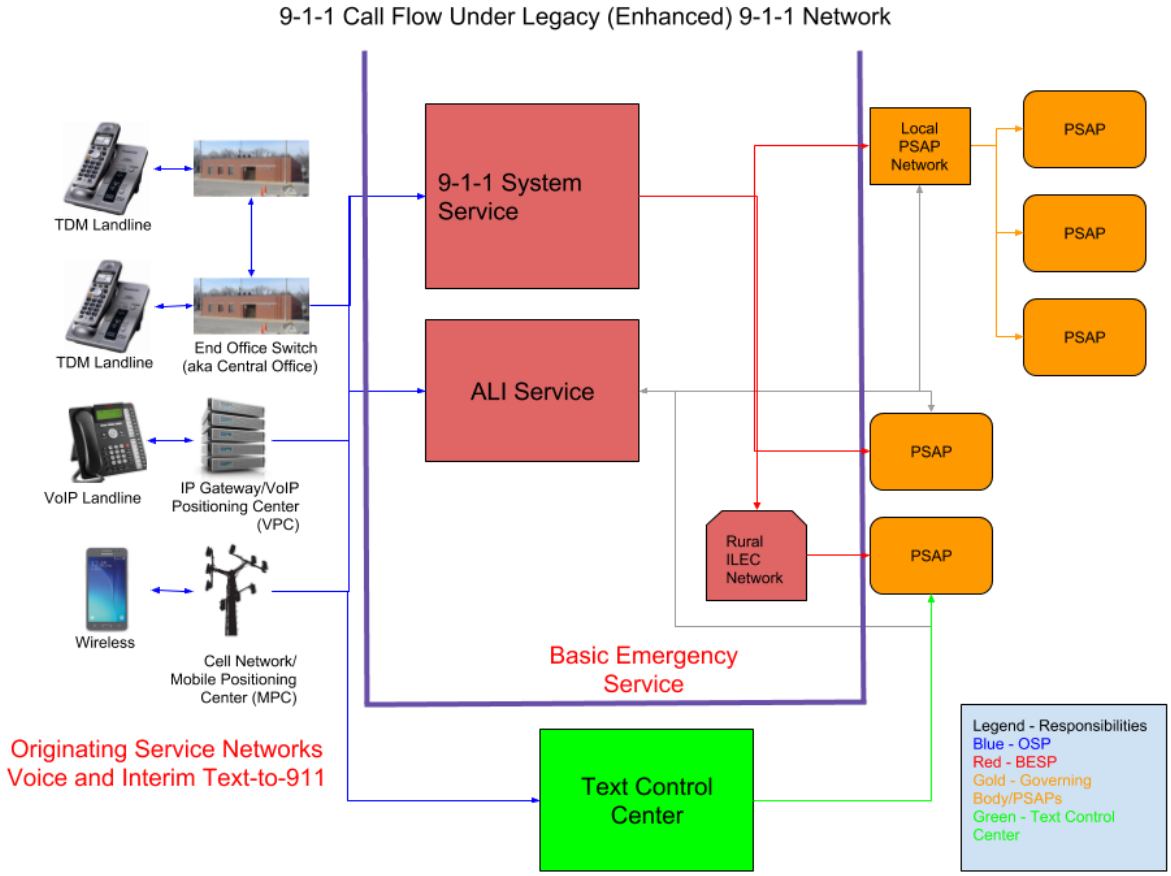

Figure 2.1: Legacy 911 Network Call Flow

OSPs include any vector by which a 9-1-1 call may be made, currently encompassing wireline, wireless, and Voice-over-Internet-Protocol (VoIP) services.

Basic Emergency Service (BES) includes the aggregation, routing, and transport of 9-1-1 calls to a PSAP[11]. BES also includes the delivery of location information which is associated with a 9-1-1 call[12]. CenturyLink is currently only one BESP in Colorado delivering 9-1-1 calls to PSAPs.

There are currently 87 primary PSAPs in Colorado (PSAPs that receive 9-1-1 calls directly from the BESP), and 11 secondary PSAPs (PSAPs that only receive 9-1-1 calls transferred from a primary PSAP). The Local Domain also includes 58 9-1-1 governing bodies, or "governing bodies" as defined in § 29-11-101(4), C.R.S., which collect 9-1-1 surcharge remittances from telecommunications service providers and fund the local emergency telephone service, and in

[11] § 29-11-101(1.2), C.R.S.
[12] 4 *CCR* 723-2-2131(j).

some cases provide technical support and local networks for PSAPs.

Technology

9-1-1 calls are delivered by originating service providers to the Basic Emergency Service Provider (BESP) at one of several points of interconnection, often co-located with one of three sets of redundant selective routers. The selective router compares the phone number from which the 9-1-1 call is originating against a selective router database (SRDB) and routes the call to the appropriate PSAP, accordingly.

Once received by the PSAP, the PSAP's 9-1-1 phone equipment (also called "customer premise equipment," or CPE) will use the phone number from which the 9-1-1 call originates to query the Automatic Location Identification (ALI) database. This database will then return basic information about the call, such as the subscriber name and address, to the PSAP. For wireless and VoIP calls, the OSP or its agent populates the ALI database with the caller's location, if known.

Colorado's 9-1-1 network is considered "legacy" technology, as opposed to "Next Generation 9-1-1" or "transitional."

Because legacy 9-1-1 networks are unable to deliver data types other than voice to the PSAP, text to 9-1-1 is delivered separately from the BES network. Text to 9-1-1 calls are routed through a third party called a Text Control Center (TCC) which then delivers the call directly to the PSAP answering the call.

9-1-1 calls may be placed from one of four general categories of services, currently.

- Landline (or wireline). These are 9-1-1 calls from traditional wired home or business phones.
- Cellular (or wireless). These are 9-1-1 calls from mobile phones, including smart phones.
- VoIP. These are 9-1-1 calls from phones that use the Internet for delivery of the call. These may be either static (installed in a specific location) or nomadic (meant to be portable and to move with the caller).
- Multi-Line Telephone Systems (MLTS, also called Enterprise Communications Systems, or ECS). These are 9-1-1 calls from enterprise telephone systems in schools, office buildings, hospitals, factories, or anywhere else that makes use of multiple extensions branching from a single phone system.

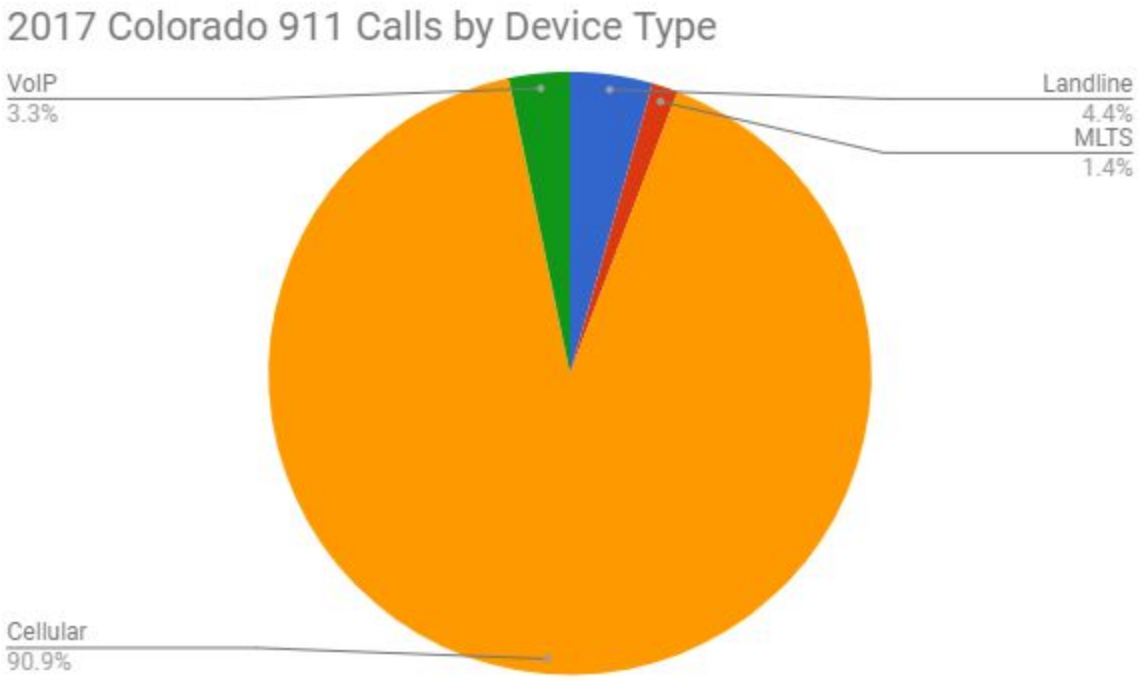

Figure 2.2: 2017 Statewide ALI Bids by Class of Service

All 9-1-1 service in Colorado is considered "Enhanced" 9-1-1 (or E9-1-1), which is distinguished by the use of selective routers for the routing of the 9-1-1 call to the appropriate PSAP. Perhaps more notably, E9-1-1 allows for the association of location information with the 9-1-1 call.

In order for wireless 9-1-1 calls to be associated with location information, the PSAP must be capable of receiving such location information. Every primary PSAP in Colorado is capable of receiving location information from wireless 9-1-1 calls with the exception of Phillips County. As a condition for an order issued by the Commission in 2015 granting a 9-1-1 surcharge application made by Phillips County 911 Emergency Telephone Service Authority Board, the Authority Board must file quarterly updates with the Commission regarding their progress toward implementation of wireless enhanced 9-1-1 service. As of their most recent filing, the Authority Board stated that they have entered into a contract with CenturyLink to make the necessary changes[13].

General Operations

Operations within Colorado's 98 PSAPs are locally controlled. PSAPs are often operated as a part of a local law enforcement agency but are sometimes operated as independent agencies

[13] See Order C16-0046, Proceeding 15A-0941T.

of a city or county government, or as part of a fire agency. While the term "PSAP" refers only to facilities that answer 9-1-1 calls from the public, every PSAP in Colorado is also a dispatch center, dispatching calls for service to first responders for one or more law enforcement agency, fire protection service, or emergency medical service. PSAPs also field a large number of non-emergency calls from the public, usually exceeding the number of 9-1-1 calls they receive.

Accessibility

Access to 9-1-1 services for individuals with accessibility needs is a consideration that must be included in any evaluation of the state's 9-1-1 services, and in any planning regarding the future of 9-1-1 services in Colorado. There are a number of ways that persons with accessibility requirements can access the 9-1-1 system in Colorado, with additional avenues for accessibility being implemented now, along with future accessibility options being anticipated.

TTY, Relay Services, and Other Accessibility Devices

TTY (an abbreviation that originally stood for "teletypewriter") is a method that is still used by some individuals who are deaf, hard of hearing, deaf-blind or have speech impairments. These devices allow the user to connect a keyboard through a telephone and type to and receive typed responses from the individual on the other end of the call. Once seen as a primary method for individuals with communications-related disabilities to contact 9-1-1, the U.S. Department of Justice still requires all PSAPs nationwide to be able to accept and respond to 9-1-1 calls made with TTY devices.

However, due to the widespread availability of text messaging service from mobile devices, and due to other technical limitations of TTY devices, fewer people continue to use TTY devices over time.

Relay services include Telecommunication Relay Services (TRS), Video Relay Services (VRS), and IP Relay Services. While still used by some individuals with communication disabilities, TRS has seen a decline in usage over recent years. Because relay services involve the use of a 3rd party to relay the call to the PSAP, location information for the caller is sometimes not available.

There is a long list of other communications methods that a caller with an accessibility need might use, depending on the nature of their disability. These include captioned telephone services, IP instant messaging, email, voice carry over (VCO) phones, and more. All of these methods have various limitations, most notably that they require an Internet connection or specialized equipment that may not be convenient for mobile use. Some of these methods, such as IP instant messaging and email, are rarely, if ever, used to request emergency assistance.

Text to 9-1-1

Text to 9-1-1 service allows individuals to send a text message to 9-1-1 by simply entering "911" in the "to" field of their cellular phone's text messaging application. Although text to 9-1-1 service has applications for hearing individuals as well (such as being able to contact 9-1-1 silently when making a verbal 9-1-1 call might put them in danger), text to 9-1-1 is an accessibility option for callers who are deaf, hard of hearing, deaf-blind, or have a speech disability.

There is no federal or state mandate for PSAPs to provide text to 9-1-1 service to their residents. Despite this, text to 9-1-1 service was first made available in Pitkin County in 2013, and today 73.2% of Colorado's primary PSAPs have implemented text to 9-1-1 service. The PSAPs providing text to 9-1-1 service cover 50.9% of the state by land area and 92.5% of the state by population.

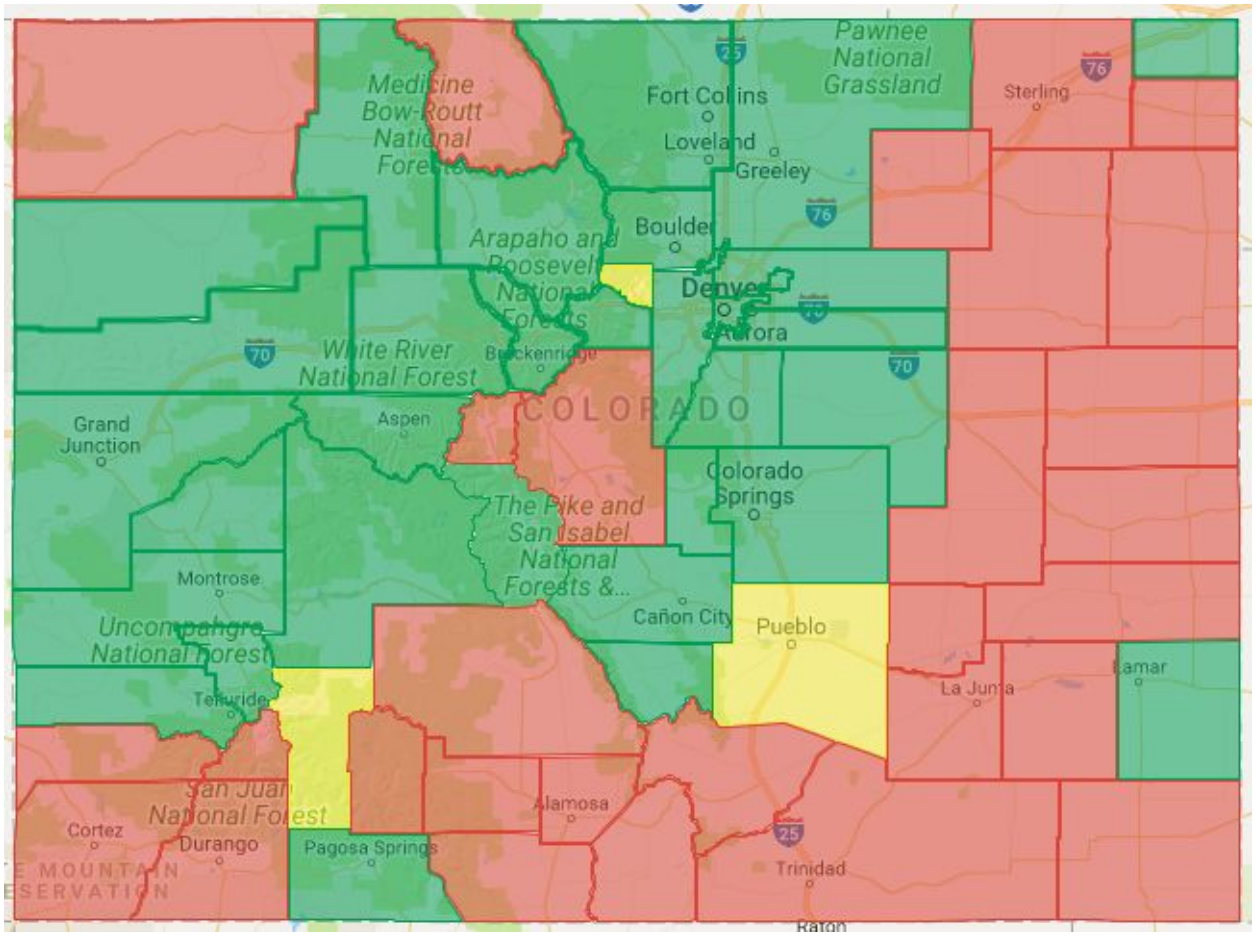

Figure 2.3: Text to 9-1-1 Availability.

RED = Counties with no ability to receive text messages sent to 9-1-1.

YELLOW = Counties with text-to-911 capability available in some but not all parts of the county.

GREEN = Counties with the county-wide text-to-911 capability.

Real Time Text (RTT)

RTT is an emerging service that is now available from the major wireless carriers with smaller carriers making the service available in the near future. It allows a user on a mobile device to type a message to another party and to see the other party's response appear character-by-character as they type it, with the text of both parties separated on the screen.

In this regard, RTT operates much like TTY, and was developed as an alternative to continuing efforts to make TTY calling possible through mobile devices. RTT is currently available through major wireless carriers, and the Commission's 9-1-1 Advisory Task Force is monitoring to determine the effect of RTT on PSAPs in the state. To our knowledge, no Colorado PSAPs have received RTT calls other test calls.

Other Considerations Regarding Accessibility

It is also essential that as NG9-1-1 is implemented, as well as any applications or services that are enabled by NG9-1-1, that the accessibility community is engaged by the 9-1-1 community to ensure that their needs and concerns are addressed and accommodated to the greatest extent possible.

9-1-1 Frequently Asked Questions

Certain questions are often asked by members of the public about how 9-1-1 service works, or about perceived problems concerning 9-1-1 service. This section attempts to answer some of those questions, which may help legislators better understand issues of concern to their constituents.

"If my pizza delivery app can find me, why can't 9-1-1?"

Location services for wireless 9-1-1 calls were developed at a time that the handsets themselves had no location awareness. As such, they relied first on network triangulation, followed later by GPS location. Today, smartphones have many different sensors that can be used in combination to determine a much more precise location for the caller, but because the location technology wasn't designed to take advantage of handset-based location information, there hasn't been an easy way to deliver this data to the PSAP.

Currently, wireless carriers, handset manufacturers, and even smartphone operating system developers are working to fix this. Most recently, Apple announced a partnership with a firm

called RapidSOS to provide handset-based location to PSAPs for every 9-1-1 call from an iPhone, following changes to Apple's iOS operating system. This service is being offered without any direct cost to the PSAP, although some equipment and software vendors may charge the PSAP for integrating the service.

"Can I call 9-1-1 on a phone with no active service plan or prepaid minutes?"

The short answer is "yes." Any cell phone with a cellular signal is able to dial 9-1-1, and carriers are required to deliver the 9-1-1 call to the appropriate 9-1-1 system service provider (or BESP, in Colorado). 9-1-1 calls from phones without a service contract, however, have limitations.

Cell phones that don't have a service contract or prepaid cell phones with no minutes can call 9-1-1, but the PSAP will not receive a callback number with the call. This makes it very difficult for the PSAP to follow up if the caller becomes disconnected. 9-1-1 calls from such phones are also frequently not associated with location information.

"Why does the call taker ask so many questions?"

9-1-1 call takers (or telecommunicators) have an important responsibility to gather all of the information necessary for first responders to respond appropriately and quickly to the emergency being reported. This also includes keeping the responders safe, which requires having a comprehensive understanding of the situation at the location of the emergency.

Many PSAPs in Colorado also provide pre-arrival medical instructions and emergency medical dispatch (EMD) services. These are medical protocol systems, developed by medical experts and overseen by local medical professionals. The purpose of these services is to help stabilize a patient's condition until emergency medical services arrive, but providing pre-arrival instructions also requires a lot of communication between the call taker and the caller. The best thing the caller can do is answer the telecommunicator's questions and follow their instructions to the best of their abilities.

Typically, medical services are dispatched early in the call and EMD is performed while responders are en route, so there is little to no delay to the response created by performing EMD.

"Since my location is sent to 9-1-1 when I call, why do I have to tell the call taker my address?"

9-1-1 location technology isn't 100% accurate. It is extremely useful when there is no other way to obtain the location of the emergency, such as if the caller can't speak or they don't know where they are. Whenever possible, however, it is best practice for the telecommunicator to ask the caller for the location of the emergency. In most cases, this will be the very first thing a telecommunicator asks of a caller to 9-1-1.

"What happens if I text to 9-1-1 in an area that doesn't provide that service?"

If you attempt to send a text message to 9-1-1 in an area that does not accept text to 9-1-1 messages, you will receive a "bounceback" message, informing you that text to 9-1-1 service isn't available and advising you to make a phone call to 9-1-1 instead. This may also occur if you're roaming on another service provider's network.

"Can someone who does not speak English call 9-1-1?"

Most 9-1-1 call centers in Colorado use 3rd party interpreter services. If an interpreter service is available at your 9-1-1 call center, as soon as the call taker determines that you are a non-English speaker, they can bring in an interpreter for a 3-way call.

"What is the difference between Next Generation 9-1-1 and FirstNet?"

Next Generation 9-1-1 (NG9-1-1) is an Internet Protocol (IP) based delivery of 9-1-1 calls and other information to a PSAP. Upgrading the existing (or, "legacy") 9-1-1 system to NG9-1-1 has many benefits, including the potential to make the system more resilient and flexible, allowing for dynamically rerouting 9-1-1 calls when necessary, and potentially opening up the network to accept other types of data, such as medical data, automatic crash notification data, pictures, etc.

FirstNet, the commonly used name for the National Public Safety Broadband Network (NPSBN), is a wireless broadband network for public safety that will allow units in the field to share data and media such as pictures, building schematics, and more.

The best way to describe NG9-1-1 and public safety broadband together is that both NG9-1-1 and public safety broadband are needed to ensure the ability to transmit and deliver data and multimedia all the way from the citizen to the responder.

3. 9-1-1 Network Reliability and Resiliency

Current Status

The Commission only receives outage notifications from the Basic Emergency Service Provider (BESP) and from Incumbent Local Exchange Carriers (LECs) when they are providing the final segment of transport of 9-1-1 calls to the demarcation point with the Public Safety Answering Point (PSAP). The Commission has no visibility into the reliability and resiliency of originating service provider (OSP) networks prior to 9-1-1 calls being aggregated by the OSPs, or into local networks or the reliability of equipment within the PSAP after 9-1-1 calls pass the demarcation point into the PSAP's responsibility.

However, to the extent that the Commission has data concerning the reliability and resiliency

of the Basic Emergency Service (BES) portion of the call flow, we provide it here. Here is a summary of what can be inferred from the data:

- BES outages have been declining each year since their peak in 2015. At our current rate of outages for 2018, it appears this trend may be continuing.
- The summer months see much higher rates of outages than winter months, primarily due to accidental fiber cuts caused by construction.

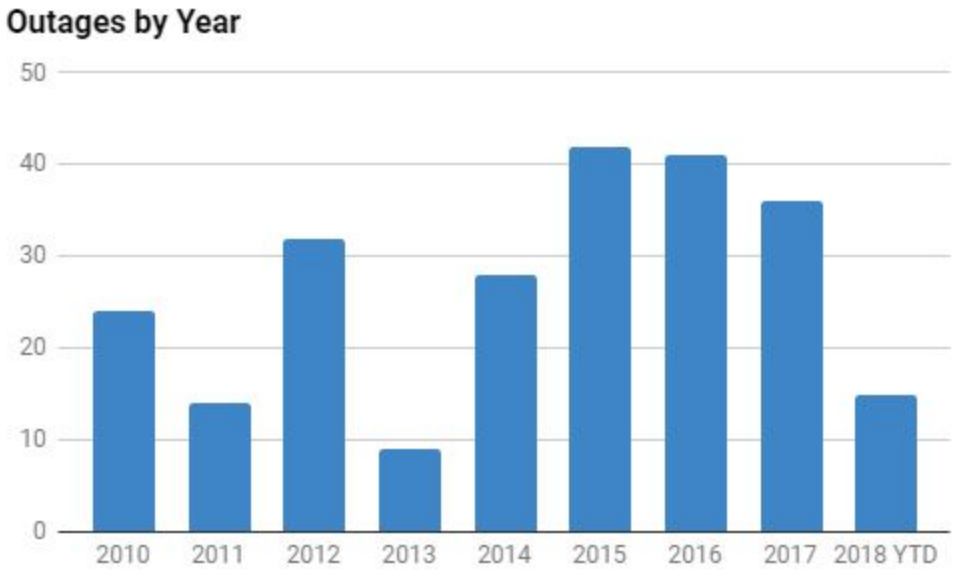

Figure 3.1: Outages by Year. 2018 YTD shows outages as of June 30, 2018.

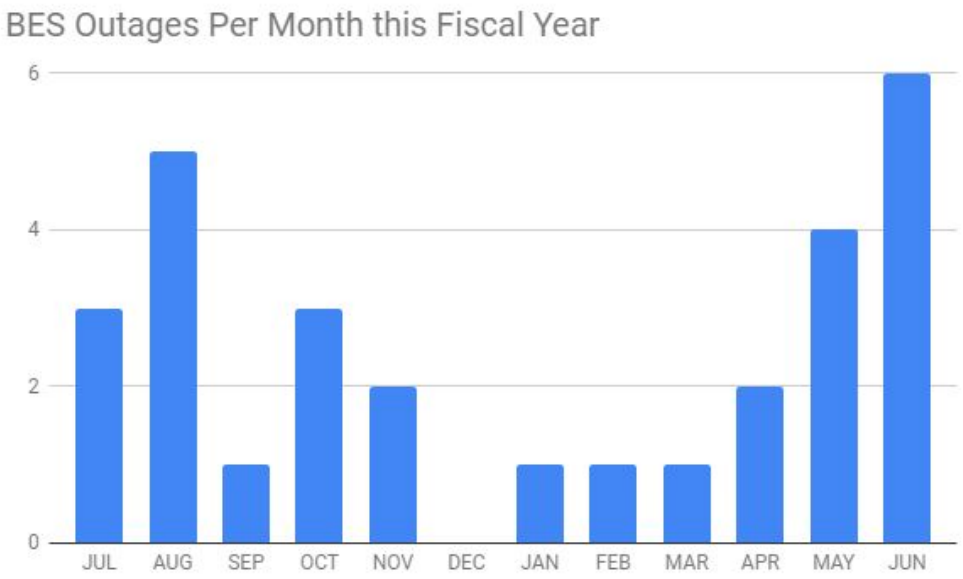

Figure 3.2: Outages per Month, July 2017-June 2018.

In 2013, the Commission initiated an inquiry into 9-1-1 network performance following recent floods and fires[14]. As part of that proceeding, CenturyLink filed with the Commission a list of locations that lacked redundant routes with geographic or physical separation of the routes in the BES network. Areas without physical network diversity are at particular risk of being the cause of an outage since a single fiber cut or equipment failure in that part of the call delivery path will result in an outage.

This proceeding resulted in an order requiring semi-annual updates from CenturyLink regarding various aspects of their progress toward developing physical diversity in the portions of the BES network where it is lacking, but potential points of failure persist[15].

Commission Process for Improvement

Beginning in 2018, with the passage of the Commission's new 9-1-1 rules, the BESP must file an annual contingency plan[16] that consists of the following:

- Identification and location of all primary and backup facilities, equipment and databases or any and all other components related to basic emergency service
- An identification and description of all demarcation points with BESPs, ALI providers, and PSAPs

[14] See Proceeding 13I-1147T.
[15] See Decision R14-0303.
[16] See 4 CCR 723-2-2143(d)

- All contingency processes and information from BESPs, OSPs, intermediary aggregation service providers (IASPs), PSAPs, and governing bodies necessary for public safety operations until BES is restored
- Contact information for designated representatives for each PSAP and/or governing body
- Any other details deemed relevant as determined by the relevant parties or the Commission

The Commission's new 911 rules also require the BESP to file a plan for "deploying, monitoring, backup power, and physically and geographically diverse redundancy for the provider's portion of the 9-1-1 system and network where such measures of reliability are lacking."[17]

This plan will be filed in a Commission proceeding, and will include the following:

- Maps depicting the provider's BES architecture
- A list and description, including geographic location, of every point within the provider's portion of the 9-1-1 system and network where monitoring, backup power, and/or physically and geographically diverse redundancy are not present
- A description of which of these items the provider proposed to improve, how it proposes to improve them, and a proposed timetable for deploying these improvements
- A description of which items the provider proposes not to improve, and an explanation as to why it proposes not to improve them
- The costs, averaged statewide, associated with all improvements, whether or not the provider proposes to undertake them

The diversity planning will be an official proceeding before the Commission and as such, interested parties, including the 9-1-1 governing bodies and PSAPs, local governments, and consumer advocate groups, will be allowed to intervene and negotiate with CenturyLink concerning the details of the diversity plan. Following the approval of a finalized version of the diversity plan by the Commission, a new tariff or modification to an existing tariff in order to provide a mechanism for paying for the improvements through statewide-averaged, cost-based pricing[18] will need to be approved through another commission process.

4. Gaps, Vulnerabilities, and Needs

What follows is a list of gaps, vulnerabilities, and needs identified by the 9-1-1 stakeholders

[17] 4 CCR 723-2-2143(a)(II). Per Commission order C18-0719, this plan is due November 2, 2018.
[18] See 4 CCR 723-2-2143(a)(III).

involved in the development of this document. Following this identification of challenges, a list of potential solutions proposed by the stakeholders is also provided.

Challenges

1. **The Basic Emergency Service Network Lacks Reliability and Resiliency in Certain Areas**: There continue to be areas within the Basic Emergency Service (BES) network that lack physical network diversity, leaving the system vulnerable to outages due to single points of failure. Improving network resiliency in these areas may incur costs that are unaffordable to some of the 9-1-1 governing bodies.

2. **Lack of Funding Accountability for Local 9-1-1 Surcharge Fees:** Statute provides local 9-1-1 governing bodies the authority to audit a telecommunications service provider's books and records regarding the collection and remittance of 9-1-1 surcharges at the governing body's own expense[19], but most of Colorado's 9-1-1 governing bodies lack the resources to undertake such a practice.

3. **Actual or Perceived Lack of Funding Transparency for Prepaid 9-1-1 Surcharge Fees:** Prepaid 9-1-1 surcharges are collected at the point of sale by retailers selling prepaid telephone service in the state, and remitted to the Colorado Department of Revenue (DOR). DOR uses a formula provided by the Commission to then distribute prepaid 9-1-1 surcharge funds to the 58 separate 9-1-1 governing bodies in the state[20]. DOR does not share with local 9-1-1 governing bodies or the Commission information regarding which retailers are remitting prepaid 9-1-1 surcharges. Local 9-1-1 governing bodies have expressed a lack of confidence that all retailers that are required to remit prepaid 9-1-1 surcharge fees are doing so.

4. **The 9-1-1 Surcharge Rate Threshold for Commission Approval Has Not Been Adjusted for Inflation in 28 Years**: There is a 70¢ threshold for requiring additional approval from the Commission for 9-1-1 surcharge rates set by local 9-1-1 governing bodies. This threshold has not been adjusted since it was established in 1990, resulting in a requirement for Commission approval for surcharge rates that are relatively low. Currently, only three 9-1-1 governing bodies (out of 58) have 9-1-1 surcharges under 70¢.

5. **User Expectations Are Outpacing System Capabilities and Funding Mechanisms:** In order to accommodate functionality that exists within commercial communications networks, the existing, or "legacy" 9-1-1 system must be upgraded to a Next Generation 9-1-1 (NG9-1-1) system, which uses an Internet Protocol-based transport network coupled with standards-based core data components to result in a 9-1-1 system that is potentially much more flexible, resilient, and feature-rich.

   There is an active proceeding before the Commission regarding the deployment of an Emergency Services IP-Network (ESInet), which is the foundational component of

[19] § 29-11-103(3)(b), C.R.S.
[20] § 29-11-102.5, C.R.S.

NG9-1-1. As this is an active proceeding, it is not yet possible to state definitively what the additional costs will be for 9-1-1 governing bodies to participate. However, it is anticipated that the costs, either through this offering or another, will be significantly higher than the costs for legacy 9-1-1 service. Without an additional funding source, rural Public Safety Answering Points (PSAPs) may need to significantly increase their local 9-1-1 surcharge rates to participate.

Other activities must also be undertaken for full implementation of NG9-1-1, such as the development of a comprehensive geographic information system (GIS) dataset containing, at a minimum, road centerlines, site/structure address points, PSAP boundaries, emergency service boundaries, and provisioning boundaries. A number of additional data layers are either recommended or highly recommended[21]. As all 9-1-1 funding in Colorado is local, there is no identified funding source for state-level or statewide projects of this sort.

6. **No Minimum Training Standards for Public Safety Telecommunicators:** Colorado is in the minority of states that do not have minimum training standards for public safety telecommunicators. Efforts to institute a voluntary statewide training program for telecommunicator training initiated by the Colorado 9-1-1 Resource Center and continued by the Colorado Training Standards Committee have received only modest participation due to resource and staffing constraints at the PSAPs that could most benefit from the program.

7. **Colorado's MLTS Statute is Out of Alignment with Federal Requirements:** With the passage of Kari's Law[22], Colorado's own statute regarding the 9-1-1 capabilities of multi-line telephone systems (MLTS)[23] is no longer in alignment with federal requirements. Kari's Law requires all MLTS made, sold, or installed after Feb 16, 2020 to allow direct dialing of 9-1-1 without dialing another digit (such as "9") for an outside line, first. It also requires on-site notification that 9-1-1 has been dialed so that on-site personnel can direct first responders to the correct location. Colorado statute, in contrast, only requires notification to end users regarding the limitations of the MLTS.

9-1-1 Stakeholder Proposed Solutions

The following solutions have been proposed by the 9-1-1 stakeholders involved in the development of this document. Unless otherwise stated, the Commission neither endorses nor opposes any of the proposed solutions. The numbering here matches the numbering of the challenges listed above.

[21] See Section 3 of NENA Standard for NG9-1-1 GIS Data Model, https://cdn.ymaws.com/www.nena.org/resource/resmgr/standards/NENA-STA-006_NG9-1-1_GIS_Dat.pdf
[22] H.R. 582 - Kari's Law Act of 2017. https://www.congress.gov/bill/115th-congress/house-bill/582/text
[23] See § 29-11-106, C.R.S.

1. **Improving Basic Emergency Service Network Reliability and Resiliency While Balancing Costs**: The Commission will hold a proceeding to review a Diversity Plan, which the Basic Emergency Service Provider is required to file by November 2, 2018. It is anticipated that a final Diversity Plan negotiated between the Basic Emergency Service Provider (BESP) and interested parties (including 9-1-1 governing bodies and PSAPs), will be approved by the Commission at the conclusion of the proceeding. The recommendation is to let this process unfold and reassess at a later date to determine whether it was successful and if additional action is needed[24].

2. **Providing Funding Accountability for Local 9-1-1 Surcharge Fees:** Enact legislation requiring telecommunications service providers remitting 9-1-1 surcharge funds to 9-1-1 governing bodies in Colorado to undergo an audit of their 9-1-1 surcharge remittances at their own expense on a regular cycle. Alternatively, or in addition to the requirements above, require the provider to submit affidavits detailing their 9-1-1 surcharge remittance practices to the Commission and the applicable 9-1-1 governing body or bodies.

3. **Improving Funding Transparency for Prepaid 9-1-1 Surcharge Fees:** Enact legislation indicating that DOR shall provide each 9-1-1 governing body with a list of retailers in their service area remitting prepaid 9-1-1 surcharges to DOR. Alternatively, have DOR provide such information to the Commission, and allow the Commission to share this information with local 9-1-1 governing bodies. Information provided to the 9-1-1 governing bodies regarding prepaid surcharge funds should include formulae or other calculations used to determine the final amounts remitted to each governing body.

4. **Updating 9-1-1 Surcharge Rate Threshold and Tying it to Inflation:** Enact legislation adjusting the threshold for requiring Commission approval to an amount commensurate with what 70¢ in 1990 would be today if adjusted for inflation (about $1.36, using CPI-U), and further allow the Commission to publish a new threshold annually based on further adjustment of the threshold for inflation. Notice to the telecommunications service providers by a governing body changing its surcharge would still be required[25].

5. **Providing Funding for NG9-1-1 Implementation Necessary to Meet User Expectations:** Enact legislation establishing a supplemental, statewide 9-1-1 surcharge (potentially 15-20¢) to fund a State 9-1-1 Program Fund at the Commission. Expenditures from this Fund would be overseen by an oversight board staffed by local 9-1-1 governing body representatives, and would be used for projects of benefit to the 9-1-1 system statewide, including grant programs for rural 9-1-1 governing bodies to ensure ubiquity of NG9-1-1 service statewide as the service is implemented. These funds would also provide a source for meeting matching fund requirements for future federal 9-1-1 grants and to fund statewide projects necessary for the full implementation of NG9-1-1, such as the development of a comprehensive statewide NG9-1-1 GIS database. Other potential uses include training for public safety telecommunicators (see #6), public education, statewide data collection systems,

[24] The Commission endorses this recommendation.
[25] See § 29-11-103(3)(a), C.R.S.

statewide text-to-911 implementation, and other projects deemed of benefit to 9-1-1 service in the state.

6. **Implementing Statewide Minimum Training Standards for Public Safety Telecommunicators**: Provide funding for the Colorado Training Standards Committee to more effectively provide its training program on a statewide basis. Alternatively, funding could be provided to the Colorado Post Officer Standards and Training (POST) program for overseeing a telecommunicator training program. See #5 for a recommendation for creating a statewide 9-1-1 funding source.

7. **Aligning Colorado's MLTS Statute with Kari's Law**: Enact legislation to bring Colorado's MLTS statute in closer alignment with federal statute and provide the Commission with authority to promulgate and enforce rules in support of the statutory requirements[26]. The legislature should also consider requiring MLTS to deliver location information for 9-1-1 calls.

5. Federal Activities and National Trends

Federal Activities

National 9-1-1 Program

The National 9-1-1 Program is housed within the National Highway Traffic Safety Administration (NHTSA) Office of Emergency Medical Services, and it is currently undertaking several activities regarding 9-1-1 service nationwide.

- *Next Generation 9-1-1 Interstate Playbook*: An ongoing project to develop case studies and best practices for the sharing of data between Next Generation 9-1-1 (NG9-1-1) systems from one state to another.

- 9-1-1 Grant program: The administration of a $115 million grant program for the implementation of NG9-1-1 systems within the states and territories. The final rules for this grant program were published on August 8. As of the final editing of this document, the Commission is gathering the necessary documentation for initial eligibility certification for this grant program, which is due September 10.

- NG9-1-1 National Roadmap: This is an effort to apply work previously performed by the Federal Communications Commission's Task Force on Optimal Public Safety Answering Point (PSAP) Architecture to develop a national plan for enabling nationwide interoperability between state and regional NG9-1-1 systems.

[26] The Commission endorses this portion of the recommendation.

- Dispatcher-Assisted Telephone Cardio-Pulmonary Resuscitation (CPR): The program is convening 9-1-1 and emergency medical stakeholders to compile and share best practices regarding the provision of cardiopulmonary resuscitation instructions by telephone.

- Model State 9-1-1 Plan: An effort to update a previous document that provided state 9-1-1 programs a template for developing a state 9-1-1 plan.

- Model Legislation: An effort to develop model state 9-1-1 legislation.

Other recent projects of the National 9-1-1 Program was to develop a recommended set of recommended minimum training guidelines for public safety telecommunicators[27]. The Program also recently completed a national NG9-1-1 Cost Study, which is currently undergoing approval at the U.S. Office of Management and Budget.

The Federal Communications Commission

The Federal Communications Commission (FCC) has issued three requests for comment recently on 9-1-1 related issues which will be completed by the time of the publication of this report, but may result in further action by the FCC following review of the comments received:

- A request for comments on the FCC's 9-1-1 network reliability rules[28].

- A request for comments on the effectiveness of a cooperative framework that had been adopted by wireless companies regarding network resiliency during disasters, and also on a future Commission study on the feasibility of providing access to 9-1-1 to the public via alternative modes of connection, such as Wi-Fi access points, when mobile networks are unavailable during times of emergency[29].

- A request for comments on the feasibility of routing wireless 9-1-1 calls to a PSAP based on the estimated location of the caller (also known as geospatial routing) rather than a programmed default routing for the cell tower[30].

The FCC has also been paying particular attention to the issue of some states diverting 9-1-1 surcharge funds to purposes other than those for which they were intended. According to the most recent edition of the FCC's NET 911 Act report to Congress[31], the FCC identified six states as having diverted 9-1-1 surcharge funds. Recently, two national organizations, the

[27] See https://www.911.gov/pdf/Minimum_Training_Guidelines_for_911_Telecommunicator_2016.pdf
[28] See https://ecfsapi.fcc.gov/file/06130379704175/DA-18-612A1.pdf
[29] See https://ecfsapi.fcc.gov/file/0613005416722/DA-18-614A1.pdf
[30] See https://docs.fcc.gov/public/attachments/FCC-18-32A1.pdf
[31] Federal Communications Commission. Ninth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges for the Period January 1, 2016 to December 31, 2016. Retrieved July 7, 2018, from https://www.fcc.gov/files/9thannual911feereportpdf

Association of Public Safety Communications Officials, Intl. (APCO) and CTIA (a major wireless industry association) urged the FCC to clarify what it considers 9-1-1 fee diversion and what it does not[32].

Federal Legislation

There are usually a handful of bills pending in the U.S. Congress that, if enacted into law, would have an impact on 9-1-1 service. The two most significant bills pending right now are:

- H.R. 4986 - The FCC Reauthorization Act of 2018 (aka Ray Baum's Act of 2018). In addition to reauthorizing the FCC, this bill codifies the FCC's responsibilities in the areas of network resiliency, spoofing intervention, and 911 requirements for multi-line telephone systems (MLTS). As of the writing of this report, this bill has passed the House and is being considered by Senate Commerce, Science, and Transportation Committee.
- H.R. 4672 and S. 2061 - The Next Generation 9-1-1 Act of 2017 and its Senate companion bill. This bill would create a permanent office to house the National 9-1-1 Program and provide ongoing funding for the program. It would also create a national Next Generation 9-1-1 Advisory Board to assist the National 9-1-1 Program Office. These bills were both introduced in late 2017, but there has not yet been any movement on them.
- H.R. 6424 - The 9-1-1 Fee Integrity Act. This bill would require the FCC to develop a standard for what may be considered 9-1-1 fee diversion. Currently the FCC reports to Congress which states have diverted 9-1-1 fees based on self-reporting from the states and territories.

National Trends

National NG9-1-1 Status

A good source of the national status of NG9-1-1 deployment is the "National 9-1-1 Progress Report", published annually by the National 9-1-1 Program[33]. Per the most recent version of the Progress Report, 19 states have reported that they have awarded state contracts for NG9-1-1 systems or services[34]. 22 states reported that at least some of their PSAPs are now receiving 9-1-1 calls from an ESInet[35].

[32] See https://blog.npstc.org/2018/03/12/fcc-urged-to-provide-more-guidance-on-911-fee-diversion/
[33] National 911 Program. (2017, November). 2017 National 911 Progress Report. Retrieved June 8, 2018, from https://www.911.gov/pdf/National-911-Program-Profile-Database-Progress-Report-2017.pdf
[34] Page 17
[35] Page 86.

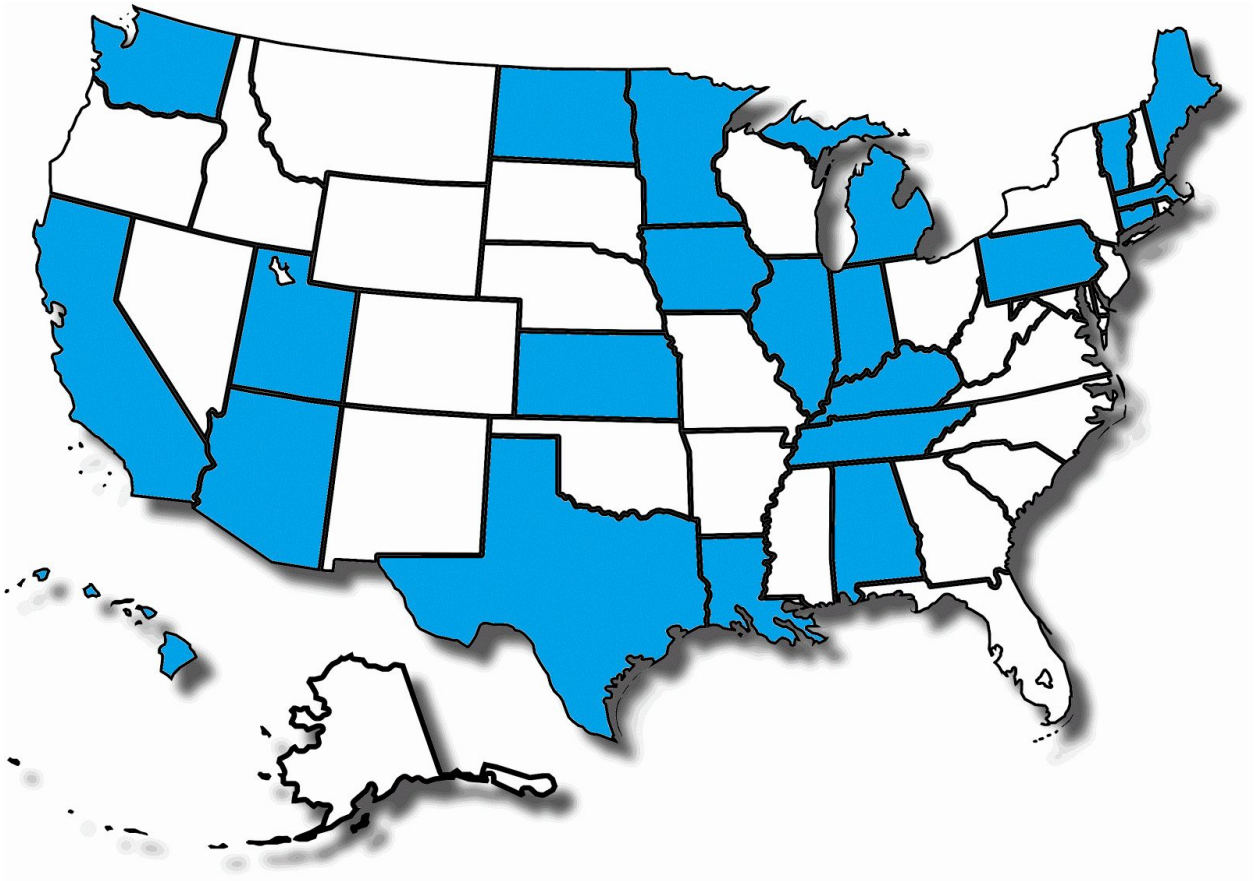

Figure 5.1: States that Deliver Calls to at Least Some PSAPs via an ESInet shown in blue. States without any calls being delivered to PSAPs via an ESInet shown in white.

Telecommunicator Training

Colorado is now in a minority of states that have not legislated minimum training standards for public safety telecommunicators. While there are no federal requirements for the implementation of minimum training standards for telecommunicators, there has been a rising awareness for the need for such standards, due in large part to the efforts of advocacy organizations such as the Denise Amber Lee Foundation[36].

[36] http://deniseamberlee.org/

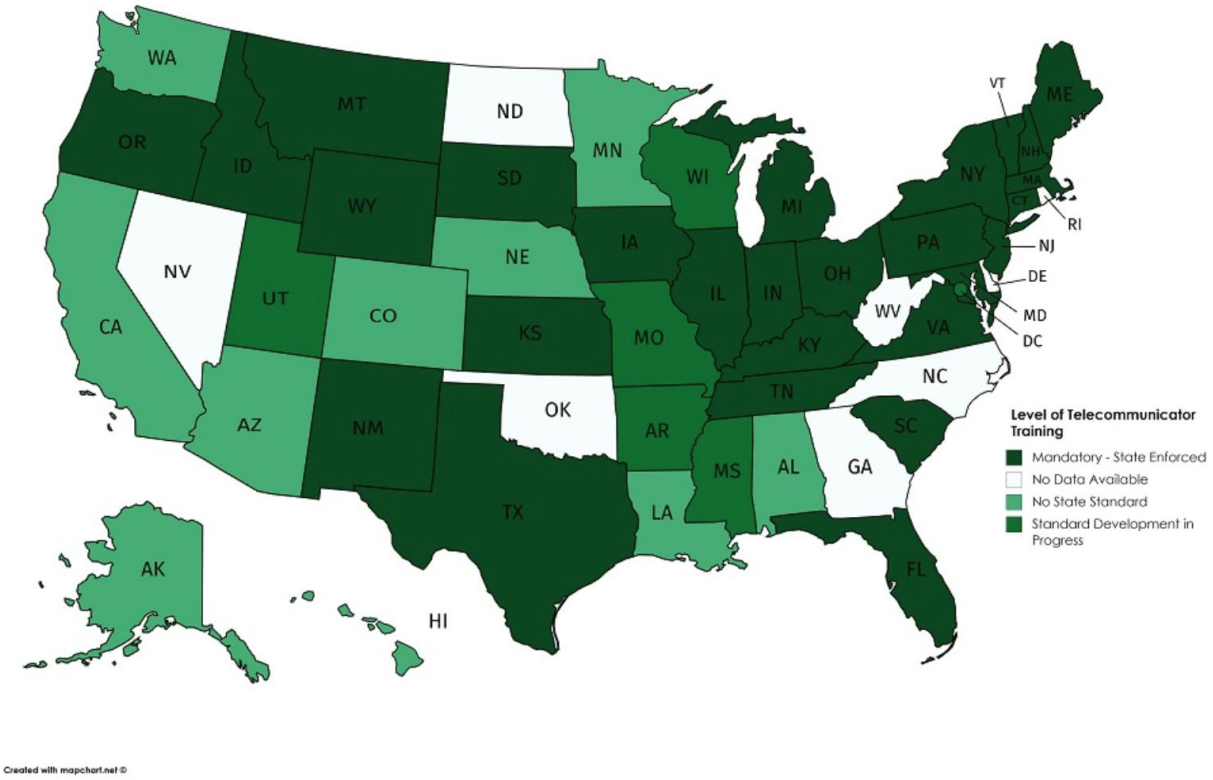

Figure 5.2: Mandatory Minimum Training Standards, by State. Source: Denise Amber Lee Foundation[37].

Funding

Nationally, states have a mix of locally set 9-1-1 surcharge, a single statewide surcharge, or a hybrid of both methods. Our average 9-1-1 surcharge rate is currently $1.05, with a low of 45¢ and a high of $1.75. Nationally, statewide 9-1-1 surcharge rates range from 20¢ (Arizona) to $1.75 (Alabama), although local surcharge rates reach as high as $6.00 in Louisiana and $6.40 in West Virginia[38].

Commission and Colorado Involvement

Over the last year, the Commission has engaged in the national conversation regarding the advancement of 9-1-1 service in the following ways:

- The Commission filed comments[39] with the National Telecommunications and

[37] http://deniseamberlee.org/minimum-training-guidelines
[38] https://www.nena.org/page/911RateByState?
[39] https://www.regulations.gov/contentStreamer?documentId=NTIA-2017-0002-0012&attachmentNumber=1&contentType=pdf

Information Administration (NTIA) in response to a Notice of Proposed Rulemaking issued by that agency to finalize rules for a Next Generation 9-1-1 grant program that is expected to be released later this year[40]. These comments were developed with input from representatives of local 9-1-1 governing bodies and public safety answering points.

- The Commission filed comments[41] with the FCC in response to a Notice of Inquiry regarding the Commission's rules concerning the 9-1-1 capabilities of enterprise communications systems (ECS), otherwise known as multi-line telephone systems (MLTS)[42].
- Commissioner Wendy Moser also sponsored a resolution through the National Association of Regulatory Utility Agencies (NARUC) on the topic of the 9-1-1 capabilities of ECS[43].

Additionally, Commission Staff represents Colorado in the National Association of State 9-1-1 Administrators (NASNA), which is very active in a number of different forums nationally, including activity at the FCC, the National 9-1-1 Program, the NG9-1-1 Institute, and the NG9-1-1 Now Coalition. Specifically, through participation with NASNA, Commission Staff has participated directly as part of the Federal Communications Commission's Task Force on Optimal PSAP Architecture[44], CTIA's Location Accuracy Advisory Group, and the National 9-1-1 Program Office's NG9-1-1 Roadmap Working Group[45].

Outside of the Commission, local Colorado 9-1-1 stakeholders have also been active at the national level, including participation in workshops held by the FCC on the topic of 911 Outage Communications[46] and various working groups of the Communications, Security, Reliability and Interoperability Council (CSRIC).

6. Migration to Next Generation 9-1-1

What Is NG9-1-1?

Next Generation 9-1-1 (NG9-1-1) is a set of technologies and components that, when implemented, comprise a standards-based approach Internet Protocol (IP)-based 9-1-1 call delivery that incorporates scalable flexibility, capacity, and security into the 9-1-1 system for the public safety answering points of a state or region. The National 9-1-1 Program Office has

[40] See the Federal Registry entry for the NPRM, https://www.federalregister.gov/documents/2017/09/21/2017-19944/911-grant-program
[41] https://ecfsapi.fcc.gov/file/1113184553096/Enterprise%20911%20Comments.pdf
[42] See https://docs.fcc.gov/public/attachments/DOC-346896A1.pdf
[43] https://pubs.naruc.org/pub/8F429EFF-F393-27D0-4ABA-25FC0801F80B
[44] https://www.fcc.gov/about-fcc/advisory-committees/general/task-force-optimal-public-safety-answering-point
[45] https://www.911.gov/project_ng911roadmap.html
[46] https://www.fcc.gov/fcc-announces-911-outage-communications-workshop-sept-11

produced a good primer video for and introduction to what NG9-1-1 is and what its benefits are[47].

NG9-1-1 and FirstNet

FirstNet, the common name for the National Public Safety Broadband Network (NPSBN) currently being built out by AT&T, is not the same thing as NG9-1-1. The purpose of the NPSBN is to provide a wireless data network for public safety agencies to communicate with *each other*, whereas one of the goals of NG9-1-1 is to provide a way for non-voice data to be sent *from the public* to 9-1-1 call centers. Together, these two systems would potentially allow the public to send non-voice data (pictures, video, medical data, etc.) to a 9-1-1 call center, and then for the 9-1-1 call center to send such data to responding units. However, the implementation of the NPSBN does not remove the need for implementation of NG9-1-1. They are two separate systems, and we need the functionality of both networks to complete the chain from the public to the first responder.

Planning, Transition, and Implementation

The ongoing negotiations between the parties in the proceeding for CenturyLink's Emergency Services IP-network (ESInet) tariff[48] are a planning process for the first stages of NG9-1-1 implementation. If the proceeding does not result in an approved tariff, the Commission may wish to explore alternative procurement methods to more closely model after other states that have been successful in procuring NG9-1-1 services through the issuance of Requests for Proposals (RFPs) and awarding of contracts.

The approval of a tariff for an ESInet is not the end of the implementation of an NG9-1-1 system, but only the beginning. The ESInet is the foundation upon which the core services and advanced services can operate, and with the implementation of an ESInet will come an opportunity for the 9-1-1 stakeholder groups to begin planning what they want Colorado's NG9-1-1 system to be.

Examples of topics that will need additional planning following the implementation of an ESInet include:

- Assessing what additional equipment and infrastructure needs must be met for individual Public Safety Answering Points (PSAPs) to take advantage of the benefits of NG9-1-1.
- Geographic information system (GIS) dataset development for geospatial routing and other uses in a fully developed NG9-1-1 system.

[47] https://www.911.gov/ng911movie.html
[48] See Proceeding 17AL-0487T. Note: A proposed settlement was filed in this proceeding on Aug 31, 2018.

- The implementation of advanced policy routing functions to better serve the PSAPs.
- The establishment of stakeholder-driven oversight to govern which 3rd party applications are allowed access to the ESInet for delivery of data to the PSAPs, and appropriate security measures for those applications. These could include hosted system solutions to reduce in-house equipment costs at the PSAPs.
- Establishing network performance monitoring processes and benchmarks, including comprehensive cybersecurity controls, if those are not already included in the tariff.

Not all of this planning must wait until an ESInet is in place, but much of the time and effort of the stakeholders is currently devoted to the negotiations with CenturyLink regarding the proposed tariff. Regardless of the outcome of the tariff proceeding, the Commission intends to initiate a process to develop a State NG9-1-1 Plan with the assistance of the Commission's 9-1-1 Advisory Task Force to help outline and prepare for the tasks and steps which will need to be accomplished along the way to full NG9-1-1 system implementation.

Projected Timeline for Full Implementation

The current procedural timeline of the CenturyLink tariff proceeding calls for statements of position to be issued by December 14, 2018, which would allow a recommended decision to be rendered by the end of 2018 or early 2019[49]. This estimated time of completion of the proceeding is subject to change, however, and has already been modified several times at the request of the parties[50].

If a settlement is reached by the parties in the CenturyLink tariff proceeding, and that settlement is approved by the Commission, implementation of the ESInet could begin as early as the first half of 2019. An estimated time frame of 18-24 months for every PSAP to begin receiving 9-1-1 calls through the ESInet is not unreasonable and is comparable to the timeframe for PSAP transition experienced by other states that have undertaken NG9-1-1 migration. This would have every PSAP connected to the ESInet by the second half of 2020 to the first half of 2021. It should be noted that this may require some conversion back to legacy 9-1-1 service at the demarcation point to some PSAPs if they are not yet equipped to receive 9-1-1 calls in IP format.

As stated previously, the approval of a tariff for ESInet transport of 9-1-1 calls and even the deployment of an ESInet would only be the beginning of the implementation of NG9-1-1, since the ESInet is the foundation of an NG9-1-1 system and requires a number of transitional stages prior to full NG9-1-1 implementation. In order to estimate a timeline for each transitional

[49] See Decision R18-0279-I.
[50] See Decisions R17-0824-I, R17-1034-I, R18-0050-I, R18-0214-I, R18-0307-I, and R18-0279-I.

stage, more planning needs to be accomplished, such as the creation of a State NG9-1-1 Plan as discussed previously in this document.

Much of the timeline for full implementation of NG9-1-1 is dependent on factors that are difficult to estimate, such as determining the length of time necessary for originating service providers to begin delivering their calls to the BESP in Session Initiation Protocol (SIP) format, or to provide location information attached to the call rather than through a separate database. Similarly, geospatial routing will require the development of a comprehensive GIS dataset for NG9-1-1, which it is not yet known who will develop that dataset or how the resources will be obtained to develop it.

Also note that the Commission recently dismissed without prejudice an application for certification as a Basic Emergency Service Provider (BESP) by Vesta Solutions, Inc[51]. Vesta may resubmit their application at any time, or another entrant may submit an application. The addition of any new entrant to provide Basic Emergency Service (BES) in Colorado would affect the timeline of implementation.

While it would be preferable for this report to be able to provide a definitive deadline by which NG9-1-1 service will be fully implemented in Colorado, there are currently too many unknowns to do so. However, we can provide a possible timeframe of the first half of 2021 for the deployment of the foundational aspect of NG9-1-1, which is the ESInet, barring delays.

7. Funding and Fiscal Outlook

Current Funding Sources

The provision of 9-1-1 service in Colorado is funded from several sources, including:

- The Emergency Telephone Charge (ETC), which includes both the local 9-1-1 surcharges established by 9-1-1 governing bodies and apply to landline, wireless, and Voice over Internet Protocol (VoIP) services[52], as well as to the prepaid 9-1-1 surcharge [53].
- "User fees" on agencies dispatched by the Public Safety Answering Point (PSAP).
- Local city and county general funds.

In some limited cases, local sales taxes have also been approved and set aside for public safety communications, including the PSAP.

[51] See Proceeding 17A-0695T.
[52] Authorized under § 29-11-102(2)(a)-(b), C.R.S.
[53] Authorized under § 29-11-102.5, C.R.S.

The ETC is remitted by the originating service provider (OSP) to one of 58 separate 9-1-1 governing bodies. Similarly, the prepaid 9-1-1 surcharge is remitted by retailers to the Colorado Department of Revenue (DOR), which then distributes the funds minus a small administrative fee to the governing bodies.

Because the ETC is remitted directly to the governing bodies, it is not known precisely how much 9-1-1 surcharge revenue is being raised statewide, but Commission staff has estimated this figure to be approximately $58.5 million in 2017. This estimate compared to estimates from previous years is shown below.

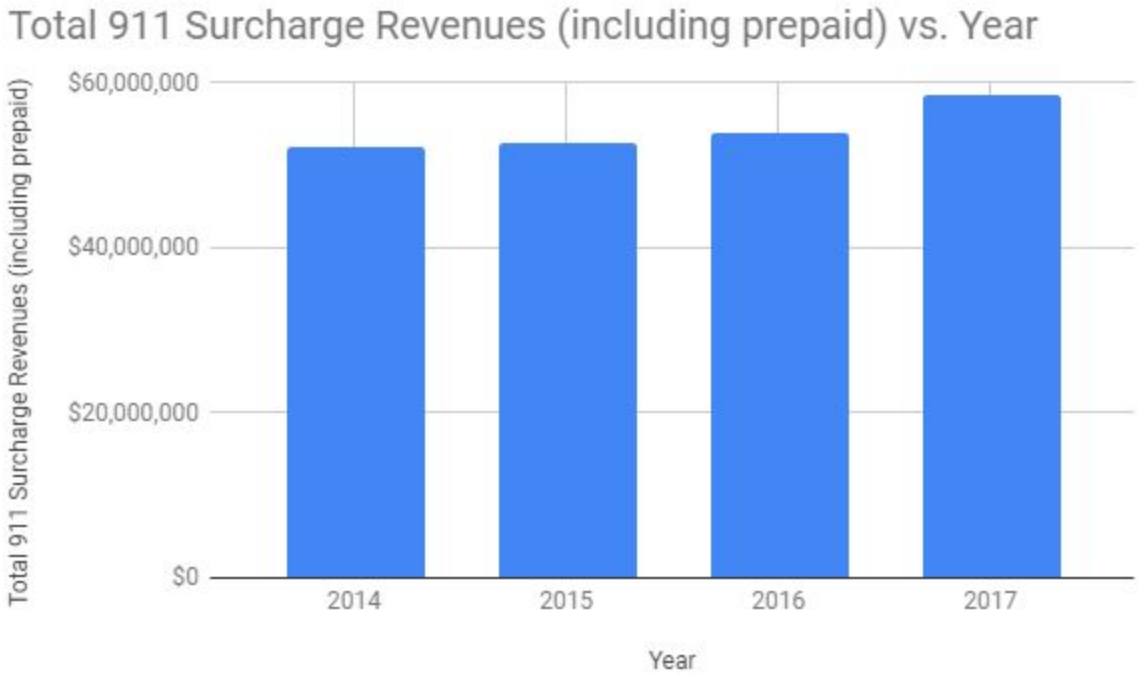

Figure 6.1: Estimated 9-1-1 surcharge revenues statewide by year.

Although estimates of overall revenue statewide have been increasing slightly from year to year, this is in the context of multiple 9-1-1 governing bodies raising their 9-1-1 surcharges every year. Without these increases in rates, it is likely that total surcharge revenues would show a decrease from year-to-year, as a number of 9-1-1 governing bodies have reported reductions in their revenues due to decreasing line counts.

Under Colorado statute, each 9-1-1 governing body may set its own surcharge rate[54]. If the body determines that a surcharge rate in excess of 70¢ is necessary, it must first receive approval from the Commission[55]. This surcharge rate is applied equally to landline, wireless, and VoIP telephone services, and the telecommunications providers remit those surcharges

[54] § 29-11-102(2)(a), C.R.S.
[55] § 29-11-102(2)(b), C.R.S.

directly to the local 9-1-1 governing body[56].

9-1-1 surcharge rates in Colorado currently range from 45¢ per month (Larimer Emergency Telephone Authority) to $1.75 per month (9-1-1 governing bodies for Pitkin County, San Juan County, Summit County, and the governing body that jointly covers both Washington and Yuma counties)[57]. The current average 9-1-1 surcharge, statewide, is $1.05.

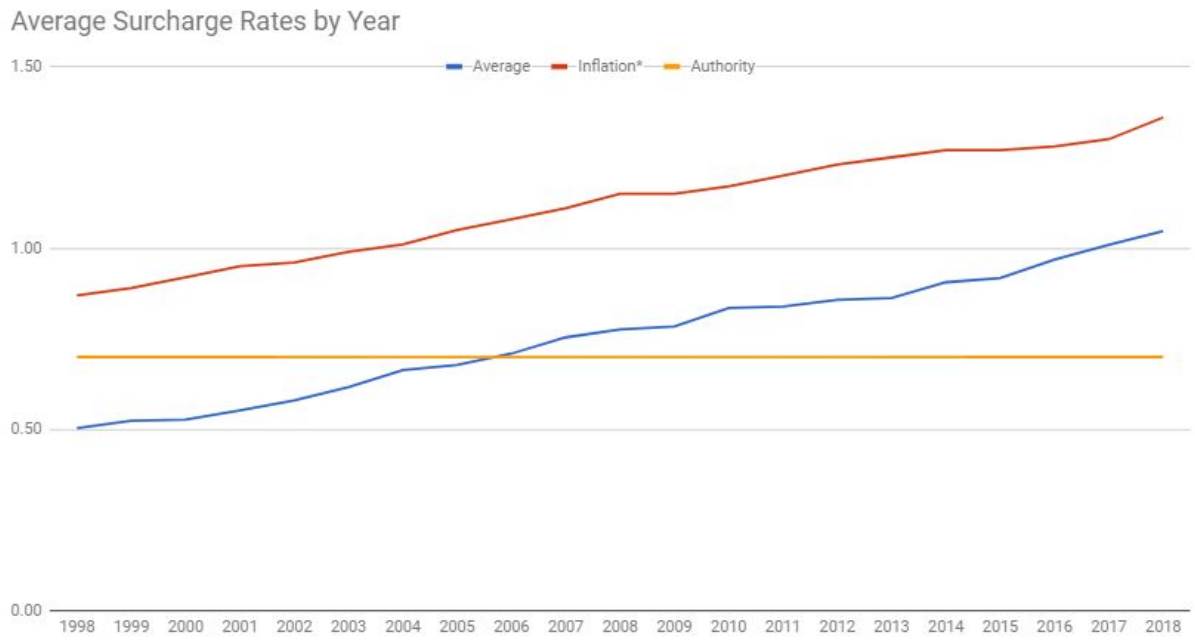

Figure 6.2: Average 9-1-1 Surcharge Rates in Colorado Since 1998 (blue) compared to 70¢ in 1990, adjusted for inflation to the current year (red). The threshold for PUC approval of 9-1-1 surcharge rates has remained unchanged at 70¢ (gold).

Prepaid 9-1-1 surcharge revenues are collected at point-of-sale by retailers and remitted to DOR before being distributed to the governing bodies.

[56] § 29-11-102(2)(c), C.R.S.; 29-11-103(1), C.R.S.
[57] For a full list of 911 surcharge rates by 911 governing body, see https://docs.google.com/spreadsheets/d/11RjBDYuv83mP1t3f2oDoolO9KhhosiUOF_oP5QsY-3c/edit#gid=0

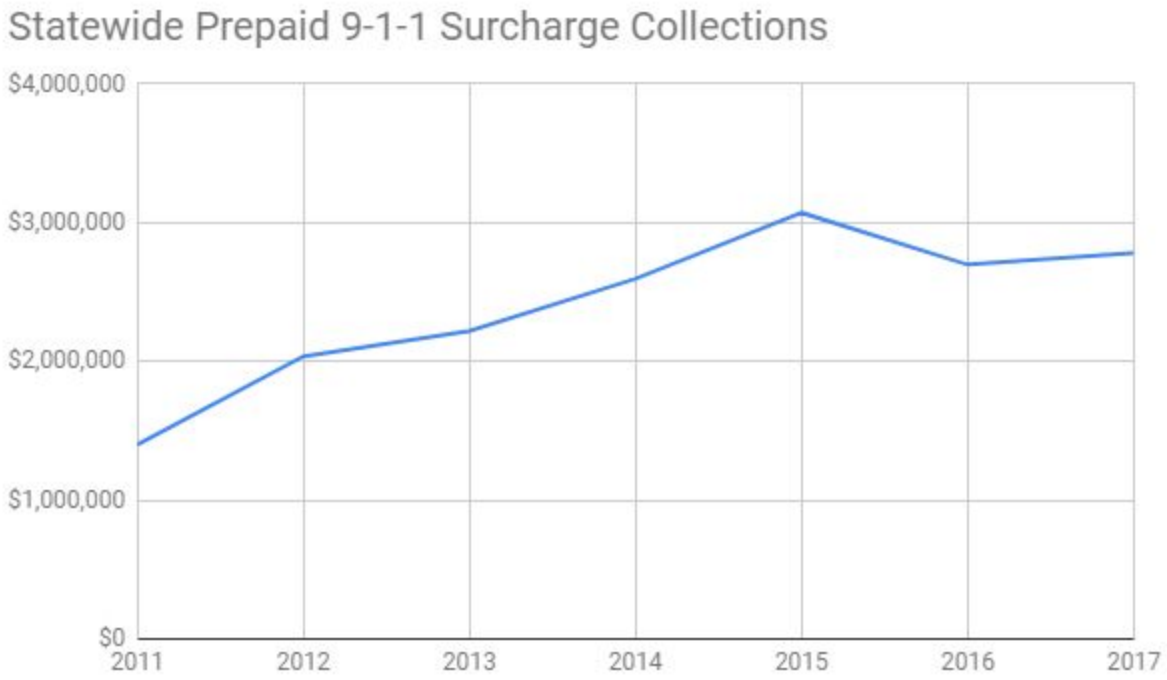

Figure 6.3: Prepaid Collections by the Colorado Department of Revenue, by Year

Aside from 2015, which appears to be an outlier, prepaid 9-1-1 surcharge funds collected by DOR have increased slightly every year. Despite this, prepaid 9-1-1 surcharge revenues make up only a small portion of the estimated 9-1-1 surcharges raised statewide (less than 5% in 2017).

Funding Challenges

The primary method of funding 9-1-1, the Emergency Telephone Charge, has been faced with increasing challenges in recent years:

- Line counts have generally been decreasing as consumers "cut the cord", meaning they are discontinuing their landline services. For some time, this decrease in landline counts was countered by increases in wireless lines, but 9-1-1 governing bodies have indicated that wireless line count increases have leveled off while landline count decreases have continued.
- 9-1-1 surcharges on wireless devices are collected from Colorado residents and businesses and remitted to 9-1-1 governing bodies based on the billing address of the customer. If the customer is not a full-time resident of a county where they are likely to use the service, like a tourist from out of state, a student from another county or from out-of-state, or any other part-time resident, they are adding to the costs of providing 9-1-1 to their community without helping to fund that service.
- It is often difficult for a 9-1-1 governing body to know which telecommunications providers are doing business in their collection area, and therefore whether they should or should not be receiving surcharge funds from them. If the 9-1-1 governing

body does receive a remittance form a service provider, there is little accountability to ensure that the amount they are receiving is the correct amount.

Potential Funding Mechanisms for Transition to and Implementation of NG9-1-1

Formal examinations of alternative funding options for 9-1-1 and NG9-1-1 service have been undertaken in recent years at the national level, with the earliest being a "Blue Ribbon Panel on 911 Funding," hosted by the National 911 Program[58]. A number of ideas for alternative funding were considered.

Table ES-1: Overview of Feasibility of Proposed Funding Mechanisms for NG911

Feasible Today	Possibly Feasible in the Future
• Wireline, Wireless, Prepaid, and VoIP Surcharges	• Auction Revenues
• Property-Based Taxes	• Special Event Permitting Fees
• Fee-for-Service Payments	• Health Insurance Taxes
• Public–Private Partnerships	• User Fees
• Hosted Solutions	• National Infrastructure Reinvestment Bank

Figure 6.4: Table from "Blue Ribbon Panel on 911 Funding" outlining potential options for 911 funding.

Additional reviews have examined these alternative funding concepts in more detail, including a 2015 report from the National Association of State 9-1-1 Administrators (NASNA)[59] and a 2016 report from the FCC's Task Force on Optimal PSAP Architecture (TFOPA)[60].

Alternative funding concepts have also been discussed by the Commission's 9-1-1 Advisory Task Force. These models include:

- A per-night hotel room fee.
- A supplemental statewide 9-1-1 surcharge[61].

One commenter providing input for this report suggested providing revenues from marijuana taxes for use related to 9-1-1 expenses.

Additional funding sources will need to be secured for implementation of Next Generation

[58] National 911 Program. (2013, Dec). Blue Ribbon Panel on 911 Funding: Report to the National 911 Program. Retrieved June 27, 2018, from https://www.911.gov/pdf/Blue_Ribbon_Panel_911_Funding_Report_2013.pdf

[59] National Association of State 9-1-1 Administrators. (2015, August 5). Four Potential Sustainable Funding Models for NG911. Retrieved June 27, 2018, from https://drive.google.com/file/d/0B6UENGshedL6MmI5dWFFMVlneU9PZ2hVakNoUVpCeDdOLVZj/view

[60] See page 27-29. Federal Communications Commission. (2016, January 29). Task Force on Optimal PSAP Architecture: Adopted Final Report. Retrieved June 27, 2018, from https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_FINALReport_012916.pdf

[61] Similar to a statewide 25¢ surcharge implemented in the State of Washington. https://www.nena.org/general/custom.asp?page=911RateByState

9-1-1 (NG9-1-1). In addition to non-recurring costs for the deployment of an NG9-1-1 system (including the Emergency Services IP-network, or ESInet, and core services), ongoing costs for basic emergency service within an NG9-1-1 system are expected to be anywhere from 2-4 times their current rates. In addition to these direct costs for NG9-1-1 service, PSAPs will have additional equipment costs and costs for 3rd party services to fully take advantage of NG9-1-1. The implementation of new services and equipment also requires expenditures for training costs and expanded services that the public may demand (such as the ability for a PSAP to receive and process pictures, video, automatic crash notification data, etc.) will likely require additional personnel.

In a decentralized 9-1-1 system such as Colorado's, it is not possible to put a precise price tag on the costs of NG9-1-1 implementation, but because of the factors listed above, it is likely to increase costs for 9-1-1 service overall significantly.

Conclusion

The intent of this report is to provide a general overview for understanding the state of the 9-1-1 system in the State of Colorado. This includes where it is now, along with its existing vulnerabilities, and strategic goals for the implementation of a 9-1-1 system that is positioned to meet the needs of Colorado's residents and visitors well into the future.

A part of this positioning for the future involves setting the stage for a migration to Next Generation 9-1-1 (NG9-1-1). The Commission is currently considering a tariff filing that would represent a foundational stage of NG9-1-1 implementation, but if approved a great deal of additional planning and action will need to be undertaken to implement NG9-1-1. The Commission intends to work with the 9-1-1 stakeholders of the state to develop a comprehensive NG9-1-1 plan for Colorado in order to map out future milestones in NG9-1-1 deployment.

In the meantime, Colorado's 9-1-1 stakeholders, including the Commission, must continue to work to meet consumer and citizen expectations. This includes the ongoing implementation of text to 9-1-1 service, improving uniformity of minimum training standards for public safety telecommunicators, and ensuring the reliability and resiliency of the existing basic emergency service (BES) network.

The Commission is committed to continuing to work with Colorado's 9-1-1 stakeholders and the legislature to ensure that Colorado's 9-1-1 system is reliable, resilient, and meets the needs of Colorado's residents and visitors.

Appendices

Appendix A: Glossary

Sources for these definitions: *4 CCR 723-2-2131*, § 29-11-101, C.R.S., and the *NENA Master Glossary of 9-1-1 Terminology*[62]. In a few cases, definitions were written specifically for this report.

9-1-1 - A three-digit abbreviated dialing code used to report an emergency situation requiring a response by a public agency such as a fire department or police department.

9-1-1 Governing Body - See *Governing Body*.

9-1-1 Service - The service by which a 9-1-1 call is routed and transported from the end user placing a 9-1-1 call to the Public Safety Answering Point (PSAP) serving the caller's location. 9-1-1 service also includes any related caller location information routed to the PSAP, if any.

9-1-1 Surcharge Fees - See *Emergency Telephone Charge*.

Automatic Location Identification (ALI) - The automatic display, on equipment at the PSAP, of the telephone number and location of the caller. ALI data includes non-listed and non-published numbers and addresses, and other information about the caller's location.

Automatic Number Identification (ANI) - The automatic display of the caller's telephone number at the PSAP.

Basic Emergency Service (BES) - The aggregation and transportation of a 9-1-1 call directly to a point of interconnection with a governing body or PSAP. Location information and selective routing of 9-1-1 calls are also considered basic emergency service. (Note: This is a modification of the Commission's definition of BES simplified for the purpose of this report. See found in *4 CCR 723-2-2131(j)* for the full definition.)

Basic Emergency Service Provider (BESP) - Any person certificated by the Commission to provide basic emergency service.

Demarcation Point - The physical point where the responsibility of a portion of a network changes from one party to another.

Emergency Services IP Network (ESInet) - A managed IP network that is used for emergency services communications, and which can be shared by all public safety agencies. It provides the IP transport infrastructure upon which independent application platforms and core services can be deployed, including, but not restricted to, those necessary for providing NG9-1-1 services. ESInets may be constructed from a mix of dedicated and shared facilities. ESInets may be interconnected at local, regional, state, federal, national and international levels to form an IP-based inter-network (network of networks).

62 https://cdn.ymaws.com/www.nena.org/resource/resmgr/standards/NENA-ADM-000.22-2018_FINAL_2.pdf

Emergency Telephone Charge (ETC) - a charge established by a governing body pursuant to § 29-11-102(2)(a), C.R.S., or established by § 29-11-102.5(2)(a), C.R.S., to pay for the expenses authorized in § 29-11-104, C.R.S.

Enhanced 9-1-1 (E9-1-1) - 9-1-1 service that includes the association of ANI and ALI (including non-listed and non-published numbers and addresses), and selective routing.

FirstNet - The common name used to refer to the National Public Safety Broadband Network (NPSBN), a conceptualized national network to provide prioritized wireless data coverage for public safety agencies.

Governing Body - The organization responsible for establishing, collecting, and disbursing the emergency telephone charge in a specific geographic area, pursuant to §§ 29-11-102, 103, and 104, C.R.S.

Intermediary Aggregation Service Provider (IASP) - A person that aggregates and transports 9-1-1 calls for one or more originating service providers (OSPs) for delivery to a BESP selective router or the functional equivalent of such a router.

Internet Protocol (IP) - The method by which data is sent from one computer to another on the Internet or other networks.

Legacy 9-1-1 - The existing, switch-based 9-1-1 system and service, as opposed to Next Generation 9-1-1.

Multi-Line Telephone System (MLTS) - A system comprised of common control units, telephones, and control hardware and software providing local telephone service to multiple customers in businesses, apartments, townhouses, condominiums, schools, dormitories, hotels, motels, resorts, extended care facilities, or similar entities, facilities, or structures. Multi-line telephone system includes:

(I) Network and premises-based systems such as Centrex, PBX, and hybrid-key telephone systems; and

(II) Systems owned or leased by governmental agencies, nonprofit entities, and for-profit businesses.

Next Generation 9-1-1 (NG9-1-1) - A secure, IP-based, open-standards system comprised of hardware, software, data, and operational policies and procedures that:

A. Provides standardized interfaces from emergency call and message services to support emergency communications;

B. Processes all types of emergency calls, including voice, text, data, and multimedia information;

C. Acquires and integrates additional emergency call data useful to call routing and

handling;

D. Delivers the emergency calls, messages, and data to the appropriate public safety answering point and other appropriate emergency entities based on the location of the caller;

E. Supports data, video, and other communications needs for coordinated incident response and management; and

F. Interoperates with services and networks used by first responders to facilitate emergency response.

Originating Service Provider (OSP) - A local exchange carrier, wireless carrier, Voice-over-Internet-Protocol service provider, or other provider of functionally equivalent services supplying the ability to place 9-1-1 calls.

Public Safety Answering Point (PSAP) - A facility equipped and staffed on a 24-hour basis to receive and process 9-1-1 calls from a BESP. Types of PSAPs:

- **Primary PSAP:** A PSAP to which 9-1-1 calls are routed directly from the 9-1-1 Control Office.

- **Secondary PSAP:** A PSAP to which 9-1-1 calls are transferred from a Primary PSAP.

Public Safety Telecommunicator (PST) or **Telecommunicator** - Person employed by a PSAP qualified to answer incoming emergency telephone calls and/or provides for the appropriate emergency response either directly or through communication with the appropriate PSAP.

Selective Routing: The capability of routing a 9-1-1 call to a designated PSAP based upon the location of the end user. (Note: This is a modification of the Commission's definition of Selective Routing simplified for the purpose of this report. See *4 CCR 723-2-2131(w)* for the full definition.)

Teletypewriter (TTY) - A special device that lets people who are deaf, hard of hearing, or speech-impaired use the telephone to communicate, by allowing them to type text messages. A TTY is required at both ends of the conversation in order to communicate. Unlike sending text messages from a mobile phone, using a TTY allows for users to see each character as it is typed by the other party.

Text to 9-1-1 - A service that allows users of 9-1-1 to send a text message directly to "911" from their mobile device and allowing that text message to be relayed to the appropriate PSAP. There are interim methods of text to 9-1-1 service that relay text to 9-1-1 messages directly to a PSAP, bypassing the existing 9-1-1 network. If a Next Generation 9-1-1 system is available, text to 9-1-1 messages may be relayed through the NG9-1-1 network.

Voice-over-Internet-Protocol (VoIP) - Technology that permits delivery of voice calls and other real-time multimedia sessions over IP networks.

Appendix B: Participating Stakeholders

Pursuant to § 40-2-131(2), C.R.S., this report was developed in consultation with representatives of public safety answering points, 9-1-1 governing bodies, and statewide organizations that represent public safety agencies.

An Editorial Committee was convened during the initial drafting of this report, which provided Commission staff with input and direction concerning it's development. Facilitation of the meetings of the Editorial Committee, and much of the original drafting of this report, were the work of Daryl Branson, State 911 Program Manager for the Colorado Public Utilities Commission.

Editorial Committee Members		
Name	**Organization**	**Organization Type**
Kimberly Culp	Larimer Emergency Telephone Authority	911 governing body
Jaime FitzSimmons	County Sheriffs of Colorado	public safety association
Brett Loeb	Pitkin County Regional Emergency Dispatch Center	PSAP
Connie Johnson	Delta County 911	PSAP
Jeff Irvin	Jefferson County Emergency Communications Authority	911 governing body
Mandy Stllsteimer	Western Colorado Regional Dispatch Center	PSAP
Scott Newman	City of Aurora 911	PSAP
Carl Simpson	El Paso-Teller County E911	911 governing body
Lynn Notarianni	Colorado Public Utilities Commission	PUC Staff
Teresa Ferguson	Colorado Public Utilities Commission	PUC Staff
Julie Smith	Southern Ute Police Department	PSAP
Lisa Shorter	Pueblo County Sheriff's Office	PSAP, public safety association
Susan Travis	Colorado Public Utilities Commission	PUC Staff
Darrell Pratt	Chaffee County Sheriff's Office Communications Center	PSAP
Jason Nettles	Routt County Communications	PSAP
Monica Million	Colorado 9-1-1 Resource Center	nonprofit resource
Trevor Choat	Prowers County Combined Communications	PSAP

	Center	
Mike Cook	Eastern Rio Blanco County 911, Meeker Police and Fire	PSAP, public safety association, police and fire agencies
Diane Culverhouse	City of Aurora 911	PSAP
Caine Hills	Aurora Fire Department	Fire agency
Patti West	Boulder Regional Emergency Telephone Service Authority	911 governing body

Also consulted during initial drafting were:

- Jason Isherwood, Michael Baker International (for input regarding GIS dataset requirements of NG9-1-1)
- Members of the 9-1-1 Advisory Task Force's Accessibility Committee.

This report was also provided in draft form to the following organizations with a request for comment:

- The Commission's 9-1-1 Advisory Task Force
- The Colorado Chapter of the National Emergency Number Association and the Association of Public Safety Communications Officials, Intl.
- County Sheriffs of Colorado
- Colorado Association of Chiefs of Police
- Colorado State Fire Chiefs
- Emergency Medical Services Association of Colorado
- Colorado Emergency Management Association
- Colorado Counties Incorporated
- Colorado Municipal League
- Colorado representatives of AARP
- The Independence Center

Appendix C: Text to 9-1-1 Status by Public Safety Answering Point

PSAP (Primary only)	Has Text to 9-1-1 or covered by other PSAP	Plans Text to 9-1-1 (Estimated Deployment)	No plans for Text to 9-1-1 or no response
Adams County Communications Center	X		
Alamosa Regional Communication Center/CSP Alamosa			X
Arapahoe County Sheriff's Office	X		
Archuleta County Combined Dispatch	X		
Auraria Campus Police Department	X		

Baca County Sheriff's Office			X
Bent-Kiowa Communications Center			X
Black Hawk Police Department	X		
Boulder County Sheriff's Office	X		
Boulder Police and Fire Communications	X		
Broomfield Police Department	X		
Castle Rock Police Department	X		
Chaffee County Sheriff's Office Comm Center	X		
Cheyenne County Sheriff's Office			X
City of Aurora PSAP	X		
City of Pueblo CO Police Dept		Fall 2018	
Clear Creek County Sheriff's Office	X		
Colorado Springs Police Department	X		
Colorado State University Police Department	X		
Cortez Communications Center		August 2018	
Craig Regional Communications Center			X
Cripple Creek Police Department	X		
Crowley County Sheriff's Office			X
CSP Montrose (Answering 911 for San Juan County Sheriff's Office)			X
Custer County Sheriff's Office	X		
Delta County 911	X		
Denver 911	X		
Denver International Airport	X		
Denver U.S. Veterans Health Administration Police	X		
Douglas Regional 9-1-1	X		
Durango-La Plata Emergency Communications Center		Unknown	
Eastern Rio Blanco County 911	X		
El Paso County Sheriff's Office	X		

Englewood Police	X		
Estes Park Police Department	X		
Federal Heights Police Department	X		
Fort Carson Fire Department	X		
Fort Collins 911	X		
FRECOM911	X		
Garfield County Emergency Communications	X		
Gilpin County			X
Glendale Police Department	X		
Grand County Communications - Hot Sulphur Springs	X		
Grand Junction Regional Communications Center	X		
Greenwood Village Police	X		
Gunnison-Hinsdale Combined Communications Center	X		
Huerfano Emergency Dispatch		Unknown	
Jackson County Sheriff's Office			X
Jeffcom	X		
Kit Carson County Sheriff's Office			X
La Junta Police Department		Sept 2018	
Lake County Sheriff's Office		Early 2019	
Larimer County Sheriff's Office	X		
Las Animas County		Unknown	
Lincoln County Sheriff's Office			X
Littleton Police Department	X		
Longmont Emergency Communications Center	X		
Loveland Emergency Communications Center	X		
Montrose Regional Dispatch Center	X		
Morgan County Communications Center		Aug 2018	
Park County Communications		2019	

Parker-Lone Tree Communications	X		
Peterson Air Force Base	X		
Phillips County Communications Center			X
Pitkin County Regional Emergency Dispatch Center	X		
Prowers County Combined Communications Center	X		
Pueblo County Sheriff's Office	X		
Rangely Police Department	X		
Rocky Ford PD			X
Routt County Communications	X		
San Miguel County Sheriff's Office	X		
Sedgwick County Communication Center	X		
Southern Ute Indian Police Department		Dec 2018	
Sterling Emergency Communications Center		Unknown	
Summit County 911 Center	X		
Teller County Sheriff's Office	X		
Thornton Police Communications	X		
University of Colorado Anschutz Medical Campus	X		
University of Colorado Police Department - Boulder	X		
University of Northern Colorado Police	X		
Vail Public Safety Communications Center	X		
Washington-Yuma Combined Communications Center			X
Weld County Regional Communications Center	X		
Western Colorado Regional Dispatch Center	X		
Westminster Police Department	X		
Woodland Park Police Department	X		

Appendix D: Additional Resources

For more information:

The Commission's "Emergency 9-1-1" Page
https://www.colorado.gov/pacific/dora/emergency911

The Colorado 9-1-1 Resource Center
www.co911rc.org

The Colorado Chapter of NENA and APCO
www.conenaapco.org

The National Emergency Number Association
www.nena.org

The Association of Public Safety Communications Officials, Intl.
www.apcointl.org

The National Association of State 9-1-1 Administrators
www.nasna911.org

The National 9-1-1 Program
www.911.gov

The FCC's Task Force on Optimal PSAP Architecture
https://www.fcc.gov/about-fcc/advisory-committees/general/task-force-optimal-public-safety-answering-point

The FCC's Communications, Security, Reliability and Interoperability Council
https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council

The National Public Safety Telecommunications Council
http://www.npstc.org/