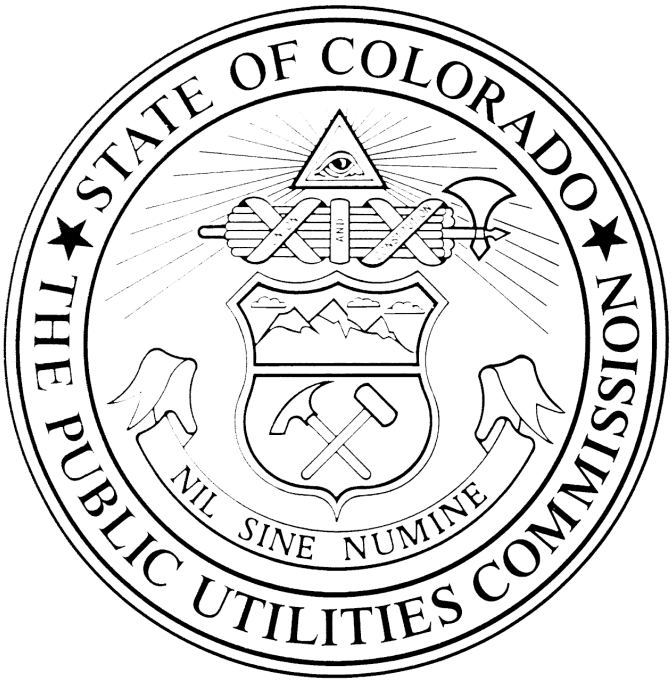
Report on the State of 9-1-1 Services in Colorado

2018-2019



Prepared by:

The Colorado Public Utilities Commission Staff

September 11, 2019

COLORADO
Department of
Regulatory Agencies
Public Utilities Commission

Jeffrey P. Ackermann, Chairman
Frances A. Koncilja, Commissioner
John C. Gavan, Commissioner
Doug Dean, Director

Patty Salazar, Executive Director
Jared Polis, Governor

September 11, 2019

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 the 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 second 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

***Key Points*:**

- ***The Commission has been very active in creating a path toward improvement of 9-1-1 services in Colorado during the 2018-2019 fiscal year, and is on track to continue being strongly involved in these efforts for the 2019-2020 fiscal year.***
- ***Funding challenges related to the delivery of 9-1-1 service in Colorado are serious and are growing. While the bulk of the non-recurring costs of migration to the ESInet will be reimbursed via federal grant and matching funds designated by the Commission, monthly recurring costs for delivery of 9-1-1 calls to PSAPs are nearly doubling.***
- ***Colorado's 9-1-1 system is at the beginning stages of a migration toward an all-IP (Internet Protocol) based infrastructure which has the potential to greatly improve the reliability and functionality of 9-1-1 services available to Colorado residents and visitors.***

The state of 9-1-1 services in Colorado is in transition. Communications capabilities available to the public have continued to advance, and consumer expectations of 9-1-1 service capabilities have correspondingly also increased. Personal telecommunications capabilities have rapidly transformed from an analog and switch-based, voice-centric network to a network based on Internet Protocol and increasingly data centric. This evolution creates risks in leaving antiquated 9-1-1 networks as a standalone legacy network isolated from the greater, more modern, telecommunications infrastructure. To address these risks, Colorado is in the initial stages of transition to an IP-based core 9-1-1 network, known as Next Generation 9-1-1 (NG9-1-1). NG9-1-1 will be capable of supporting additional services as desired by local 9-1-1 officials and the public and postured to meet the needs of 21st century telecommunications requirements and demands.

At the end of 2018, the Commission approved a tariff proposed by Qwest Corporation d/b/a CenturyLink QC and a number of other participating stakeholders to migrate every Public Safety Answering Point (PSAP) in the state to an all-IP based infrastructure known as an Emergency Services IP-network (ESInet) by the end of 2020.[1] With this step,Colorado is now ona path toward implementing the first phase of a transition to NG9-1-1.

While this transition is necessary, it is not without its costs. The one-time costs for migrating every PSAP in the state to the ESInet is expected to cost approximately $3.9 million, and the annual costs of ESInet are expected to be approximately $5.9 million, as opposed to the approximately $2.9 million paid for under the legacy 9-1-1 tariff. While the non-recurring costs are expected to be reimbursed by a federal grant and with matching funds designated by the Commission, the ongoing costs for the ESInet are currently responsibility of the state's 58 local 9-1-1 governing bodies.

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

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 approved a series of workshops to consider ways of achieving greater measures of reliability and resiliency in the existing 9-1-1 network, as well as how to pay for those improvements. Those workshops are ongoing.[2]

In Section 5, this report identifies a number of specific vulnerabilities to be addressed. Challenges and potential solutions identified by 9-1-1 stakeholders, primarily in the form of the Commission's 9-1-1 Advisory Task Force, are also provided. Challenges identified by the stakeholders in Section 5 follow below.

1. **User Expectations Are Outpacing System Capabilities and Funding Mechanisms.**
2. **The Basic Emergency Service Network Lacks Reliability and Resiliency in Certain Areas.**
3. **Lack of Funding Accountability for Local 9-1-1 Surcharge Fees.**
4. **Actual or Perceived Lack of Funding Transparency for Prepaid 9-1-1 Surcharge Fees.**
5. **The 9-1-1 Surcharge Rate Threshold for Commission Approval Has Not Been Adjusted for Inflation in 29 Years.**
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 5, 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 2018-2019 Fiscal Year

During the 2018-2019 Fiscal Year, the Commission undertook the following activity regarding 9-1-1 service:

- Concluded six 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. All six of these were approved to the amount requested.[3]

[2] See Proceeding 19M-0026T and Decision C19-0117-I.
[3] For a list of all 9-1-1 surcharge applications considered by the Commission over the last several years, see

- Conducted hearings regarding a Stipulation and Settlement Agreement, as well as a proposed tariff, agreed upon by various local 9-1-1 stakeholders and Qwest Corporation d/b/a/ CenturyLink, QC[4]. The Commission approved this Settlement, which provides for the implementation of an Emergency Services IP network (ESInet), including a migration of all existing Public Safety Answering Points (PSAPs) in the state from the legacy 9-1-1 network to the ESInet. A finalized version of this tariff was filed on December 28, 2018[5] then amended on March 10, 2019.[6]
- Facilitated six meetings of the Commission's 9-1-1 Advisory Task Force, created pursuant to 4 *CCR* 723-1-2145.[7]
- Facilitated the establishment of the ESInet Users Group, a committee of the 9-1-1 Advisory Task Force, created by order of the Commission approving the ESInet tariff described above[8], and facilitated its first meetings.
- Filed an annual report to the Federal Communications Commission pursuant to the NET 911 Improvement Act of 2008[9].
- Participated in an annual data collection effort conducted by the National 9-1-1 Program[10].
- Submitted an application to the National Telecommunications and Information Administration and the National Highway Traffic Administration for funding to assist local 9-1-1 governing bodies in paying for the migration of Colorado's PSAPs to the ESInet.
- Initiated a series of workshops, still ongoing, on the topic of 9-1-1 network reliability.[11]
- Conducted five regional educational sessions for local 9-1-1 governing bodies to facilitate preparation for the migration to the ESInet[12], as well as a number of individual meetings with local 9-1-1 governing bodies on this topic.

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

- Participated in a workshop facilitated by the national 9-1-1 Program Office in the creation of a document entitled NG911 Roadmap: Pathways Toward Nationwide Interconnection of 911 Services.[13]
- Presented or participated in panels at conferences of the National Association of Regulatory Utility Commissions (NARUC), the National Association of State 9-1-1 Administrators (NASNA), the Colorado joint chapter of the National Emergency Number

https://docs.google.com/spreadsheets/d/1SrJ5hPynvFC8YtA7H4FiIFwe5D6zU5zVuhGgO3vZb7A/edit#gid=1139515964

[4] See Proceeding 17AL-0487T.
[5] See Proceeding 18AL-0916T.
[6] See Proceeding 19AL-0238T.
[7] The Commission's authority for creating the Task Force derives from its oversight of Basic Emergency Service. See § 40-15-201 (2), C.R.S.
[8] See Decision R18-1063T.
[9] See https://www.fcc.gov/general/911-fee-reports
[10] See https://resourcecenter.911.gov/code/9-1-1ProfileDatabase.aspx
[11] See Proceeding 19M-0026T and Decision C19-0117-I.
[12] Regional meetings were held in Sterling, Rifle, Trinidad, Durango, and Lakewood.
[13] https://www.911.gov/pdf/NG911_Roadmap_Final.pdf

Association and the Association of Public Safety Communications Officials (Colorado NENA/APCO), the Colorado Assisted Living Association (CALA), the annual Radio Summit organized by the Homeland Security Advisory Committee's Public Safety Communications Subcommittee, and the 2019 Mountain Connect conference.
- Serving as an officer on the board of the Colorado 9-1-1 Resource Center, the Colorado 9-1-1 Training Standards Institute, and Colorado NENA/APCO.
- Conducting numerous site visits and participating in local meetings throughout the state.
- Leading several committees of the Commission's 9-1-1 Advisory Task Force, including the Agenda Committee, Equal Access Committee, Outage Committee, and Reports Committee.
- Participated in updating of the Colorado state-wide Communications Interoperability Plan (SCIP).
- Participated on the Location Accuracy Advisory Group of CTIA (the national wireless association).
- Participated in meetings of the Homeland Security Advisory Committee's Public Safety Communications Subcommittee.
- Submitted comments to the Federal Communications Commission in response to a call for input regarding the "Tenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges".[14]
- Co-authored an article in The Call magazine, the journal of the National Emergency Number Association, on the topic of the ESInet tariff and the planned migration.[15]

Commission staff assigned to 9-1-1 related matters for the 2018-2019 fiscal year primarily consisted of the following:
- Daryl Branson, state 9-1-1 program manager
- Lynn Notarianni, telecom section chief
- Susan Travis, rate financial analyst
- Teresa Ferguson, senior telecom analyst
- Holly Bise, state relay administrator

Commission Activity Planned for the 2019-2020 Fiscal Year

With the approval of a Settlement agreement and tariff for migration of every Public Safety Answering Point (PSAP) to an Emergency Services IP network (ESInet) beginning in October of 2019 and concluding in October of 2020[16], a large portion of the Commission's work regarding 9-1-1 service will be focused on the Commission's 9-1-1 Advisory Task Force and the newly formed ESInet Users Group, to ensure a smooth transition. The ESInet User's Group has begun holding regular meetings. Although it is a user-driven group, Commission staff will be facilitating the meetings and serving as the secretary of the group. In October, CenturyLink

[14] See Public Notice DA 18-1271. https://www.fcc.gov/document/fcc-seeks-comment-tenth-annual-report-congress-state-911-fees
[15] Branson, Daryl and Romero, Bruce. "Statewide ESInet Without an RFP? Colorado Uses the Utility Tariff Process as a Path Toward NG9-1-1." The Call, issue 32. pp. 8-10.
[16] See Proceeding 17AL-0487T.

will begin filing with the Commission any changes to the migration schedule. If there are changes to the schedule not agreed to by both parties, the Commission may resolve the dispute.

On August 9, 2019, the Commission received a final award by the National Telecommunications Information Administration (NTIA) regarding a 9-1-1 grant program being jointly administered by the NTIA and the National Highway Traffic Safety Administration. The award amount is nearly $2.3 million in federal funds to assist local 9-1-1 governing bodies with the transition of Colorado's PSAPs to the ESInet[17], along with nearly $1.6 million in matching funds designated by the Commission for that purpose.[18] Work will commence to ensure all processes are in place for local 9-1-1 governing bodies to submit for reimbursement of their non-recurring costs for migration to the ESInet.

The 9-1-1 network reliability workshops authorized by the Commission and initiated earlier this year are ongoing.[19] Commission staff will continue to facilitate those workshops with the goal of providing the Commission with a recommendation before the end of the year.

Commission staff will be completing annual reporting requests from the Federal Communications Commission and the National 9-1-1 Program. Commission staff is aware of several local 9-1-1 governing bodies that are preparing 9-1-1 surcharge applications for the Commission. Commission staff will 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 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.

Commission staff currently assigned to matters related to 9-1-1 for the 2019-2020 fiscal year include:

- Daryl Branson, state 9-1-1 program manager
- Holly Bise, state relay administrator

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

[17] See Grant Opportunity NHTSA-NTIA-911-GRANT-PROGRAM-2018. https://www.grants.gov/web/grants/view-opportunity.html?oppId=307868
[18] See Decisions C18-0751 and C19-0331.
[19] See Proceeding 19M-0026T and Decision C19-0117-I.

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.

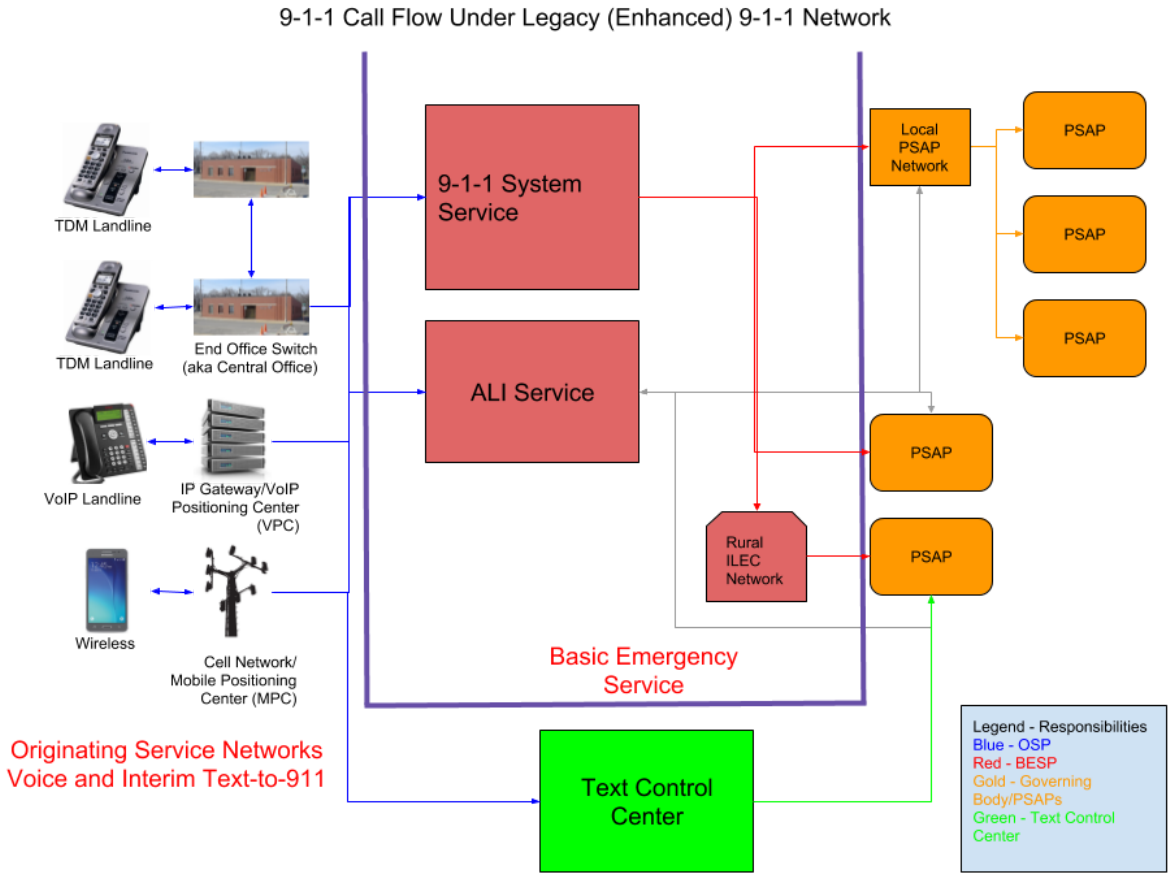

Figure 2.1: Legacy 911 Network Call Flow

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[20]. BES also includes the delivery of location information which is associated with a 9-1-1 call[21]. CenturyLink is currently the only BESP in Colorado delivering 9-1-1 calls to PSAPs.

There are currently 84 primary PSAPs in Colorado (PSAPs that receive 9-1-1 calls directly from the BESP), and six secondary PSAPs (PSAPs that only receive 9-1-1 calls transferred from a primary PSAP and delivered by the BESP). 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 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." See Section 3 for information about Colorado's migration to Next Generation 9-1-1.

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).

[20] § 29-11-101(1.2), C.R.S.
[21] 4 *CCR* 723-2-2131(j).

- 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.

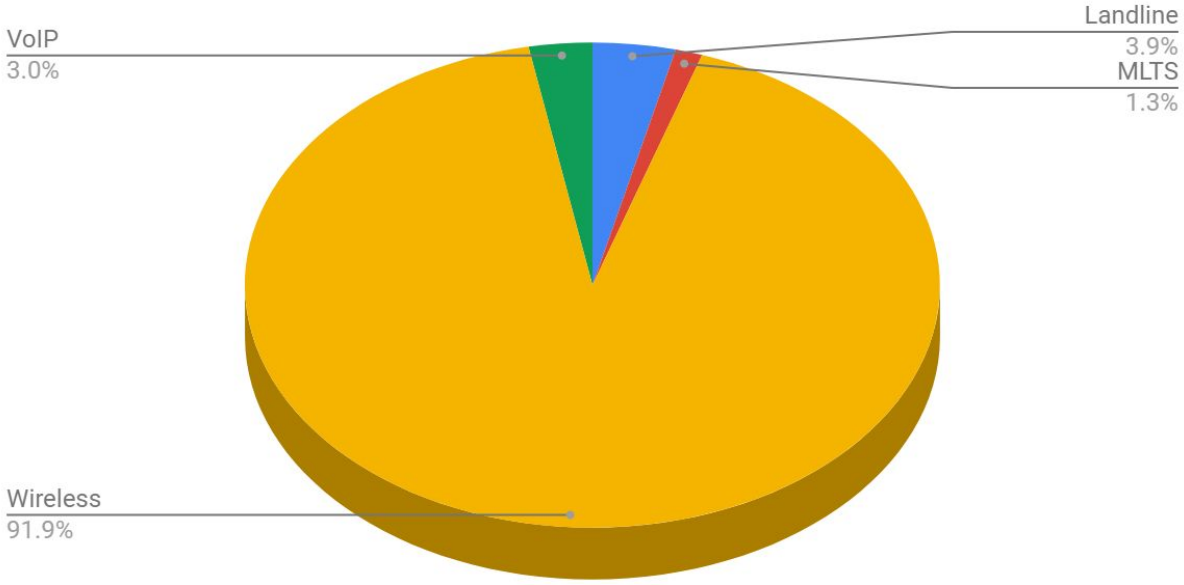

Figure 2.2: 2018 State-wide ALI Bids by General Category of Service

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[22].

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

General Operations

Operations within Colorado's 90 PSAPs (84 primary and 6 secondary) are locally controlled. PSAPs are often operated as a part of a local law enforcement agency but are sometimes operated as independent agencies 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 needs can access the 9-1-1 system in Colorado.

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.

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.

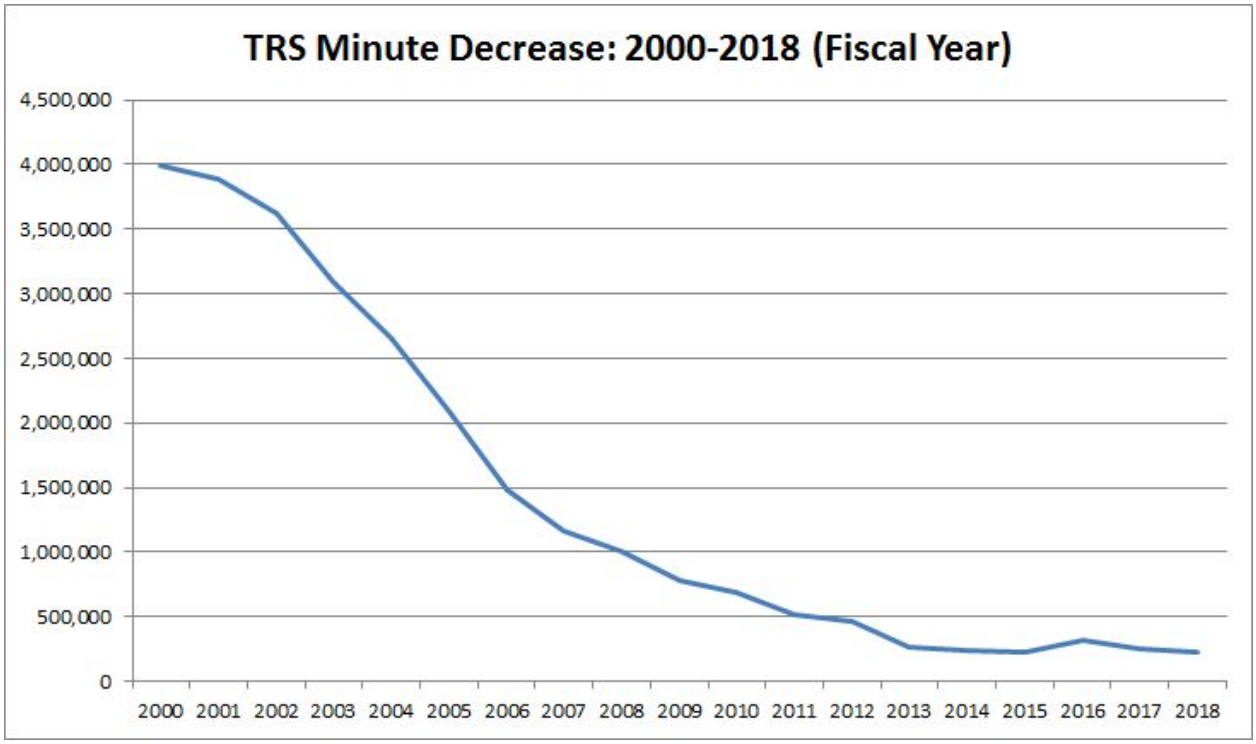

Figure 2.3: Number of minutes of state TRS service usage by fiscal year.

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 75.6% of Colorado's primary PSAPs have implemented text to 9-1-1 service. The PSAPs providing text to 9-1-1 service cover 59.6% of the state by land area and 93.4% of the

state by population.

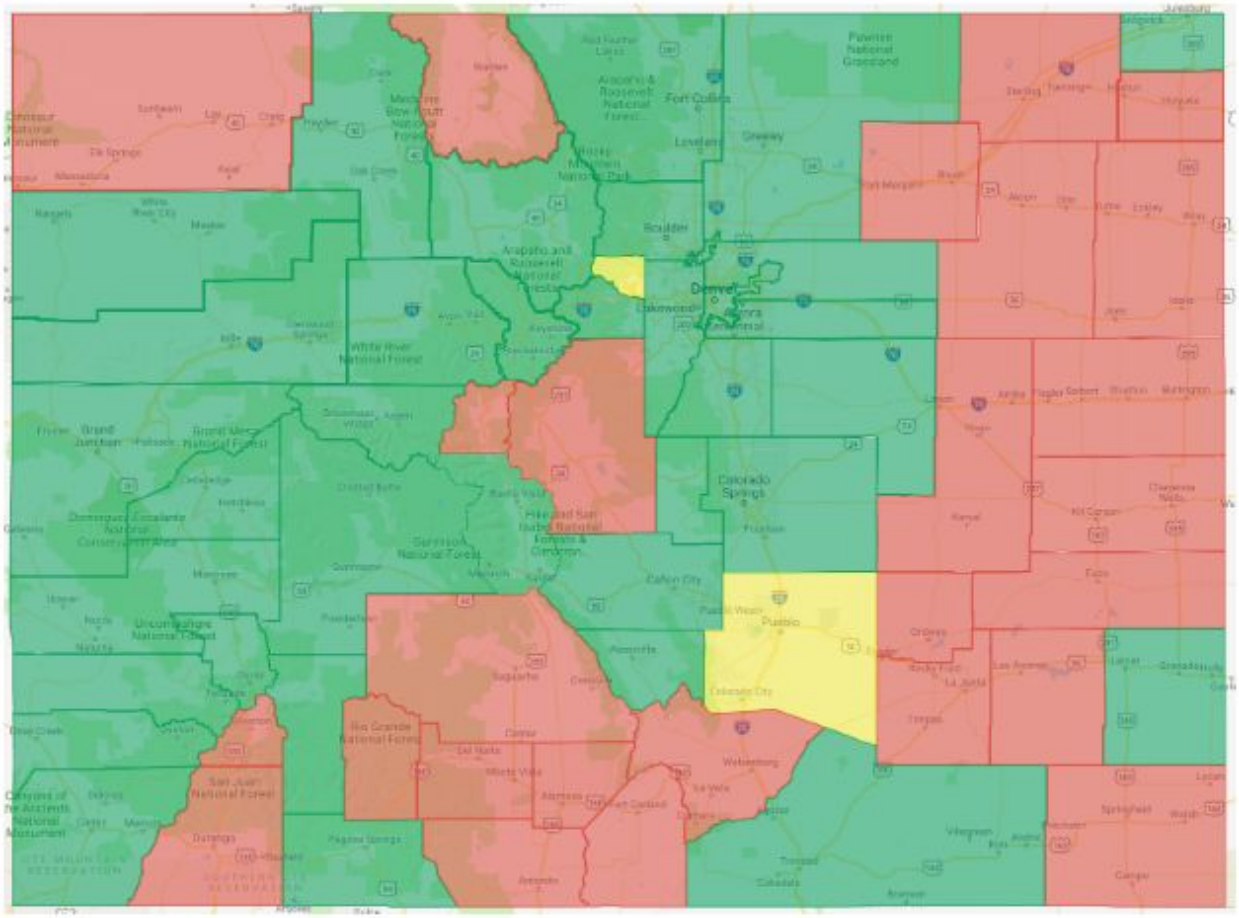

Figure 2.4: Text to 9-1-1 Availability as of July 31, 2019.

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 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.

NG9-1-1 does provide opportunities for more consistency in the availability of accessibility functions for 9-1-1 services. For instance, text to 9-1-1 is currently available on a PSAP by PSAP basis, with each PSAP implementing a separate solution for delivery of text 9-1-1 calls to the PSAP. After the state-wide implementation of the Emergency Services IP network described in Section 3, it will be possible to deliver text to 9-1-1 to every PSAP via the same call path that PSAPs use to receive voice 9-1-1 calls. Whether this or similar solutions are the best path for Colorado is a topic that will need to be explored by the Commission and local 9-1-1 stakeholders.

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 developed for 9-1-1 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. As a result, the location information typically delivered to the PSAP today, known as Automatic Location Information (ALI), is often then handset-based location that is available to applications and other commercial services.

Currently, wireless carriers, handset manufacturers, and even smartphone operating system developers are working to fix this. For example, both Apple and Google have announced partnerships with a firm called RapidSOS to provide handset-based location to PSAPs for every 9-1-1 call from devices using their operating systems. 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.

Currently, the Federal Communications Commission is also working with stakeholders to develop rules concerning the implementation of Z-Axis, or altitude, coordinates to be included with the location information for wireless 9-1-1 calls. If implemented, the inclusion of this data could be used to help locate callers in multi-floor buildings.

"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. 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 produced a good primer video for and introduction to what NG9-1-1 is and what its benefits are[23].

It should be noted that the implementation of NG9-1-1 is a transitional process. The FCC's Task Force on Optimal PSAP Architecture (TFOPA) developed an NG9-1-1 Maturity Model that helps illustrate the different areas of NG9-1-1 deployment, including legacy, foundational, transitional, intermediate, and end state for different aspects of NG9-1-1 deployment, governance, and funding.[24] Colorado currently fits the descriptions for the "foundational" level of deployment in most of the domains identified in the model, and will soon be entering the "transitional" level of deployment in other areas as the Emergency Services IP network (ESInet) begins to be deployed in the state. A more complete analysis of Colorado's position within the Maturity Model will be conducted as part of the development of an State NG9-1-1 Plan over the coming year.

NG9-1-1 and ESInet

Throughout this document, there is a differentiation between two related terms, NG9-1-1 and ESInet. As described above, NG9-1-1 describes a full suite of technologies and components that fully replace every aspect of a legacy (non-IP) 9-1-1 network, as well as provide the capability of additional functionality to the 9-1-1 network that is not supported in legacy networks.

An ESInet is a part of that suite of technologies and components. It is an IP-network connected to every Public Safety Answering Point (PSAP) in a given geographic area (such as state-wide) that allows for delivery of 9-1-1 calls and other data to PSAPs in Internet Protocol (IP) format. While it by itself does not constitute NG9-1-1, it is an important foundational component for the implementation of NG9-1-1.

[23] https://www.911.gov/ng911movie.html
[24] https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf

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

As of the last edition of this report, negotiations were ongoing between the parties in the proceeding for CenturyLink's Emergency Services IP-network (ESInet) tariff[25]. A joint proposed settlement[26] was filed in the proceeding on August 31, 2018, and Hearing Commissioner Wendy Moser held hearings to gather additional testimony regarding the settlement and the proposed tariff that was part of that settlement. In December of 2018, Hearing Commissioner Moser issued a Recommended Order[27] that became the final decision of the Commission, which approved the Settlement with additional requirements. A final version of the tariff was filed by CenturyLink on December 28, 2018[28], and subsequently modified through an additional filing on May 10, 2019[29].

The tariff, now approved, contains a schedule for each Public Safety Answering Point (PSAP) in the state to migrate from the CenturyLink legacy Emergency 9-1-1 network to the ESInet over the course of 13 months, starting in October of 2019 and completing in October of 2020. The migration is mandatory, since CenturyLink has stated that it is their intention to retire the legacy 9-1-1 tariff once every PSAP has been migrated to the new network, at which point the ESInet tariff will be the only one on file with the Commission, unless another provider becomes certified as a Basic Emergency Service Provider and files a competing tariff.

The approved Settlement called for the creation of an ESInet Users Group as part of the Commission's 9-1-1 Advisory Task Force. This Users Group has started meeting, and identifying concerns and issues of the local 9-1-1 governing body representatives that make up the voting membership of the body. This Users Group will monitor the progress of the

[25] See Proceeding 17AL-0487T.
[26] https://www.dora.state.co.us/pls/efi/EFI.Show_Filing?p_fil=G_747895&p_session_id=
[27] See Decision R18-1063.
[28] See Proceeding 18AL-0916T.
[29] See Proceeding 19AL-0238T.

implementation and help resolve issues as they are identified between CenturyLink and the 9-1-1 governing bodies or Public Safety Answering Points. Commission staff is also participating in the meetings. If issues cannot be resolved within the ESInet Users Group, parties may still petition the Commission for resolution.

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. While much of the work of the ESInet Users Group will be focused on ensuring a smooth transition from the legacy 9-1-1 network to the ESInet, planning the future development of that ESInet, and negotiating the details and costs of that development with CenturyLink, will also be part of the duty of the ESInet Users Group.

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

- Geographic information system (GIS) dataset development for geospatial routing and other uses in a fully developed NG9-1-1 system.
- The implementation of advanced policy routing functions to better serve the PSAPs.
- Determining what advanced services should be implemented via the ESInet, and how such services should be implemented and how they will be paid for. Examples of such advanced services potentially include state-wide text-to-911 service, delivery of pictures or videos from 9-1-1 callers to PSAPs, caller-provided medical data, automatic crash notification data, extended caller location information, and more.
- Monitoring reports from CenturyLink regarding cybersecurity activity and network performance measures, as specified in the tariff.

While the ESInet Users Group will primarily be focused on ensuring a smooth migration of Colorado's PSAPs to the ESInet during the migration scheduled to begin in October of 2019 and conclude in October of 2020, the ESInet may be able to provide a more definitive timeline for these other stages of NG9-1-1 transition by mid- to late-2020.

In addition to these efforts, Commission staff plans to engage the ESInet Users Group to help develop a comprehensive State NG9-1-1 Plan using the template provided by 911.gov for that purpose.[30]

[30] 911.gov, Draft Guidelines for State NG911 Plan, Version 2.0. Published 2018.

A critical component of the planning, transition, and implementation of the ESInet is ensuring proper funding. The new tariff states that the previous tariff rates remain in place until each PSAP has transitioned to the new network, but that once each particular PSAP has transitioned, the new rates take effect. These new rates are significantly higher than they were for the legacy 9-1-1 tariff. The legacy 9-1-1 tariff rates, aggregated state-wide, cost 9-1-1 governing bodies approximately $2.9 million per year, whereas the estimated costs for service under the ESInet tariff are approximately $5.9 million per year. See Section 7 for a full discussion of funding.

Projected Timeline for Full Implementation

It is not possible to provide a timeline for full implementation of Next Generation 9-1-1 at this time, since it is the ESInet Users Group that will be creating the roadmap and timeline toward full implementation in the coming months and years. However, the timeline for implementing the ESInet, which is the foundational platform for NG9-1-1, is established in the ESInet tariff.[31]

Douglas County is currently scheduled to be the first PSAP to migrate to the ESInet with a target date of October 1, 2019, and the final PSAP, the State Patrol Dispatch office in Montrose, which answers 9-1-1 calls for San Juan County, is scheduled for migration with a target date of October 29, 2020.

This schedule can be adjusted by agreement between CenturyLink and the local 9-1-1 governing body, per the tariff. If the parties cannot agree on the change in the schedule, either party may petition the Commission for resolution, but it is also hoped that the ESInet Users Group may serve as a forum for resolving such disagreements.

Starting on October 1, 2019, CenturyLink must also file with the Commission updates regarding its progress in implementation, including any changes to the schedule as approved in the settlement.[32]

Commission staff has been coordinating with the Colorado 9-1-1 Resource Center and CenturyLink to provide a series of regional workshops to inform local 9-1-1 governing bodies and PSAPs regarding the coming changes, including the migration schedule and the changes to the tariffed rates, as well as to encourage all local 9-1-1 governing bodies to participate in the ESInet Users Group.

[31] See Proceeding 18AL-0916T. The schedule begins on page 49.
[32] See Decision R18-1063 at paragraph 60.

4. 9-1-1 Network Reliability and Resiliency

Current Status

Terms of particular importance to this section:

- *Redundancy - Additional or alternate instances of network devices, equipment and communication mediums that are installed within network infrastructure as a method for ensuring network availability in case of a network device or path failure and unavailability. Example: Having two separate fiber optic paths between two points in the network.*
- *Diversity[33] - The physical separation of redundant network devices, equipment, and communication mediums necessary to reduce the likelihood of one event causing a failure in both redundant components. Example: Routing two redundant fiber optic lines via geographically separated paths so that a single event, such as a flood or a fire, is unlikely to damage both components.*
- *Resiliency - The level of ability of a network to continue operating despite damage or failure to individual components. The level of resiliency a network possesses is to a large extent the result of its redundancy and diversity.*
- *Basic Emergency Service - The portion of the call flow from the point at which 9-1-1 calls are aggregated from originating service providers (OSPs) to the point that they are transmitted across the demarcation point to a Public Safety Answering Point (PSAP). Location information associated with 9-1-1 calls is also considered part of Basic Emergency Service.*

State statute provides the Commission authority over Basic Emergency Service[34], but with some exceptions deregulates other telecommunications services.[35] Commission rules, therefore, only require notification from carriers for outages to Basic Emergency Service.[36] In practice, this means that the Commission generally only receives outage notifications from the Basic Emergency Service Provider (BESP), currently CenturyLink, and from some rural Local Exchange Carriers in instances where they are providing the portion of Basic Emergency Service by delivering 9-1-1 calls to the PSAP.[37]

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[33] For a much more in-depth discussion of network diversity, see iGillottResearch Inc, "Network Diversity and Survivability: Five ways to evolve to true diversity." Published 2016. https://business.timewarnercable.com/content/dam/business/pdfs/resource-center/white-papers/TWCBC%20Network%20Diversity%20and%20Survivability%20White%20Paper%202016.pdf

[34] § 40-15-201 (2), C.R.S.

[35] § 40-15-401 (3) and (4), C.R.S.

[36] 4 *CCR* 723-2-2143 (g)

[37] The Federal Communications Commission requires reports from carriers experiencing any outage in excess of 900,000 user-minutes, defined as the duration of the outage in minutes multiplied by the number of users affected by the outage. However, these reports are considered confidential and are not shared with the states. See 47 CFR § 4.2, 4.9 and 4.11. The FCC issued a Notice of Proposed Rulemaking in March of 2015 seeking comment on whether outage reporting data obtained by the FCC

Because of this distinction, there are types of disruptions to 9-1-1 service that are **not** captured in the data collected by the Commission. Examples of those types of outages not reflected in our statistics include:

- Outages originating due to failure of an originating service provider's network.
- Outages affecting local landline customers but not affecting a PSAP directly.
- Outages occurring due to a failure of a local network past the demarcation point with the PSAP.
- Outages occurring due to an equipment failure at a PSAP, or due to the failure of a third-party hosted service contracted by a PSAP.

With these limitations in mind, the Commission provides the following statistics in regard to Basic Emergency Service outages.

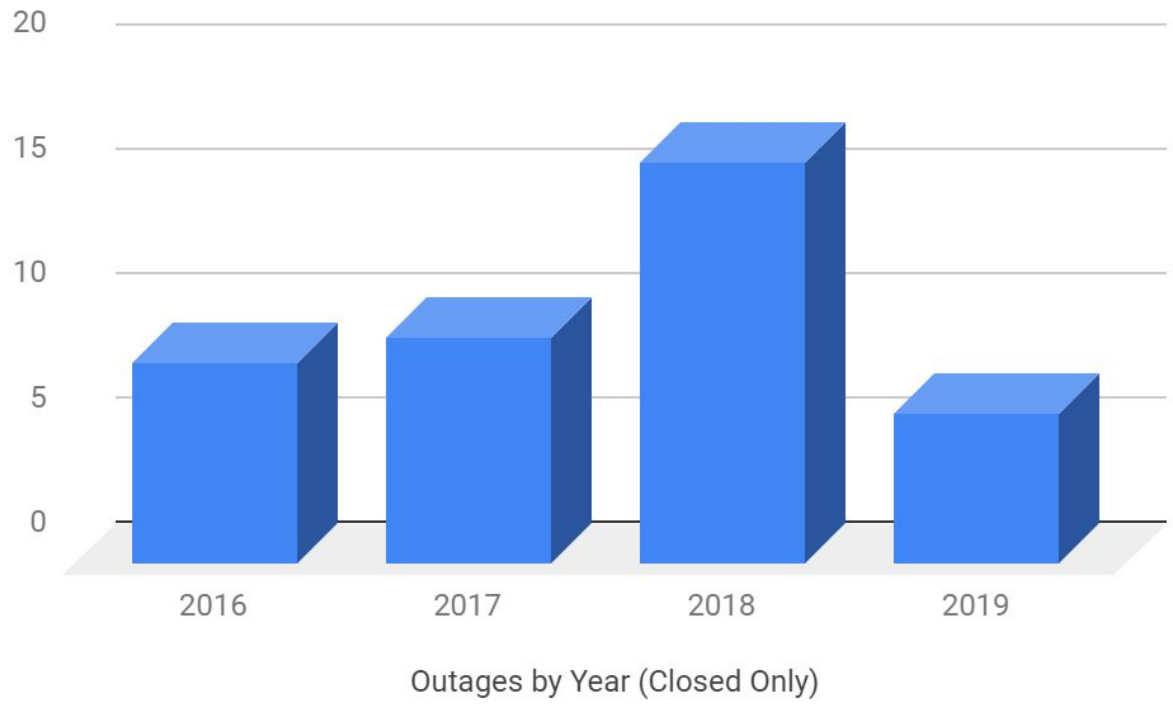

Figure 4.1: Outages by Year. 2019 YTD shows outages as of July 25, 2019.

should be shared with the states, but never took action on the comments received. See FCC 15-39, paragraphs 48-55.

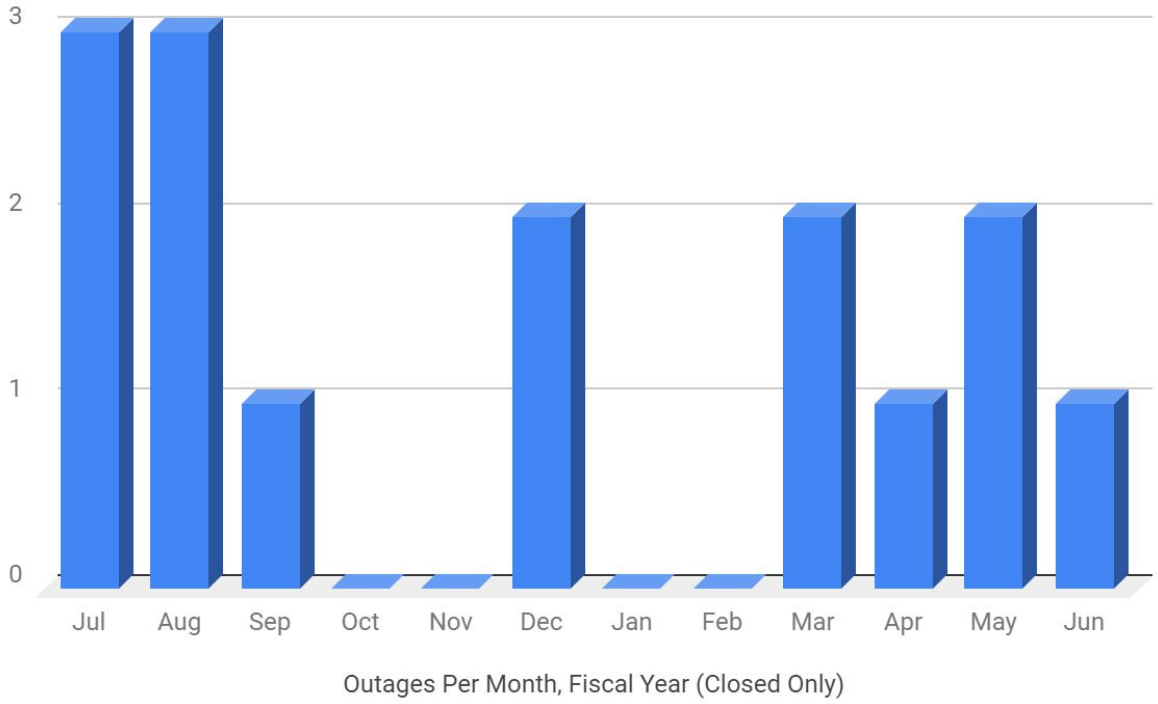

Figure 4.2: Outages per Month, July 2018-June 2019.

Commission staff maintains a Basic Emergency Service Outage Dashboard[38], which is updated with outage data as we receive it from the BESP and from the rural Local Exchange Carriers.

In 2013, the Commission initiated an inquiry into 9-1-1 network performance following recent floods and fires[39]. 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[40].

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[38] https://docs.google.com/spreadsheets/d/e/2PACX-1vRJtEttZSSxe6VZAq3kFRQcQ_NvcDtnf-jzNMBbrEsEuwRUN2lkDkGP1pkZ91x34hy3AUsPK7tYgzpO/pubhtml?gid=676399402&single=true

[39] See Proceeding 13I-1147T.

[40] See Decision R14-0303.

Commission Process for Improvement

4 *CCR* 723-2-2143 (a) (II), effective in March of 2018, requires each BESP to file with the Commission a plan for resolution of any components of the Basic Emergency Service that currently lack in diversity, and estimates for how much such resolution would cost. In response to this rule, on January 9, 2019 CenturyLink filed with the Commission a list of all areas of its Basic Emergency Service network currently lacking redundancy and diversity.[41] On January 29, the Commission issued an interim decision directing CenturyLink to conduct an informal stakeholder workshop to review CenturyLink's plan and to report back every two months to the Commission.[42] These workshops are ongoing.

Per the Commission's rules, the result of this process is to be a 911 Diversity Plan that can be approved by the Commission, associated with either a modification of the existing Basic Emergency Service Tariff or a new tariff to be filed to provide the funding for potential improvements to the Basic Emergency Service network's redundancy, geographic diversity, and resiliency[43].

The creation of an additional tariff, or an increase to the existing one, is problematic at a time when the 9-1-1 governing bodies are already having to make financial adjustments to pay the higher rates that they will be charged upon migration to the ESInet. With a separate state-wide funding source for 9-1-1, as described in Section 5 and Section 7 of this report, improvements to BES network resiliency could be funded without requiring additional payments from local 9-1-1 governing bodies.

Through the 9-1-1 resiliency workshops described above, it has also been concluded that some areas of Basic Emergency Service where redundancy and diversity are currently lacking should be resolved with the migration to the ESInet. As the migration for each PSAP is planned and implemented, benefits gained in improved 9-1-1 network resiliency will also be monitored.

CenturyLink is also required to file a contingency plan annually, the most recent being filed May 3, 2019[44]. The purpose of this requirement is to ensure that CenturyLink has, on file, a list of current contacts for all of the PSAPs as well as phone numbers for alternate routing of 9-1-1 calls, when necessary. The contents of these reports may be expanded in the future, and may be done so without a rulemaking.[45]

[41] See Proceeding 19M-0026T.
[42] See Decision C19-0117-I.
[43] 4 *CCR* 723-2-2143(a)(III).
[44] See Proceeding 18M-0294T.
[45] 4 *CCR* 723-2-2143 (d) (V), C.R.S., includes as one of the components of the annual contingency plan "any other details deemed relevant as determined by the relevant parties or the Commission".

5. Gaps, Vulnerabilities, and Needs

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

These challenges are largely unchanged from the last edition of this report, although they have been reordered somewhat to highlight our first challenge - the lack of funding for a transition to a Next Generation 9-1-1 system capable of meeting user expectations now and into the future.

1. **User Expectations Are Outpacing System Capabilities and Funding Mechanisms:** User expectations are driven primarily by the functionality available in commercial communications networks, which include the ability to send text messages, pictures, video, and other types of data. In order to accommodate functionality that exists within commercial communications, the existing "legacy" 9-1-1 system must be upgraded to a Next Generation 9-1-1 (NG9-1-1) system. NG9-1-1 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.

   The ongoing migration to Emergency Services IP-Network (ESInet) 9-1-1 call delivery, as described in the CenturyLink ESInet tariff,[46] represents the first step in modernizing Colorado's 9-1-1 call delivery infrastructure to better meet public expectations. The ESInet is the foundational component of NG9-1-1. However, the ongoing costs of the ESInet are significantly higher than those of the legacy E9-1-1 system. Under the tariff for legacy E9-1-1 service state-wide costs for Basic Emergency Service delivery of 9-1-1 calls to the Public Safety Answering Points (PSAPs) were approximately $2.9 million per year. Under the new ESInet tariff we are expecting those charges to be approximately $5.9 million per year.

   Federal grant funds recently awarded to Colorado, along with matching funds made available by the Commission, will be available to assist local 9-1-1 governing bodies with the nonrecurring costs of the migration from the legacy 9-1-1 network to the ESInet, but over the long term additional funding will be required through a supplemental state-wide 9-1-1 surcharge, through higher local 9-1-1 surcharges, or through some other funding mechanism.

   Other activities must also be undertaken for full implementation of NG9-1-1, such as the development of a comprehensive state-wide geographic information system (GIS)

[46] See Proceeding 18AL-0916T.

dataset containing, at a minimum, road centerlines, site/structure address points, PSAP boundaries, emergency service boundaries, and provisioning boundaries. A number of additional GIS data layers are either recommended or highly recommended [47]. As all 9-1-1 funding in Colorado is local, there is no identified funding source for state-level or state-wide projects of this sort.[48]

2. **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. The Commission is currently hosting a series of workshops for CenturyLink and local 9-1-1 stakeholders to examine the issue and provide mitigation recommendations. However, improving network resiliency in these areas will incur costs that will have to be passed on to local 9-1-1 governing bodies through a tariff revision unless a state-level funding source is identified.

3. **Lack of Funding Accountability for Local 9-1-1 Surcharge Fees:** A 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[49]. However, most of Colorado's 9-1-1 governing bodies lack the resources to undertake such audits.

4. **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, and are 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 9-1-1 governing bodies in the state[50]. 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 required to remit prepaid 9-1-1 surcharge fees are doing so.

5. **The 9-1-1 Surcharge Rate Threshold for Commission Approval Has Not Been Adjusted for Inflation in 29 Years**: There is a 70¢ threshold for requiring approval from the Commission for higher 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 Commission approval being required for surcharge rates that are relatively low. Currently, only one local 9-1-1 governing body (out of 58) has a 9-1-1 surcharge under 70¢.

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[47] 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

[48] Weld County 911 Emergency Telephone Service Authority Board has expressed disagreement with the inclusion of this challenge, stating that they believe local agencies can meet the gaps identified in this challenge by forming consortiums and partnerships.

[49] § 29-11-103(3)(b), C.R.S.

[50] § 29-11-102.5, C.R.S.

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 state-wide training program for telecommunicator training, initiated by the Colorado 9-1-1 Resource Center and continued by the Colorado 9-1-1 Training Standards Institute, have received only modest participation due to resource and staffing constraints at the PSAPs that could most benefit from the program. The primary barrier to participation is funding to pay for travel to the training, backfill of that employee's position while they are in training, and reimbursement for personnel costs of instructors sent to support the training.[51]

7. **Colorado's MLTS Statute is Out of Alignment with Federal Requirements:** With the passage of Kari's Law[52], Colorado's own statute regarding the 9-1-1 capabilities of multi-line telephone systems (MLTS)[53] 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 first dialing another digit (such as "9") for an outside line. It also requires on-site notification that 9-1-1 has been dialed so on-site personnel can direct first responders to the correct location. Colorado's 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.

1. **Provide Funding for NG9-1-1 Implementation Necessary to Meet User Expectations:** Enact legislation establishing a supplemental, state-wide 9-1-1 surcharge (up to 50¢) to fund a State 9-1-1 Fund at the Commission. The existence of this fund is a necessary prerequisite for several of the other recommendations in this section, including offsetting the costs to local 9-1-1 governing bodies for implementation of state-wide Next Generation 9-1-1, particularly for small and/or rural 9-1-1 governing bodies that would otherwise have to raise local 9-1-1 surcharges in order to pay higher costs or request higher subsidies from county or municipal budgets.[54]

2. **Improve Basic Emergency Service Network Reliability and Resiliency While Balancing Costs**: A series of workshops on the topic of 9-1-1 network resiliency are

[51] Weld County 911 Emergency Telephone Service Authority Board has expressed disagreement with the inclusion of this item, stating that training of public safety telecommunicators is a solely a local responsibility.
[52] H.R. 582 - Kari's Law Act of 2017.
https://www.congress.gov/bill/115th-congress/house-bill/582/text
[53] See § 29-11-106, C.R.S.
[54] Weld County 911 Emergency Telephone Service Authority Board has expressed disagreement with this solution, stating that they oppose the establishment of a separate state 9-1-1 surcharge.

currently underway (See Section 4). The stakeholders, which include CenturyLink, a number of local 9-1-1 governing bodies, and other interested parties, are reviewing documentation regarding lack of redundancy and diversity in the Basic Emergency Service network, and are exploring ways to resolve those issues in a cost effective manner. Ultimately, improvement of network reliability will incur costs that will have to be funded either by local 9-1-1 governing bodies through a state-wide tariff, or through a separate state-level funding source like the state-wide charge described in item #1. The recommendation is to continue the Commission's workshop process while also thinking ahead regarding options for funding improvements to the 9-1-1 network.

3. **Provide Funding Accountability for Local 9-1-1 Surcharge Fees:** Enact legislation authorizing the Colorado Public Utilities Commission to conduct audits or cause such audits to be conducted of telecommunications carriers' 9-1-1 surcharge remittance practices, and provide the funding necessary to undertake such audits. Such funding could be sourced from recommendation #1.

4. **Improve Funding Transparency for Prepaid 9-1-1 Surcharge Fees:** Enact legislation indicating that DOR shall provide the Commission with a list of retailers which are remitting prepaid 9-1-1 surcharges to DOR. This would allow local 9-1-1 governing bodies to notify the Commission of retailers in their jurisdictions that are selling prepaid cell phone minutes or prepaid cell phone devices. A comparison of this list with the list from DOR should reveal discrepancies, if any, which could then be reported back to DOR for investigation.

5. **Update the 9-1-1 Surcharge Rate Threshold and Tie It to Inflation:** Enact legislation adjusting the threshold for requiring Commission approval to an amount commensurate with (i) the fact that the current threshold of 70¢ hasn't been adjusted for inflation since being put in place in 1990, (ii) the increased costs expected from the forthcoming transition to a digital IP-based ESInet and NG9-1-1, and (iii) the higher costs of providing 9-1-1 service that have developed over the last thirty years due to increased use of computer-based processes and the equipment, software, and IT support that comes with that development. The legislation should also 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[55]. The legislation should also eliminate the requirement for Emergency Telephone Charges (ETC) surcharge notices to be delivered by Registered Mail, which is costly and unnecessary with modern electronic communications.

6. **Implement State-wide Minimum Training Standards for Public Safety Telecommunicators**: Provide funding for the Colorado 9-1-1 Training Standards Institute to more effectively operate its voluntary training program on a state-wide basis. The funding for this program could be sourced from the mechanism described in

[55] See § 29-11-103(3)(a), C.R.S.

recommendation #1.[56]

7. **Align Colorado's MLTS Statute with Kari's Law**: Enact legislation to align Colorado's MLTS statute with the federal statute and provide the Commission with authority to promulgate and enforce rules in support of the revised statute. Kari's Law, enacted in February of 2018, requires all multi-line telephone systems (MLTS) manufactured, sold, or installed after February of 2020 to allow direct dialing of 9-1-1 without having to first dial another digit for an outside line (such as "9"). The legislature should also require MLTS to deliver location information for 9-1-1 calls, just as it is required for other 9-1-1 calls.

Vision

This section is new to this year's edition of this report. It is intended to provide a broad overview of what the future of 9-1-1 service in Colorado could look like.

Funding

As with many government services, the ability to achieve a specific vision largely revolves around funding. Colorado's current model of local funding for 9-1-1 service has worked well, preserving local control of 9-1-1 and public safety operations. This allows local authorities to configure systems and operations to best serve their individual jurisdictions. While this has been an important factor in providing high quality local 9-1-1 service in Colorado, there are state-wide aspects of 9-1-1, some of which are described throughout the rest of this section that are impractical to fund solely through local surcharges.

Vision: A bifurcated funding model which preserves the local control that 9-1-1 governing bodies and PSAPs currently enjoy, while facilitating the funding of certain aspects of 9-1-1 service on a state-wide level where it is more efficient and effective to do so. Commission staff has estimated that for every penny charged monthly through a state-wide 9-1-1 surcharge on landlines, wireless phones, and Voice-over-Internet Protocol (VoIP) service, approximately $650,000 would be raised for expenditures to benefit 9-1-1 service state-wide. Examples of these expenditures follow.

Ubiquity and Consistency of Service

Whether they are residents or visitors, 9-1-1 callers expect the service to work regardless of where they are, and they expect reasonably consistent levels of service across the state. Ubiquity and consistency of service are difficult to attain due to economies of scale, resulting in a higher per capita cost of 9-1-1 service in small communities. This is further exacerbated for communities with high levels of tourism, which must scale their 9-1-1 center capacities

[56] Weld County 911 Emergency Telephone Service Authority Board submitted comments stating that they oppose funding of state-wide training resources for public safety telecommunicators. The Colorado Municipal League also expressed disagreement with this solution.

accordingly while only receiving 9-1-1 surcharge funding from permanent residents who have local telephone billing addresses.

Vision: A grant or subsidy program for small or rural 9-1-1 governing bodies and PSAPs would be implemented. This may also slow the march toward higher local 9-1-1 surcharges, which are often sought by local 9-1-1 governing bodies.

State-wide 9-1-1 Training Program

Colorado is one of a small minority of states that do not have a state-wide 9-1-1 training program. Currently, a nonprofit entity called the Colorado 9-1-1 Training Standards Institute is providing voluntary new-hire training for public safety telecommunicators (call takers and dispatchers) to participating PSAPs, but participation is limited due to the costs associated with sending employees out of town for training, backfilling positions in the PSAP, and committing trainers to teach the courses.

Vision: A funded state-wide 9-1-1 training program that establishes a minimum level of training for public safety telecommunicators without imposing unfunded mandates on local agencies. Achieving this vision would also contribute to the previously expressed vision of providing consistency of 9-1-1 service state-wide.

Next Generation 9-1-1 Implementation

A state-wide Emergency Services IP network (ESInet) will provide the foundation for future implementation of Next Generation 9-1-1. However, there is much to be done as part of that implementation. For instance, a state-wide Geographic Information Systems (GIS) project is required to create and maintain the datasets needed for geospatial routing of 9-1-1 calls and other purposes. Implementation of state-wide text-to-911 service via the ESInet, data and multimedia services, and CAD-to-CAD data transfer are other examples of potential benefits of NG9-1-1 that will require additional effort and funding.

Through the creation of the ESInet Users Group, the Commission has established the mechanism by which the local 9-1-1 governing bodies may help form the future of what NG9-1-1 in Colorado will look like, but each new service or layer of features operating on the ESInet will come with additional costs. With few exceptions, it is unlikely that current funding will be sufficient to implement the level of service that NG9-1-1 is capable of providing and what the citizens and visitors of the State of Colorado deserve and expect.

Vision: Continued development and enhancement of the ESInet in accordance with the vision and planning of the ESInet Users Group, which is made up of representatives of all of the local 9-1-1 governing bodies in the state, along with the funding to allow for the implementation of the features and services identified by the Users Group as important to the delivery of 9-1-1 service in the state.

6. 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[57].

- Next Generation 911 for Public Safety Leaders: A collection of resources for educating public safety professionals learn about the benefits of Next Generation 9-1-1.

- Next Generation 9-1-1 Cost Study: In response to a request from Congress, the 911 Program conducted and published a study of anticipated costs of migrating to a fully implemented NG9-1-1 system nationwide. This study, transmitted to Congress in October of 2018, is difficult to apply to state or local costs since each state has different funding and cost sharing mechanisms for paying for 9-1-1 upgrades. However, the study is an excellent resource for understanding the depth and complexity that is involved in a full-scale NG9-1-1 implementation.

- 9-1-1 Grant program: The administration of a $109 million grant program for the implementation of NG9-1-1 systems within the states and territories. Colorado was recently awarded approximately $2.3 million from this grant program to assist local agencies with the non-recurring costs of migrating from the legacy 9-1-1 network to an Emergency Services IP-network. See Section 7 for more information about Colorado's application for funding through this grant program.

- NG9-1-1 National Roadmap: This is a recent publication of the program 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.

- Strategic Planning for Collection and use of National 911 Data: In June of 2019, that National 911 Program published a *911 Data & Information Sharing Strategic Plan* that establishes goals for coordinating the collation of data from the nation's various 911 systems, leveraging the greater ease with which NG9-1-1 systems can collect data regarding 9-1-1 calls.

[57] See https://www.911.gov/current_projects.html.

- CPR LifeLinks: The program convened 9-1-1 and emergency medical stakeholders to compile and share best practices regarding the provision of cardiopulmonary resuscitation (CPR) instructions by telephone. They have since published an implementation toolkit and training materials for local agencies. Colorado does not currently require CPR by telephone or CPR training for public safety telecommunicators.

Other recent notable projects of the National 9-1-1 Program were to develop a recommended set of recommended minimum training guidelines for public safety telecommunicators[58], which are being used by the Colorado 9-1-1 Training Standards Institute as a guideline for their materials, as well as the development of Guidelines for Developing a State NG911 Plan[59], which is currently being reviewed by the Commission's 9-1-1 Advisory Task Force as a possible template for use in Colorado.

The Federal Communications Commission

The Federal Communications Commission (FCC) recently issued a Notice of Proposed Rulemaking[60] regarding the implementation of a Z-Axis requirement for location information associated with 9-1-1 calls from wireless devices. The FCC proposes to require that 9-1-1 location information for wireless devices be accurate to within 3 meters at least 80 percent of the time in testbeds, and implemented in the top 50 wireless markets in the country, a requirement that is to be phased in between now and 2022. The "top 50 cellular market areas" is a designation that includes the Denver-Boulder area, but no other region or city in Colorado[61]. The 3-meter proposal is a compromise between industry commenters who pushed for a 5-meter requirement and public safety organizations that stated that a 2-meter requirement was the minimum necessary to precisely identify on which floor of a building a caller is located.

The FCC also continues to pay 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[62], the FCC identified six states and one territory as having diverted 9-1-1 surcharge funds. Recently, two national organizations, the 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[63].

[58] See https://www.911.gov/pdf/Minimum_Training_Guidelines_for_911_Telecommunicator_2016.pdf
[59] See https://www.911.gov/pdf/Guidelines_for_Developing_a_State_NG911_Plan.pdf
[60] See FCC 19-20 in Proceeding PS 07-114. https://ecfsapi.fcc.gov/file/031804287561/FCC-19-20A1.pdf
[61] See https://transition.fcc.gov/bureaus/oet/info/maps/areas/names/cmanames.txt
[62] Federal Communications Commission. Tenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges for the Period January 1, 2017 to December 31, 2017. Retrieved July 5, 2019, from https://www.fcc.gov/files/10thannual911feereporttocongresspdf
[63] See https://blog.npstc.org/2018/03/12/fcc-urged-to-provide-more-guidance-on-911-fee-diversion/

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 most significant bills pending right now are:

- H.R. 1479 and S. 2760 - 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, and then reintroduced in May of 2019. The House version of this bill has been integrated into the LIFT Act, H.R. 2741.
- H.R. 2165 - 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. This bill was introduced previously, then reintroduced in April of 2019.

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[64]. The Program has unfortunately not yet published its updated edition for 2018, but 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[65]. 22 states reported that at least some of their PSAPs are now receiving 9-1-1 calls from an ESInet[66].

[64] 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
[65] Page 17
[66] Page 86.

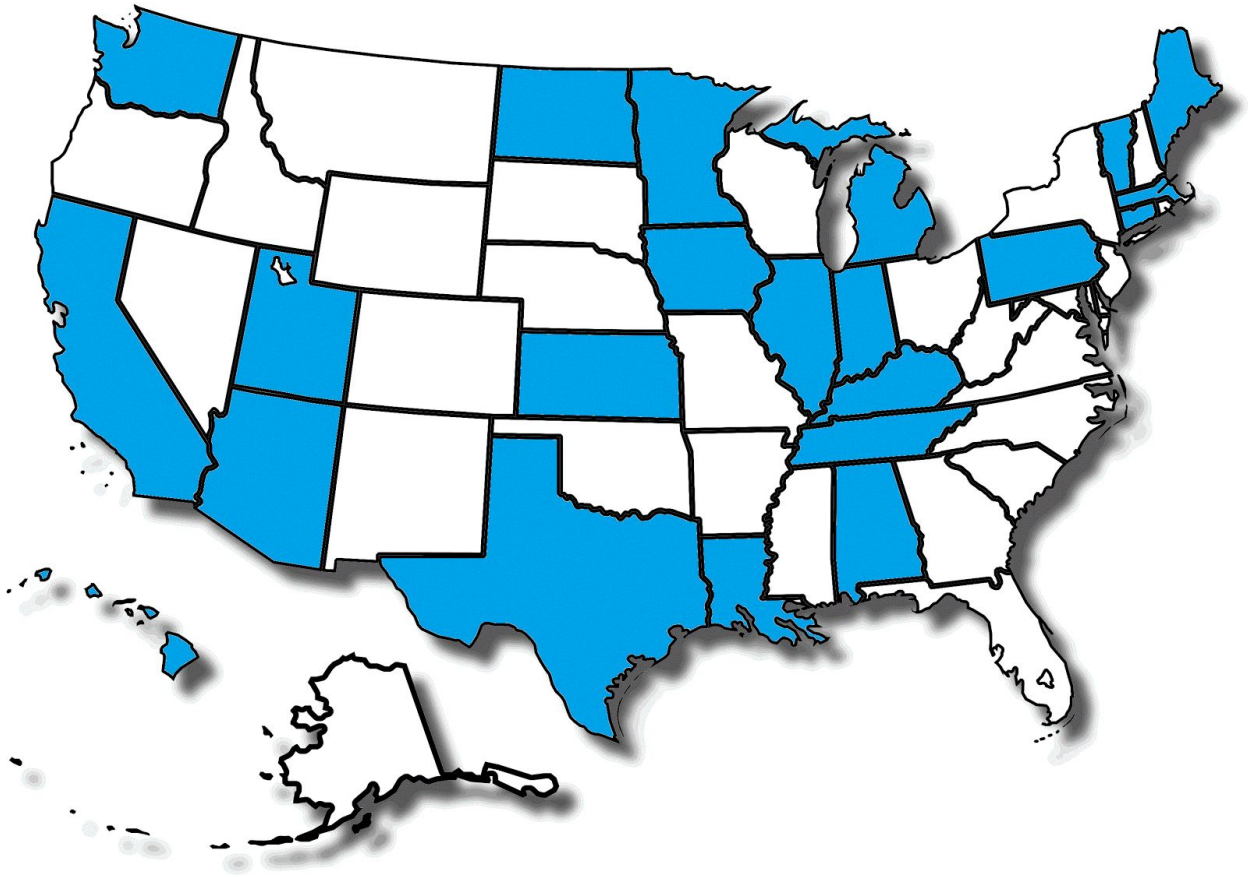

Figure 5.1: States that Deliver Calls to at Least Some PSAPs via an ESInet shown in blue. States without any calls being delivered to PSAPs via an ESInet shown in white.

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[67].

[67] http://deniseamberlee.org/

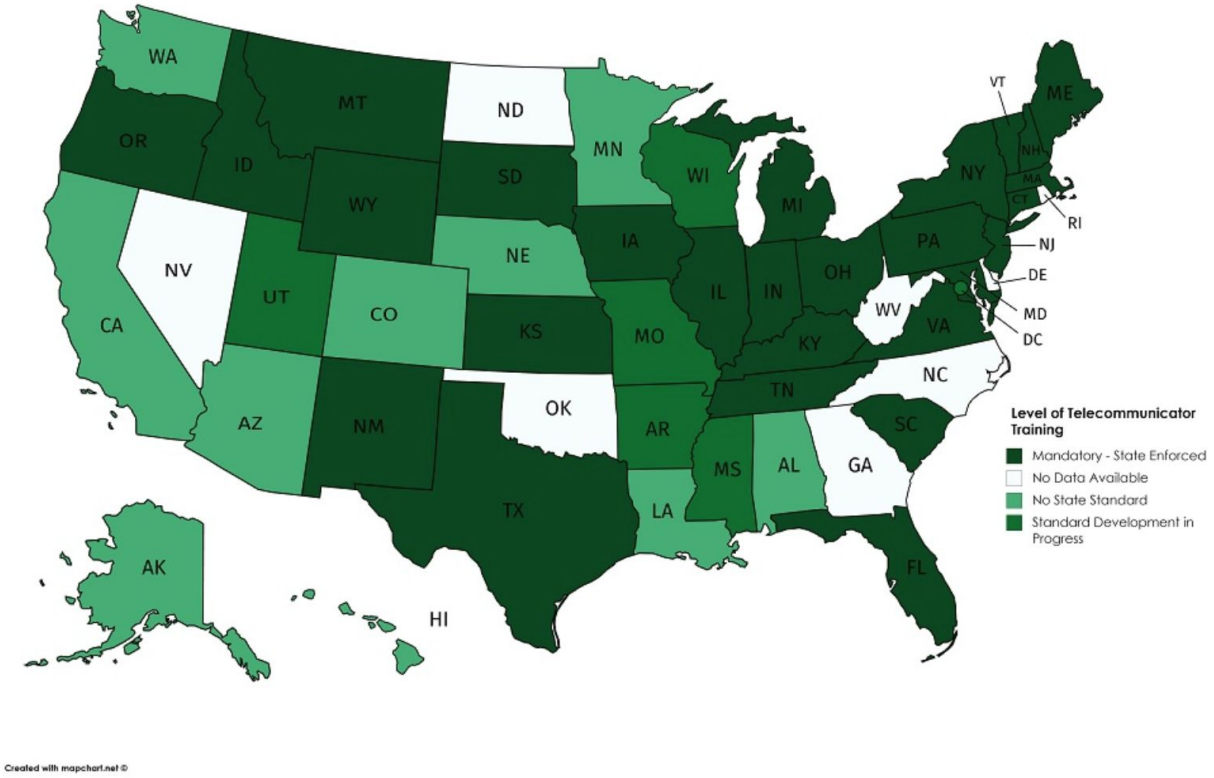

Figure 5.2: Mandatory Minimum Training Standards, by State. Source: Denise Amber Lee Foundation[68].

Funding

Nationally, states have a mix of locally set 9-1-1 surcharge, a single state-wide surcharge, or a hybrid of both methods. Our average 9-1-1 surcharge rate is currently $1.11 (up from $1.05 in last year's report), with a low of 50¢ and a high of $2.00. Nationally, state-wide 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[69].

Commission and Colorado Involvement

In the 2017-2018 edition of this report, we reported that the Commission had engaged in the national conversation regarding the advancement of 9-1-1 service in the following ways:

- The Commission filed comments[70] with the National Telecommunications and

[68] http://deniseamberlee.org/minimum-training-guidelines
[69] https://www.nena.org/page/911RateByState?
[70] 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 to which Colorado has just recently been named as a recipient[71]. These comments were developed with input from representatives of local 9-1-1 governing bodies and public safety answering points.

- The Commission filed comments[72] 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)[73].
- 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[74].

In December 2018, the FCC issued a request for comment regarding its Tenth Annual Report to Congress on State 911 Fees[75]. The Commission responded to this request by filing providing a number of suggestions for improvement of the FCC's annual reports to Congress[76].

Additionally, Commission staff continues to represent 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[77], CTIA's Location Accuracy Advisory Group, and the National 9-1-1 Program Office's NG9-1-1 Roadmap Working Group[78].

Outside of the Commission, local Colorado 9-1-1 stakeholders have also been active at the national level, including filing comments with the FCC on various proceedings and participation in workshops held by the FCC on the topic of 911 Outage Communications[79] and various working groups of the Communications, Security, Reliability and Interoperability Council (CSRIC).

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[71] See the Federal Registry entry for the NPRM, https://www.federalregister.gov/documents/2017/09/21/2017-19944/911-grant-program
[72] https://ecfsapi.fcc.gov/file/1113184553096/Enterprise%20911%20Comments.pdf
[73] See https://docs.fcc.gov/public/attachments/DOC-346896A1.pdf
[74] https://pubs.naruc.org/pub/8F429EFF-F393-27D0-4ABA-25FC0801F80B
[75] See https://www.fcc.gov/document/fcc-seeks-comment-tenth-annual-report-congress-state-911-fees.
[76] See https://www.fcc.gov/ecfs/filing/10124219858546.
[77] https://www.fcc.gov/about-fcc/advisory-committees/general/task-force-optimal-public-safety-answering-point
[78] https://www.911.gov/project_ng911roadmap.html
[79] https://www.fcc.gov/fcc-announces-911-outage-communications-workshop-sept-11

7. Funding and Fiscal Outlook

Current Funding Sources

Key points:

- *Colorado's Public Safety Answering Points have an estimated combined operational budget of approximately $323 million annually.*
- *An estimated $74 million was raised through local 9-1-1 surcharges and the prepaid 9-1-1 surcharge in 2018.*
- *Prepaid 9-1-1 surcharge revenue dropped nearly $300,000 between 2017 and 2018.*

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[80], as well as to the prepaid 9-1-1 surcharge.[81]
- "User fees" on agencies dispatched by the Public Safety Answering Point (PSAP).
- Local city and county general funds.

The majority of the operational costs for operating PSAPs in Colorado is paid for out of city and county general funds. In a survey conducted this year, Commission staff asked Public Safety Answering Points to provide their annual operating budget. Only 41 out of the 90 PSAPs surveyed responded to the question, but those combined 41 PSAPS provided a total operating budget of $120,633,244. The median cost per capita among the responding PSAPs is $45 annually. Applying this rate to the non-responsive PSAPs, taking into account their population, we estimate the total aggregate of PSAP operational budgets state-wide at about $323 million annually.

Additionally, not all costs are borne by the PSAPs. Some costs, such as charges paid to the Basic Emergency Service Provider for delivery of 9-1-1 calls to the PSAP, are paid directly by the 9-1-1 governing bodies. Most of the governing bodies also pay for some of the capital equipment in the PSAPs, as well.

In contrast, Commission staff has estimated, again based on partial data from the local 9-1-1 governing bodies, that about $74 million was raised state-wide through 9-1-1 surcharges in calendar year 2018. Most of the difference between these two figures, $249 million, is the responsibility of county and municipal governments.

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

[80] Authorized under § 29-11-102(2)(a)-(b), C.R.S.
[81] 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.

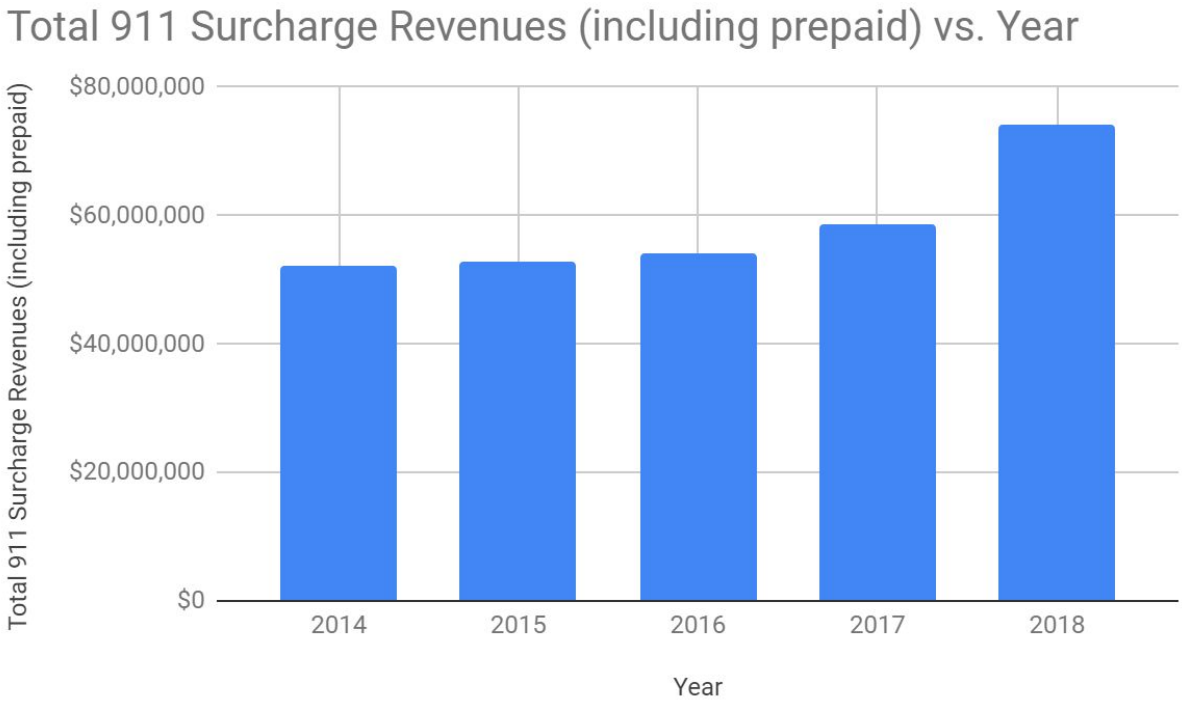

Figure 7.1: Estimated 9-1-1 surcharge revenues state-wide by year.

Although estimates of overall revenue state-wide have been increasing 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[82]. If the body determines that a surcharge rate in excess of 70¢ is necessary, it must first receive approval from the Commission[83]. This surcharge rate is applied equally to landline, wireless, and VoIP telephone services, and the telecommunications providers remit those surcharges directly to the local 9-1-1 governing body[84].

[82] § 29-11-102(2)(a), C.R.S.
[83] § 29-11-102(2)(b), C.R.S.
[84] § 29-11-102(2)(c), C.R.S.; 29-11-103(1), C.R.S.

9-1-1 surcharge rates in Colorado currently range from 50¢ per month (San Luis Valley E9-1-1) to $2.00 per month (Pitkin County)[85]. The current average 9-1-1 surcharge, state-wide, is $1.11.

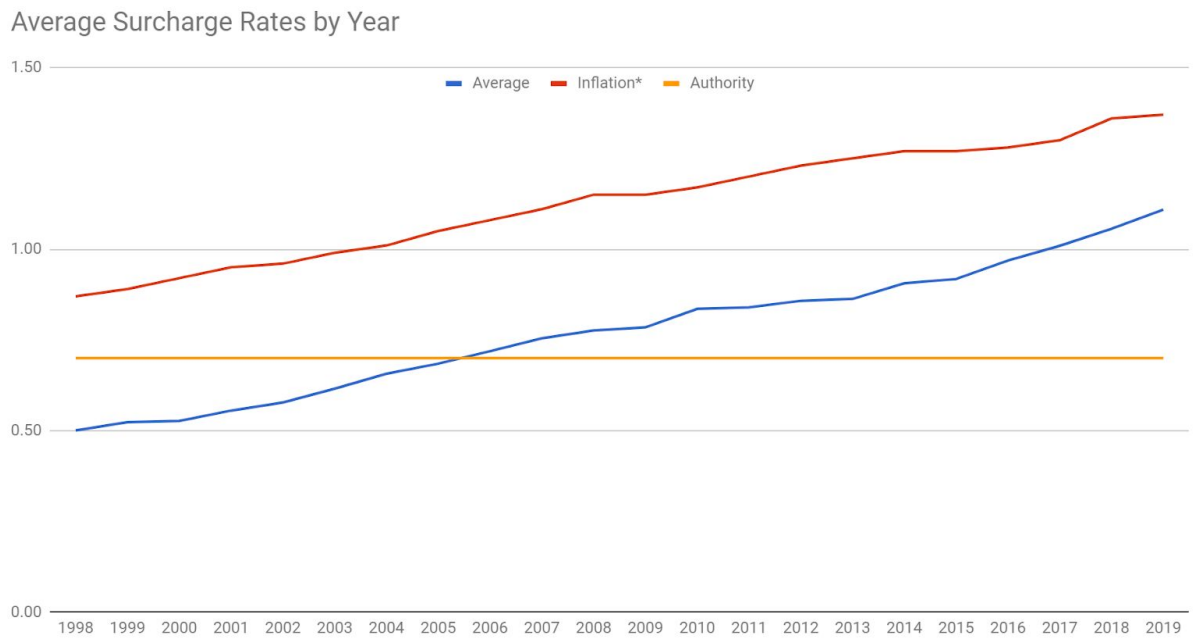

Figure 7.2: Average 9-1-1 Surcharge Rates in Colorado Since 1998 (blue) compared to 70¢ in 1990, adjusted for inflation to the current year (red). The threshold for PUC approval of 9-1-1 surcharge rates has remained unchanged at 70¢ (gold).

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.

[85] 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

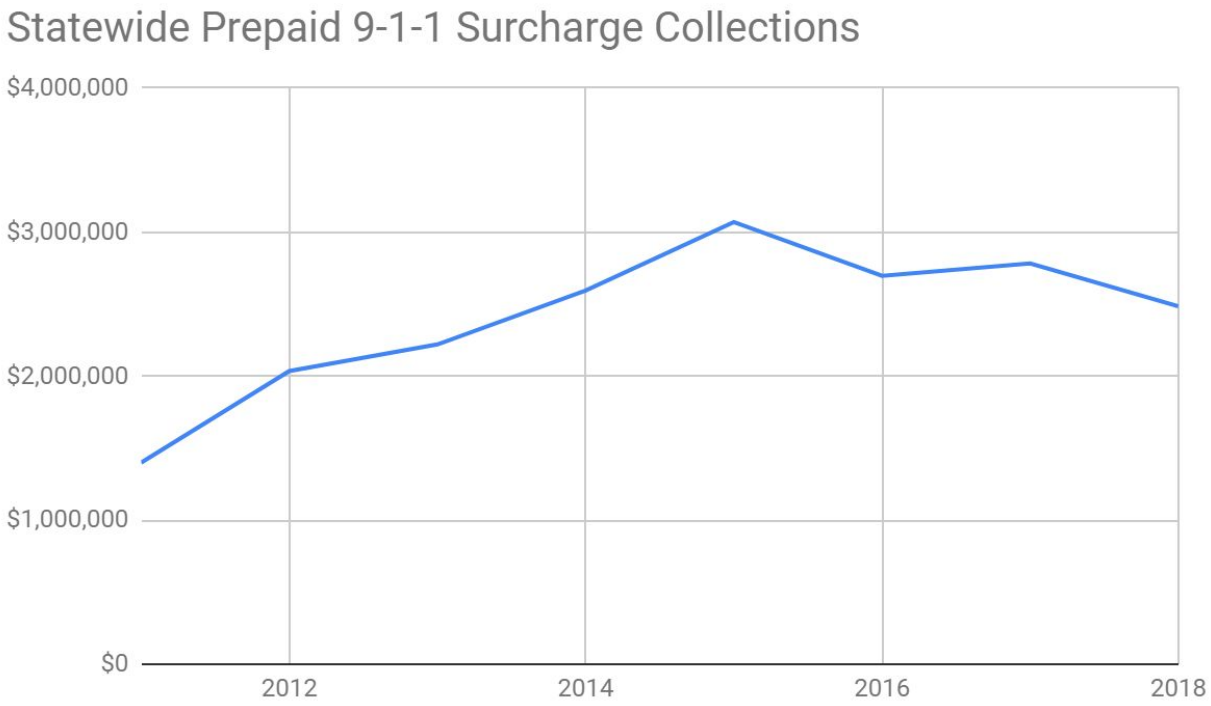

Figure 7.3: Prepaid Collections by the Colorado Department of Revenue, by Year

Revenue from prepaid 9-1-1 surcharges seems to have peaked in 2015. There was a slight increase in 2017 over the previous year, but 2018's total prepaid revenue is nearly $300,000 less than the previous year. As it is, in 2018 prepaid 9-1-1 surcharge revenue made up only 3.3% of the estimated 9-1-1 surcharges raised state-wide, but that is down from 5% in the previous year.

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.

- Statute current puts the onus of auditing carriers' practices as they related to 9-1-1 surcharge remittances on the local 9-1-1 governing bodies, which must conduct the audits at their own expense.[86] As many of the 9-1-1 governing bodies are very small and have very low budgets, this in practice means that very few audits are conducted to ensure that carriers are remitting properly and with the correct amounts.

The coming implementation of the ESInet tariff creates an additional burden to the local 9-1-1 governing bodies of approximately $3,000,000 per year. Under the legacy 9-1-1 tariff, total annual charges from the Basic Emergency Service Provider to the Public Safety Answering Points (PSAPs) amount to about $2.9 million per year. Under the ESInet tariff, it is estimated that total state-wide charges will amount to $5.9 million per year.

For each PSAP, the legacy E9-1-1 tariff rates continue to apply until the PSAP has been migrated to the new network, and each PSAP has a target migration date sometime between October 1, 2019 and October 29, 2020.[87] At that time, the PSAP will also incur a non-recurring fee, including project management fees, for the migration.

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

In 2018, the National Telecommunications and Information Administration promulgated rules for a 9-1-1 grant program to be jointly administered by NTIA and the National Highway Traffic Safety Administration. This grant program intends to make available $109,250,000 nationally for Next Generation 9-1-1 deployment, as authorized by the Middle Class Tax Relief and Job Creation Act of 2012.[88]

The 9-1-1 Grant Program requires a single point of coordination with each state, and individual local agencies may not apply. Governor Hickenlooper designated the Commission to serve as Colorado's state 9-1-1 coordinator for the purposes of the bill. The grant is non-competitive and formula-based, but states were required to confirm that they met eligibility requirements, including providing attestation that the state has not diverted 9-1-1 surcharge funds to other uses. After confirming eligibility, the Commission was notified that Colorado is eligible for approximately $2.4 million.[89]

The grant program requires a 40% match, which the Commission authorized to be paid out of

[86] § 29-11-103 (3) (b), C.R.S.
[87] See Proceeding 18AL-0916T. The schedule begins on page 49.
[88] https://www.congress.gov/112/plaws/publ96/PLAW-112publ96.pdf. See sections 6501 through 6509.
[89] Grant opportunity NHTSA-NTIA-911-GRANT-PROGRAM-2018. See the document labeled "911 Grant Program.Revision to NOFO.Final.PDF

Colorado Performance Assurance Plan Tier 2 Fund.[90] Each 9-1-1 governing body will be reimbursed for the non-recurring costs of the migration to the Emergency Services IP network (ESInet). Additionally, each PSAP will receive the ESInet service free of charge for the first six months. The Commission was notified on August 9, 2019 that its grant application had been awarded, and that Colorado would be receiving nearly $2.3 million in federal funds. Along with the Commission's nearly $1.6 million commitment of matching funds, this means that local agencies will be reimbursed for their non-recurring costs, and receive six months of 9-1-1 call delivery at no additional charge, and will be fully reimbursed for those costs, to a total project cost of approximately $3.9 million.

In addition to the increased charges from the Basic Emergency Service Provider (BESP) for delivery of 9-1-1 calls to the PSAP, PSAPs will have ancillary costs that must be addressed. Costs to prepare their facility to receive the equipment necessary for the deployment of the ESInet are not included in the tariffed rates from CenturyLink, and the amount of those costs will vary from one PSAP to another. Additionally, while the tariff requires CenturyLink to provide PSAP Gateway Modules (PGMs) to accomodate PSAPs that do not have phone systems capable of receiving calls in IP-format, in order for PSAPs to take full advantage of the ESInet some PSAPs may need to upgrade their phone equipment. Long term, it will also be necessary to upgrade logging recorders, as well.

Aside from the federal 9-1-1 Grant Program, which is a one-time provision of assistance, the options currently offered to the local 9-1-1 governing bodies for funding are to increase their local 9-1-1 surcharge rates, pending Commission approval, to increase the subsidy they receive from county or municipal governments, or to enact a different funding mechanism, for paying the operational costs of 9-1-1 service, such as a sales tax.

One funding mechanism that is in place in many other states that has not been implemented in Colorado is a state-wide 9-1-1 surcharge. In some states this is in lieu of local 9-1-1 surcharges, and in other states it is in addition to local surcharges. In either case, the creation of a state-level fund for paying certain 9-1-1 costs could greatly alleviate the burden on local 9-1-1 governing bodies, particularly those serving small and rural community.

Commission staff has estimated that for each penny charged through a monthly state-wide 9-1-1 surcharge on all landline, wireless, and Voice over Internet Protocol (VoIP) services should raise approximately $650,000 annually. As an example of how this could be applied, the ESInet tariff will result in a total of approximately $5.9 million being charged annually to the local 9-1-1 governing bodies. Paying these at the state level (without any other costs) would require a state-wide supplemental 9-1-1 surcharge of 10 cents, which would free up nearly six million dollars at the local level that could then be spent on equipment, training, and personnel in the PSAPs.

Additionally, a state-level 9-1-1 surcharge could fund a number of other programs and services of benefit to 9-1-1 service state-wide. For example:

[90] See Decisions C18-0751 and C19-0331.

- Providing grants or subsidies to small and rural 9-1-1 governing bodies
- A Geographic Information System (GIS) data collection project to prepare for full NG9-1-1 implementation
- Advanced features of NG9-1-1, such as state-wide text-to-911 service
- Funding a state-wide minimum training program for 9-1-1 call takers
- Funding 9-1-1 network diversity improvement projects
- Providing matching funds for future federal 9-1-1 grant programs
- Providing funding and incentives for Public Safety Answering Point (PSAP) consolidation

The Commission's 9-1-1 Advisory Task Force has a Legislative Committee that is currently working on potential legislative language regarding this issue.

Conclusion

The intent of this report is to provide a general overview for understanding the state of the 9-1-1 system in Colorado. This includes the current status and vulnerabilities, and strategic goals for the implementation of changes to meet the needs of Colorado's residents and visitors well into the future.

The changes include setting the stage for a migration to Next Generation 9-1-1 (NG9-1-1). The Commission is pleased that progress has been made in this regard, specifically by the approval of a state-wide tariff for an Emergency Services IP network (ESInet) which will serve as the first step toward NG9-1-1 service.[91] The Commission looks forward to working with the Colorado 9-1-1 Advisory Task Force, the newly formed ESInet Users Group, and all of the stakeholders to help ensure a smooth transition to the ESInet, and to build a roadmap forward to NG9-1-1.

In the meantime, Colorado's 9-1-1 stakeholders, including the Commission, must continue to work to meet consumer and citizen expectations. This includes promoting local implementation of text-to-911 service, improving uniformity of minimum training standards for public safety telecommunicators, and improving 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.

[91] See Proceeding 17AL-0487T, Decision R18-1063.

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*[92]. 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 *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

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

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).

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 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 state-wide organizations that represent public safety agencies.

An Editorial Committee was convened during the initial updating of this report, which provided Commission staff with input and direction concerning its development.

Editorial Committee Members		
Name	**Organization**	**Organization Type**
Matt Goetsch	Montrose Emergency Telephone Service Authority	9-1-1 governing body
Darrell Pratt	Chaffee County Sheriff's Office Comm Center	Public Safety Answering Point
Jennifer Kirkland	Vail Public Safety Communications Center	Public Safety Answering Point
Carl Stephens	Garfield County Emergency Communications Authority	9-1-1 governing body
Shawn Shear	Thornton Police Communications	Public Safety Answering Point
Connie Johnson	Delta County 911	Public Safety Answering Point
Joe Benkert	Boulder Regional Emergency Telephone Service Authority	9-1-1 governing body
Jeff Irvin	Jefferson County Emergency Communications Authority	9-1-1 governing body

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

Additionally, a copy was provided to the following state agencies and bodies with a request for comment:
- The Colorado Department of Public Safety
- The Colorado Department of Homeland Security and Emergency Management
- The Colorado Broadband Office
- The Homeland Security Advisory Committee's Public Safety Communications Subcommittee

Commission Staff involved in the development and updating of this report consisted of Daryl Branson, state 911 program manager.

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

What follows is a chart showing the text to 9-1-1 deployment status for each primary Public Safety Answering Point in the state, as of July 29, 2019. Some of the estimated dates for deployment have passed, and Commission staff will be following up with these agencies to update their estimated deployment dates.

PSAP (Primary only)	Has TT911 or covered by other PSAP	Plans TT911 (Estimated Time)	No plans for TT911 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		
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		
Buckley AFB			X
Castle Rock Police Department	X		
Chaffee County Sheriff's Office Comm Center	X		
Cheyenne Air Force Station			X
Cheyenne County Sheriff's Office			X
City of Aurora PSAP	X		
City of Pueblo CO Police Dept		August 1, 2019	
Clear Creek County Sheriff's Office	X		
Colorado Springs Police Department	X		
Colorado State University Police Department	X		
Cortez Communications Center	X		
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		
Douglas Regional 9-1-1	X		
Durango-La Plata Emergency Communications Center		End of 2nd quarter 2019	
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		Late 2019	
La Junta Police Department		Unknown	
Lake County Sheriff's Office		Early 2019	
Larimer County Sheriff's Office	X		
Las Animas County	X		
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		Feb 2019	
Park County Communications		June 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		2019	
Routt County Communications	X		
San Miguel County Sheriff's Office	X		
Sedgwick County Communication Center	X		
Southern Ute Indian Police Department		Unknown	
Sterling Emergency Communications Center		Spring 2019	
Summit County 911 Center	X		
Teller County Sheriff's Office	X		
Thornton Police Communications	X		
University of Colorado Police Department - Boulder	X		
Vail Public Safety Communications Center	X		
Washington-Yuma Combined Communications Center		1st Quarter 2019	
Weld County Regional Communications Center	X		
Western Colorado Regional Dispatch Center	X		
Westminster Police Department	X		
Woodland Park Police Department	X		
COUNT	59	12	13

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/