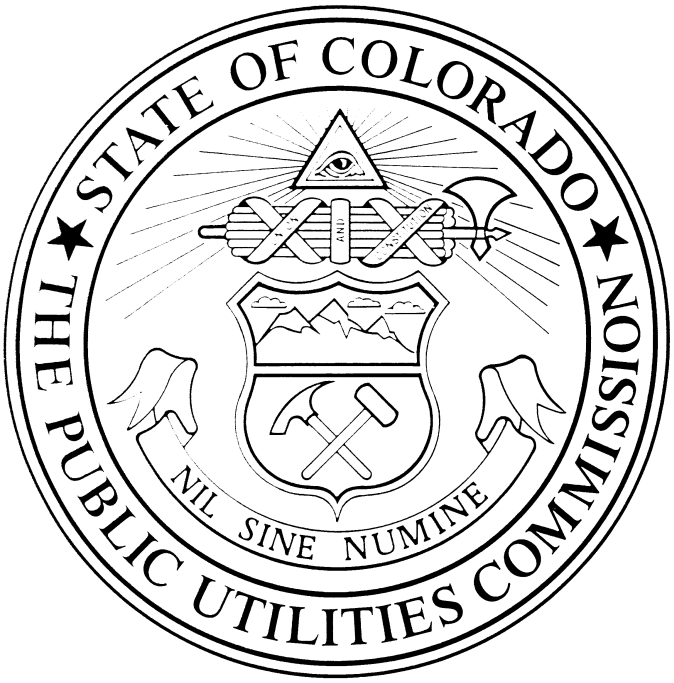
Report on the State of 9-1-1 Services in Colorado

2020-2021



Prepared by:

The Colorado Public Utilities Commission Staff

September 10, 2021

COLORADO
Department of Regulatory Agencies
Public Utilities Commission

Eric Blank, Chairman
John C. Gavan, Commissioner
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Patty Salazar, Executive Director
Jared Polis, Governor

September 10, 2021

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 State of 9-1-1 report for the members of the General Assembly, covering seven specific topic areas.[1] Statute also requires that the Commission present the report to the Senate Committee on Business, Labor, and Technology, or its successor committee, and the House of Committee on Business Affairs and Labor or its successor committee, on or before February 1.

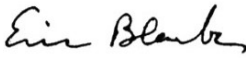
Additionally, the statute requires that the report be developed in consultation with Public Safety Answering Points (PSAPs), 9-1-1 governing bodies, and statewide organizations that represent public safety. For a description of how this consultation was obtained, and how input from the stakeholders was 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 fourth 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)(a)-(g), C.R.S.

Respectfully submitted,



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Executive Summary

***Key Points*:**

- ***The migration of Colorado's Public Safety Answering Points (PSAPs) from the legacy 9-1-1 network to an Emergency Services IP Network (ESInet) is nearing completion and is expected to be completed in 2021.***
- ***Funding for 9-1-1 in Colorado has been greatly enhanced by the passage and implementation of HB 20-1293.***
- ***A great deal of additional planning and stakeholder engagement is required to enable a full transition to Next Generation 9-1-1 (NG9-1-1).***
- ***Several persistent issues must be addressed, including 9-1-1 network resiliency, which will be addressed by the Commission over the coming year.***
- ***Other issues, such as a lack of statewide minimum training standards for emergency communications specialists or operational standards for Public Safety Answering Points, are outside of the Commission's authority to address.***

The state of 9-1-1 services in Colorado continues to be in transition, but significant progress has been made in the 2020-2021 fiscal year. While the capabilities of the 9-1-1 system lag behind the functionality available to the public through commercial telecommunications services, Colorado has taken the first step towards modernizing its 9-1-1 capabilities. Nearly all of Colorado's Public Safety Answering Points (PSAPs) have been migrated off of the legacy E9-1-1 network onto an Emergency Services IP Network (ESInet). While this is only the first step toward full implementation of Next Generation 9-1-1 (NG9-1-1), it is an essential one that sets the foundation for future advancements.

In the meantime, Colorado's local 9-1-1 governing bodies through the ESInet Users Group have begun discussing future steps with Colorado's Basic Emergency Service Provider (BESP), CenturyLink, also known as Lumen Technologies. One tool under development to help guide this transition is a Next Generation 9-1-1 Strategic Plan, which will help solidify the future development of the ESInet into an NG9-1-1 system. Commission staff hope to have this plan completed in the first half of 2022.

Through the passage of HB 20-1293 and the implementation of the state 9-1-1 surcharge by the Commission this year, Colorado has established a strong financial foundation for future deployment of NG9-1-1 technologies. While these deployments will not be without costs for local governments, the implementation of the state 9-1-1 surcharge will allow the state's stakeholders to build on the deployment of the ESInet without overly burdening county and municipal general funds. The establishment of this statewide 9-1-1 funding source was critical to future advancement of 9-1-1 technology in Colorado. That being said, the Commission wishes the legislature to be aware that as Colorado's 9-1-1 stakeholders solidify their vision for the future of 9-1-1 service in the state, there may be additional requests for resources and funding.

In the meantime, the existing 9-1-1 network, including the legacy 9-1-1 network and the ESInet, must be improved and action must be taken to ensure that residents and visitors to the state have the most reliable service possible. The Commission will be addressing 9-1-1 network resiliency and reliability in a rulemaking in the latter half of 2021. Again, the additional funding provided as a result of the enactment of HB 20-1293 is expected to provide the Commission and the stakeholders with more options for accomplishing this goal.

In Section 5, this report identifies a number of specific gaps, vulnerabilities, and needs to be addressed. Some of these issues are not within, or not completely within, the Commission's authority to address, but they are provided in this report in the spirit of providing the legislature with a complete understanding of the state of Colorado's 9-1-1 system.

The Commission has two recommendations for the legislature to consider:

- **The legislature should consider working with 9-1-1 stakeholders to develop minimum operational standards for PSAPs.** This could include minimum training standards for emergency communications specialists, standard goals for call answering times, standards regarding the use of emergency medical dispatch protocols and the provision of medical pre-arrival instructions, the use of foreign language interpretation services for 9-1-1 callers who do not speak English, and other standards that may enhance the basic level of 9-1-1 service offered statewide.[1] The Commission is considering initiating a proceeding to consider the creation of voluntary standards.
- **The legislature should consider whether a percentage-based prepaid wireless 9-1-1 charge might be more appropriate and equitable than a flat per-transaction rate.** Prior to the passage of HB 20-1293, the prepaid wireless 9-1-1 charge was 1.4% of the value of the wireless prepaid telephone service being sold to the customer at the retail point of sale. HB 20-1293 changed this percentage to a flat rate, set annually by the Commission based on a prescriptive formula in statute. While this change has generated an additional $800,000 per month for Colorado's 9-1-1 governing bodies, the Commission has concerns that it may be disproportionately impacting lower-income consumers who, due to economic circumstances, may be forced to purchase prepaid wireless telecommunications services more frequently than customers with higher income levels. While it is not the Commission's intent to reduce the overall revenue being generated by this surcharge, the Commission believes that a percentage-based rate may be more equitable.[2]

[1] See pages 37-38 for more detail regarding this recommendation.
[2] See page 51.

1. Commission Activity Regarding 9-1-1 Service

Commission Activity During the 2020-2021 Fiscal Year

During the 2020-2021 Fiscal Year, the Commission undertook the following activity regarding 9-1-1 service:

- Issued two sets of temporary rules to implement HB 20-1293, which requires the Commission to conclude a proceeding by October 1 of each year to set, with an effective date of January 1, a new emergency telephone charge threshold above which applications are required to be filed with the Commission by the local 9-1-1 governing body wishing to establish the charge, a statewide 9-1-1 surcharge (which may not exceed 50 cents per 9-1-1 access connection per month), a per-transaction prepaid wireless 9-1-1 charge, and the distribution formulas for both the statewide 9-1-1 surcharge and the prepaid wireless 9-1-1 charge.[3]
- Initiated rulemaking for permanent rules, which is ongoing, to replace both sets of temporary rules above.[4]
- Hired an additional FTE, authorized by HB 20-1293, to perform audits of telecommunications service providers regarding the collection and remittance of emergency telephone charges and the new statewide 9-1-1 surcharge.
- Filed two sets of comments with the Federal Communications Commission, both on the topic of 9-1-1 fee diversion.[5]
- Concluded two proceedings for applications for 9-1-1 emergency telephone charge increases filed by local 9-1-1 governing bodies pursuant to § 29-11-102(2)(c), C.R.S. In both cases, the requests were approved to the amount requested.[6] Commission Staff offers to review draft applications before being filed for completeness and financial soundness.
- Implemented internal processes for the receipt of statewide 9-1-1 surcharge remittances from originating service providers and distribution of those surcharges to the 9-1-1 governing bodies.
- Deployed a new website for the Commission's 9-1-1 program.[7]
- Facilitated six meetings of the Commission's 9-1-1 Advisory Task Force, created pursuant to 4 *CCR* 723-1-2145.[8]

[3] See Decision C20-0599 in Proceeding 20R-0335T and Decision C20-0795 in 20R-0480T.
[4] See Proceeding 21R-0099T.
[5] The Commission's comments to the FCC may be viewed at https://drive.google.com/drive/folders/1nBCw5l6RF1b2bdOkEW5mGnpWX56KQCqa
[6] A list of all 9-1-1 surcharge applications considered by the Commission over the last several years may be viewed here: https://docs.google.com/spreadsheets/d/1SrJ5hPynvFC8YtA7H4FiIFwe5D6zU5zVuhGgO3vZb7A/edit#gid=1139515964
[7] See https://sites.google.com/state.co.us/colorado911program/home.
[8] 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. See the Task Force's website at https://sites.google.com/state.co.us/9-1-1-advisory-task-force/home.

- Continued facilitation of the ESInet Users Group, a committee of the 9-1-1 Advisory Task Force, created by order of the Commission approving the implementation of an Emergency Services IP network (ESInet).[9]
- Oversaw the continued migration of the state's Public Safety Answering Points (PSAPs) to the ESInet, a process which is nearly complete.
- Filed an annual report to the Federal Communications Commission pursuant to the New and Emerging Technologies 911 Improvement Act of 2008 (NET 911 Act).[10]
- Participated in an annual data collection effort conducted by the National 9-1-1 Program.[11]
- Continued administration of a grant program to the local 9-1-1 governing bodies to reimburse them for tariffed non-recurring costs and project management fees.
- Concluded a series of workshops on the topic of 9-1-1 network reliability.[12]
- Continued our partnership with the Colorado 9-1-1 Resource Center, a non-profit organization that provides information and support services for local 9-1-1 governing bodies and PSAPs in the state, to conduct roundtable discussions and provide information to local 9-1-1 officials regarding COVID-19 response.[13]

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 on a working group of the Communications, Security, Reliability, and Interoperability Council (CSRIC), established by the Federal Communications Commission.[14]
- Serving as an officer on the board of the Colorado 9-1-1 Resource Center and the National Association of State 9-1-1 Administrators.
- Serving as co-chair of the technology committee for the Colorado joint chapter of the National Emergency Number Association and the Association of Public Safety Telecommunications Officials, Intl.
- Leading several committees of the Commission's 9-1-1 Advisory Task Force, including the Agenda Committee, Outage Committee, and Reports Committee.
- Participated in meetings of the Colorado Homeland Security Advisory Committee's Public Safety Communications Subcommittee.
- Began serving on the recently formed 9-1-1 Fee Diversion Strike Force created by the FCC.

Due to the ongoing pandemic, the ability of Staff to conduct site visits and meet with stakeholders in the field has been curtailed significantly. However, virtual meetings with stakeholders continue apace, and all meetings of the Colorado 9-1-1 Advisory Task Force and

[9] See Decision R18-1063T.
[10] See https://www.fcc.gov/general/911-fee-reports
[11] See https://resourcecenter.911.gov/code/9-1-1ProfileDatabase.aspx
[12] See Proceeding 19M-0026T and Decision C19-0117-I.
[13] See https://sites.google.com/state.co.us/colorado911program/covid-19-resources
[14] See https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-vii

its committees have continued without interruption with the use of remote meeting technology.

Commission staff assigned to 9-1-1 related matters for the 2019-2020 fiscal year primarily consisted of the following:

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

Commission Activity Planned for the 2021-2022 Fiscal Year

Only three Public Safety Answering Point (PSAP) sites remain to be migrated from Centurylink's legacy 9-1-1 network to Centurylink's Emergency Services IP Network (ESInet). With this long project nearly complete, the ESInet Users Group has requested Centurylink provide it with information and pricing regarding additional services that may be implemented once all PSAPs are being served via the ESInet, such as statewide text-to-911 via the ESInet and statewide data collection regarding 9-1-1 call statistics.

With the ESInet deployment nearly complete, the Commission will also close its participation in a federal grant program that is reimbursing 60% of the costs of the migration, amounting to nearly $2.3 million in federal funds,[15] along with nearly $1.6 million in matching funds designated by the Commission for that purpose.[16]

In 2019, the Commission initiated a working group to examine issues related to 9-1-1 network reliability, and those meetings have concluded.[17] In its order closing the proceeding, the Commission directed Commission staff to prepare a notice of proposed rulemaking (NOPR) to modify the Commission's current 9-1-1 reliability rules to incorporate the findings of the working group. The issuance of that NOPR has been delayed by the ongoing rulemaking to implement HB 20-1293, but staff plans on initiating the proceeding before the end of calendar year 2021.

Commission staff will be completing annual reporting requests from the Federal Communications Commission and the National 9-1-1 Program. Staff will also continue to administer the Commission's 9-1-1 Advisory Task Force and facilitate its meetings and agendas, pursuant to 4 *CCR* 723-2-2145(a), as well to facilitate the meetings of the ESInet Users Group, which is chaired by Kimberly Culp with the Larimer Emergency Telephone Authority. Staff will continue to participate in the activities of the Colorado joint chapter of the National Emergency Number Association (NENA) and the Association of Public Safety Communications Officials, Intl. (APCO), as well as the national organizations of NENA, APCO, the National Association of State 9-1-1 Administrators (NASNA) and the National Association of Regulatory Utility Commissioners (NARUC).

[15] See Grant Opportunity NHTSA-NTIA-911-GRANT-PROGRAM-2018. https://www.grants.gov/web/grants/view-opportunity.html?oppId=307868
[16] See Decisions C18-0751 and C19-0331.
[17] See Proceeding 19M-0026T and Decision C21-0036.

Commission staff activity related to 9-1-1 for the 2021-2022 fiscal year includes the addition of our new 9-1-1 surcharge auditor. This position will also be responsible for auditing 9-8-8 surcharges, as authorized by SB 21-154.

2. The Current 9-1-1 Service Environment

Structure

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

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

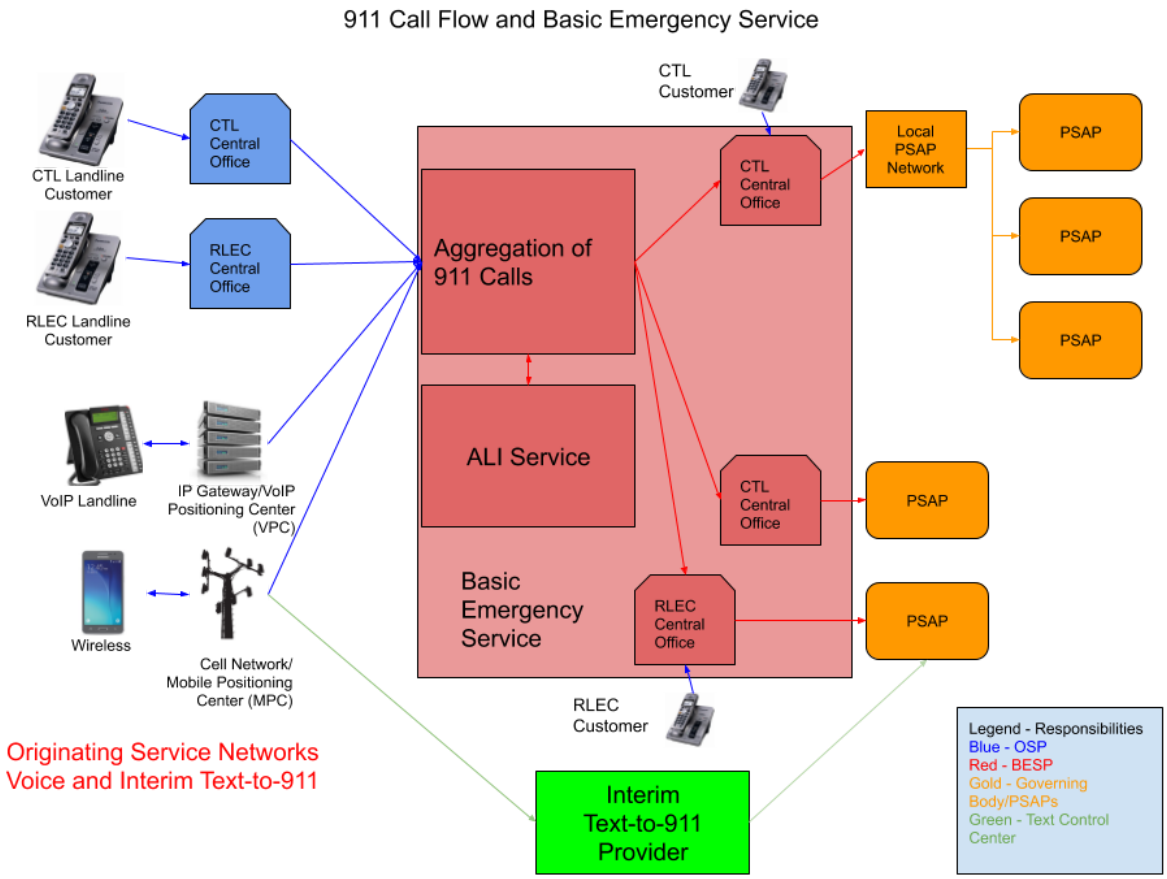


Figure 2.1: 9-1-1 Network Call Flow

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.[18] BES also includes the delivery of the location information that is associated with a 9-1-1 call.[19] CenturyLink is currently the only BESP in Colorado that is delivering 9-1-1 calls to PSAPs.

There are currently 83 primary PSAPs in Colorado (PSAPs that receive 9-1-1 calls directly from the BESP), and two secondary PSAPs (PSAPs that only receive 9-1-1 calls transferred from a primary PSAP and delivered by the BESP). Colorado State Patrol is in the process of converting two of its dispatch centers into secondary PSAPs, which will serve as backups to its three

[18] § 29-11-101(7), C.R.S.
[19] 4 *CCR* 723-2-2131(j).

existing PSAPs, bringing the total to four secondary PSAPs. The Local Domain also includes 58 9-1-1 governing bodies, or "governing bodies" (29-11-101(16), C.R.S.). These governing bodies collect 9-1-1 emergency telephone charge remittances from telecommunications service providers and fund the local emergency telephone service, and in some cases provide technical support and local networks for PSAPs.

The Statutory Limits of Commission Oversight of 9-1-1 Service

It is important to differentiate what parts of the 9-1-1 call flow are overseen by the Commission, and what parts of the 9-1-1 call flow the Commission is statutorily restricted from regulating.

A 9-1-1 call begins with an individual caller dialing 9-1-1 on their landline, wireless, or VoIP device. It must then pass through a variety of networks, owned by a variety of different entities, before it is finally delivered to the BESP for aggregation and delivery to the PSAP. Since the Commission is only granted regulatory authority by statute over "Basic Emergency Service," any failure within the 9-1-1 call flow that occurs before the call is delivered to the Basic Emergency Service Provider is unregulated by the Commission.[20]

Likewise, once the call is delivered by the BESP to the PSAP, or to a local network employed by the PSAP, it is no longer part of "Basic Emergency Service," meaning any failure that occurs within local PSAP networks or within the PSAPs themselves are outside of the jurisdictional scope of the Commission's authority regarding 9-1-1 service.

For a visual representation of this, note that in figure 2.1 above, only the portion of the call flow shaded in red is regulated by the Commission.

In practical terms, this means that the Commission cannot require outage reporting from Originating Service Providers. Nor can the Commission impose requirements, including outage reporting, on the PSAPs, with the exception of requiring annual reporting as allowed in § 29-11-102(4), C.R.S.

One implication of these limits that should be noted is that Centurylink serves as both a BESP and an OSP, depending upon which parts of its network are being considered. An outage in a portion of the network that affects call flow from the aggregation point of the Basic Emergency Service network to the PSAP is regulated, but an outage that occurs in a portion of their network preventing calls from ever reaching the aggregation point is not.

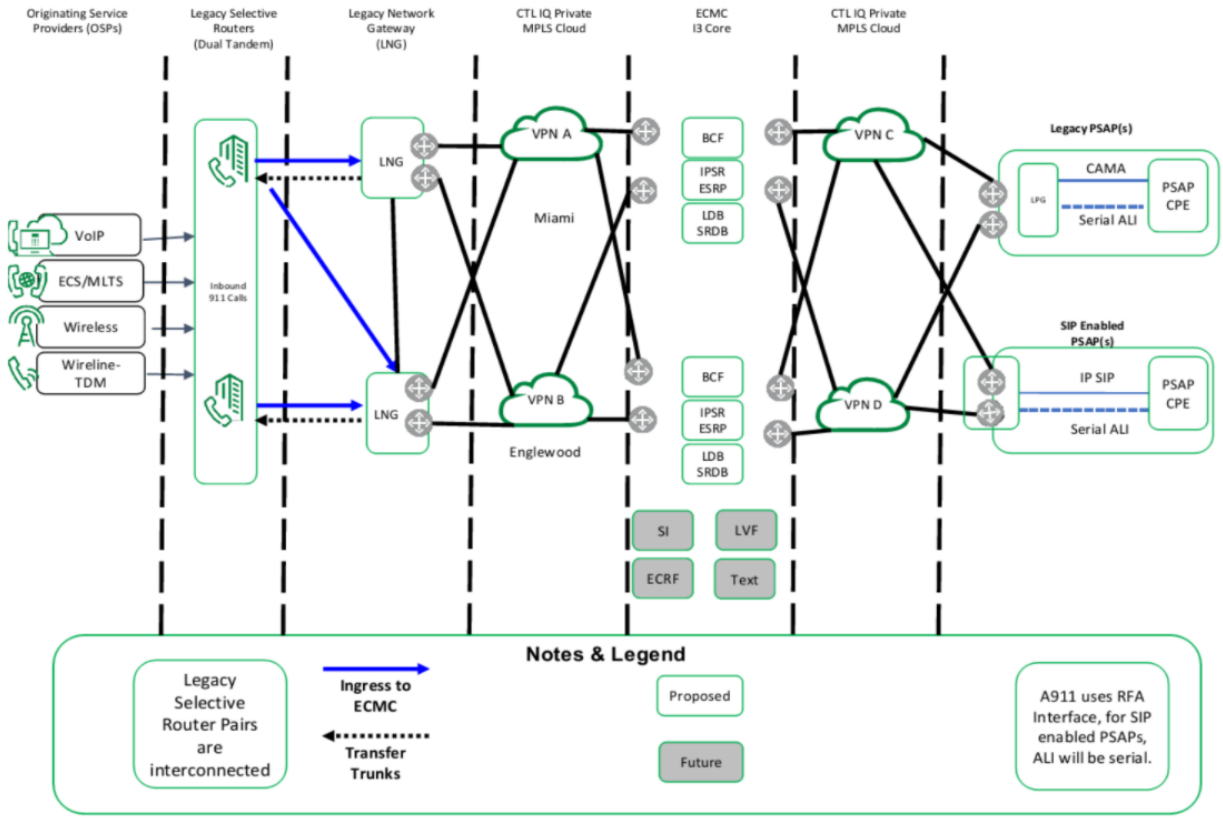
Examples of this distinction can be found throughout the state, but a notable example is western and northern Boulder County. Mountain communities in those areas, including Allenspark, Four Mile Canyon, and Gold Hill, have invited Commission Staff to attend meetings between Boulder County officials and CenturyLink representatives regarding an ongoing problem with outages and service quality issues in those communities. While those outages and service quality issues can result in an inability for individual callers to reach

[20] § 40-15-201, C.R.S.

9-1-1, those outages are not considered “Basic Emergency Service” because they take place outside of the red shaded area of figure 2.1, and are therefore outside of the regulatory authority of the Commission.

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. Prior to delivery of the 9-1-1 call to the PSAP, Centurylink converts the call, if necessary, to SIP (Session Initiated Protocol) format, so that the call may be delivered to the PSAP via the Emergency Services IP Network (ESInet). In some cases, the call is then converted back into an analog format for handling by the PSAP’s 9-1-1 phone equipment, also referred to as Customer Premise Equipment (CPE). If the PSAP’s CPE is capable of handling calls in IP format, this last step conversion is unnecessary, and it is anticipated that as older CPE is retired at the PSAPs, eventually all 9-1-1 calls will be handled in IP format.



Legend:

BCF - Border Control Function
ECRF - Emergency Call Routing Function
ECS – Enterprise Communications System
ESRP - Emergency Services Routing Proxy
IPSR - IP Selective Router
LDB - Location Database
LNG – Legacy Network Gateway
LPG – Legacy PSAP Gateway
MLTS – Multi-Line Telephone System
MPLS – Multiple Protocol Labeling Service
SI - Spatial Interface
TDM – Time Division Multiplexing
Text - Text to 911 service
VPN – Virtual Private Network

Figure 2.2: ESInet 9-1-1 Call Flow with Legend. Source: Centurylink Basic Emergency Service Tariff, Colorado Tariff No. 25

Once received by the PSAP, the PSAP's 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 currently a mix of "legacy" technology, and "transitional" technology, as opposed to "Next Generation 9-1-1". As of the end of the 2020-2021 fiscal year, all but 6 PSAP sites have been migrated to the "transitional" technology, a step toward a Next Generation 9-1-1 network, while the rest of the state's PSAPs remain on the legacy 9-1-1 network. 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 smartphones. This category includes prepaid wireless telecommunications services.
- VoIP. These are 9-1-1 calls from phones that use the Internet for delivery of the call. These may be either static (installed in a specific location) or nomadic (meant to be portable and to move with the caller).
- Multi-Line Telephone Systems (MLTS, also called Enterprise Communications Systems, or ECS). These are 9-1-1 calls from enterprise telephone systems in schools, office buildings, hospitals, factories, or anywhere else that makes use of multiple extensions branching from a single phone system.

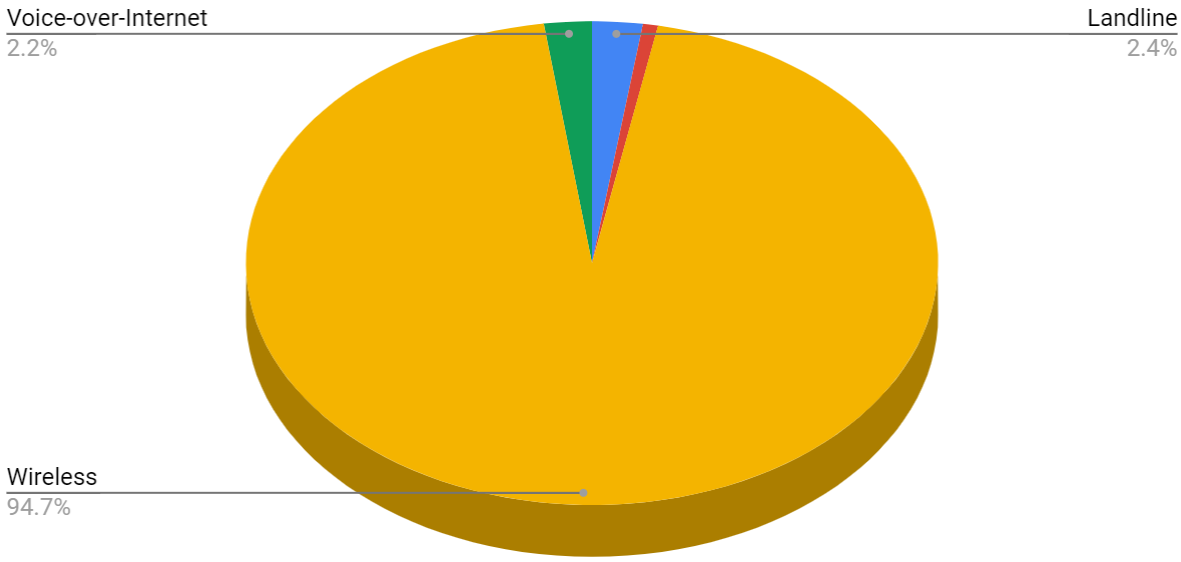


Figure 2.3: 2020 State-wide ALI Bids by General Category of Service.[21] Not labeled: Multi-Line Telephone Systems (red), 0.7%

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.

General Operations

Operations within Colorado's 85 PSAPs (83 primary and 2 secondary) are locally controlled. PSAPs are often operated as a part of a local law enforcement agency but are sometimes

[21] ALI Bids are requests for location information sent by PSAPs after receiving a 911 call. Until all of Colorado's PSAPs have been migrated to the Centurylink ESInet, there is no mechanism for counting the actual number of calls, which may differ from the number of ALI bids. Following completion of the migration to the ESInet, future editions of this report will be able to start providing actual call count statistics.

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 agencies, 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, deafblind or have speech disabilities. These devices allow the user to connect a keyboard telephone and type to and receive typed responses from the individual on the other end of the call also using a TTY or type and receive responses through a third party relay service if the other caller is using a traditional telephone. 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 traditional Telecommunication Relay Services (TRS), Captioned Telephone Services (CTS), Video Relay Services (VRS), and IP Relay Services. While still used by some individuals with communication disabilities, traditional TRS has seen a decline in usage over recent years due to TRS users switching to Internet-based relay services and video relay services that accommodate sign language users. 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.

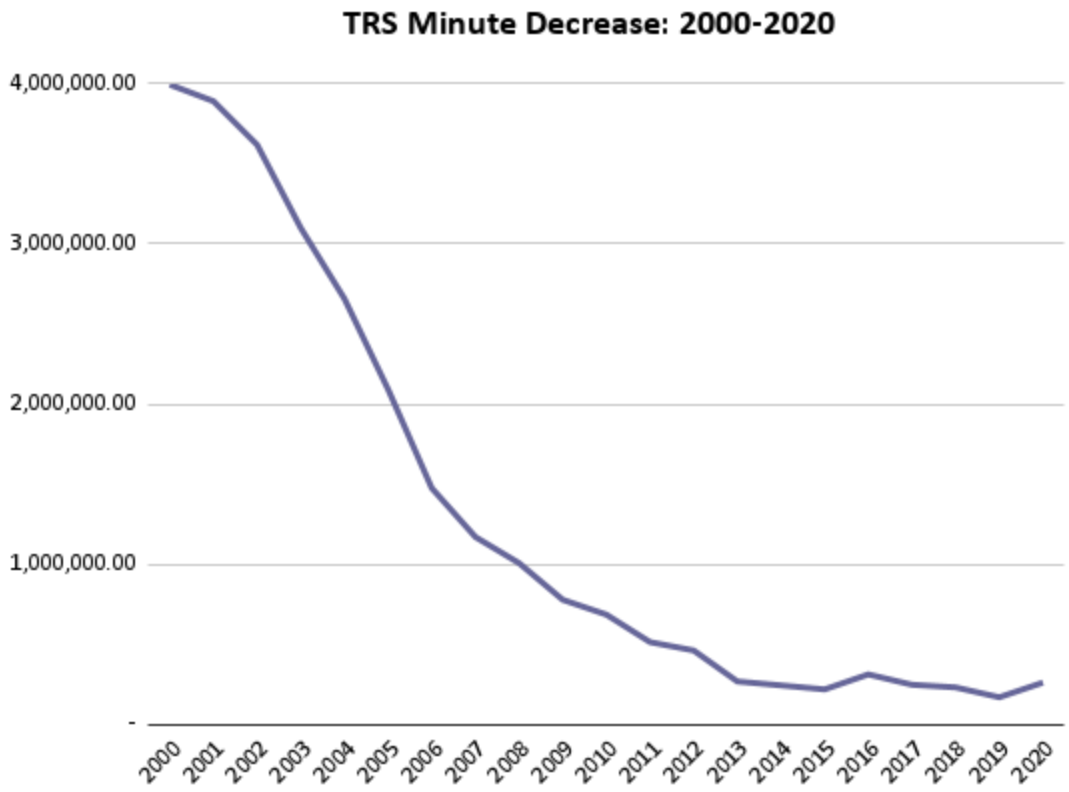


Figure 2.4: Number of minutes of state TRS service usage by fiscal year.

There is a long list of other communications methods other than TTYs that a caller with an accessibility need might use, depending on the nature of their disability. These include IP captioned telephone services, video relay 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 90.7% of Colorado's primary PSAPs have implemented text to 9-1-1 service. The PSAPs providing text to 9-1-1 service cover 69.4% of the state by area and 97.2% of the state by population. The six counties of the San Luis Valley are expected to have text to 9-1-1 available soon, as well as Moffat County, and talks are underway to potentially have the PSAP in Prowers County handle text to 9-1-1 calls for surrounding counties in the Southeast part of the state. These efforts are being supported largely by the Colorado 9-1-1 Resource Center, a non-profit entity created by order of the Commission in 2006 to provide support and informational resources to local 9-1-1 officials.

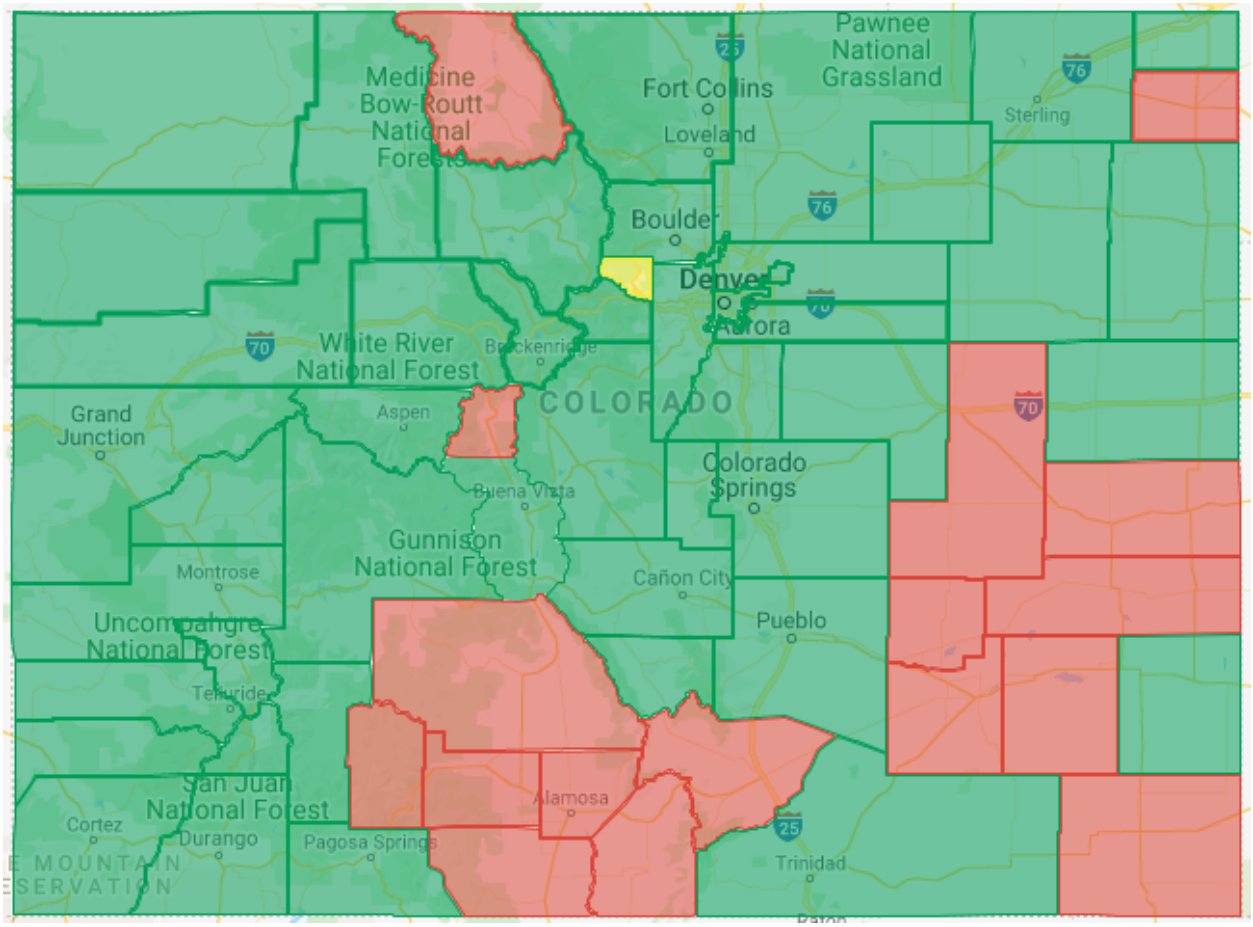


Figure 2.5: Text to 9-1-1 Availability as of July 1, 2021. Red indicates that a county contains no PSAP providing text to 9-1-1 service. Yellow indicates that one but not all PSAPs in that county provide text to 9-1-1 service. Green indicates that all PSAPs serving that county provide text to 9-1-1 service.

The ESInet Users Group, a committee of the Commission's 9-1-1 Advisory Task Force, has entered into discussions with Centurylink regarding the possibility of delivering text to 9-1-1

calls via the Emergency Services IP network (ESInet) to the PSAPs. This would not necessarily replace the secondary connections most of the PSAPs are currently using to receive text messages from the public, but would help bring Colorado into having 100% coverage for text to 9-1-1 service and add another layer of redundancy that could help make the public's ability to contact 9-1-1 more reliable.

Other Considerations Regarding Accessibility

It is essential that as Next Generation 9-1-1 is implemented, as well as any applications or services that are enabled by Next Generation 9-1-1, 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.

Next Generation 9-1-1 provides 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. The ESInet Users Group is currently in discussions with Centurylink regarding the feasibility and costs associated with delivering text to 9-1-1 calls via the ESInet, thereby delivering text to 9-1-1 to every PSAP via the same call path that PSAPs use to receive voice 9-1-1 calls.

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 when 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 9-1-1 center. As a result, the location information typically delivered to the 9-1-1 center today, known as Automatic Location Information (ALI), is sometimes less accurate than handset-based location that is available to applications and other commercial services, or not available at all.

Currently, wireless carriers, handset manufacturers, and even smartphone operating system developers are working to fix this. For example, both Apple and Google have partnerships with a firm called RapidSOS to provide a handset-based location to 9-1-1 centers for every 9-1-1 call from devices using their operating systems. This service is offered without any

direct cost to the call center, although some equipment and software vendors may charge the call center for integrating the service.

Recently, national wireless carriers have also begun providing Z-Axis (altitude) coordinates with the location information for wireless 9-1-1 calls in accordance with requirements imposed by the Federal Communications Commission. While these Z-Axis coordinates are of limited value now, they are the first step to being able to pinpoint not only where a 9-1-1 call is coming from on the surface of the Earth, but what floor of the building the caller is, as well.

"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 the Federal Communications Commission, which has regulatory authority over wireless telecommunications services, requires that carriers 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 call is 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 Next Generation 9-1-1 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 Next Generation 9-1-1 and public safety broadband together is that both Next Generation 9-1-1 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 Next Generation 9-1-1?

Next Generation 9-1-1 (NG9-1-1) is a set of technologies and components that, when implemented, comprise a standards-based approach to 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 introducing what NG9-1-1 is and what its benefits are.[22]

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 or "domains" of NG9-1-1 deployment, governance, and funding.[23] In its most recent annual report to the National 9-1-1 Office, Commission Staff estimated the state's NG9-1-1 maturity levels as the following for the various domains, using the definitions for each state provided by the National 9-1-1 Office, which were in turn based on the TFOPA report:

- Governance: Intermediate
- Routing and Location: Legacy
- 9-1-1 GIS Data: Legacy
- NG9-1-1 Core Services: Intermediate
- Network: Foundational
- PSAP Call Handling Systems and Applications: Transitional
- Security: Foundational
- Operations: Foundational
- Optional Interfaces: Unknown

It should also be noted that while there is a national standard for the basis of NG9-1-1, there is disagreement about what actually constitutes "full Next Generation 9-1-1," meaning that there may not be a specific point in time when we can specifically say that "Today, we have implemented NG9-1-1." Viewing NG9-1-1 as an evolutionary process applying to the entire 9-1-1 call flow is more helpful in this regard.

Finally, there is some debate at the national level regarding which sets of standards should be considered when determining whether a system is actually NG9-1-1 and when it is not. There is a firm consensus among the stakeholders of the Commission's 9-1-1 Advisory Task Force that the standard referred to briefly as "i3", published and currently being updated by the National Emergency Number Association (NENA), is the standard document for the

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

architecture of a true Next Generation 9-1-1 network and system.[24,25,26,27]

Next Generation 9-1-1 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 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 the 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.

NG9-1-1 and FirstNet

FirstNet, the common name for the National Public Safety Broadband Network (NPSBN) currently being provided nationally 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, the Commission had established an ESInet Users Group as a committee of the Commission's 9-1-1 Advisory Task Force to oversee the implementation and statewide deployment of an ESInet. Previous to this, the Commission had approved a jointly proposed settlement filed on August 31, 2018, between CenturyLink and a number of local 9-1-1 governing bodies that had intervened in the proceeding to transition CenturyLink's

[24] Version 2 is the "stable" version of the NENA i3 standard, and it can be viewed here: https://cdn.ymaws.com/www.nena.org/resource/resmgr/standards/NENA-STA-010.2_i3_Architectu.pdf
[25] Version 3 of the NENA i3 was recently release and is available here: https://www.nena.org/page/i3_Stage3
[26] Colorado 9-1-1 Advisory Task Force, "Recommended 9-1-1 Standards". Published Jan 14, 2021. https://drive.google.com/drive/folders/0B1oMNUeCI8FYfjBVam9ndkQ5cW96Q1JzUFhRRENkU19kQnhIX2M2eTlUeFplU2dpdkhjT1U?resourcekey=0-37b5n5n1ItceFcif36ce2w.
[27] Colorado 9-1-1 Advisory Task Force and the Colorado NENA/APCO Chapter, "Position Statement Regarding Section 15001 of the LIFT America Act of 2021 (H.R. 1848). Published June 25, 2021. https://drive.google.com/file/d/1jLpiFwFKlsYjIrigU2JxUNx0fZvPAUnU/view.

9-1-1 network in Colorado from a legacy 9-1-1 network (using a combination of switch-based and IP technology) to a fully IP-based network, or ESInet.[28] A final version of the tariff was filed by CenturyLink on December 28, 2018[29], and subsequently modified through an additional filing on May 10, 2019[30].

The tariff as approved by the Commission contained 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. This schedule has been revised on a rolling basis, but we are nearing completion of the migration, with only six PSAP sites remaining to be converted from the legacy network to the ESInet. The remaining PSAPs consist of the PSAP operated by Rangely Police Department, the PSAPs operated by the U.S. Department of Defense, and two dispatch centers operated by Colorado State Patrol, which were previously not PSAPs but are being equipped as PSAPs to serve as backup centers to CSP's existing PSAPs.

The migration is mandatory, since CenturyLink states in the ESInet tariff its intent to retire the legacy 9-1-1 tariff, and CenturyLink is currently the only provider certified by the Commission to provide Basic Emergency Service that also has an active tariff on file.[31]

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 been meeting regularly and has been instrumental in 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 continue to monitor the progress of the 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 are also participating in the meetings. If issues cannot be resolved within the ESInet Users Group, parties may still petition the Commission for resolution.

The migration of Colorado's PSAPs to the 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

[28] https://www.dora.state.co.us/pls/efi/EFI.Show_Filing?p_fil=G_747895&p_session_id=
[29] See Proceeding 18AL-0916T.
[30] See Proceeding 19AL-0238T.
[31] Other providers have filed applications for BESP certification, but withdrew their applications before completion. One other company, Intrado, has BESP certification from the Commission but has never filed a tariff to provide Basic Emergency Service.

development with CenturyLink, will also be part of the duty of the ESInet Users Group. It is expected that the Users Group will take up those issues as the migration nears completion.

So far, the ESInet Users Group has requested information and pricing from CenturyLink regarding the possibility of including statewide delivery of text to 9-1-1 calls via the ESInet, and for pricing and terms regarding the statewide implementation of a 9-1-1 call data collection system known as ECaTS.

Examples of other 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.
- Other advanced services that could be implemented via the ESInet. Examples of such advanced services potentially include 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.

The ESInet Users Group also serves to monitor quality of service metrics regarding the ESInet. CenturyLink provides the Users Group with quarterly metrics reports regarding latency, jitter, packet loss,[32] and other measures of service quality that are then reviewed by the ESInet Users Group to ensure those metrics are within the ranges agreed upon in the tariff.

In addition to these efforts, Commission staff is developing a "State NG9-1-1 Plan" that it intends to complete through a stakeholder process with the ESInet Users Group, and will be made publicly available. This plan will then be used by the Users Group and updated regularly to help guide future deployment of features and services. Having a Colorado NG9-1-1 Plan will also provide CenturyLink or other potential service providers a roadmap for what features and services the 9-1-1 community has agreed it would like to see incorporated into the ESInet long-term.

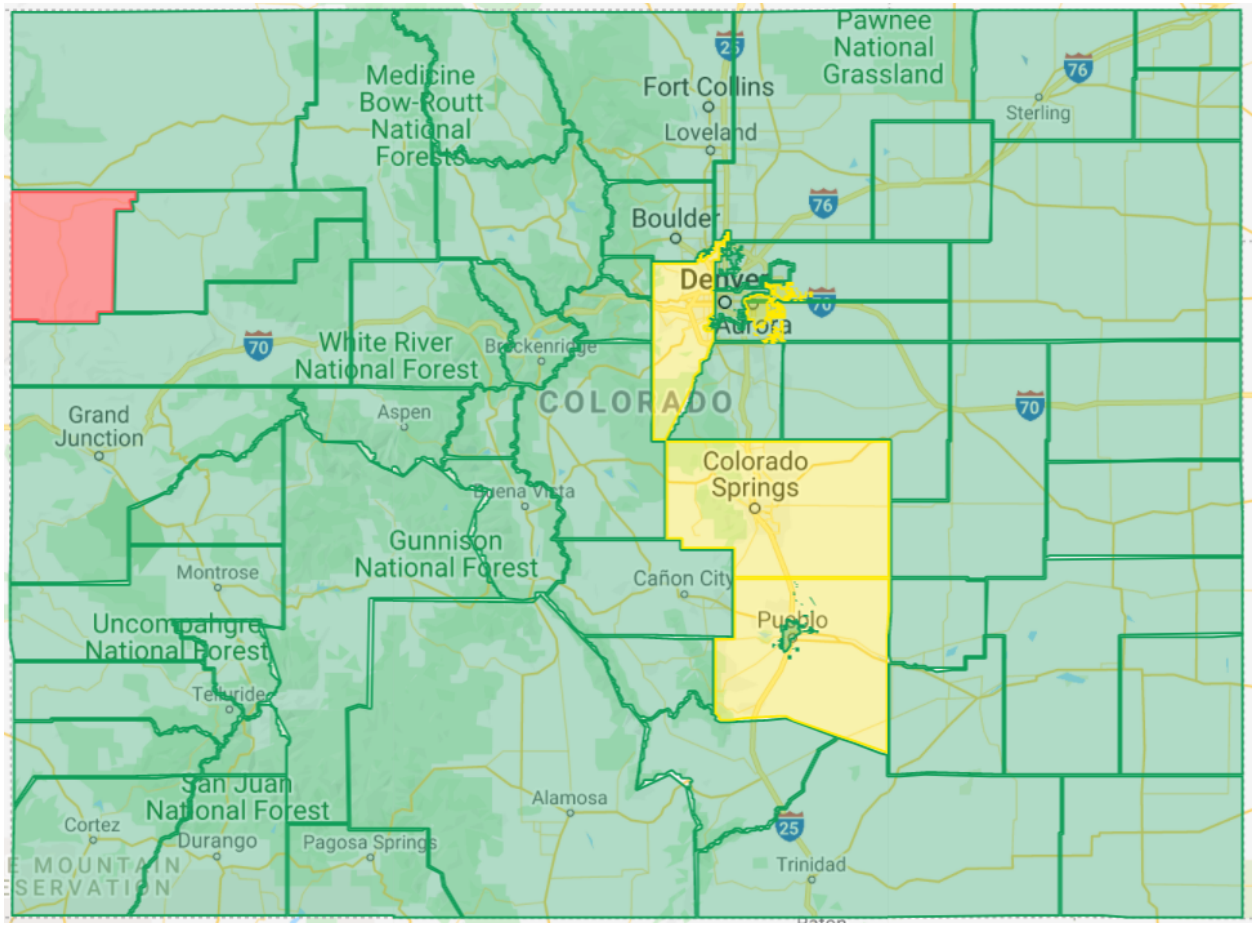
A critical component of the planning, transition, and implementation of the ESInet is ensuring proper funding. The new tariff states that the previous tariff rates remain in place until each

[32] *Latency* is the time it takes data packets to traverse the network. Too much latency in IP-based telephony causes callers to speak over the top of each other. *Jitter* is the measure of inconsistency in the arrival of data packets between sender and receiver, which can cause a connection to be unstable and for data packets to be lost. *Packet loss* is the measure of how many packets of data are lost between sender and receiver. A high degree of packet loss in IP-base telephony can result in poor audio quality.

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. With the passage of House Bill 20-1293 last year, the Commission has been able to implement a statewide 9-1-1 surcharge to reimburse the 9-1-1 governing bodies for the cost of purchasing Basic Emergency Service from CenturyLink, and is hopeful that this surcharge can be leveraged to pay for the additional features and services necessary for the full implementation of NG9-1-1. See Section 7 for a full discussion of funding.

Current Migration Status

As of July 1, 2021, only 6 out of 96 PSAP sites remain to be migrated.[33] The remaining migrations are expected to be completed in the second half of 2021.



[33] There are 96 PSAP sites, despite there being only 85 PSAPs, due to some PSAPs having permanent off-site backup facilities that must also be migrated to the ESInet.

Figure 3.1: 9-1-1 governing bodies by ESInet migration status as of July 1, 2021. Red indicates no PSAP sites have migrated within the 9-1-1 governing body's service area. Yellow indicates some, but not all PSAP sites have migrated. Green indicates all PSAP sites have migrated.

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. One of the goals of Commission staff in developing a State NG9-1-1 Plan with input from the stakeholders is to establish goals and milestones for full implementation. Much of the timing, however, is dependent on the ability of CenturyLink and its subcontractors to implement the additional network components necessary for the ESInet to be considered true NG9-1-1.

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[34]: 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[35], but with some exceptions deregulates other telecommunications services.[36] Commission rules, therefore, only require notification from carriers for outages to Basic Emergency Service.[37] 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.[38]

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[34] 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

[35] § 40-15-201 (2), C.R.S.

[36] § 40-15-401 (3) and (4), C.R.S.

[37] 4 *CCR* 723-2-2143 (g)

[38] 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 is currently considering granting states read-only access to its outage reporting database. See FCC 20-20.

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 that occur 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.

For a graphical representation of the scope of the Commission's authority regarding outages, refer to figure 2.1, reproduced below. Only outages occurring in the red shaded section of the diagram are considered Basic Emergency Service outages, and therefore are required to be reported to the Commission.

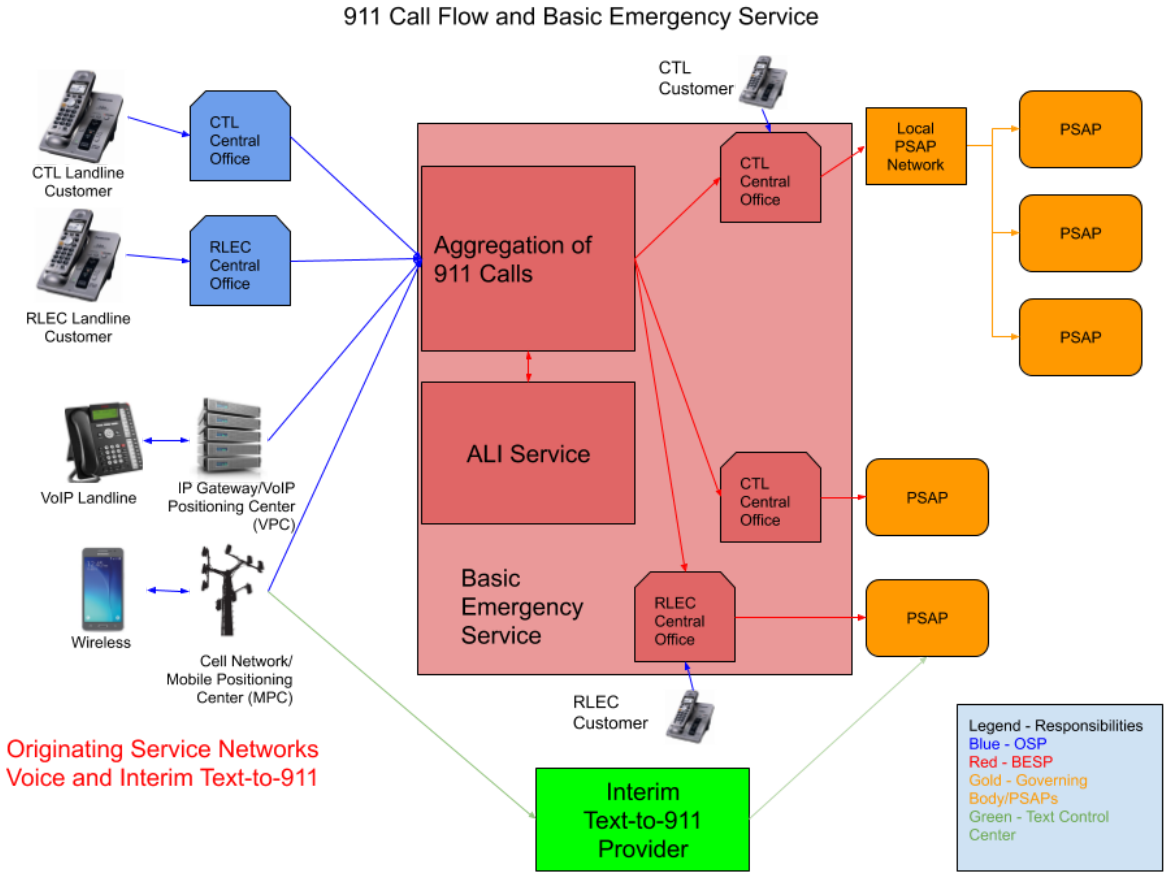

Figure 2.1: 9-1-1 Call Flow with "Basic Emergency Service" shown in red.

With these limitations in mind, the Commission provides the following statistics in regard to

Basic Emergency Service outages.

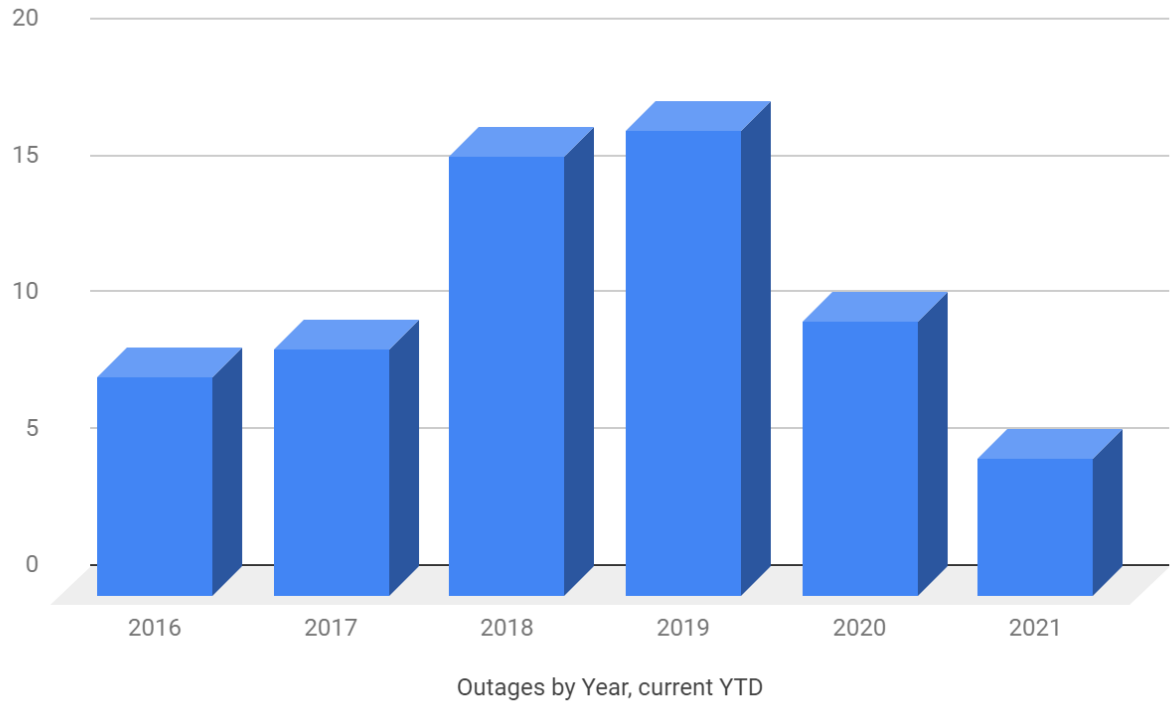

Figure 4.1: BES outages by Year. 2021 shows outages as of July 12, 2021.

Figure 4.1 shows that with half of 2021 completed, Colorado is on track to see roughly the same number of outages this year that occurred in 2020. Total outages for 2020 were a significant decrease from 2018 and 2019.

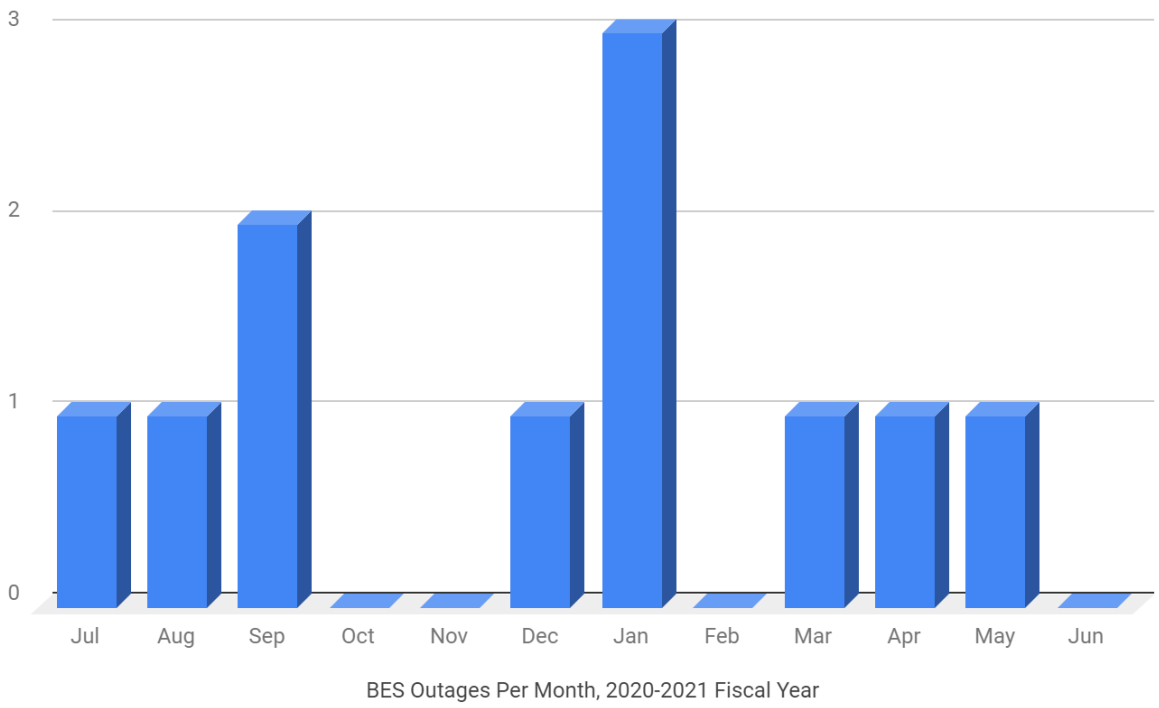

Figure 4.2: Outages per Month, July 2020-June 2021

Figure 4.2 represents outages by month over the 2020-2021 fiscal year. Typically outages are more likely to occur during the summer months when construction activity is more likely to damage underground facilities, but with the small number of basic emergency service outages that Colorado experiences, a small spike in numbers can upset that usual pattern. In this case, January was the worst month for outages with three outages occurring.

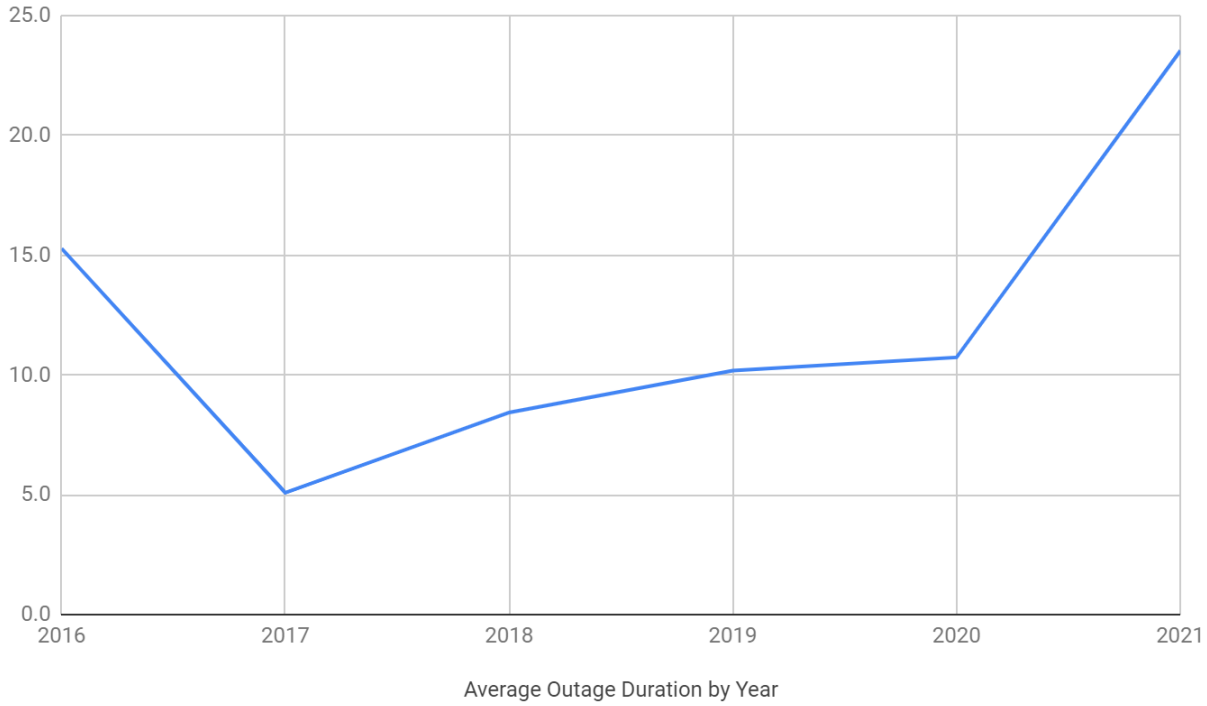

Figure 4.3: Average duration of BES outages in hours. 2021 is YTD as of July 12, 2021.

Basic Emergency Service outage duration is measured in hours, with 2021 having the highest average duration of outages on record.

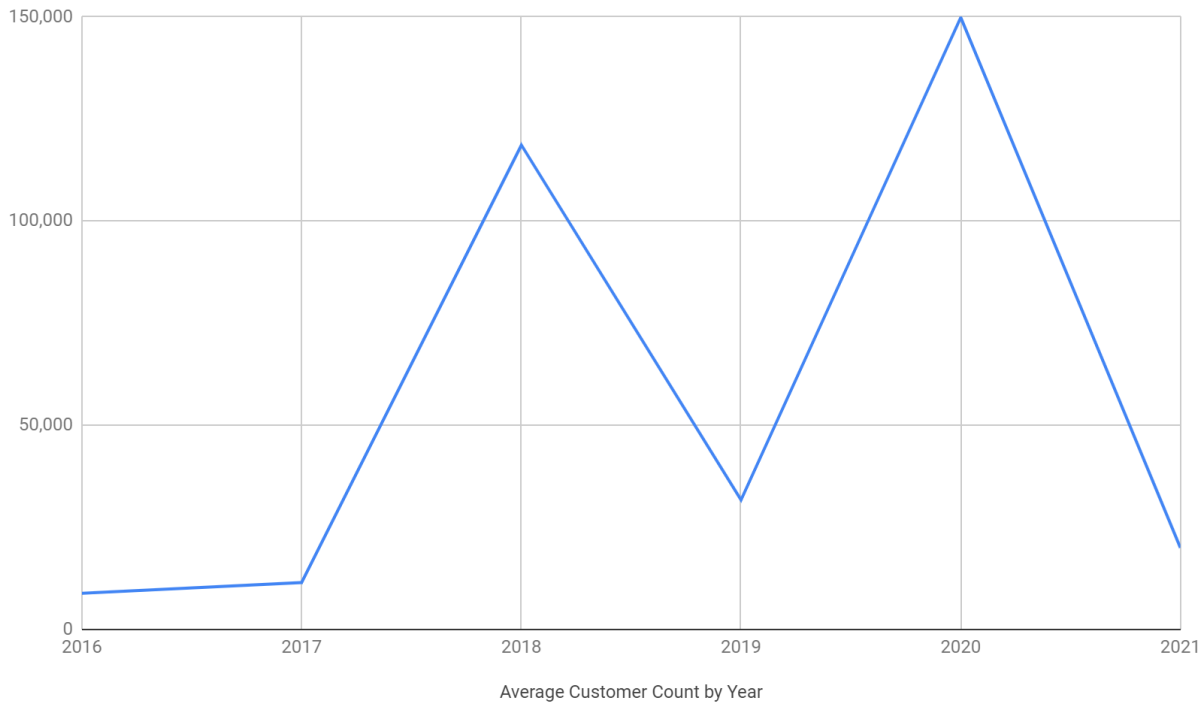

Figure 4.4: Average number of customers affected by a BES outage. 2021 is YTD as of July 12, 2021

Figure 4.4 demonstrates that the average number of customers affected by a basic emergency service outage is, so far this year, the lowest number since 2017. Between this chart and figure 4.3, we can see that outages in 2021 have, thus far, affected smaller communities for longer durations of time than in recent years. This pattern makes the most sense if you consider outages occurring in more rural areas that take longer to repair because of a lack of technicians living in those areas able to be assigned to repair the cable or network component that needs repaired.

Commission staff maintains a Basic Emergency Service Outage Dashboard[39], which is updated with outage data as it is received from the BESP and from the rural Local Exchange Carriers.

[39] https://sites.google.com/state.co.us/9-1-1-advisory-task-force/outage-dashboard

Commission Process for Improvement

In 2013, the Commission initiated an inquiry into 9-1-1 network performance following recent floods and fires[40]. 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[41].

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.[42] 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.[43]

Per the Commission's rules, the result of this process was 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[44]. However, on December 29, 2020, Commission staff participating in the workshops filed in the proceeding a letter recommending that the proceeding be closed to allow a rulemaking to proceed to change the Commission's rules regulating resiliency and reliability of the 9-1-1 network. The reasoning behind this request was that with the passage of HB 20-1293, the Commission now has the statewide 9-1-1 surcharge created by that bill to help fund improvements to the Basic Emergency Service network to reduce its vulnerability to outages, and that Commission rules should take this fact into account.[45]

The Commission agreed with this recommendation, and ordered the proceeding to be closed and directed Commission staff to begin preparing a Notice of Proposed Rulemaking on the topic of 9-1-1 network reliability.[46] At the advice of Commission counsel, this rulemaking has

[40] See Proceeding 13I-1147T.
[41] See Decision R14-0303.
[42] See Proceeding 19M-0026T.
[43] See Decision C19-0117-I.
[44] 4 *CCR* 723-2-2143(a)(III).
[45] See https://www.dora.state.co.us/pls/efi/EFI.Show_Filing?p_fil=G_771812&p_session_id= for a direct link to the letter.
[46] See Decision C21-0036.

been postponed until after the completion of our current rulemaking on 9-1-1 funding and audit procedures, but Commission staff anticipates that this Notice of Proposed Rulemaking will be initiated before the close of the calendar year.

CenturyLink is also required to file a contingency plan annually, the most recent being filed April 30, 2021[47]. 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, without rulemaking.[48]

Work of the 9-1-1 Advisory Task Force Outage Committee

In addition to the work being done in the workshops discussed above, the efforts of the Outage Committee of the 9-1-1 Advisory Task Force are also relevant. In the fall of 2019, this Committee created a set of thresholds for Basic Emergency Service outages that would trigger a special investigation by the committee. This committee conducts a special investigation of any outage that meets any of the following criteria:

- Multiple PSAPs affected.
- Details of the outage are unclear from the outage report.
- Outage duration in excess of four hours.
- Unusual pattern of impact.
- The PSAP or 9-1-1 governing body report differs from the BESP report.
- Any report of poor communication between the PSAP and BESP during the outage.
- Apparent failure to notify the PSAP of the outage in a timely manner.
- Repeated outages of a similar nature or in the same area over a short period of time.
- Any request for a special investigation by either one or more PSAP or 9-1-1 governing bodies, or by Commission Staff.

For each special investigation, the Outage Committee develops a list of questions that it wishes the BESP to answer regarding the outage, and before closing the special investigation it attempts to identify "lessons learned" that will help either avoid a similar outage in the future or mitigate the impact of the outage by reducing the duration, improving communication between the PSAP and the BESP, or providing other remedies.

Based on these special investigations, the Outage Committee has begun compiling a "911 Outage Lessons Learned and Best Practices" document, which is available on the 9-1-1 Advisory Task Force webpage.[49] This is a living document that will continue to be updated as additional special investigations are completed. This document serves as a companion document to a document entitled "Colorado 9-1-1 Outage Guidelines for PSAPs and Authorities," produced in November of 2019.

[47] See Proceeding 18M-0294T.
[48] 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".
[49] https://docs.google.com/document/d/1zX7sl2yb7sR83YxM6YrcW234A-bA-T7duUb7j9KEOPk

The special investigations completed by this committee, as well as the PSAP outage guide and best practices document, can be accessed on the Committee's web page[50].

Monitoring Outages in the Originating Service Environment

As discussed earlier, the Commission is precluded by Colorado statute from imposing outage notification requirements on originating service providers.[51] However, outages in the originating service environment do impact the ability of users to call 9-1-1. Currently, the Commission has no way to inform the legislature regarding the degree of impact that such outages are having on the 9-1-1 system and the public in the state.

While the Colorado Public Utilities Commission is prohibited from imposing outage notification rules on originating service providers, the Federal Communications Commission is not. The FCC requires all carriers to report outages to the FCC via the FCC's Network Outage Reporting System (NORS). On March 17, the Federal Communications Commission issued a Report and Order directing FCC staff to begin working on a process by which state and local governments could gain read-only access to reports submitted to the FCC in NORS, and to allow those state and local governments to share aggregated statistical information based on those reports.

The Commission intends to participate in this process when it becomes available, although the FCC has set a date of September 30, 2022 to enact this program. That being the case, data regarding the frequency, duration, and impact of originating service provider outages won't be available for inclusion into this report until the 2022-2023 edition, at the earliest.

[50] https://sites.google.com/state.co.us/9-1-1-advisory-task-force/committees/outage-committee
[51] § 40-15-401, C.R.S.

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. Potential solutions for these issues are also presented, with some discussion. While this document will be circulated in draft form and input received and incorporated as appropriate from Colorado's 9-1-1 stakeholders, it should be noted that the entire 9-1-1 community may not be in agreement on any of the challenges or solutions presented here.

New in this year's edition of this report is a more detailed look at each challenge, what potential solutions exist, and what the current status is of solving them.

9-1-1 System Capabilities Need to Catch Up to User Expectations

The Challenge: User expectations, driven primarily by the functionality available in commercial communications networks, have outpaced the abilities of the 9-1-1 system.

The Details: Commercial communications networks, particularly wireless telecommunications networks, include the ability to send text messages, pictures, video, and other types of data to other users, seemingly without restrictions.

The Solution: 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. This is a phased, long-term implementation process, which has already begun with the deployment of an Emergency Services IP Network (ESInet). See Section 3 for a full discussion of Colorado's journey to full implementation of Next Generation 9-1-1.

Recommendation: It is not yet known what additional resources may be required to implement NG9-1-1 services statewide. This is a topic that is currently being explored by the ESInet Users Group. **The Commission's recommendation is to allow the ESInet Users Group to continue developing its vision of what the future of 9-1-1 in Colorado should be, but also to be aware that there may be additional requests for funding and resources as that vision solidifies.**

No Public Safety Answering Point Performance and Service Standards

The Challenge: There are no minimum standards for the operation of a Public Safety Answering Point (PSAP), potentially exacerbating uneven outcomes for 9-1-1 callers depending on where the 9-1-1 call takes place.

The Details: There is no statewide standard for performance in place for Colorado's PSAPs. As a result, the level of service provided by PSAPs has the potential to vary widely across the state, and a person traveling through Colorado could experience different levels of care depending on where they place a 9-1-1 call. Examples of ways in which 9-1-1 care may vary

include:

- Most PSAPs provide pre-arrival instructions for medical calls, such as cardiopulmonary resuscitation instructions, and some do not.
- Some PSAPs conduct quality assurance on random samples of their calls, and some do not.
- Most PSAPs contract with foreign language translator services to be able to take 9-1-1 calls from non-English speakers, and some do not.
- Most PSAPs support text to 9-1-1 calls from the public, and some do not.
- Most PSAPs in Colorado require emergency communications specialists[52] to undergo a minimum basic training program, and some do not.[53]

The Solution: The only solution to a lack of operational standards is to implement standards. It should be noted that all of the items listed above as examples of disparities in service levels may be funded with local emergency telephone charges,[54] and that 9-1-1 governing bodies may adjust their emergency telephone charges up to a threshold amount set by the Commission annually.[55] Governing bodies that determine that an emergency telephone charge in excess of this threshold is necessary to fund PSAP operations may also file an application with the Commission for approval to exceed the threshold.[56] As such, the funding mechanism for implementation of minimum PSAP operational standards is already in place.

There have been objections to the inclusion of this challenge in previous editions of this report, particularly as it relates to minimum training standards for emergency communications specialists, stating that decisions regarding operational standards and training standards should remain a local decision. However, the Commission believes that citizens or visitors to the state expect a foundational level of service, at least, when they call 9-1-1, and the Commission believes the only way to achieve this foundational level of service consistently is with the development of minimum operational standards for PSAPs. The Commission also believes that the state has an obligation to ensure that every caller to 9-1-1 receives a minimum level of service.

Recommendation: The legislature should consider working with 9-1-1 stakeholders to develop minimum operational standards for PSAPs. Alternatively, the legislature could consider authorizing the Commission or the Department of Public Safety to develop such standards through a collaborative process with stakeholders and implement them.

Lack of Visibility into the Reliability of the Full 9-1-1 Call Flow

[52] Past editions of this report referred to 9-1-1 call takers and dispatchers as "Public Safety Telecommunicators." This term has been updated here to "Emergency Communications Specialists" to reflect changes in the common usage in the industry.
[53] In previous editions of this report the issue of a lack of minimum training standards for emergency communications specialists was its own category. Since it relates to a lack of operational standards for PSAPs, it was combined into one challenge for this report.
[54] See the full list of allowable uses of 9-1-1 funds enumerated in § 29-11-104, C.R.S.
[55] See § 29-11-102(2)(a), C.R.S.
[56] See § 29-11-102(2)(c), C.R.S.

The Challenge: As discussed in more detail in Section 4, the Commission only has authority to require reporting of outages that occur in the portion of the 9-1-1 call flow referred to in statute as Basic Emergency Service.

The Details: Basic Emergency Service is the middle portion of the 9-1-1 call flow, starting where 9-1-1 calls are aggregated from all of the originating service providers to the point where 9-1-1 calls are handed off to the PSAP, or to a local network operated by the PSAP or 9-1-1 governing body. As a result, the Commission is unable to provide the legislature with a complete picture regarding the reliability of 9-1-1 service in the state, nor are we able to provide any insight regarding outages at the PSAPs that may affect the public's ability to call 9-1-1. In fact, there is no state agency overseeing the reliability of the entire 9-1-1 call flow.

The Solution: The FCC requires reporting from all telecommunications providers for any outage over 30 minutes in duration that potentially affects a "911 special facility" or has the potential to reach 900,000 user minutes.[57] The contents of these reports, however, are not available to the public, or even to the state. In a Report and Order issued on March 17, 2021, the FCC committed to creating a process by which state agencies and local governments may apply to receive read-only access to the FCC's outage reporting system, known as the Network Outage Reporting System (NORS). The process to apply for access is expected to be in place by September of 2022.

Recommendation: The legislature should wait for the FCC's processes to be put in place so that the Commission may participate and use the data obtained to provide the legislature with aggregated data regarding the frequency, duration, and impact of originating service provider outages that affect Colorado. However, if this process is delayed or fails to produce actionable data for the legislature, the Commission may change this recommendation. An alternative solution would be for the legislature to authorize the Commission to enact outage reporting requirements for originating service providers.

No Clear Path Toward Consistent Statewide Cybersecurity Defense at Local PSAPs

The Challenge: Cybersecurity of Public Safety Answering Points is largely left to local IT resources, which may vary in their ability to ensure the security of PSAP systems.

The Details: The Basic Emergency Service Provider, CenturyLink, which is authorized to aggregate 9-1-1 calls, then route and transport them to the PSAP, is responsible for cybersecurity on the ESInet. However, all cybersecurity defense within the PSAP itself is the responsibility of the PSAP. PSAPs in the urban areas of the state have robust information technology staff support to rely upon, including the IT staff supporting the cities and counties in those urban areas. It is unclear at this time whether PSAPs in rural areas of the state have sufficient cybersecurity support, and what can or should be done to assist local agencies to ensure that they are sufficiently protected. While the implementation of the ESInet provides a great number of benefits, it does introduce vulnerabilities to every PSAP on the network if

[57] The "user minutes" of an outage is measured by the number of customers suspected to be impacted by an outage multiplied by the duration of the outage in minutes. See 47 CFR §4.5 and 4.9.

one PSAP does not observe sufficient cybersecurity precautions.

The Solution: The Commission does not have sufficient cybersecurity expertise to fill this gap for rural PSAPs that may not have sufficient cybersecurity support locally. Activity should be undertaken to determine if the Governor's Office of Information Technology could provide support.

Recommendation: No action by the legislature is recommended on this issue at this time. Commission staff intend to engage with the Governor's Office of Information Technology to discuss this issue and the issue below. If it is determined that OIT could potentially fill this gap, the Commission and OIT may jointly make a recommendation in the future for appropriations to support PSAP cybersecurity.

No Clear Path Toward a Statewide GIS Dataset for NG9-1-1

The Challenge: Full implementation of Next Generation 9-1-1 includes geospatial routing of 9-1-1 calls, which is routing of 9-1-1 calls based on the x/y coordinate of the caller rather than the cell tower location. This requires a statewide Geographic Information System (GIS) dataset sufficiently provisioned for use in 9-1-1, which does not currently exist.

The Details: The GIS Committee of the Commission's 9-1-1 Advisory Task Force has been exploring this issue, but the solution is elusive. Since all 9-1-1 funding in Colorado is remitted to local 9-1-1 governing bodies, there is no funding mechanism to pay for statewide GIS data collection for use in an NG9-1-1 system.

The Solution: Three possible solutions have been discussed regarding this challenge.

1. Because it is related to the provision of Basic Emergency Service, CenturyLink or another company serving as the Basic Emergency Service Provider could offer this service (provided directly by the BESP or by a contractor to the BESP) as part of the Basic Emergency Service Tariff. This would require a modification of the tariff.
2. The Governor's Office of Information Technology may be able to assist with this task. Commission staff will engage in discussions with OIT to discuss potential collaboration and identify if additional resources are needed.
3. The local 9-1-1 governing bodies could form a statewide coalition to pool their resources to pay for the GIS dataset. This idea was first promoted by the Larimer Emergency Telephone Authority, and while it is still in the conceptual stage it has garnered some support from the other 9-1-1 governing bodies. The coalition would also pay for other 9-1-1 expenses that make sense to fund on a statewide basis, such as public education campaigns and basic training programs for emergency communications specialists.

Recommendations: No action by the legislature is recommended on this issue at this time. Commission staff will engage with OIT to discuss this issue and the one above, and the Commission will provide recommendations or an update related to this issue in the next edition of this report.

Changing Federal Regulations Regarding Use of 9-1-1 Fees

The Challenge: The Federal Communications Commission has issued new rules regarding the use of 9-1-1 fees that are ambiguous, but may require Colorado to modify its statute in order to avoid penalties.

The Details: On June 24, 2021, the FCC issued a Report and Order establishing rules for the use of 9-1-1 fees by the states.[58] This action was required by Section 902 of the Consolidated Appropriations Act of 2021 (Section 902), which directed the FCC to undertake a rulemaking defining acceptable uses of 9-1-1 fees and establishing a 9-1-1 Fee Diversion Strike Force to make further recommendations to Congress regarding penalties for violating those rules, up to and potentially including criminal penalties.

The rules issued by the Commission define acceptable uses of 9-1-1 fees for the purposes of Section 902, and provide examples of expenses that would be considered acceptable and examples of expenses that would be considered unacceptable. The acceptable uses of 9-1-1 fees as described in the Report and Order largely comport with Colorado's statutory definition of acceptable use of 9-1-1 funds as outlined in § 29-11-104, C.R.S. One area of ambiguity, however, is on the use of 9-1-1 funds to pay for public safety radio systems and equipment.

Colorado statute enumerates a number of expenses for which 9-1-1 funds, meaning funds derived from local emergency telephone charges, the statewide 9-1-1 surcharge, or the prepaid wireless 9-1-1 charge, may be expended. If the first set of allowable expenses are paid for, remaining funds may be used for "public safety radio equipment outside the PSAP" and "personnel expenses necessarily incurred for a PSAP or the governing body in the provision of emergency telephone service."[59] The rules recently adopted by the FCC, however, states that some radio equipment is an acceptable expense, but that "Equipment or infrastructure for law enforcement, firefighters, and other public safety/first responder entities that do not directly support providing 911 services" is not considered an acceptable use.

This language creates some ambiguity regarding what radio equipment may be considered an acceptable expense, and it is unclear whether Colorado's statute would fit fully within the FCC's definition of allowable expenses for 9-1-1 fees. At this time, the only penalty for failing to meet the FCC's definition of allowable expenses for 9-1-1 fees is that states or taxing jurisdictions found to be diverting 9-1-1 fees based on the FCC's definition would be "ineligible to participate or send a representative to serve on any advisory committee established by the [Federal Communications] Commission." However, the FCC has formed the 9-1-1 Fee Diversion Strike Force required by Section 902 with the purpose of making recommendations to Congress on what additional penalties should be imposed on states to discourage them from allowing 9-1-1 fees to be used for purposes other than those authorized in the FCC's rules.

[58] See https://docs.fcc.gov/public/attachments/FCC-21-80A1.pdf.
[59] § 29-11-104(2)(a)(II), C.R.S.

The FCC seems to also realize that the guidelines they provided regarding the use of 9-1-1 fees to pay for land mobile radio systems or equipment are ambiguous, since the Report and Order also directed the Strike Force to make additional recommendations to the FCC regarding the use of 911 fees for public safety radio systems.

The Solution: Following the additional recommendations that we are expecting to be issued by the 9-1-1 Fee Diversion Strike Force, we expect that the FCC may clarify their rules regarding the use of 9-1-1 fees, which will hopefully provide more clarity regarding whether Colorado's current statute fits within the FCC's rules. We also won't know the full extent of penalties to which Colorado may be subject if it chooses not to comply with the FCC's rules on this matter. Until then, we believe there is no solution to this problem except to wait and see what the outcome of this process is.

It should be noted that the Commission's 9-1-1 Program Manager, Daryl Branson, is serving on the Strike Force.

Recommendations: No action by the legislature is recommended on this issue at this time. However, the legislature should be aware of this developing issue, and if it is determined that Colorado's statute is out of compliance with the FCC's rules on 9-1-1 fee diversion, and that the penalties are severe enough that we must become "in compliance," then the legislature may be called upon to modify Section 29-11-104. If this results in loss of funding for public safety radio equipment for local agencies, the legislature may also be called upon to find another way to fund those resources that are currently being funded, at least in part, from 9-1-1 surcharge funds.

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[60].

- NG911/PSBN Interconnection: A collaboration with public and private representatives to address the connection between Next Generation 9-1-1 systems and public safety broadband networks, such as the one managed by the FirstNet Authority.
- COVID-19 Resources: A collection of resources regarding COVID-19 response for 9-1-1 centers and telecommunicators.
- Public Safety Telecommunicator Job Reclassification: This is an effort to encourage local, state, and federal agencies (such as the Bureau of Labor Statistics) to recognize 9-1-1 telecommunicators as public safety personnel rather than classifying them as clerical workers.
- Next Generation 9-1-1 Self-Assessment Tool: This is a self-assessment tool that can be used by PSAP managers and local and state 9-1-1 officials to assess their agency's readiness for NG9-1-1.
- Next Generation 911 for Public Safety Leaders: A collection of resources for educating public safety professionals about the benefits of Next Generation 9-1-1.
- 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 utilizing 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.

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

- 9-1-1 Datapath: This initiative is working on creating a standardized national 9-1-1 dataset that PSAPs could use to classify calls. The classification will allow data to be compared nationally regarding call volume, what types of calls are received, and what types of calls first responders are dispatched to.

- 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.

The Federal Communications Commission

There are three FCC proceedings of relevance to this report.

- For several years, the FCC has maintained a timeline by which wireless carriers were required to improve indoor 9-1-1 location accuracy, including the implementation of Z-Axis measurements, which could eventually be used to inform a 9-1-1 call taker which floor of a multi-level building a caller is on within a certain margin of error. After rejecting requests to delay implementing the inclusion of Z-Axis coordinates with 9-1-1 location information, the FCC announced in June that the three major wireless carriers (AT&T, Verizon, and T-Mobile) had agreed to begin delivering the data with their 9-1-1 calls.[61] A full timeline of the FCC's phased-in location accuracy improvements is available on the FCC's website.[62]

- On March 17, 2021, the Federal Communications Commission issued a Report and Order that directs FCC staff to implement a process by the end of September 2022, by which states, territories, and other government entities may obtain read-only access to the FCC's Network Outage Reporting System (NORS). They will also be able to share data from that system, with the requirement that the data be aggregated and anonymized. This will be helpful in allowing states and other jurisdictions to understand the reliability of originating service provider networks and what impact outages in those networks may have on the ability of citizens to reach 9-1-1.[63] The PUC filed comments in response to the Notice of Proposed Rulemaking that preceded this

[61] Lawler, R. "AT&T, Verizon and T-Mobile will start providing z-axis data for 911 calls". Published June 4, 2021. Retrieved July 15, 2021 from https://www.engadget.com/911-vertical-location-fcc-025655574.html

[62] https://www.fcc.gov/public-safety-and-homeland-security/policy-and-licensing-division/911-services/general/location-accuracy-indoor-benchmarks

[63] See https://www.fcc.gov/document/fcc-share-communications-outage-info-federal-state-agencies-0

Report and Order, encouraging the FCC to take this action.[64]

- On June 24, 2021, the FCC issued a Report and Order on the topic of 9-1-1 Fee Diversion. As required by the Consolidated Appropriations Act of 2021, the FCC established through this Report and Order a definition of "acceptable purposes and functions for the obligation or expenditure of 911 fees or charges" for the purposes of the Act.[65] The PUC filed comments in reply to the Notice of Proposed Rulemaking that preceded this Report and Order, encouraging the FCC to make specific changes to the proposed rules.[66] The FCC adopted some of the PUC's proposed changes.

- In compliance with the Consolidated Appropriations Act of 2021, the FCC also created a 9-1-1 Fee Diversion Strike Force to make additional recommendations to Congress regarding what penalties or incentives might be instituted to discourage states, territories, and taxing jurisdictions (such as 9-1-1 governing bodies) from using 9-1-1 fees for purposes other than those designated as "acceptable" by the FCC.[67] The final report from that Strike Force is due in September of 2021. PUC staff member Daryl Branson is serving on this Strike Force.

- On April 1, 2021, the FCC issued a Notice of Proposed Rulemaking on the topic of 9-1-1 outage reporting to Public Safety Answering Points (PSAPs). The proposed rules intend to harmonize and improve the notifications received by PSAPs from originating service providers when outages occur.[68]

- Since 1992, the FCC has hosted a series of working groups, today known as the Communications Security, Reliability, and Interoperability Council (CSRIC). The most recent iteration of this working group (CSRIC VII) concluded in March of 2021, and CSCRIC VIII began in June of 2021. CSRIC focuses on topics related to public safety communications and related issues, and its reports may be found on the FCC's website.[69] PUC staff member Daryl Branson served in Working Group 4 of CSRIC VII, which focused on developing recommendations regarding cybersecurity in 9-1-1 systems in transitional Internet Protocol (IP) environments, such as 9-1-1 systems transitioning from legacy 9-1-1 networks to Next Generation 9-1-1.

Federal Legislation

There are a significant number of bills pending in Congress that could have an effect on 9-1-1 service. The most significant bills pending as of the writing of this report are:

- H.R. 1848 - The LIFT America Act. Sec. 15001 of the infrastructure bill as introduced in

[64] https://drive.google.com/file/d/1J02LHl05-atWTE1kW5hSg8OP-s9UDkT2/view
[65] https://docs.fcc.gov/public/attachments/FCC-21-80A1.pdf
[66] https://drive.google.com/file/d/1GaMTlxDv5RsTkBL6FIHBx3zGRdeUlTPG/view?usp=sharing
[67] https://www.fcc.gov/911strikeforce
[68] https://docs.fcc.gov/public/attachments/DOC-371282A1.pdf
[69] https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-vii

Congress would establish a $15 billion grant program to the states for further deployment of Next Generation 9-1-1. The Commission's 9-1-1 Advisory Task Force has adopted a position statement supportive of the program, but calling for specific changes to the language of the bill.[70] If passed, this grant program would be administered by the national 9-1-1 Implementation and Coordination Office in the National Highway Traffic Safety Administration in conjunction with the National Telecommunications and Information Administration.

- S. 1175 - The 911 Saves Act. Currently 9-1-1 call takers and dispatchers are classified by the U.S. Office of Management and Budget as an "office and administrative support" profession.[71] National 9-1-1 organizations lobbied for this classification to be changed to "protective services" when the OMB revisited its classification schedule in 2018, but ultimately the OMB left the classification unchanged. This bill would direct the OMB to make that classification change.

- S. 2016 - Surface Transportation Investment Act of 2021. In 2019, the national 9-1-1 Implementation and Coordination Office (ICO) published an "NG9-1-1 Roadmap" outlining several tasks that must be accomplished so that state-based NG9-1-1 systems can interoperate and that calls can be transferred, if necessary from one NG9-1-1 system to another.[72] Section 4113 of this infrastructure bill would direct the ICO to develop a plan for implementing its recommendations in the Roadmap document.

- H.R. 1250 and S. 390 - Emergency Reporting Act. This bill requires the Federal Communications Commission to issue a report summarizing any activation of the Disaster Information Reporting System (DIRS) of at least seven days in duration. The FCC must also hold at least one public field hearing in the area affected by the event, and it must issue a final report that includes recommendations on how to improve the resiliency of affected communications or networks recovery efforts. The FCC must also determine the circumstances under which it shall require certain service providers to notify a PSAP of a communications service disruption that prevents the origination of 9-1-1 calls or the delivery of information that allows the PSAP to identify the number of or locate a 9-1-1 caller. Further, the FCC must require this notification to be made and specify the appropriate timing of the notification.

- Additionally, a number of bills have been introduced, some potentially overlapping in their scope, designed to divert non-emergency calls from 9-1-1 to other resources. Samples of these bills include:

    - S.515 (117th) - Mental Health Justice Act of 2021
    - H.R.1859 (117th) - 911 Diversion to Unarmed Personnel Act of 2021
    - S.1570 (117th) - HELP Act of 2021
    - S.2046 (117th) - Community-Based Response Act of 2021

[70] https://drive.google.com/file/d/1jLpiFwFKlsYjIrigU2JxUNx0fZvPAUnU/view
[71] Job classification 43-5031. See https://www.bls.gov/soc/2018/major_groups.htm#43-0000
[72] https://www.911.gov/project_ng911roadmap.html

National Trends

National Next Generation 9-1-1 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[73]. In this most recent edition of the report, it is reported that 28 states now have at least some PSAPs receiving 9-1-1 calls via an Emergency Services IP-network (ESInet)[74] and that 14 states now NG9-1-1 statewide[75]. Unfortunately, this information is now outdated, as it shows Colorado as having made no progress towards the implementation of an ESInet.

Telecommunicator Training

Colorado is in a minority of states that have not legislated minimum training standards for public safety telecommunicators.[76] 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[77].

In 2016, the National 911 Program Office, part of the National Highway Traffic Safety Administration (NHTSA) published a minimum training guideline for state and local agencies to use, listing topics that should be covered as a basis for public safety telecommunicator training.[78]

Funding

Nationally, states have a mix of a locally set 9-1-1 surcharge, a single state-wide surcharge, or a hybrid of both methods. Our average 9-1-1 emergency telephone charge rate is currently $1.54 (up from $1.28 in last year's report), with a low of 70¢ and a high of $3.00. Our state 9-1-1 surcharge is $0.10, which is currently the lowest in the nation, followed by 20¢ (Arizona) at the low end and $1.75 (Alabama) at the high end, although local surcharge rates reach as high as $6.00 in Louisiana and $6.40 in West Virginia[79].

Commission and Colorado Involvement in National Venues

[73] National 911 Program. (2019, November). 2019 National 911 Progress Report. Retrieved July 7, 2020, from https://www.911.gov/pdf/National-911-Program-Profile-Database-Progress-Report-2019.pdf
[74] Page 9.
[75] Page 58.
[76] Unpublished 2017 survey data provided by the National Association of State 911 Administrators indicates the following states reported having no minimum statewide 911 training standards: Alabama, Alaska, Arizona, California, Colorado, Hawaii, Louisiana, Minnesota, and Washington.
[77] http://deniseamberlee.org/
[78] https://www.911.gov/pdf/Minimum_Training_Guidelines_for_911_Telecommunicator_2016.pdf
[79] https://www.nena.org/page/911RateByState?

The Commission has been involved in national 9-1-1 venues in the following ways over the past year:

- Filed comments with the FCC regarding proposed rules to allow states and local governments to access the FCC's Network Outage Reporting System.[80]
- Filed comments with the FCC in response to a Notice of Inquiry published on the topic of 9-1-1 fee diversion.[81]
- Filed comments with the FCC regarding proposed rules to establish a definition of "acceptable uses of 9-1-1 fees" for the purposes of the Consolidated Appropriations Act of 2021.[82]
- Commission staff served on the Working Group 4 of the seventh iteration of the FCC's Communications, Security, Reliability and Interoperability Council (CSRIC VII). The final reports of this working group are available on the FCC's website.[83]
- Commission staff currently serving on the 9-1-1 Fee Diversion Strike Force, formed by the FCC as directed by Congress in the Consolidated Appropriations Act of 2021.[84]
- Commission staff currently serving as the treasurer of the National Association of State 9-1-1 Administrators.[85]

Additionally, Monica Million with the Colorado 9-1-1 Resource Center is currently serving as Immediate Past President of the National Emergency Number Association, and Bruce Romero with Arapahoe County E9-1-1 is serving as the Western Regional Director.[86]

[80] https://drive.google.com/file/d/1J02LHl05-atWTE1kW5hSg8OP-s9UDkT2/view
[81] https://drive.google.com/file/d/1t6YnZCx5siDhEe5Cu0JtdtLQiPZarD-g/view
[82] https://drive.google.com/file/d/1GaMTlxDv5RsTkBL6FIHBx3zGRdeUlTPG/view
[83] https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-0
[84] https://www.fcc.gov/911strikeforce
[85] https://www.nasna911.org/
[86] https://www.nena.org/page/board

7. Funding and Fiscal Outlook

Costs of Providing 9-1-1 Service

Key point: Based on partial responses to a data request sent to the 9-1-1 governing bodies, Commission staff estimated that roughly $200 million was spent by all of the state's 9-1-1 centers combined.

It is difficult to determine the total cost of providing 9-1-1 service in Colorado. Some costs are borne directly by the 9-1-1 governing bodies, which serve as the funding entity for 9-1-1 service. Others are borne by the entities that operate the Public Safety Answering Points (PSAPs), and some of those costs may not even be attributed to the PSAP budget, particularly when a PSAP is housed within a larger facility operated by a county or municipal government.

Early in 2021, Commission staff issued a data request to all of Colorado's 9-1-1 governing bodies asking, among other things, what the total annual expenses were for all of their PSAPs in 2020. The total of all of the responses was roughly $178 million, but 17 out of the 58 9-1-1 governing bodies did not provide responses. All of the 17 governing bodies that failed to respond were rural 9-1-1 authorities with typically lower expenses than the governing bodies funding 9-1-1 services in the metropolitan areas. As such, Commission staff estimates that roughly $200 million was spent by all of the PSAPs statewide in 2020 on provision of 9-1-1 service.

Funding Sources

Key points:

- *The current funding mechanisms are sufficiently flexible to meet the 9-1-1 funding needs of Colorado and its 9-1-1 centers.*
- *Roughly $90 million was raised through local emergency telephone charges, the prepaid 9-1-1 charge, and the state 9-1-1 surcharge combined in 2020.*
- *The revenue from the prepaid 9-1-1 surcharge has increased from roughly $200,000 per month to over $1 million per month with the implementation of a flat per-transaction charge due to the passage of HB 20-1293.*
- *The Commission recommends that the legislature revisit the prepaid wireless 9-1-1 charge and consider whether returning to a percentage-based prepaid wireless 9-1-1 charge might be more appropriate and equitable.*
- *Recent rules issued by the FCC may require changes to Colorado's statute governing the use of 9-1-1 funds.*

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

- The state 9-1-1 surcharge, implemented in January of this year due to the passage of

HB 20-1293. The rate of the surcharge is set by the Commission, up to $0.50 per line per month. For calendar year 2021, this rate was set at $0.10, an amount calculated to reimburse the 9-1-1 governing bodies for tariffed rates charged by the Basic Emergency Service Provider (BESP) for the delivery of 9-1-1 calls to the Public Safety Answering Points (PSAPs).

- The Emergency Telephone Charge (ETC), a local charge established separately by the 58 9-1-1 governing bodies that apply to landline, wireless, and Voice over Internet Protocol (VoIP) services.[87] These rates can be set by local 9-1-1 governing bodies independent of oversight up to a threshold set annually by the Commission. ETC rates in excess of this threshold require approval from the Commission obtained through an application process.
- The Prepaid Wireless 9-1-1 Charge, which is set annually by the Commission and charged per transaction. The charges are collected by retailers of prepaid wireless telecommunications services and remitted to DOR. The methodology the Commission uses to set this surcharge is prescribed by statute, and must be the sum of the average of the local emergency telephone charge rates and the state 9-1-1 surcharge.
- "User fees" on agencies dispatched by the Public Safety Answering Point (PSAP).
- Local city and county general funds.

Based on the partial response to the data request sent by Commission staff to all of the 9-1-1 governing bodies in early 2021, staff estimates that roughly $90 million was raised through emergency telephone charges and the prepaid wireless 9-1-1 charge in 2020. Comparing this to the estimated cost of 9-1-1 service provision of roughly $200 million, this means that a little over half of the costs of providing 9-1-1 service in the state had to be paid through means other than the 9-1-1 surcharges.

In some limited cases, local sales taxes have also been approved and set aside for public safety communications, including the PSAP. Otherwise the remaining costs of operating Colorado's PSAPs are paid out of county and municipal budgets.

Because this analysis reflects revenues raised and expenditures made in calendar year 2020, it does not take into account the changes enacted by the legislature through the passage of HB 20-1293. Those changes took effect in January of 2021, and while sufficient data does not yet exist to determine the full impact of those changes, some effects were immediately visible.

For instance, the prepaid wireless 9-1-1 charge, previously set in statute at 1.4% of the value of the prepaid wireless telecommunications service being sold, raised roughly $200,000 per month in 2020. Beginning in January of 2021, the charge was changed to a flat rate of $1.38 per transaction. No data existed regarding how many prepaid wireless telecommunications transactions were taking place in the state, so it was not possible to predict what the revenue generated from this flat rate would be. Since the implementation of that flat rate, reports issued by the Colorado Department of Revenue indicated that the revenue from the prepaid wireless 9-1-1 charge increased roughly five-fold, bringing in around $1 million per month. These funds are distributed to the 9-1-1 governing bodies based on wireless call volume at

[87] § 29-11-102(2)(a)-(b), C.R.S.

PSAP or PSAPs associated with each governing body.

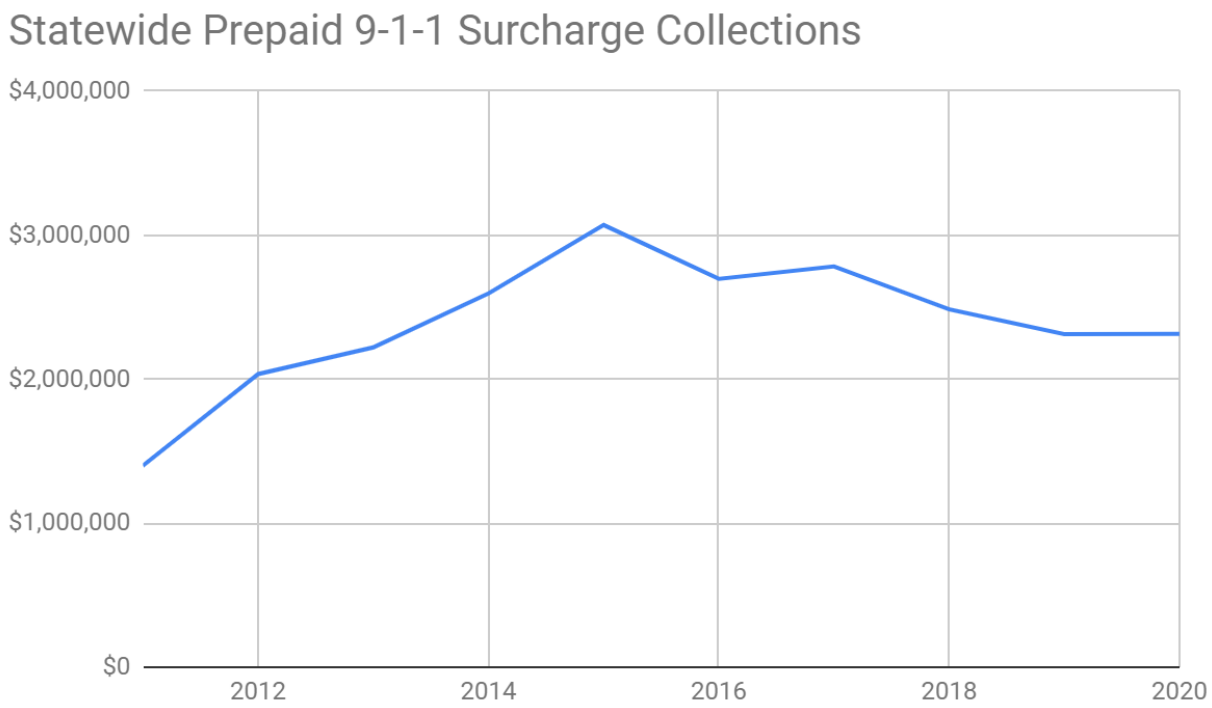

Figure 7.1: Prepaid 9-1-1 surcharge revenues by year. Does not reflect increases due to the changes made by HB 20-1293, which took effect in January of 2021.
Source: Colorado Department of Revenue.

One Commissioner has expressed concern that the transition from a percentage-based prepaid wireless 9-1-1 charge to a per-transaction flat rate may adversely impact low-income individuals, who may be forced by circumstances to purchase prepaid wireless telephone service minutes in smaller increments, resulting in them paying more transactions fees than customers that can afford to buy prepaid services in larger quantities with fewer transactions. **We recommend that the legislature revisit this issue and consider whether a percentage-based prepaid wireless 9-1-1 charge might be more appropriate and equitable.** It is not the Commission's intention to reduce the revenue being generated by the prepaid wireless 9-1-1 charge for the 9-1-1 governing bodies, but the Commission believes that the same revenue could be generated with a properly set percentage-based surcharge that would not have the same potential to adversely impact low-income residents.

The second major change implemented pursuant to HB 20-1293 was the creation of a state 9-1-1 surcharge. The Commission sets the state 9-1-1 surcharge, up to $0.50 per 9-1-1 access connection per month, each October 1 to take effect the following January 1. Statute states that "the amount of the surcharge must be reasonably calculated to meet the needs of governing bodies to operate the 911 system,"[88] although it is not intended to pay the entire

[88] § 29-11-102.3(1)(b), C.R.S.

cost of providing 9-1-1 service, since the prepaid 9-1-1 charge and the local emergency telephone charges continue to exist. Statute also implies that the purpose of the state 9-1-1 surcharge is to reimburse 9-1-1 governing bodies for the cost of purchasing "concurrent sessions," or 9-1-1 lines purchased from the Basic Emergency Service Provider.[89] Using that guidance, the Commission established a state 9-1-1 surcharge rate of $0.10 per 9-1-1 access connection per month, an amount calculated to result in each 9-1-1 governing body receiving payments roughly equal to what they pay CenturyLink as the BESP for the number of concurrent sessions in use by all of the PSAPs associated with the governing body.

The amount needed to be raised every month to reimburse the governing bodies for the cost of paying the BESP for delivery of 9-1-1 calls can be calculated by multiplying the total number of concurrent sessions statewide, 601 at the time that the surcharge rate was set by the Commission, and the tariffed rate per concurrent sessions of $752.22 per month. The result is $452,084.22 per month that must be distributed to the governing bodies in order to fully reimburse them for the cost of 9-1-1 call delivery to the PSAP. This calculation represents the cost of paying the tariffed rates for 9-1-1 call delivery to a call center, only, not the total cost of providing 9-1-1 service.

In setting the surcharge rate, additional adjustments must be made to account for the 1% administrative retention that statute allows providers to keep, and the 4% administrative retention that statute allows the Commission to keep.[90]

As of the writing of this report, five month's worth of 9-1-1 surcharge remittances have been received by the Commission, averaging $606,101.39 per month. The average monthly amount distributed to the 9-1-1 governing bodies is $581,857.33, more than covering the tariffed charges for 9-1-1 call delivery to the PSAP.

The third major change under HB 20-1293 was to require the Commission to adjust the threshold above which local emergency telephone charges required an application to be approved by the Commission. Under Colorado statute, each 9-1-1 governing body may set its own local emergency telephone charge (ETC) up to a certain threshold.[91] If a governing body finds it necessary to set an ETC rate above that threshold, it must first file an application with the Commission and receive approval.[92] This ETC 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.[93]

Prior to the passage of HB 20-1293, this threshold was set at $0.70 per line per month. Following the passage of that bill, the Commission must now set the threshold annually by

[89] § 29-11-102.3(3)(c)(III), C.R.S.
[90] § 29-11-102.3(3)(b) and (3)(c)(II), C.R.S. The four percent administrative retention for the Commission is for actual administrative costs for administering the surcharge, and as such it may be reduced in future years to avoid building up an excess fund balance.
[91] § 29-11-102(2)(a), C.R.S.
[92] § 29-11-102(2)(c), C.R.S.
[93] § 29-11-102(2)(c), C.R.S.; 29-11-103(1), C.R.S.

October 1 to take effect the following January 1. In setting this threshold, the Commission is directed by statute to "take into account inflation and the needs of the governing bodies."[94]

In setting the ETC threshold for calendar year 2021, the Commission noted that the Emergency Telephone Charge threshold had been set at $0.70 since 1990, and stated that $0.70 in June of 1990 would equal $1.39 in June of 2020, per the most recent comparison available through the Bureau of Labor Statistics Consumer Price Index Calculator. However, since the statute also requires the Commission to consider the "needs of the governing bodies," the Commission also noted that from 2016 to 2020, the average increase in local ETC rates had increased faster than the rate of inflation. Based on an analysis of this rate of increase, the Commission set an ETC threshold of $1.72 per 9-1-1 access connection per month, which took effect in January of 2021.[95]

The low and high end of emergency telephone charge rates have not changed since last year's edition of this report, ranging from 70¢ per month (the rate for nine different local 9-1-1 governing bodies in the state) to $3.00 per month (Las Animas County and Gilpin County).[96] The current average emergency telephone charge, state-wide, has increased from $1.28 in 2020 to $1.54 in 2021.

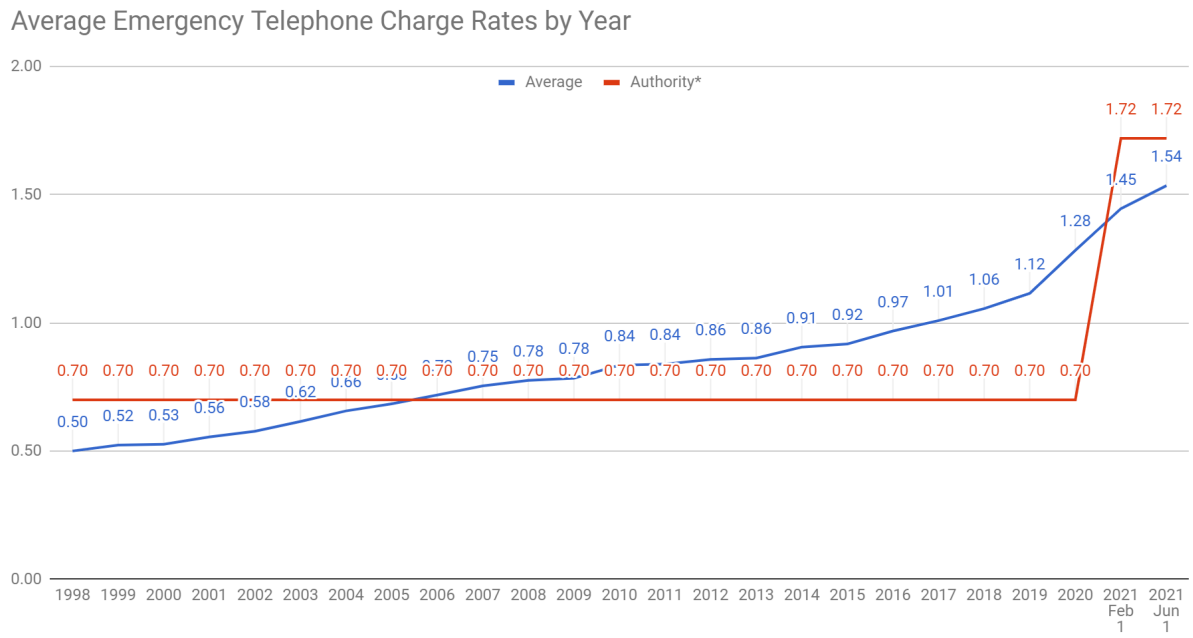

Figure 7.2: Average emergency telephone charge rates in Colorado Since 1998 (blue) compared to the threshold above which governing bodies must apply for approval from the Commission (red).

[94] § 29-11-102(2)(f)(II), C.R.S.
[95] See ¶ 21-24, Commission Decision C20-0690 for a more thorough discussion of the Commission's methodology in determining the ETC threshold for 2021.
[96] For a full list of 911 surcharge rates by 911 governing body, see https://sites.google.com/state.co.us/colorado911program/emergency-telephone-charges?authuser=0

Funding Challenges

Per-line surcharges applied to communications services remains the primary method for funding 9-1-1 services not just in Colorado, but nationally.[97] However, this method has challenges. First, line counts have been decreasing in some rural areas of the state, which results in fewer revenues generated from per-line emergency telephone charges (ETCs). In 2020, every application received by the Commission for an increase in the ETC rate above the threshold showed ETC revenues that were either decreasing or failing to keep up with inflation. Below are the applications filed in 2020 and the average revenue increase or decrease revealed in their applications:

- .86% annual increase - Gilpin County 911 Authority Board[98]
- 4.64% annual decrease - Western Rio Blanco County Emergency Telephone Service Authority[99]
- .17% annual decrease - Archuleta County 911[100]
- .32% annual decrease - Clear Creek County 911[101]
- 1.56% annual increase - Montezuma County 911[102]

With the passage of HB 20-1293, the Commission now sets the threshold above which ETC applications are required annually. Additionally, increases in the ETC rate must have an effective date of Feb 1 or Jun 1 of each year.[103] As of the writing of this report, the Commission has received no applications for increasing the local ETC above the threshold, currently set at $1.72 per line per month.

However, if revenues from ETCs in rural areas of the state continue to increase at rates necessary for local 9-1-1 governing bodies to keep up with inflation, it is likely that local ETC rates will continue to increase. The average ETC rate in June of 2021 was $1.54, up $0.26 from the previous year's average rate of $1.28 per line per month.

Despite these concerns, the changes made by HB 20-1293 have added needed flexibility in the ETC mechanism to allow Colorado's 9-1-1 governing bodies to ensure they are receiving the funding they need. The implementation of the state 9-1-1 surcharge has also provided relief to the governing bodies by reimbursing them for the costs of paying for 9-1-1 call delivery to the Public Safety Answering Point.

Additionally, changing the prepaid wireless 9-1-1 charge rate from 1.4% of the value of wireless prepaid telephone service transactions to a flat per-transaction rate based on the

[97] See https://www.nena.org/page/911RateByState for a list of 9-1-1 fees in other states.
[98] See Proceeding 20A-0447T.
[99] See Proceeding 20A-0441T.
[100] See Proceeding 20A-0175T.
[101] See Proceeding 20A-0145T.
[102] See Proceeding 20A-0087T.
[103] § 29-11-102(2)(b), C.R.S.

average local ETC and the state 9-1-1 surcharge has resulted in a five-fold increase in the revenues generated by the prepaid wireless 9-1-1 charge. These funds are distributed to the governing bodies based on the number of wireless 9-1-1 calls they process in proportion to the total wireless 9-1-1 call volume statewide, and the change has generated an additional $800,000 per month for the 9-1-1 governing bodies of the state.

While the changes made by HB 20-1293 have made a significant improvement in cash flow for Colorado's 9-1-1 governing bodies, there may come a time when other possible funding mechanisms may need to be explored. Nationally, a discussion of other funding structures for 9-1-1 have been discussed, but rarely implemented.[104] The Commission believes that the current funding per-line and per-transaction funding model, with the additional flexibility introduced with the passage of HB 20-1293 is sufficient to meet the needs of the state's 9-1-1 governing bodies for at least the next decade.

Of concern, however, is recent federal scrutiny regarding the acceptable uses of 9-1-1 fees by states and local jurisdictions. As directed by the Consolidated Appropriations Act of 2021, the FCC has defined what it considers to be "acceptable uses" of 9-1-1 funds.[105] The FCC's definition of acceptable uses of 9-1-1 fees reads as follows:

> (a) Acceptable purposes and functions for the obligation or expenditure of 911 fees or charges for purposes of section 902 are limited to:
>
> (1) Support and implementation of 911 services provided by or in the State or taxing jurisdiction imposing the fee or charge; and
>
> (2) Operational expenses of public safety answering points within such State or taxing jurisdiction

Colorado's own statute allows 9-1-1 funds to be spent by local 9-1-1 governing bodies on radios and radio systems. Radio equipment inside the PSAP may be paid for without restrictions from 9-1-1 funds (which includes funds from local emergency telephone charges, the state 9-1-1 surcharge distributions, and the prepaid wireless 911 charge distributions).[106] After all other allowable expenses are funded, 9-1-1 funds may also be used to pay for personnel costs and public safety radio equipment outside the PSAP.[107]

Whether radio equipment and systems outside the PSAP are considered an acceptable expense hinges on whether the FCC considers those expenses to "directly support providing 911 services." The Commission is hopeful that the FCC clarifies this in a further report and order at a later date, and that the clarification will show that Colorado's statute is already in compliance with the FCC's rules. The legislature should be aware that if the FCC chooses to

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[104] See, for example, the National Association of 9-1-1 Administrators, "Four Potential Sustainable Funding Models for NG911", published Aug 5, 2015. Retrieved July 20, 2021. https://drive.google.com/file/d/0B6UENGshedL6MmI5dWFFMVlneU9PZ2hVakNoUVpCeDdOLVZj/view?resourcekey=0-qY7_G1R6aLJIME9rZQmcJQ

[105] See https://www.fcc.gov/document/fcc-adopts-order-address-911-fee-diversion

[106] § 29-11-104(2)(a)(I)(C), C.R.S.

[107] § 29-11-104(2)(a)(II), C.R.S.

define acceptable expenditures for public safety radios and systems in a way that is narrower than Colorado statute allows, Colorado will have two choices:

- Leave its statute unchanged, causing less immediate hardship for local agencies that use 9-1-1 funds to pay for radios and radio systems, but risking potential penalties from the FCC for doing so.
- Change the statute to comply with the FCC's rules, which would create a need to find another source of funding for some local communities in Colorado that use 9-1-1 funding to pay for radios and radio systems for first responders.

The penalties for failing to comply with the FCC's rules currently consist of being prohibited, as representatives of the state, to serve on any advisory committees at the FCC. However, the FCC has established a 9-1-1 Fee Diversion Strike Force, which is due to deliver its recommendations to Congress by the end of September, 2021. One of the tasks assigned to the Strike Force is to recommend penalties that may be applied to states and jurisdictions that do not comply with the Commission's guidelines on acceptable uses of 9-1-1 funds.

In the meantime, we are not recommending any action by the legislature. Following the outcome of the 9-1-1 Fee Diversion Strike Force and the potential for a subsequent Report and Order from the FCC in response to that outcome, we will have a better understanding of whether Colorado's statutes comply with the FCC's rules and what the consequences would be of not being in compliance.

Potential Funding Mechanisms for Transition to and Implementation of Next Generation 9-1-1

Colorado's current funding mechanisms for Next Generation 9-1-1 technology deployment are sufficient, those mechanisms being the local emergency telephone charge, the statewide 9-1-1 surcharge, and the prepaid wireless 9-1-1 charge. As an example, the statewide 9-1-1 surcharge, primarily serving to reimburse 9-1-1 governing bodies for the cost of 9-1-1 call delivery to the PSAP, is achieving that purpose at a rate of only $0.10 per line per month, and the Commission has the statutory authority to increase that surcharge to as much as $0.50 in future years, if necessary, meaning that additional services and features may be added to the tariffed service without needing legislative approval for an increase in those costs or the reimbursements to the governing bodies. Based on this, the Commission believes that our current funding mechanisms should be sufficient for the rest of the decade.

Other expenses related to NG9-1-1 are borne by the PSAPs and the 9-1-1 governing bodies themselves, specifically those related to upgrading phone equipment, conducting GIS data collection, upgrading logging recorders, and implementing training to use new systems. The authority granted in statute to local 9-1-1 governing bodies to set their emergency telephone charge at a rate necessary to recover those costs is sufficient to the task, particularly now that the Commission has the authority to set the threshold annually. If an ETC rate in excess of that threshold is required, an application must be filed with the Commission, but if the

needs of the governing body can be sufficiently documented and the proposed expenditures comport with the allowable uses of 9-1-1 funds as defined in § 29-11-104, C.R.S., then this is not an insurmountable obstacle.

We are also nearing the end of Colorado's involvement in a federal grant program entered into by the Commission which, along with matching funds provided by the Commission out of the Colorado Performance Assurance Plan (CPAP) is providing up to $4 million to fund the tariffed non-recurring costs related to the migration of all of Colorado's PSAPs to the CenturyLink ESInet.[108]

The current version of the LIFT America Act being considered in Congress (H.R. 1848) contains appropriations of $15 billion for another round of federal grants to states and other jurisdictions for further implementation of NG9-1-1. It's unknown whether this funding will be included in the final version of the bill, but if it were implemented it would potentially mean a very substantial sum of funding available to the state. The current grant program is $115 million nationwide, of which Colorado was awarded $2.4 million in federal funds. If the $15 billion in the LIFT America Act for NG9-1-1 deployment were to be distributed based on the same formula, Colorado could be eligible for as much as $315 million in federal funds for NG9-1-1 deployment. The funding source that the Commission leveraged to meet the 40% matching requirements for the current federal 9-1-1 grant program is nearly exhausted. The grant program as outlined in Section 15001 of the LIFT America Act does not include a matching requirement, but if the final version of this grant program includes a matching requirement, then a different source of matching funds will need to be identified.

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.

As described in this document, Colorado's 9-1-1 system has begun the transition away from the legacy E9-1-1 network towards implementation of Next Generation 9-1-1, beginning with the migration of every Public Safety Answering Point (PSAP) in the state off of analog 9-1-1 trunks and onto an Emergency Services IP Network (ESInet). The deployment of the ESInet is almost complete, and the state's 9-1-1 stakeholders are currently in discussions with the state's Basic Emergency Service Provider (BESP), CenturyLink, regarding next possible steps.

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

[108] CFDA No. 20.615. See Decisions C18-0751 and C19-0331 for an explanation of the source of the matching funds for this grant program.

for public safety telecommunicators, and improving the reliability and resiliency of the 9-1-1 network.

Implementation of HB 20-1293 has resulted in more robust funding for 9-1-1 in the state, and has the flexibility to meet the needs of the 9-1-1 community for the next decade. This being said, we wish to be clear that Colorado's 9-1-1 funding mechanisms do not pay all of the costs of operating PSAPs across the state. 9-1-1 service, while costly, is essential to Colorado's residents and visitors, and all of Colorado's counties and municipalities have a role in providing the best 9-1-1 service possible for Colorado.

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. Our partners in this endeavor are the cities, the counties, the PSAPs, the 9-1-1 governing bodies, and the BESP. Together, we will continue to develop solutions and strategies to improve the provision of 9-1-1 service in the state, and ensure that Colorado's residents and visitors have access to the high quality 9-1-1 service that they expect and deserve.

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*[109]. In a few cases, definitions were written specifically for this report.

9-1-1 - Three-digit abbreviated dialing code used to report an emergency situation requiring a response by an emergency service provider.

9-1-1 Access Connection - Any communications service including wireline, wireless cellular, interconnected voice-over-internet-protocol, or satellite in which connections are enabled, configured, or capable of making 911 calls.

9-1-1 Call - A request for emergency assistance from the public by dialing 911 or addressing the ESInet regardless of the technology used.

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 Fee - The statewide 9-1-1 surcharge fee established by § 29-1-102.3, C.R.S.

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)* or § 29-11-101 (7), C.R.S. for the full definition.)

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

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 Call Center (ECC) - A facility that is designated to receive requests for emergency assistance, including but not limited to 9-1-1 calls, and staffed to perform one or more of the following functions:

- Determine the location where an emergency response is being requested.
- Interrogate callers to identify, assess, prioritize, and classify requests for emergency assistance and other gathered information.
- Determine the appropriate emergency response required.
- Assess the available emergency response resources that are, or will be, available in the time required.
- Dispatch appropriate emergency response providers.
- Transfer or exchange requests for emergency assistance and other gathered information with other emergency communications centers and emergency response providers.
- Analyze and respond to communications received from emergency response providers and coordinate appropriate actions.
- Support incident command functions.

All PSAPs in Colorado are also ECCs.

Emergency Communications Specialist - See *Public Safety Telecommunicator.*

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

Emergency Telephone Charge (ETC) - a charge established by a governing body pursuant to § 29-11-102(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 allows 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.

This report was 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
- The Colorado 9-1-1 Training Standards Institute

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
- Holly Bise, state TRS program manager
- Jolene Sena, telecom surcharge administrator

Appendix C: Additional Resources

For more information:

The Commission's 9-1-1 Program Webpage
https://sites.google.com/state.co.us/colorado911program/home?authuser=1

The Commission's 9-1-1 Advisory Task Force Webpage
https://sites.google.com/state.co.us/9-1-1-advisory-task-force/home?authuser=1

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 FCC's Ending 9-1-1 Fee Diversion Now Strike Force
https://www.fcc.gov/911strikeforce

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