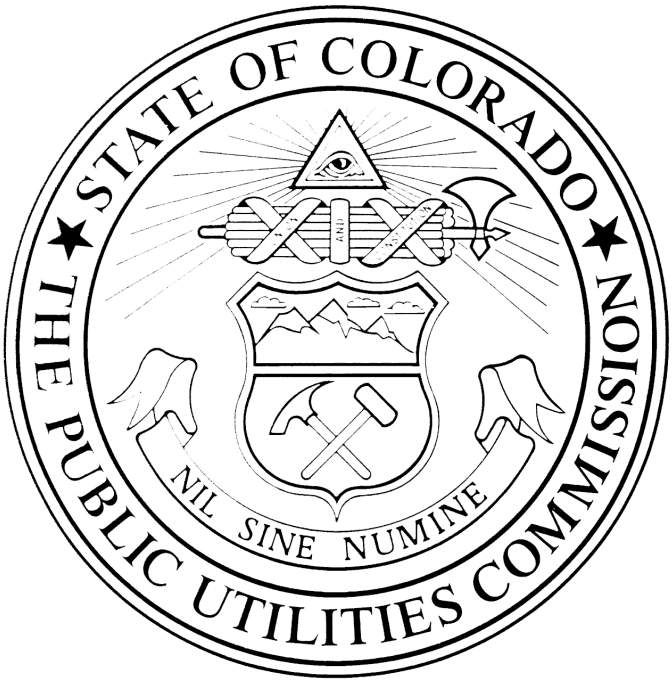
Report on the State of 9-1-1 Services in Colorado

2019-2020



Prepared by:

The Colorado Public Utilities Commission Staff

September 11, 2020

COLORADO
Department of Regulatory Agencies
Public Utilities Commission

Jeffrey P. Ackermann, Chairman
John C. Gavan, Commissioner
Megan M. Gilman, Commissioner
Doug Dean, Director

Patty Salazar, Executive Director
Jared Polis, Governor

September 11, 2020

The General Assembly
State Capitol Building
Denver, Colorado 80203

Dear Members of the Colorado General Assembly:

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

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

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

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

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

Respectfully submitted,

Jeffrey P. Ackermann, Chairman
Colorado Public Utilities Commission
1560 Broadway Suite 250
Denver, CO 80202

John C. Gavan , Commissioner
Colorado Public Utilities Commission
1560 Broadway Suite 250
Denver, CO 80202

Megan M. Gilman, Commissioner
Colorado Public Utilities Commission
1560 Broadway Suite 250
Denver, CO 80202

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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) has begun and is expected to be completed in 2021.***
- ***Funding for 9-1-1 has been a challenge across Colorado. To help solve the problem, the 9-1-1 Advisory Task Force worked with the legislature on HB 20-1293. With the implementation of HB 20-1293 in January of 2021, we anticipate the 9-1-1 Authorities in Colorado to receive financial beginning relief next year.***
- ***Network diversity and reliability continue to be a concern in various areas of the state, but with the creation of the new funding mechanism provided for by the enactment of HB 20-1293, the Commission will have more options for addressing this shortcoming over the coming years.***

The state of 9-1-1 services in Colorado continues to be in transition. Communications capabilities available to the public have continued to advance, and public expectations of 9-1-1 service capabilities have increased. Personal telecommunications capabilities have rapidly transformed in recent years, and 9-1-1 networks and services have lagged behind the nationwide capabilities of consumer services.

At the end of 2018, the Public Utilities Commission (referred throughout the rest of this report simply as the Commission) approved a tariff proposed by Qwest Corporation d/b/a CenturyLink QC and a number of other participating stakeholders to migrate every Public Safety Answering Point (PSAP) in the state to an all-IP based infrastructure known as an Emergency Services IP-network (ESInet) by the end of 2020 and later extended to be completed in 2021. The implementation of the ESInet is now well underway, and as it nears completion, it will be time for the Commission to turn to the state's stakeholders in the 9-1-1 system and help shape what steps should be taken next in the transition to full NG9-1-1.

While this transition is necessary, it is not without its costs. The one-time costs for migrating every PSAP in the state to the ESInet is expected to cost approximately $3.9 million, and the annual costs of ESInet are expected to be approximately $5.9 million, as opposed to the approximately $2.9 million paid for under the legacy 9-1-1 tariff. The tariffed non-recurring costs are paid for by a one-time federal grant and matching funds designated by the Commission, while the ongoing costs for the ESInet are currently the responsibility of the state's 58 local 9-1-1 governing bodies. The enactment of HB 20-1293, which among other things creates a statewide 9-1-1 surcharge to provide additional funding to local 9-1-1 governing bodies, is expected to remedy this cost increase, particularly in the rural areas that lack a robust telecommunications subscriber base to pay for the increases strictly through increasing local emergency telephone charges.

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 approved a series of workshops to consider ways of achieving greater measures of reliability and resiliency in the existing 9-1-1 network, as well as how to pay for those improvements. Those workshops are ongoing.[1] 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. Several of these challenges are expected to be at least partially addressed by the recent enactment of HB 20-1293, but they remain on the list for now as the full impact of the new law won't be seen for two years. Items that are expected to be at least partially remedied due to the enactment of HB 20-1293 are noted with an asterisk (*).

Items one through seven were noted in the 2018-2019 State of 9-1-1 Report. Items eight through ten are newly identified in this report.

1. **User Expectations Are Outpacing System Capabilities and Funding Mechanisms.***
2. **The Basic Emergency Service Network Lacks Reliability and Resiliency in Certain Areas.***
3. **Lack of Funding Accountability for Local 9-1-1 Surcharge Fees.**
4. **Actual or Perceived Lack of Funding Transparency for Prepaid 9-1-1 Surcharge Fees.**
5. **The 9-1-1 Surcharge Rate Threshold for Commission Approval Has Not Been Adjusted for Inflation in 29 Years.**
6. **No Minimum Training Standards for Public Safety Telecommunicators.**
7. **Colorado's MLTS Statute is Out of Alignment with Federal Requirements.**
8. **No statewide performance and service standards exist for local public safety answering points (PSAPs).**
9. **Limited jurisdiction to only certain parts of the 9-1-1 call process prevents the PUC from determining the full scope of 9-1-1 call reliability in the state.**
10. **No clear path toward consistent statewide cybersecurity defense at local PSAPs.**

[1] See Proceeding 19M-0026T and Decision C19-0117-I.

1. Commission Activity Regarding 9-1-1 Service

Commission Activity During the 2019-2020 Fiscal Year

During the 2019-2020 Fiscal Year, the Commission undertook the following activity regarding 9-1-1 service:

- Concluded thirteen 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)(b), C.R.S. All of these were approved to the amount requested.[2] It should be noted that Commission Staff offers to review draft applications before being filed for completeness and financial soundness, which is part of the reason for the high approval rate.
- Facilitated six meetings of the Commission's 9-1-1 Advisory Task Force, created pursuant to 4 *CCR* 723-1-2145.[3]
- 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)[4].
- Oversaw the early migrations of the state's Public Safety Answering Points (PSAPs) to the ESInet.
- Filed an annual report to the Federal Communications Commission pursuant to the NET 911 Improvement Act of 2008[5].
- Participated in an annual data collection effort conducted by the National 9-1-1 Program[6].
- Initiated a grant program to the local 9-1-1 governing bodies to reimburse them for tariffed non-recurring costs and project management fees.
- Continued a series of workshops on the topic of 9-1-1 network reliability.[7]
- Partnered 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.[8]

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 (ongoing) on a working group of the Communications, Security, Reliability, and Interoperability Council (CSRIC), established by the Federal

[2] For a list of all 9-1-1 surcharge applications considered by the Commission over the last several years, see bit.ly/3eR3LTJ.
[3] 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.
[4] See Decision R18-1063T.
[5] See https://www.fcc.gov/general/911-fee-reports
[6] See https://resourcecenter.911.gov/code/9-1-1ProfileDatabase.aspx
[7] See Proceeding 19M-0026T and Decision C19-0117-I.
[8] See https://sites.google.com/state.co.us/colorado911program/covid-19-resources

Communications Commission.[9]
- Serving as an officer on the board of the Colorado 9-1-1 Resource Center, Colorado NENA/APCO, and the National Association of State 9-1-1 Administrators.
- 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 Homeland Security Advisory Committee's Public Safety Communications Subcommittee.
- Submitted comments to the Federal Communications Commission in response to a federal Notice of Proposed Rulemaking regarding providing states access to the FCC's National Outage Reporting System (NORS) and Disaster Information Reporting System (DIRS).

With the emergence of the coronavirus pandemic in the second half of the fiscal year, 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 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

This staff assignment is a reduction over previous years due to telecommunications deregulation passed by the legislature in 2014[10], as the Commission has reduced the number of staff assigned to telecom matters generally to four, with only two of those specifically having duties related to the Commission's 9-1-1 program.

Commission Activity Planned for the 2020-2021 Fiscal Year

With the approval of a Settlement agreement and tariff for migration of every Public Safety Answering Point (PSAP) to an Emergency Services IP network (ESInet)[11], it was expected that migrations of the state's PSAPs would begin in October of 2019 and conclude in October of 2020. However, due to delays affecting the vendor, CenturyLink[12], the migrations did not begin until January of 2020, and are now planned to be completed in 2021. The migration is being closely monitored by the ESInet User's Group, created by order of the Commission as a committee of the 9-1-1 Advisory Task Force, and CenturyLink is also required to file bimonthly reports on its progress toward completion of the migrations. Commission staff facilitates the meetings of the Users Group and serves as the secretary of the group.

[9] See https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-vii
[10] House Bills 14-1329 - 1331
[11] See Proceeding 17AL-0487T.
[12] See Section 3 for a discussion of the migration to the ESInet and delays experienced.

On August 9, 2019, the Commission received a final award by the National Telecommunications Information Administration (NTIA) regarding a 9-1-1 grant program being jointly administered by the NTIA and the National Highway Traffic Safety Administration. The award amount is nearly $2.3 million in federal funds to assist local 9-1-1 governing bodies with the transition of Colorado's PSAPs to the ESInet[13], along with nearly $1.6 million in matching funds designated by the Commission for that purpose.[14] Since that time, Commission Staff and other DORA personnel have been working to ensure that all processes are in place for providing reimbursement payments to the local 9-1-1 governing bodies, including both the state-provided matching funds and the federal 9-1-1 grant funds. The first payments to the local 9-1-1 governing bodies have been made, and more will be made as the migrations are completed and the governing bodies are billed for the tariffed services.

In 2019, the Commission initiated a working group to examine issues related to 9-1-1 network reliability, and those meetings are ongoing.[15] Commission staff will continue to facilitate those workshops.

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

Commission staff currently assigned to matters related to 9-1-1 for the 2020-2021 fiscal year include are unchanged from the 2019-2020 fiscal year:

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

With the recent passage of HB 20-1293, which creates a statewide 911 surcharge and allows the Commission to retain a portion of those funds for administrative costs, we expect to hire an additional staff member over the course of the fiscal year to assist in the administration of this new surcharge and the 911 Surcharge Trust Cash Fund.

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

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.

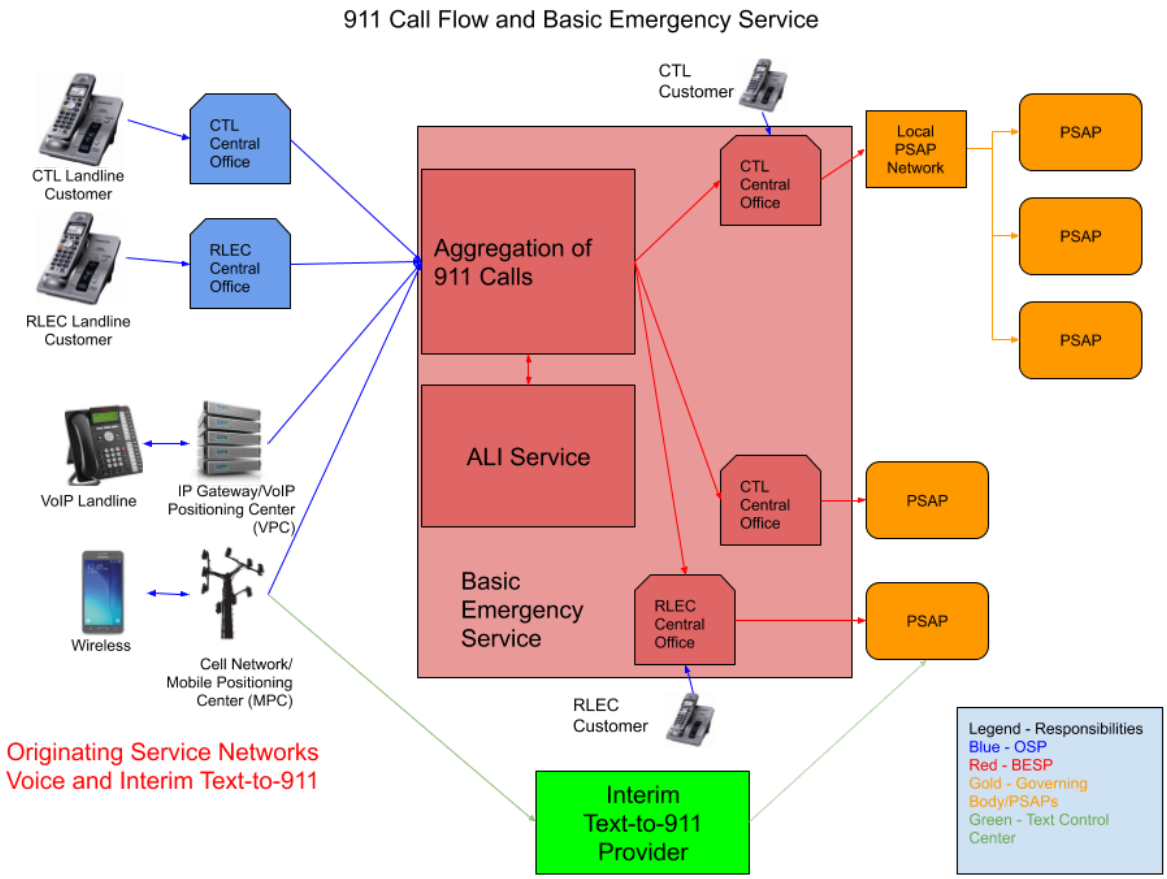

Figure 2.1: 9-1-1 Network Call Flow

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[16]. BES also includes the delivery of the location information that is associated with a 9-1-1 call[17]. CenturyLink is currently the only BESP in Colorado that is delivering 9-1-1 calls to PSAPs.

There are currently 82 primary PSAPs in Colorado (PSAPs that receive 9-1-1 calls directly from the BESP), and three secondary PSAPs (PSAPs that only receive 9-1-1 calls transferred from a primary PSAP and delivered by the BESP). The Local Domain also includes 58 9-1-1 governing bodies, or "governing bodies" (29-11-101(16), C.R.S.).These governing bodies collect 9-1-1

[16] § 29-11-101(7), C.R.S.
[17] 4 *CCR* 723-2-2131(j).

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[18].

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, from the PSAPs.

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 prevents 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 recently begun inviting 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 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.

[18] § 40-15-201, C.R.S.

Technology

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

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

Colorado's 9-1-1 network is currently a mix of "legacy" technology, and "transitional" technology, as opposed to "Next Generation 9-1-1". As of the end of the 2019-2020 fiscal year, 16 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.

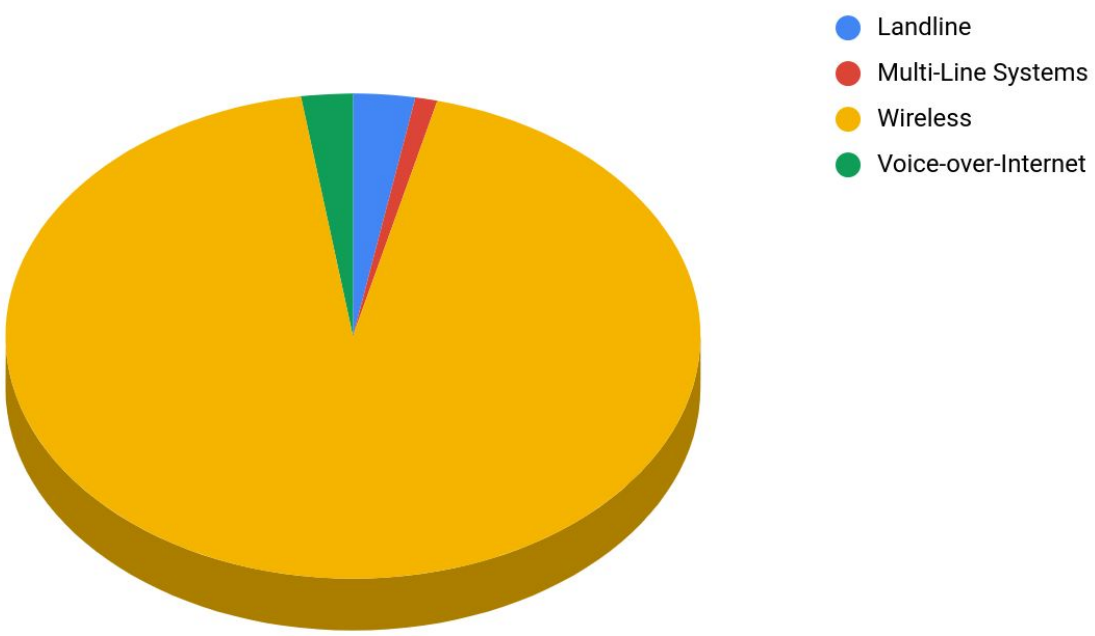

Figure 2.2: 2019 State-wide ALI Bids by General Category of Service[19]

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. In the last annual report from the Commission to the legislature on this issue, it was noted that Phillips County was not capable of receiving location information from wireless 9-1-1 callers. As a condition for an order issued by the Commission in 2015 granting a 9-1-1 emergency telephone charge application made by Phillips County 911 Emergency Telephone Service Authority Board, the Authority Board must file quarterly updates with the Commission regarding their progress toward implementation of wireless enhanced 9-1-1 service.[20] As of the end of the fiscal year, Phillips

[19] ALI Bids are requests for location information sent by PSAPs after receiving a 911 call. Currently, there is no mechanism for counting actual number of calls, which may differ from the number of ALI bids. Following completion of the migration to the ESInet, we should be able to start providing actual call count statistics.

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

has reported that it now has the ability to receive ALI from wireless carriers and is in the process of notifying the wireless carriers of their request to begin receiving location information from wireless 9-1-1 calls. Per FCC regulations, the carriers have six months to comply with the request.[21]

General Operations

Operations within Colorado's 85 PSAPs (82 primary and 3 secondary) are locally controlled. PSAPs are often operated as a part of a local law enforcement agency but are sometimes operated as independent agencies of a city or county government, or as part of a fire agency. While the term "PSAP" refers only to facilities that answer 9-1-1 calls from the public, every PSAP in Colorado is also a dispatch center, dispatching calls for service to first responders for one or more law enforcement 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, deaf-blind or have speech impairments. These devices allow the user to connect a keyboard through a telephone and type to and receive typed responses from the individual on the other end of the call. Once seen as a primary method for individuals with communications-related disabilities to contact 9-1-1, the U.S. Department of Justice still requires all PSAPs nationwide to be able to accept and respond to 9-1-1 calls made with TTY devices.

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

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

[21] See https://www.fcc.gov/general/enhanced-9-1-1-wireless-services

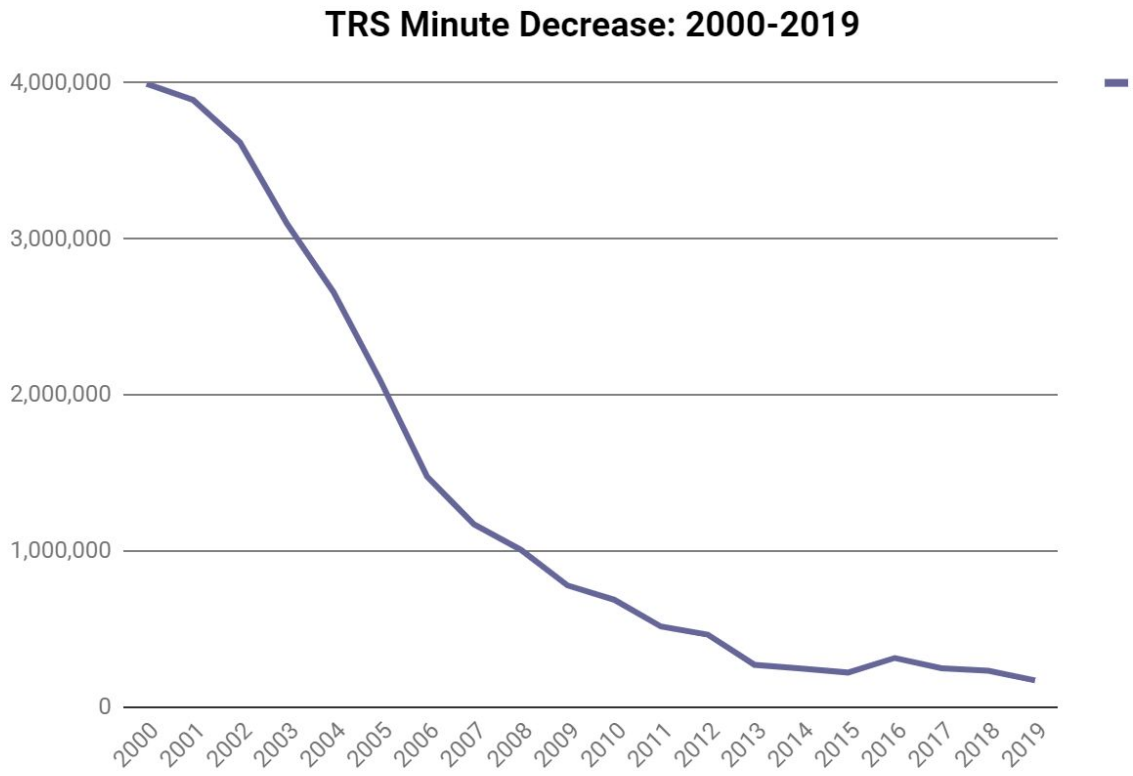

Figure 2.3: Number of minutes of state TRS service usage by fiscal year.

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

Text to 9-1-1

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

There is no federal or state mandate for PSAPs to provide text to 9-1-1 service to their residents. Despite this, text to 9-1-1 service was first made available in Pitkin County in 2013, and today 79.5% of Colorado's primary PSAPs have implemented text to 9-1-1 service. The PSAPs providing text to 9-1-1 service cover 64.6% of the state by area and 95.9% of the state by population. This isn't a large increase over last year's report, at which time 75.6% of Colorado's primary PSAPs had implemented text to 9-1-1 service. The PSAPs providing text to 9-1-1 service at that time covered 59.6% of the state by land area and 93.4% of the state by population.

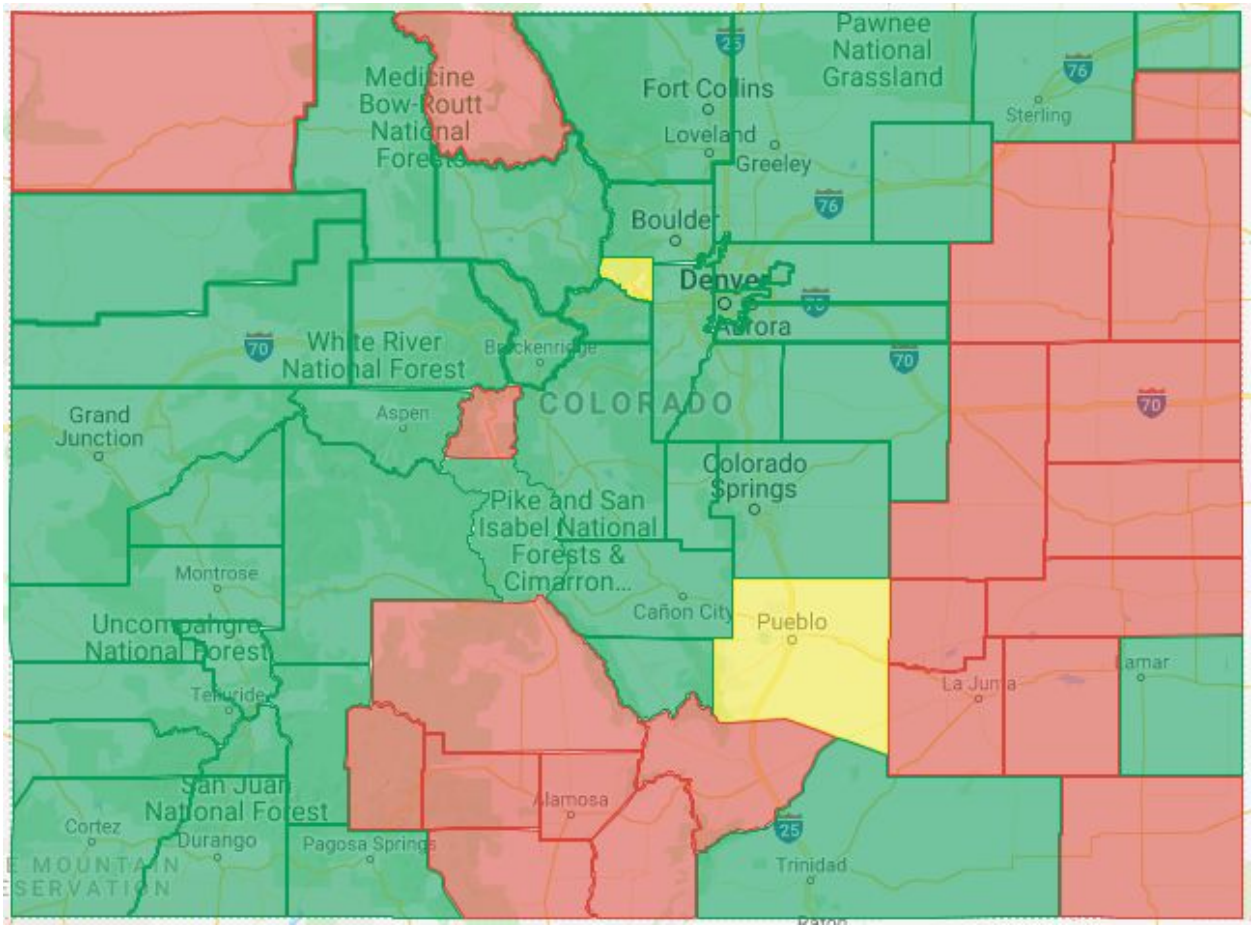

Figure 2.4: Text to 9-1-1 Availability as of July 1, 2020. Red indicates that the county contains no PSAP providing text to 9-1-1 service. Yellow indicates that one but not all PSAPs in that county provide text to 9-1-1 service. Green indicates that all PSAPs serving that county provide text to 9-1-1 service.

Commission Staff has also been informed that the Colorado State Police dispatch center in Alamosa, which handles 9-1-1 calls for all six counties of the San Luis Valley, is preparing to implement text to 9-1-1. This improvement will significantly increase the percentage of the state covered with text to 9-1-1 service by land area.

At the July 2020 meeting of the 9-1-1 Advisory Task Force, the Task Force approved a resolution making it a goal to achieve 100% statewide coverage of text to 9-1-1 service by May of 2021. This can be accomplished with little to no cost to the remaining service areas that still do not have text to 9-1-1 by partnering those PSAPs with PSAPs that do provide text to 9-1-1 service. A Colorado-based company, Intrado, has also offered to take text to 9-1-1 calls for PSAPs that are not currently text to 9-1-1 capable and relay the request for emergency assistance to those PSAPs.

Other Considerations Regarding Accessibility

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

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

9-1-1 Frequently Asked Questions

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

“If my pizza delivery app can find me, why can’t 9-1-1?”

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

Currently, wireless carriers, handset manufacturers, and even smartphone operating system

developers are working to fix this. For example, both Apple and Google have announced partnerships with a firm called RapidSOS to provide a handset-based location to PSAPs for every 9-1-1 call from devices using their operating systems. This service is being offered without any direct cost to the PSAP, although some equipment and software vendors may charge the PSAP for integrating the service.

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

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

The short answer is "yes." Any cell phone with a cellular signal is able to dial 9-1-1, and 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 NG9-1-1 has many benefits, including the potential to make the system more resilient and flexible, allowing for dynamically rerouting 9-1-1 calls when necessary, and potentially opening up the network to accept other types of data, such as medical data, automatic crash notification data, pictures, etc.

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

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

3. Migration to Next Generation 9-1-1

What Is NG9-1-1?

Next Generation 9-1-1 (NG9-1-1) is a set of technologies and components that, when implemented, comprise a standards-based approach 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: Transitional
- Routing and Location: Legacy
- 9-1-1 GIS Data: Legacy
- NG9-1-1 Core Services: Legacy
- Network: Transitional
- PSAP Call Handling Systems and Applications: Unknown
- 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.

NG9-1-1 and ESInet

Throughout this document, there is a differentiation between two related terms, NG9-1-1 and ESInet. As described above, NG9-1-1 describes a full suite of technologies and components that fully replace every aspect of a legacy (non-IP) 9-1-1 network, as well as provide the

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

capability of additional functionality to the 9-1-1 network that is not supported in legacy networks.

An ESInet is a part of that suite of technologies and components. It is an IP-network connected to every Public Safety Answering Point (PSAP) in a given geographic area (such as state-wide) that allows for 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 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 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.[24] A final version of the tariff was filed by CenturyLink on December 28, 2018[25], and subsequently modified through an additional filing on May 10, 2019[26].

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. CenturyLink has since filed updated schedules for the implementation with the first PSAPs migrating in January of 2020 and the last PSAPs migrating in February of 2021.[27]

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

The migration is mandatory, since the new ESInet tariff replaces 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.[28]

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 is also participating in the meetings. If issues cannot be resolved within the ESInet Users Group, parties may still petition the Commission for resolution.

The 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 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.

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

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

[28] 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.

While the ESInet Users Group will primarily be focused on ensuring a smooth migration of Colorado's PSAPs to the ESInet during the migration, the ESInet may be able to provide a more definitive timeline for these other stages of NG9-1-1 transition by early 2021. In addition to these efforts, Commission staff plans to engage the ESInet Users Group to help develop a comprehensive State NG9-1-1 Plan using the template provided by 911.gov for that purpose.[29] It was hoped that such an analysis would be available in time for this year's report to the legislature, but due to unforeseen delays in the ESInet migration, this analysis has not yet taken place.

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

Current Migration Status

As of July 1, 2020, only 16 out of 96 PSAP sites have been migrated.[30] It has been noted by Commission Staff to CenturyLink that at the current rate of transition, the migration will not be fully complete until October of 2022. However, while a number of PSAP migrations have been delayed, CenturyLink has stated that those PSAP may be folded back into the schedule so that the full migration will still be completed by early 2021.

The reasons for the delays are various, including, most notably, the coronavirus pandemic, which prompted a number of PSAPs to bar CenturyLink technicians access to the sites for anything other than essential repairs. In other cases, the delays were caused by technological challenges encountered by CenturyLink technicians and the project management team upon attempting to implement the migration at specific PSAP sites.

Regardless of the reasons, the pace of PSAP migrations will need to increase significantly in order for all PSAPs to be migrated before the performance period of the federal 9-1-1 grant helping to pay for the transition closes. Currently, the ESInet Users Group and CenturyLink are working to reschedule the migrations that have been delayed, and the pace of migrations has improved.

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

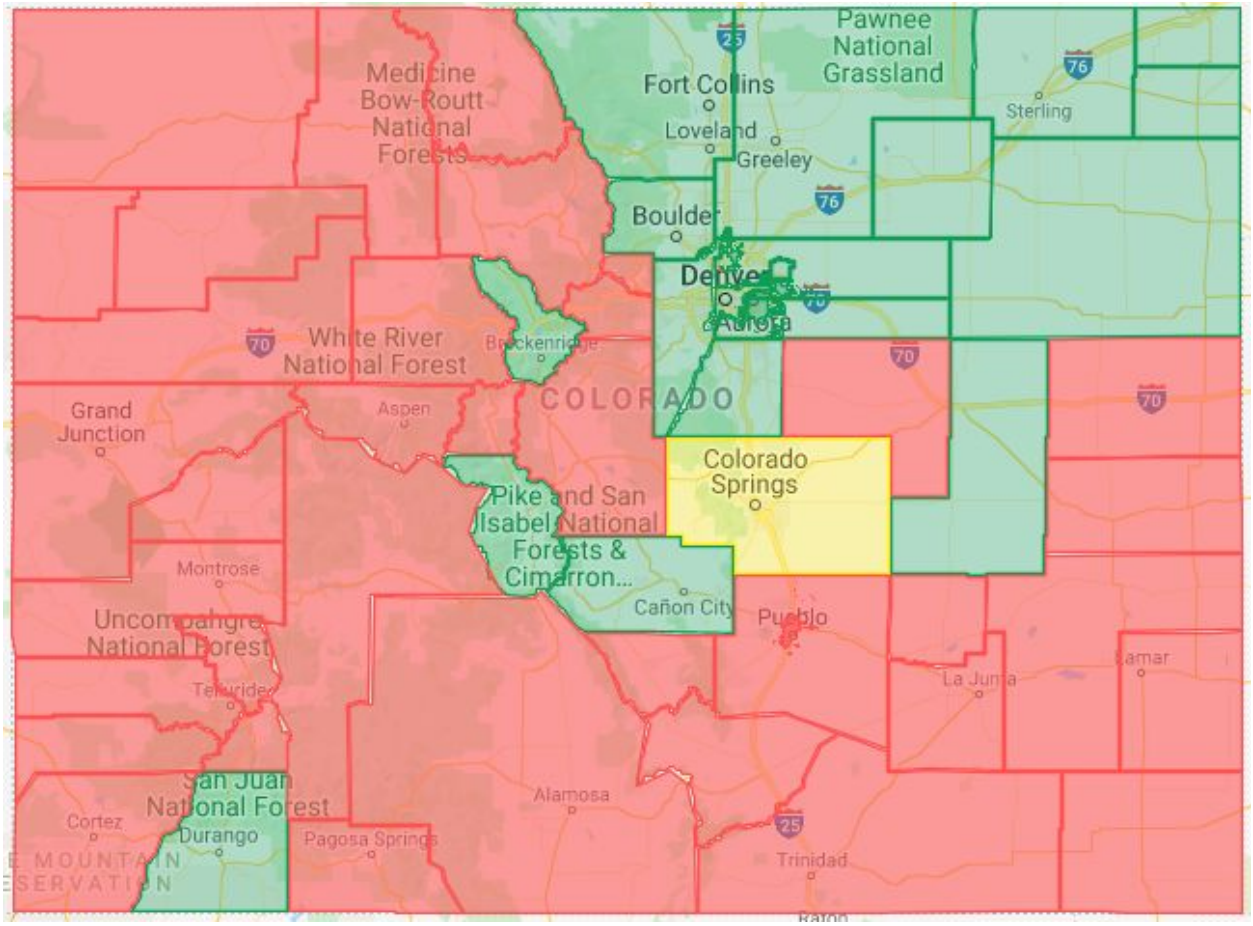

Figure 3.1: 9-1-1 governing bodies by ESInet migration status as of September 11, 2020. Red indicates no PSAP sites have migrated within the 9-1-1 governing body's service area. Yellow indicates some but not all PSAP sites have migrated. Green indicates all PSAP sites have migrated.

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. Once the ESInet migration is complete, all 9-1-1 calls will be delivered to PSAPs in the state in Session Initiated Protocol (SIP) format, which is a major milestone toward NG9-1-1 implementation but is only the first step.

The local 9-1-1 stakeholders participating in the the ESInet Users Group will be tasked with determining what additional features or functionality they desire to be added to the ESInet, and, just as importantly, they will need to negotiate the cost and terms of those features and

functionality with CenturyLink or some future BESP. Because all 9-1-1 funds are remitted to the local 9-1-1 governing bodies, those local 9-1-1 governing body representatives will need to determine what they can afford and what would be most beneficial to their residents and visitors. To the extent that any additional functionality added to the system may be considered Basic Emergency Service, the Commission will also have a role in overseeing the implementation of those services, including pricing, terms of service, functionality, and quality of service.

In addition to the normal technical challenges that cause delays in complex IT projects such as this, the novel coronavirus pandemic has also been a source of delays. Some PSAPs for a time were, through a prudent abundance of caution, not allowing technicians into their facilities except for emergency repairs. Despite these delays, however, the PSAP and 911 governing body managers, CenturyLink, and PUC staff have been meeting weekly to reincorporate PSAPs into the migration schedule in order to keep the goal of completing all of the migrations in 2021.

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[31]: 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[32], but with some exceptions deregulates other telecommunications services.[33] Commission rules, therefore, only require notification from carriers for outages to Basic Emergency Service.[34] 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.[35]

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[31] 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

[32] § 40-15-201 (2), C.R.S.

[33] § 40-15-401 (3) and (4), C.R.S.

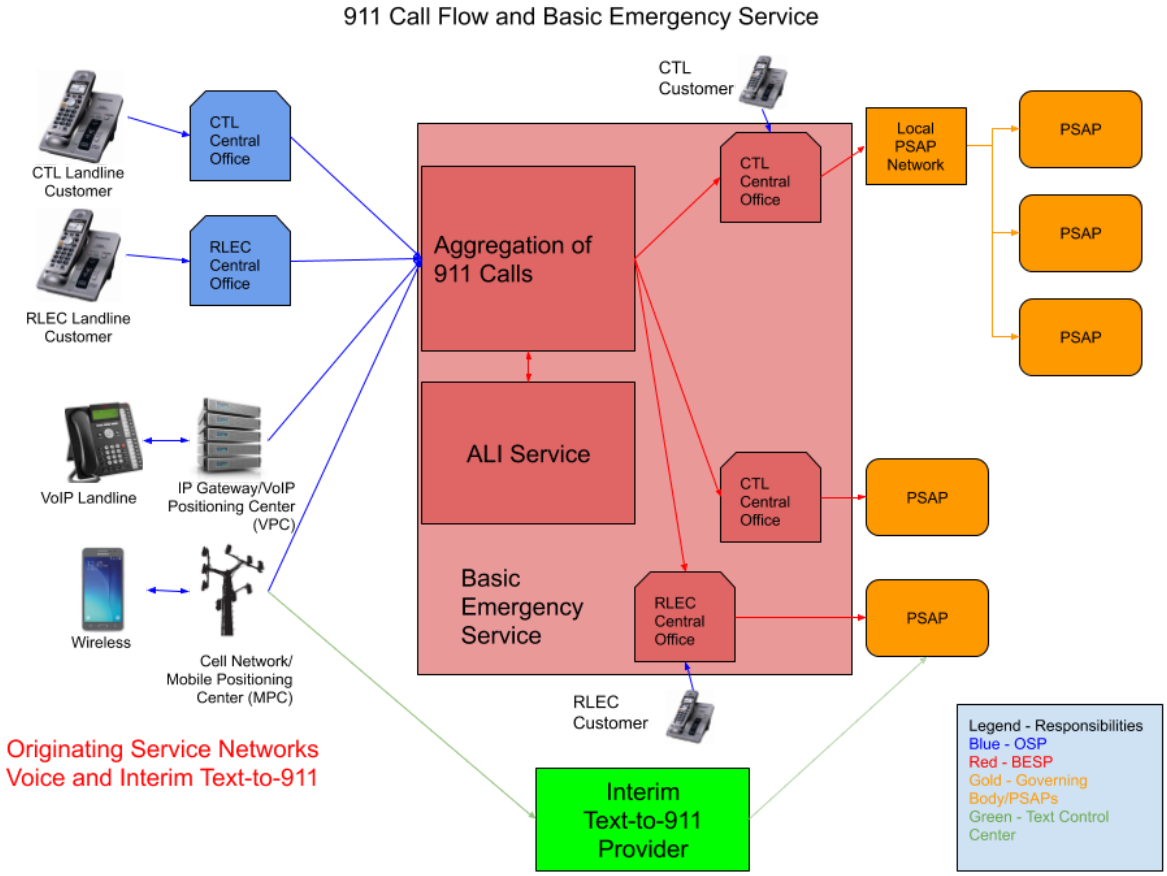
[34] 4 *CCR* 723-2-2143 (g)

[35] 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 occurring due to a failure of a local network past the demarcation point with the PSAP.
- Outages occurring due to an equipment failure at a PSAP, or due to the failure of a third-party hosted service contracted by a PSAP.

For a graphical representation of 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.



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

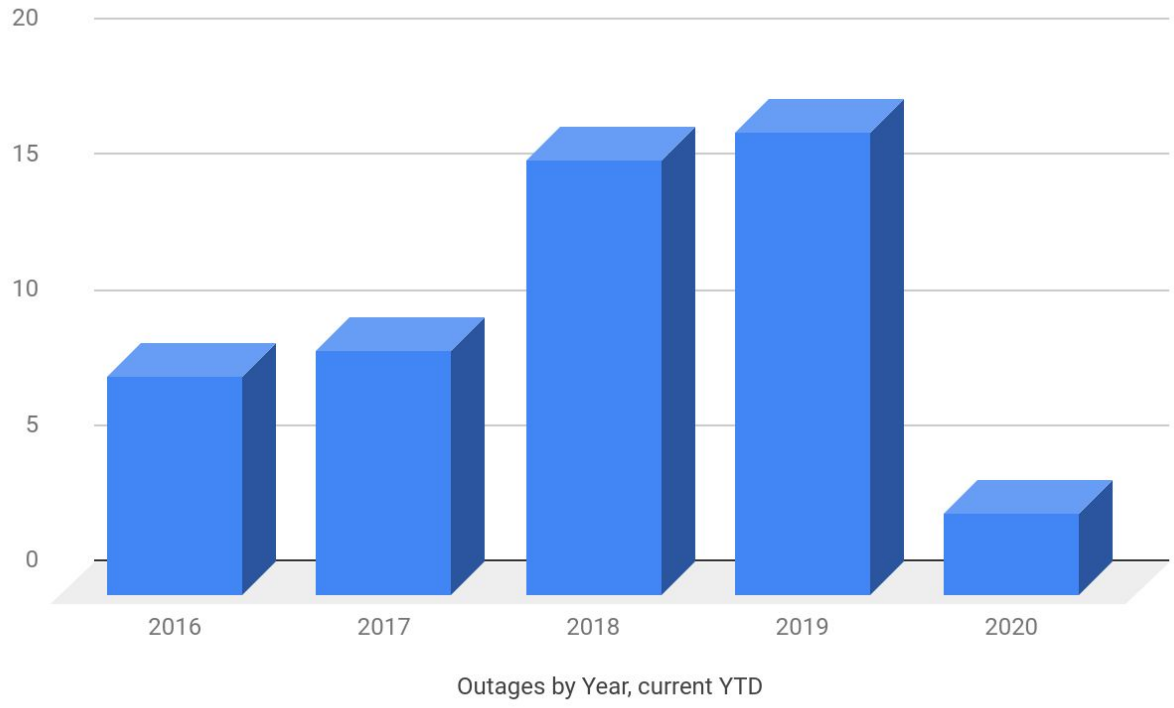


Figure 4.1: BES outages by Year. 2020 YTD shows outages as of July 1, 2020.

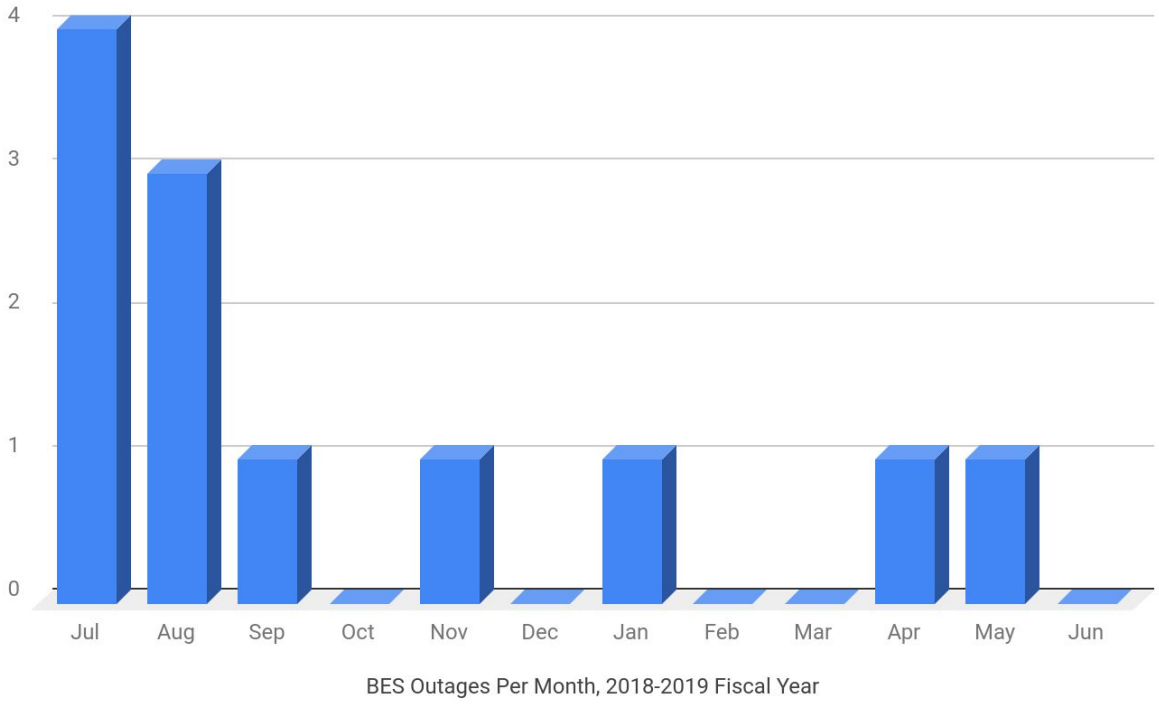


Figure 4.2: Outages per Month, July 2019-June 2020.

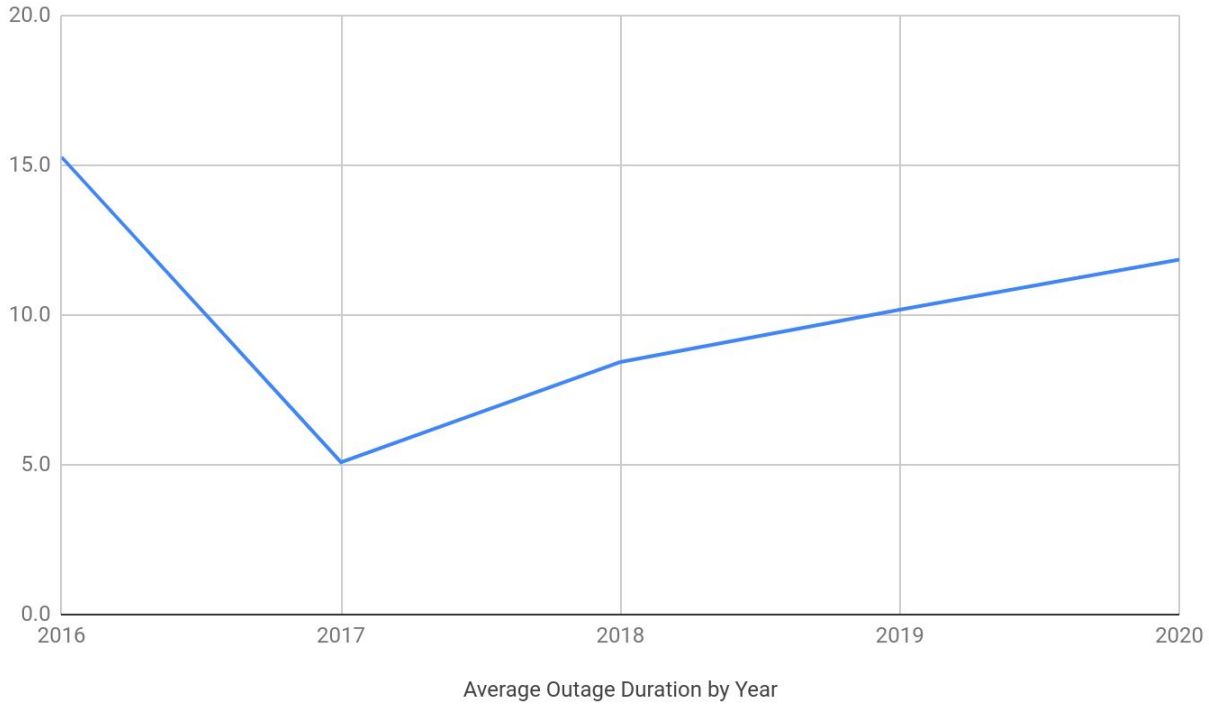


Figure 4.3: Average duration of BES outages in hours. 2020 is YTD as of July 1, 2020.

Commission staff maintains a Basic Emergency Service Outage Dashboard[36], which is updated with outage data as it is received from the BESP and from the rural Local Exchange Carriers.

[36] 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[37]. 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[38].

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.[39] 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.[40] These workshops are ongoing, and are expected to continue indefinitely.

Per the Commission's rules, the result of this process is to be a 911 Diversity Plan that can be approved by the Commission, associated with either a modification of the existing Basic Emergency Service Tariff or a new tariff to be filed to provide the funding for potential improvements to the Basic Emergency Service network's redundancy, geographic diversity, and resiliency[41].

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

House Bill 20-1293, recently passed by the legislature and signed by the governor, creates a separate funding mechanism that could be used to offset tariff costs, including the costs under the ESInet tariff and the costs of an additional tariff to pay for statewide 911 network diversity improvements. The Commission is required to set the statewide surcharge rate by

[37] See Proceeding 13I-1147T.
[38] See Decision R14-0303.
[39] See Proceeding 19M-0026T.
[40] See Decision C19-0117-I.
[41] 4 *CCR* 723-2-2143(a)(III).

October 1, 2020, to take effect on Jan 1, 2020.

CenturyLink is also required to file a contingency plan annually, the most recent being filed April 30, 2020[42]. 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.[43]

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.
- 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 body, 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.

Once a sufficient number of these special investigations have been completed, the Outage Committee intends to review those investigations for common themes and develop some "best practice" recommendations that could be included in next year's version of this report.

The Outage Committee also created a document intended for use at the PSAPs that is intended to help them prepare for and react to outages that may impact their service areas.

The special investigations completed by this committee, as well as the PSAP outage guide

[42] See Proceeding 18M-0294T.
[43] 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".

created by the committee, can be accessed on the Committee's web page[44].

[44] https://sites.google.com/state.co.us/9-1-1-advisory-task-force/committees/outage-committee

5. Gaps, Vulnerabilities, and Needs

What follows is a list of gaps, vulnerabilities, and needs identified by the 9-1-1 stakeholders involved in the development of this document. Following this identification of challenges, a list of potential solutions proposed by the stakeholders is also provided.

Challenges and Solutions

As opposed to previous editions of this report, this edition lists both the challenges and the solutions together. Several references are made to House Bill 20-1293, which is now law. This bill creates a statewide 9-1-1 surcharge, in addition to the existing local emergency telephone charges, which can be used to help offset tariffed costs and other costs incurred by local governing bodies in the provision of 9-1-1 services to their residents. Because of this, we anticipate that some of the items from this list may be removed by next year's annual report.

Items number 8 and 9 are new to this list, starting this year.

1. **User Expectations Are Outpacing System Capabilities and Funding Mechanisms:** User expectations are driven primarily by the functionality available in commercial communications networks, which include the ability to send text messages, pictures, video, and other types of data. In order to accommodate functionality that exists within commercial communications, the existing "legacy" 9-1-1 system must be upgraded to a Next Generation 9-1-1 (NG9-1-1) system. NG9-1-1 uses an Internet Protocol-based transport network coupled with standards-based core data components to result in a 9-1-1 system that is potentially much more flexible, resilient, and feature-rich.

   The ongoing migration to Emergency Services IP-Network (ESInet) 9-1-1 call delivery, as described in the CenturyLink ESInet tariff,[45] represents the first step in modernizing Colorado's 9-1-1 call delivery infrastructure to better meet public expectations. The ESInet is a foundational component of NG9-1-1. However, the ongoing costs of the ESInet are significantly higher than those of the legacy E9-1-1 system. Under the tariff for legacy E9-1-1 service, state-wide costs for Basic Emergency Service delivery of 9-1-1 calls to the Public Safety Answering Points (PSAPs) were approximately $2.9 million per year. Under the new ESInet tariff, we are expecting those charges to be approximately $5.9 million per year.

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

[45] See Proceeding 18AL-0916T.

new statewide 9-1-1 surcharge authorized by the passage of House Bill 20-1293 could be utilized to provide the required funding mechanism for paying the higher ongoing costs of the ESInet without having to raise local emergency telephone charges. Whether the funding will completely reimburse local governing bodies for this cost or only partially reimburse them will depend on the outcome of a proceeding that will take place this fall to determine what the statewide 9-1-1 surcharge rate will be. The maximum rate allowable by the statute is 50¢.[46]

Other activities must also be undertaken for full implementation of NG9-1-1, such as the development of a comprehensive state-wide geographic information system (GIS) dataset containing, at a minimum, road centerlines, site/structure address points, PSAP boundaries, emergency service boundaries, and provisioning boundaries. A number of additional GIS data layers are either recommended or highly recommended.[47]

2. **The Basic Emergency Service Network Lacks Reliability and Resiliency in Certain Areas**: There continue to be areas within the Basic Emergency Service (BES) network that lack physical network diversity, leaving the system vulnerable to outages due to single points of failure. The Commission is currently hosting a series of workshops for CenturyLink and local 9-1-1 stakeholders to examine the issue and provide mitigation recommendations. However, improving network resiliency in these areas will incur costs that will have to be passed on to local 9-1-1 governing bodies through a tariff revision unless a state-level funding source is identified.

   As with the first item in this list of vulnerabilities, one potential solution may be the statewide 9-1-1 surcharge recently authorized by the passage of HB 20-1293, which could be used to pay in part or in full any higher tariff rates being charged to local 9-1-1 governing bodies as a way to fund improvements to the Basic Emergency Service network. To utilize the surcharge for this purpose, the costs for improving 9-1-1 network reliability would have to be included in the statewide Basic Emergency Service tariff rates paid by the local 9-1-1 governing bodies. This is a funding mechanism that will be explored by the 9-1-1 network diversity working group created by Commission Decision.[48]

3. **Lack of Funding Accountability for Local 9-1-1 Surcharge Fees:** Until recently, statute provided local 9-1-1 governing bodies the authority to audit a telecommunications service provider's books and records regarding the collection and remittance of 9-1-1 surcharges at the governing body's own expense. However, most of Colorado's 9-1-1 governing bodies lack the resources to undertake such audits.

   Once again, the enactment of HB 20-1293 provides a potential solution, this time by

[46] See § 29-11-102.3
[47] See Section 3 of NENA Standard for NG9-1-1 GIS Data Model, https://cdn.ymaws.com/www.nena.org/resource/resmgr/standards/NENA-STA-006_NG9-1-1_GIS_Dat.pdf
[48] See Proceeding 19M-0026T, Decision C19-0117-I.

providing the Commission with the authority to audit carriers' 9-1-1 surcharge remittances both for state-level surcharges and for local emergency telephone charges. The costs of these audits must be paid for out of the 4% of the new statewide 9-1-1 surcharge that the Commission is allowed to retain for administrative costs.[49]

4. **Actual or Perceived Lack of Funding Transparency for Prepaid 9-1-1 Surcharge Fees:** Prepaid 9-1-1 surcharges are collected at the point of sale by retailers selling prepaid telephone service, and are remitted to the Colorado Department of Revenue (DOR). DOR uses a formula provided by the Commission to then distribute prepaid 9-1-1 surcharge funds to the 58 9-1-1 governing bodies in the state[50]. DOR does not share with local 9-1-1 governing bodies or the Commission information regarding which retailers are remitting prepaid 9-1-1 surcharges. Local 9-1-1 governing bodies have expressed a lack of confidence that all retailers required to remit prepaid 9-1-1 surcharge fees are doing so.

   The enactment of House Bill 20-1293 provides some potential remedy to this issue by allowing the Department of Revenue to provide data to the Commission regarding the administration of the Wireless Trust Cash Fund.[51]

5. **The 9-1-1 Surcharge Rate Threshold for Commission Approval Has Not Been Adjusted for Inflation in 29 Years**: There is a 70¢ threshold for requiring approval from the Commission for higher 9-1-1 surcharge rates set by local 9-1-1 governing bodies. This threshold has not been adjusted since it was established in 1990, resulting in Commission approval being required for surcharge rates that are relatively low. Currently, all local 9-1-1 governing bodies in the state have a 9-1-1 emergency telephone charge of 70¢ or higher.

   The enactment of House Bill 20-1293 attempts to address this need by allowing the Commission to adjust the threshold at which 9-1-1 emergency telephone charge applications are required on an annual basis, taking into account inflation and the needs of the state.

6. **No Minimum Training Standards for Public Safety Telecommunicators:** Colorado is in the minority of states that do not have minimum training standards for public safety telecommunicators.[52] Efforts to institute a voluntary state-wide training program for telecommunicator training, initiated by the Colorado 9-1-1 Resource Center and continued by the Colorado 9-1-1 Training Standards Institute (CTSI), have received only modest participation due to resource and staffing constraints at the PSAPs that could most benefit from the program. The primary barrier to participation is funding to pay for travel to the training, backfill of that employee's position while they are in training, and reimbursement for personnel costs of instructors sent to support the

[49] § 29-11-10(7)(e), C.R.S.
[50] § 29-11-102.5, C.R.S.
[51] § 29-11-102.5(5), C.R.S.
[52] 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.

training.[53]

One solution currently being explored by CTSI is providing training materials directly to local 9-1-1 centers rather than requiring in-person attendance at training sessions, reducing the costs of participation from rural PSAPs. Ideally, a resident or visitor dialing 9-1-1 from anywhere in the state should reach a telecommunicator with a standard, statewide minimum base of training. It is unknown if voluntary participation by PSAPs will be sufficient to establish a statewide baseline for telecommunicator training.

7. **Colorado's MLTS Statute is Out of Alignment with Federal Requirements:** With the passage of Kari's Law[54] state statutes regarding multi-line telephone systems (MLTS), including Colorado's, needed to be updated to remain synchronous with federal law. Kari's Law requires all MLTS made, sold, or installed after Feb 16, 2020, to allow direct dialing of 9-1-1 without first dialing another digit (such as "9") for an outside line. It also requires on-site notification that 9-1-1 has been dialed so on-site personnel can direct first responders to the correct location. Colorado's statute, in contrast, only required notification to end-users regarding the limitations of the MLTS.

   House Bill 20-1293 addresses this discrepancy by removing the state's separate 9-1-1 requirements for MLTS and referring to the federal requirements, while also requiring the Commission to create a complaint portal for Colorado residents and visitors to use to notify the Commission of violations of the federal requirements for MLTS.[55]

8. **No public safety answering point performance and service standards:** There is no statewide standard for performance in place for Colorado's PSAPs. As an example, there is no minimum staffing requirement, and some PSAPs in rural areas have only a single telecommunicator on duty during portions of the day. There is no statewide expectation that PSAPs provide pre-arrival instructions for medical calls, such as providing CPR instructions to callers that need them, and although most PSAPs in Colorado do this voluntarily, some do not. If they do provide pre-arrival instructions, there is no requirement that their medical protocols are from an accredited institution, that their protocol usage is supervised by a medical professional, or that their medical calls undergo any sort of quality assurance. This is a potentially dangerous oversight that the Commission does not have the authority to address under the current statute.

9. **Lack of visibility to determine the full scope of 9-1-1 call reliability in the state:** A comprehensive assessment of the public's ability to reach 911 in the state is not possible because the Commission does not have the statutory authority to require reporting of outages in other parts of the 911 flow. Authority only exists to require

[53] Weld County 911 Emergency Telephone Service Authority Board has expressed disagreement with the inclusion of this item, stating that training of public safety telecommunicators is solely a local responsibility.
[54] H.R. 582 - Kari's Law Act of 2017.
https://www.congress.gov/bill/115th-congress/house-bill/582/text
[55] § 29-11-107, C.R.S.

reporting for outages of the Basic Emergency Service Network.

The portion of the call flow for which the Commission lacks authority to require reporting includes outages in originating service provider networks (landline, wireless, and VoIP providers), intermediary aggregation service providers that aggregate calls before they are delivered to the BESP, and outages occurring in individual PSAPs or in local networks maintained by the local 9-1-1 governing bodies.

Potential action from the FCC may provide a solution. The Federal Communications Commission recently issued a Second Further Notice of Proposed Rulemaking. This Notice proposes to provide state agencies and tribal governments with access to the FCC's National Outage Reporting System (NORS), and Disaster Information Reporting System (DIRS).[56] If implemented, the FCC's proposal would potentially provide the Commission with additional visibility into the portion of the 9-1-1 call flow prior to calls entering the Basic Emergency Service Network. The Commission filed comments in support of the rulemaking.[57]

10. **No clear path toward consistent statewide cybersecurity defense at local PSAPs:** 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 one PSAP does not observe sufficient cybersecurity precautions. The Commission currently does not have the statutory authority to require a particular regimen of cybersecurity practices or minimum standards.

[56] See https://ecfsapi.fcc.gov/file/03021428901295/FCC-20-20A1.pdf.
[57] See https://ecfsapi.fcc.gov/file/104290252904262/Comments%20of%20CoPUC%20to%20FCC%2015-80%202020-04-29.pdf

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[58].

- 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 learn about the benefits of Next Generation 9-1-1.

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

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

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

- 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.

- 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.

Other recent notable projects of the National 9-1-1 Program were to develop a recommended set of recommended minimum training guidelines for public safety telecommunicators[59], which are being used by the Colorado 9-1-1 Training Standards Institute as a guideline for their materials, as well as the development of Guidelines for Developing a State NG911 Plan[60], which is currently being reviewed by the Commission's 9-1-1 Advisory Task Force as a possible template for use in Colorado.

The Federal Communications Commission

After adopting rules regarding requiring wireless providers to deliver Z-Axis or vertical coordinates with wireless 9-1-1 calls in November of 2019[61], the FCC continues to evaluate this policy. At its July open meeting, the FCC adopted rules requiring some wireless providers to meet accuracy requirements for vertical positioning in a phased manner beginning in April of 2021. The draft order also requires wireless providers to provide a dispatchable location, meaning a civic address along with floor or room number, for wireless calls by January of 2022 "when it is technically feasible to do so."[62]

The FCC also continues to pay particular attention to the issue of some states diverting 9-1-1 surcharge funds to purposes other than those for which they were intended. According to the most recent edition of the FCC's NET 911 Act report to Congress[63], the FCC identified five

[59] See https://www.911.gov/pdf/Minimum_Training_Guidelines_for_911_Telecommunicator_2016.pdf
[60] See https://www.911.gov/pdf/Guidelines_for_Developing_a_State_NG911_Plan.pdf
[61] See https://www.fcc.gov/document/fcc-helps-first-responders-quickly-locate-wireless-911-callers-0
[62] See https://docs.fcc.gov/public/attachments/DOC-365168A1.pdf
[63] Federal Communications Commission. Tenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges for the Period January 1, 2018 to December 31,

states as having diverted 9-1-1 surcharge funds. Recently, two national organizations, the Association of Public Safety Communications Officials, Intl. (APCO) and CTIA (a major wireless industry association) urged the FCC to clarify what it considers 9-1-1 fee diversion and what it does not[64].

In February of 2020, the FCC issued a Notice of Proposed Rulemaking (NPRM) proposing to give state agencies access to the FCC's National Outage Reporting System (NORS) and Disaster Information Reporting System (DIRS).[65] The Commission filed comments with the FCC largely supportive of the proposed rules that would potentially allow the Commission to have access to outage notifications and reports provided to the FCC that the Commission does not currently have the statutory authority to require directly, and which may allow the Commission to provide the legislature with more complete annual reports in the future.

Federal Legislation

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

- H.R. 2 - The INVEST in America Act, contains a 19-page section that would designate $12 billion for grants to be distributed to states, territories, and native nations for implementation of Next Generation 9-1-1. The bill also establishes criteria for eligibility in the grant program.
- H.R. 5928 - The "Don't Break up T-Band" Act, which also incorporates the contents of H.R. 2165, The 9-1-1 Fee Integrity Act. This bill would require the FCC to develop a standard for what may be considered 9-1-1 fee diversion. Currently the FCC reports to Congress which states have diverted 9-1-1 fees based on self-reporting from the states and territories.

National Trends

National NG9-1-1 Status

A good source of the national status of NG9-1-1 deployment is the "National 9-1-1 Progress Report," published annually by the National 9-1-1 Program[66]. 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[67] and that 14 states now NG9-1-1 statewide[68].

2018. Retrieved July 6, 2020, from https://www.fcc.gov/files/11thannual911feereport2019pdf
[64] See https://blog.npstc.org/2018/03/12/fcc-urged-to-provide-more-guidance-on-911-fee-diversion/
[65] See https://ecfsapi.fcc.gov/file/03021428901295/FCC-20-20A1.pdf
[66] 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
[67] Page 9.
[68] Page 58.

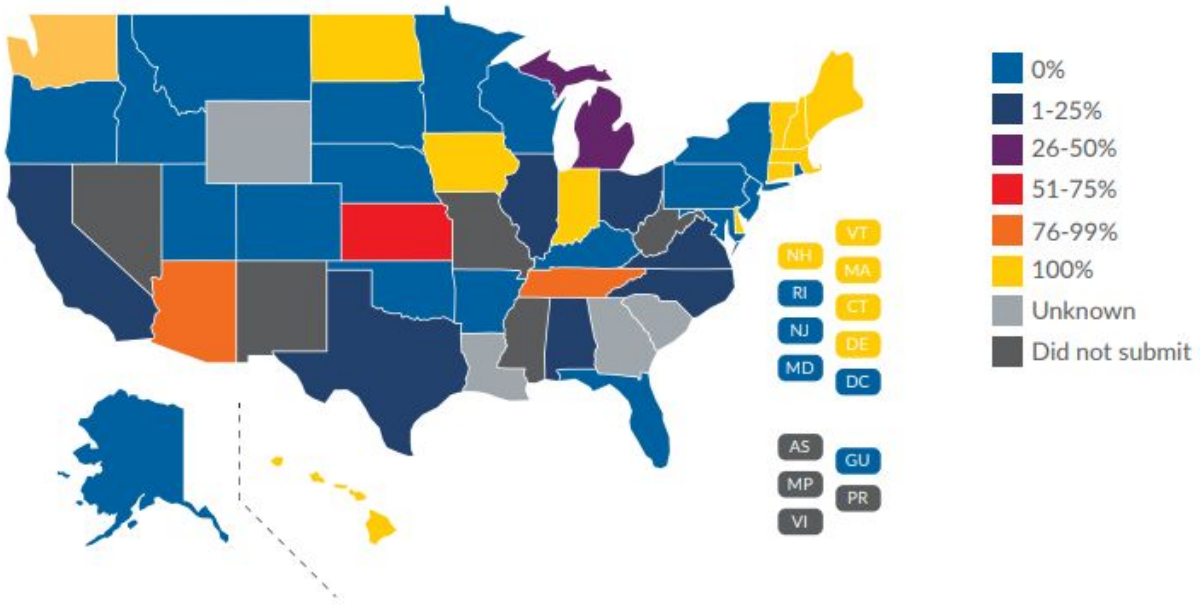


Figure 5.1: Percentage of state population served by NG9-1-1 capable services.
Source: National 9-1-1 Progress Report.[69]

Telecommunicator Training

Colorado is in a minority of states that have not legislated minimum training standards for public safety telecommunicators.[70] 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[71].

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.[72]

Funding

[69] Note: The data collection for this map pre-dates the current migration of Colorado's PSAPs to the ESInet, which is the first step in our NG9-1-1 transition.
[70] 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.
[71] http://deniseamberlee.org/
[72] https://www.911.gov/pdf/Minimum_Training_Guidelines_for_911_Telecommunicator_2016.pdf

Nationally, states have a mix of locally set 9-1-1 surcharge, a single state-wide surcharge, or a hybrid of both methods. Our average 9-1-1 emergency telephone charge rate is currently $1.28 (up from $1.11 in last year's report), with a low of 70¢ and a high of $3.00. Nationally, state-wide 9-1-1 surcharge rates range from 20¢ (Arizona) to $1.75 (Alabama), although local surcharge rates reach as high as $6.00 in Louisiana and $6.40 in West Virginia[73].

Commission and Colorado Involvement

The Commission filed comments in response to a Notice of Proposed Rulemaking issued by the FCC in February of 2020, proposing to provide state agencies access to the FCC's National Outage Reporting System (NORS) and Disaster Information Reporting System (DIRS).[74] The Commission's comments were largely supportive of the proposed rules.

Additionally, Commission staff continues to represent Colorado and serve on the board of directors for the National Association of State 9-1-1 Administrators (NASNA), which is very active in a number of different forums nationally, including activity at the FCC, the National 9-1-1 Program, the NG9-1-1 Institute, and the NG9-1-1 Now Coalition. In the past, through participation with NASNA, Commission staff has participated directly as part of the Federal Communications Commission's Task Force on Optimal PSAP Architecture[75], CTIA's Location Accuracy Advisory Group, and the National 9-1-1 Program Office's NG9-1-1 Roadmap Working Group[76]. Currently, Commission Staff is also participating as a working group member for the Communications Security, Reliability, Interoperability Council (CSRIC), which advises the FCC on the technical matters related to 9-1-1 service.[77]

[73] https://www.nena.org/page/911RateByState?

[74] See https://ecfsapi.fcc.gov/file/030214289012 95/FCC-20-20A1.pdf for the NPRM, and https://ecfsapi.fcc.gov/file/104290252904262/Comments%20of%20CoPUC%20to%20FCC%2015-80%202020-04-29.pdf for the Commission's comments.

[75] https://www.fcc.gov/about-fcc/advisory-committees/general/task-force-optimal-public-safety-answering-point

[76] https://www.911.gov/project_ng911roadmap.html

[77] https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-vii

7. Funding and Fiscal Outlook

Current Funding Sources

Key points:

- *It is unknown what the total cost of providing 9-1-1 statewide is. In 2019, Commission staff estimated the cost to roughly $323 million annually, based on partial survey responses.*
- *At least $64 million was raised through local 9-1-1 surcharges and the prepaid 9-1-1 surcharge in 2019.*
- *Prepaid 9-1-1 surcharge revenue dropped nearly $300,000 between 2017 and 2018, and another $172,940 between 2018 and 2019.*

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

- The Emergency Telephone Charge (ETC), local 9-1-1 surcharges established by 9-1-1 governing bodies that apply to landline, wireless, and Voice over Internet Protocol (VoIP) services[78]
- A statewide 9-1-1 surcharge that will begin being assessed on January 1, 2021. The Commission is authorized by statute to set this rate up to 50 cents per month per 911 access. The revenue from this surcharge will be collected by the Commission and distributed to the 911 governing bodies based on a formula, which in turn is based on the number of concurrent sessions (or how many 9-1-1 calls at once) can be handled by the PSAPs that are associated with the 911 governing body.[79]
- Prepaid 9-1-1 surcharges, which until January 1, 2021 is a 1.4% fee assessed at the point of sale for retail purchase of prepaid telecommunications services, remitted by retailers to the Colorado Department of Revenue, which then distributes the funds based on a formula to local 9-1-1 governing bodies.[80] From January 1 onward, the surcharge amount will be a flat fee per retail transaction, that fee having been set by the Commission by October 1, 2020, and every October 1 annually thereafter. The fee will be calculated as the average local ETC plus the statewide 9-1-1 surcharge rate.[81]
- "User fees" on agencies dispatched by the Public Safety Answering Point (PSAP).
- Local city and county general funds.

It is difficult to state with certainty what the total cost of providing 9-1-1 service is statewide including not only tariff rates for 9-1-1 call delivery, but the cost of facilities, equipment, personnel, and training necessary to operate the state's PSAPs. Budgets are set locally, usually by county or municipal governments, and only partially funded with local 9-1-1 emergency telephone charges, which are remitted by carriers directly to local 9-1-1 governing

[78] § 29-11-102(2)(a)-(b), C.R.S.
[79] § 29-11-102.3(1)(a), (1)(b), and (3)(c)(III), C.R.S.
[80] § 29-11-102.5(2)(b)(I)(A), C.R.S.
[81] § 29-11-102.5(2)(b)(II) and 102.5(c), C.R.S.

bodies. In a survey conducted last year, Commission staff asked Public Safety Answering Points to provide their annual operating budget. Only 41 out of the 90 PSAPs at the time surveyed responded to the question, but those combined 41 PSAPS provided a total operating budget of $120,633,244. The median cost per capita among the responding PSAPs was $45 annually. Applying this rate to the non-responsive PSAPs, taking into account their population, staff estimated the total aggregate of PSAP operational budgets state-wide at about $323 million annually.

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

In contrast, Commission staff has estimated (again based on partial data from the local 9-1-1 governing bodies) that at least $64 million was raised state-wide through 9-1-1 surcharges in calendar year 2019. Most of the difference between these two figures, $259 million, is the responsibility of county and municipal governments.

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

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

The prepaid 9-1-1 surcharge funds are the only portion of the 9-1-1 funds that we have clear visibility of, since those are remitted directly by retailers to DOR prior to those funds being distributed to the local 9-1-1 governing bodies. Revenues from the prepaid 9-1-1 have declined for the last two years.

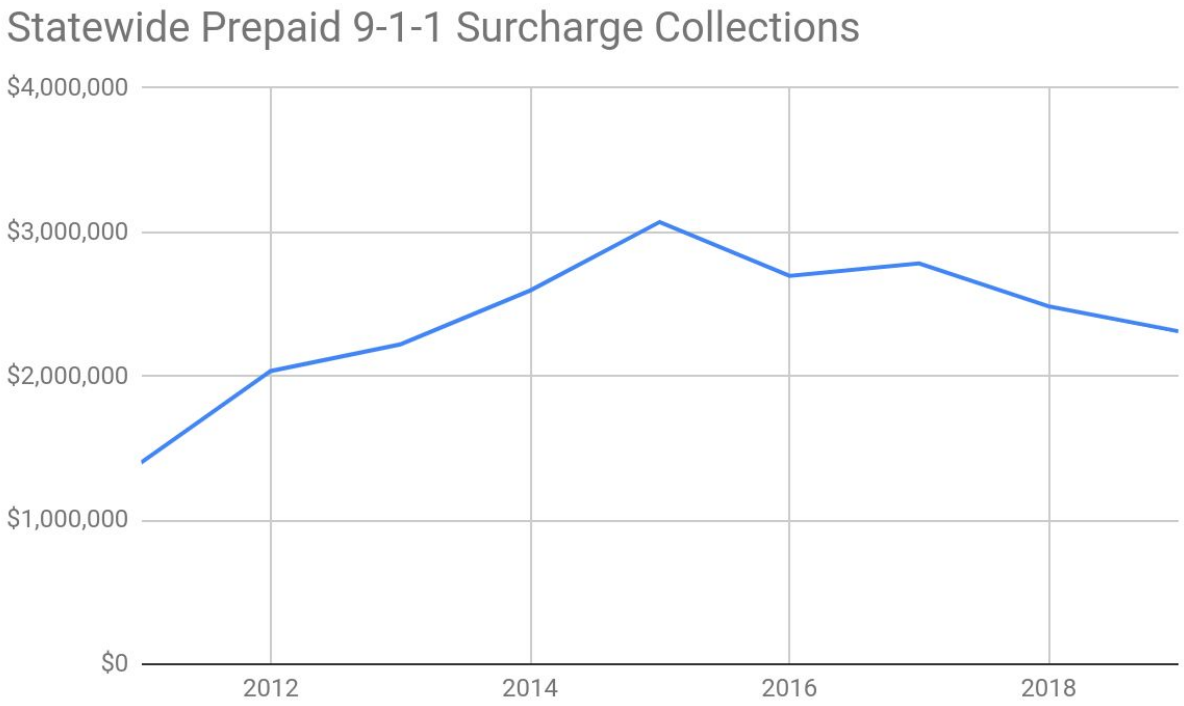


Figure 7.1: Prepaid 9-1-1 surcharge revenues by year.
Source: Colorado Department of Revenue.

Under Colorado statute, each 9-1-1 governing body may set its own local emergency telephone charge[82]. Until January 1, 2021, if the body determines that a surcharge rate in excess of 70¢ is necessary, it must first receive approval from the Commission[83]. After January 1, 2021, the threshold at which approval is required will be set by the Commission.[84] This surcharge rate is applied equally to landline, wireless, and VoIP telephone services, and the telecommunications providers remit those surcharges directly to the local 9-1-1 governing body[85].

9-1-1 surcharge rates in Colorado currently range from 70¢ per month (the rate for 15 different local 9-1-1 Authorities in the state) to $3.00 per month (Las Animas County)[86]. The current average 9-1-1 surcharge, state-wide, is $1.27.

[82] § 29-11-102(2)(a), C.R.S.
[83] § 29-11-102(2)(f)(I), C.R.S.
[84] § 29-11-102(2)(f)(II), C.R.S.
[85] § 29-11-102(2)(c), C.R.S.; 29-11-103(1), C.R.S.
[86] 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

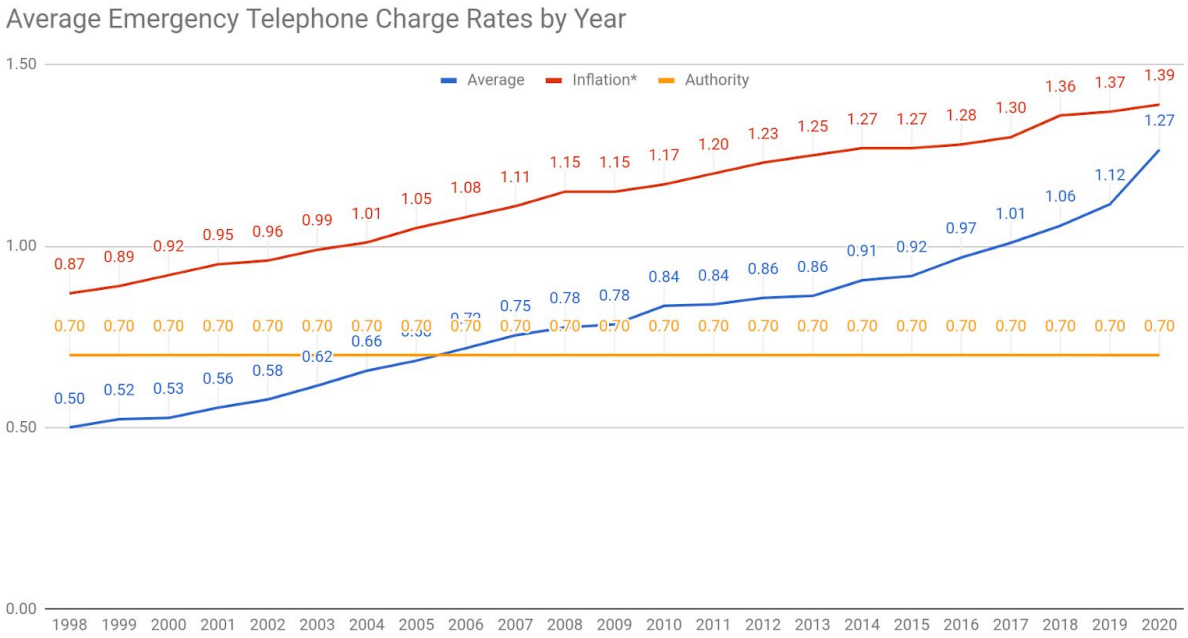


Figure 7.2: Average 9-1-1 Surcharge Rates in Colorado Since 1998 (blue) compared to 70¢ in 1990, adjusted for inflation to the current year (red). The threshold for PUC approval of 9-1-1 surcharge rates has remained unchanged at 70¢ (gold).

Funding Challenges

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

- Line counts have generally been decreasing as consumers "cut the cord," meaning they are discontinuing their landline services. For some time, this decrease in landline counts was countered by increases in wireless lines, but 9-1-1 governing bodies have indicated that wireless line count increases have leveled off while landline count decreases have continued.
- 9-1-1 surcharges on wireless devices are collected from Colorado residents and businesses and remitted to 9-1-1 governing bodies based on the billing address of the customer. If the customer is not a full-time resident of a county where they are likely to use the service, like a tourist from out of state, a student from another county or from out-of-state, or any other part-time resident, they are adding to the costs of providing 9-1-1 to their community without helping to fund that service.
- It is often difficult for a 9-1-1 governing body to know which telecommunications providers are doing business in their collection area, and therefore whether they should or should not be receiving surcharge funds from them. If the 9-1-1 governing body does receive a remittance form a service provider, there is little accountability to ensure that the amount they are receiving is the correct amount.
- Until the enactment of HB 20-1293, statute put the onus of auditing carriers' practices

as they relate to 9-1-1 surcharge remittances on the local 9-1-1 governing bodies, which were required to conduct the audits at their own expense. Many of the 9-1-1 governing bodies serve small populations and have small budgets, which means that very few audits are conducted to ensure that carriers are remitting properly and with the correct amounts. In fact, Commission staff is not aware of any audits being conducted by the 9-1-1 governing bodies of carriers' 9-1-1 surcharge remittance practices in 2019 or so far in 2020. With the enactment of HB 20-1293, the Commission will have the authority to conduct audits on either a statewide basis or on behalf of individual governing bodies, or may fund audits conducted by governing bodies using a portion of the revenue collected from the newly authorized statewide 9-1-1 surcharge.

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

For each PSAP, the legacy 9-1-1 tariff rates continue to apply until the PSAP has been migrated to the new network.[87] Following migration to the ESInet, the PSAP will also incur a non-recurring fee, including project management fees for the migration.

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

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

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

The grant program requires a 40% match, which the Commission authorized to be paid out of the Colorado Performance Assurance Plan Tier 2 Fund.[90] Each 9-1-1 governing body will be

[87] See Proceeding 18AL-0916T. The schedule begins on page 49.
[88] https://www.congress.gov/112/plaws/publ96/PLAW-112publ96.pdf. See sections 6501 through 6509.
[89] Grant opportunity NHTSA-NTIA-911-GRANT-PROGRAM-2018. See the document labeled "911 Grant Program.Revision to NOFO.Final.PDF
[90] See Decisions C18-0751 and C19-0331.

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

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

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

The enactment of House Bill 20-1293, which authorizes the assessment of a statewide 9-1-1 surcharge in addition to local emergency telephone charges, will allow Colorado to join other states that have taken this approach to equalizing 9-1-1 service levels between rural and urban areas.[91] The new statewide surcharge rate will be set by the Commission by October 1, 2020, and take effect on January 1, 2021.

Commission staff estimated that each penny charged through a monthly state-wide 9-1-1 surcharge on all landline, wireless, and Voice over Internet Protocol (VoIP) services should raise approximately $650,000 annually. For example, the ESInet tariff will result in a total of approximately $5.9 million being charged annually to the local 9-1-1 governing bodies. Paying these at the state level (without any other costs) would require a state-wide supplemental 9-1-1 surcharge of 10 cents. This surcharge would free up nearly six million dollars at the local level that could then be spent on equipment, training, and personnel in the PSAPs. Setting the statewide surcharge rate higher than 10 cents would provide additional funding to all of the 9-1-1 governing bodies in the state, but proportionally more per capita to the rural areas of the state.

[91] For a list of 9-1-1 surcharge rates by state, see https://www.nena.org/page/911RateByState.

Conclusion

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

The desired improvements to the 9-1-1 system in Colorado include setting the stage for a migration to Next Generation 9-1-1 (NG9-1-1). The Commission is pleased that progress has been made in this regard, with 16 out of 96 PSAP sites (including backup sites) having been migrated to an Emergency Services IP Network (ESInet) as of the writing of this report. The Commission looks forward to working with the Colorado 9-1-1 Advisory Task Force and its committee, the ESInet Users Group, and all of the stakeholders to help ensure a smooth transition to the ESInet, and to build a roadmap forward to NG9-1-1.

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

The enactment of HB 20-1293 has the potential to remedy a number of the difficulties facing 9-1-1 service provision in the State of Colorado by providing an additional funding source that is not reliant on local subscriber counts in each 9-1-1 governing body's collection area. A great deal of work must be done by the Commission and by the local 9-1-1 stakeholders to fully implement this bill, but it is hopeful that it will have a strong impact on the 2020-2021 State of 9-1-1 Report, and even more so in subsequent years when we will see results of a full year of revenue from the new surcharge.

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

Appendices

Appendix A: Glossary

Sources for these definitions: *4 CCR 723-2-2131*, § 29-11-101, C.R.S., and the *NENA Master Glossary of 9-1-1 Terminology*[92]. 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.)

92 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 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 allowing that text message to be relayed to the appropriate PSAP. There are interim methods of text to 9-1-1 service that relay text to 9-1-1 messages directly to a PSAP, bypassing the existing 9-1-1 network. If a Next Generation 9-1-1 system is available, text to 9-1-1 messages may be relayed through the NG9-1-1 network.

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

Appendix B: Participating Stakeholders

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

The Reports Committee of the 9-1-1 Advisory Task Force was provided with an advanced draft of this report and provided Commission staff with input and direction concerning its development.

Name	Organization
A. Srsen	Washington-Yuma 911
Athena Butler	Denver 911
Bill Duggan	Fremont County 911
Cari Wojcik	City of Thornton
Carl Stephens	Garfield County
Cassel McWaters	NICE
Daryl Branson	Colorado PUC
Greg Brooks	Comtech TCS
Joe Benkert	BRETSA
K. Jeffries	City of Pueblo
Ken Winward	TC Communications
Kimberly Culp	Larimer Emergency Telephone Authority
Kitty Curtis	City of Glendale
Melony Hemphill	San Miguel County

Pete Kirchhof	Colorado Telecom Association
Rachel Parrinello	BRETSA Boulder Regional Emergency Telephone Authority
Rhawnie McGruder	Eastern Rio Blanco County 911
Ryan Tharp	Fairfield and Woods
Scott Newman	City of Aurora
Shawn Shear	City of Thornton
Steve Fullerton	Solacom
Steve Silbermann	Boulder County

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

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

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