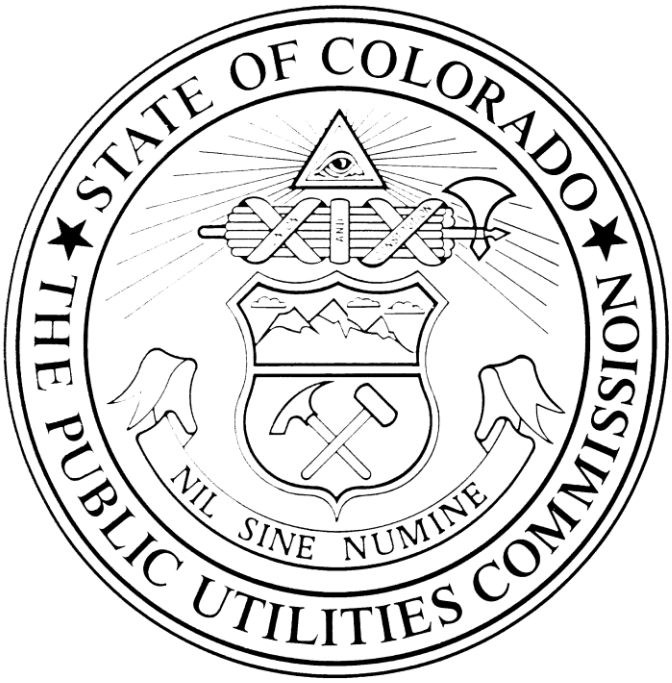
Report on the State of 9-1-1 Services in Colorado

2023-2024



Prepared by:

The Colorado Public Utilities Commission Staff

September 11, 2024

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Executive Summary

***Key Points*:**

- ***The ESInet Users Group continues to plan for future deployment of Next Generation 9-1-1 (NG9-1-1) services, ESINET performance, and ESINET service disruptions.***
- ***The Commission concluded a rulemaking process strengthening the rules regarding 9-1-1 PSAP service disruptions, formerly known as Basic Emergency Service outages.***
- ***The PUC 9-1-1 Advisory Task Force worked with legislators to pass SB24-139, which created the 9-1-1 Services Enterprise and its statewide 9-1-1 funding mechanism, to be included within the statewide 9-1-1 surcharge.***
- ***The PUC 9-1-1 Advisory Task Force worked with legislators to pass HB24-1016, which formally defines 9-1-1 telecommunicators as first responders.***
- ***The Commission conducted a proceeding in which the Basic Emergency Service Provider (BESP) proposed several projects designed to improve the 9-1-1 call delivery network. Staff and Intervenors participated heavily in this proceeding. As of this report, the proposed projects were approved.***
- ***CenturyLink filed a new tariff to comply with new Rule 2137 in September 2023. Commission Staff filed a protest, as did a governing body. The matter was referred to an administrative law judge. Most of the parties settled their issues, and the administrative law judge should issue a ruling shortly.***
- ***Colorado remains one of a shrinking minority of states with no minimum operational or training standards for 9-1-1 call centers.***
- ***Disparities in local monthly Emergency Telephone Charge rates continue to grow between some rural areas and urban areas, with some being five and a half times higher than others.***

The state of 9-1-1 services in Colorado is dynamic. Technologically, Colorado has the backbone of the network needed to move toward Next-Generation 9-1-1 (NG9-1-1). Many steps remain in achieving this goal, such as the implementation of geospatial routing within the ESINet (IP-based network used to transport, route, and deliver 9-1-1 calls) and the provision of other NG9-1-1 Core Services. Public Safety Answering Point (PSAP) capabilities related to universal access to 9-1-1 vary widely across the state, resulting in disparities in the services citizens and visitors may receive when reaching out via 9-1-1 for emergency assistance.

Colorado has several avenues for 9-1-1 stakeholder collaboration and involvement. Many PSAPs and governing bodies take advantage of those opportunities, lending their voices to the conversation and helping the community take steps to shape Colorado's future in 9-1-1. This results in vigorous conversations and debate, leading to collaborative decisions.

The Commission is grateful to the Colorado General Assembly for its recognition, with the passage of HB24-1016, of telecommunicators as first responders. The women and men working in 9-1-1 are dedicated, compassionate professionals. They are the first point of contact for those in crisis and need, and serve as coordinators of on-scene responses of law enforcement, fire, and EMS personnel. We are proud that Colorado recognizes their important work as such.

The Commission continues to address issues of reliability and resiliency in the portion of 9-1-1 call flow that it regulates, referred to as Basic Emergency Service (BES). The BES network improvement plan process reported about last year is underway, as is a new staff-led outage investigation process. A rulemaking to strengthen and clarify regulations regarding BES outages was recently completed, and is discussed further in Section 3.

9-1-1 funding decisions in Colorado remain entirely local (for a detailed explanation of funding mechanisms, see Section 5). This funding is generally not sufficient for governing body costs related to the provision of baseline 9-1-1 service. Further, additional costs related to a robust, ubiquitous 9-1-1 service and full implementation of NG9-1-1 are harder to pay for through other local funding sources. One solution to help mitigate this problem was enabled in 2024, and is discussed in Section 7.

The Commission herein makes several recommendations to the legislature for consideration, which are discussed in detail in Section 7. **These recommendations are of the Commission, not of the Commission's 9-1-1 Advisory Task Force, the Department of Regulatory Agencies, the Governor's Office, nor any other organization.**

- **The legislature should take notice of challenges PSAPs and governing bodies are experiencing with the responsiveness of the Basic Emergency Service Provider.**
- **The legislature should continue to support efforts to fund non-tariffed 9-1-1 expenses on a statewide level.**
- **The legislature should support 9-1-1 professionals and stakeholders in developing minimum operational and training standards for PSAPs.**
- **The legislature should consider directing other resources to provide cybersecurity support for PSAPs that do not have sufficient local support.**
- **The legislature should consider taking action to address growing disparities between local Emergency Telephone Charge (ETC) rates statewide.**

1. Commission Activity Regarding 9-1-1 Service

Commission Activity During the 2023-2024 Fiscal Year

During the 2023-2024 Fiscal Year the Commission undertook the following activity:

- Received two applications for increases to local ETC rates, filed by the Washington-Yuma Counties Emergency Telephone Service Authority for $3.25 per line per month,[1] and by the Aspen-Pitkin County Emergency Telephone Service Authority for $4.00 per line per month.[2] Both were approved.

- Conducted a proceeding to set the state 9-1-1 Surcharge rate, the threshold for Commission approval required for ETC rates, the Prepaid Wireless 9-1-1 Charge rate, and distribution formulas for the state 9-1-1 Surcharge and Prepaid Wireless 9-1-1 Charge funds by October 1, 2023, for calendar year 2024, as required by § 29-11-102.3 and 102.5, C.R.S.[3]

- Concluded a rulemaking to clarify the definition of Basic Emergency Services (BES) outage and related reporting requirements, and to update terminology and internal references.[4] The recommended decision was issued June 13, 2024 and is awaiting final adoption.

- Facilitated six meetings of the Commission's 9-1-1 Advisory Task Force, which was created pursuant to 4 *CCR* 723-1-2145.[5] Beginning in 2022, staff has arranged "lunch-and-learn" webinars for local 9-1-1 stakeholders in alternate months between meetings of the Task Force.

- Continued facilitation of the ESInet Users Group, a committee of the 9-1-1 Advisory Task Force, which was created by Commission Decision.[6]

- Continued facilitation of the Committees of the Task Force, with the following

[1] See Proceeding No. 23A-0500T.
[2] See Proceeding No. 23A-0509T. It should be noted that for the first time the Commission granted *temporary* approval for a governing body to increase its ETC rate. Aspen-Pitkin County Emergency Telephone Service Authority was granted approval to raise its rate to $4.00 per line per month for a period of five years, after which time it will need to revert to its previous rate of $2.00 or file an additional application to justify the continuance of the $4.00 rate.
[3] See Proceeding No. 23M-0385T.
[4] See Proceeding No. 23R-0577T. Part of the resolution to conflicting interpretations of the term "BES Outage" is to abandon the term in favor of "PSAP Service Disruption."
[5] The Commission's authority for creating the Task Force derives from its oversight of Basic Emergency Service. See § 40-15-201 (2), C.R.S. See the Task Force's website at https://sites.google.com/state.co.us/9-1-1-advisory-task-force/home.
[6] See Decision R18-1063T.

activities:
    - Equal Access Committee hosted a Town Hall event, bringing together 9-1-1 professionals and members of the Access and Functional Needs community to discuss how they can work together.
    - Legislative Committee worked with members of the legislature to draft and pass HB24-1016, which defines 9-1-1 telecommunicators as first responders, and SB24-139, which creates the 9-1-1 Services Enterprise.

- Filed an annual report to the Federal Communications Commission pursuant to the New and Emerging Technologies 911 Improvement Act of 2008 (NET 911 Act).[7]

- Participated in an annual data collection effort conducted by the National 911 Program.[8]

- Continued collaboration with the 9-8-8 Program Manager at the Colorado Behavioral Health Administration to further establish relationships between 9-8-8 and 9-1-1 and aid smooth implementation of 9-8-8 and mobile crisis response services.

- Administered a CenturyLink-initiated proceeding to amend the existing BES tariff for certain matters of reliability as required by Commission Rule 4 CCR 723-2-2137, which was adopted in Decision R22-0811 and became effective on March 30, 2023. As of the time of this report, it is awaiting final Commission decision.[9]

- Administered and participated in a CenturyLink-initiated proceeding, required by Commission Rule 4 CCR 723-2-2143(b), regarding its BES Improvement Plan Application.[10] As of the time of this report, it is awaiting final Commission decision.

- Facilitated the second revision of the ESInet Users Group Next Generation 9-1-1 Strategic Plan, which was adopted by the Users Group in August 2022.[11] The revision process is ongoing as of this report.

- Conducted a proceeding to distribute the remainder of the Colorado Performance Assurance Plan (CPAP) Special Funds. This proceeding allocated approximately $1.6 million to various entities, including $500,000 to the Colorado 9-1-1 Resource Center for Geographic Information System (GIS) dataset development for geospatial routing of 9-1-1 calls, $20,000 to the Colorado Council of Authorities (a membership-based organization supporting 9-1-1 governing bodies), and $95,387 to the Colorado 9-1-1 Resource Center to extend ongoing operations.[12]

- Assisted CenturyLink in its implementation of a Management Information System (MIS)

[7] See https://www.fcc.gov/general/911-fee-reports
[8] See https://resourcecenter.911.gov/code/9-1-1ProfileDatabase.aspx
[9] See Proceeding 23AL-0486T
[10] See Proceeding 23A-0197T.
[11] https://docs.google.com/document/d/1SbsHfCjbJ_aKAkD8IfGZqRRz6-44-ZBu35BW1DZmXCw/edit
[12] See Proceeding 23M-0210T

called ECaTS at the request, and for the benefit, of the local governing bodies and PSAPs.[13] ECaTS is a call metrics and analytics system that assists PSAPs with staffing decisions, among other capabilities.

In addition to the activities listed above, Commission staff were very engaged in statewide and national activities regarding 9-1-1 service, including:

- Serving as an officer on the boards of the Colorado 9-1-1 Resource Center and the National Association of State 911 Administrators.
- Serving as co-chair of the technology committee of the Colorado joint chapter of the National Emergency Number Association (NENA) and the Association of Public Safety Telecommunications Officials, Intl (APCO).[14]
- Serving as an officer of the Colorado NENA/APCO Chapter.
- Serving on several committees of the Commission's 9-1-1 Advisory Task Force.
- Serving as co-chair of NENA's Education Advisory Board.[15]
- Serving as the governor-appointed 9-1-1 representative on Colorado's Standing Committee on First Responder Safety.[16]
- Serving on NENA's FutureThink Committee.[17]

Commission staff assigned to 9-1-1 related matters for the 2023-2024 fiscal year primarily consisted of the following:

- Jennifer Kirkland, State 9-1-1 Program Manager - 1.0 FTE
- Daryl Branson, Telecom Programs Section Chief - 0.5 FTE
- Holly Bise, State Relay Administrator - 0.2 FTE
- Jolene Sena, Surcharge Administrator - 0.3 FTE

Ms. Kirkland is the Commission's only staff member fully focused on 9-1-1 related issues. Mr. Branson, Ms. Bise, and Ms. Sena have other duties in addition to 9-1-1.

Commission Activity Planned for the 2024-2025 Fiscal Year

Rules adopted in 2022 required the state's Basic Emergency Service Provider (BESP), CenturyLink, to file an improvement plan with proposed projects that would improve the reliability, redundancy, or geographic diversity of the BES network. CenturyLink filed the first plan in February 2023, which was later withdrawn. CenturyLink filed a second plan in February 2024, which was approved in August 2024. At the time of this report, exceptions had

[13] See Proceeding 23AL-0133T.
[14] See www.conenaapco.org for more information
[15] See https://www.nena.org/page/EducationAdvisoryBrd for more information
[16] See https://sites.google.com/state.co.us/coloradotim/first-responder-committee/focus-areas
[17] See https://www.nena.org/page/FutureThink for more information.

been filed in the proceeding, which were not yet resolved[18] Commission Staff will be involved in the implementation of this improvement plan if it moves forward, including oversight of required tariff amendments related to the improvement plan.

Additionally, CenturyLink has expressed its intent to file a tariff amendment in late 2024 that would provide text-to-9-1-1 over the ESInet, geospatial routing of 9-1-1 calls, and a GIS management module that would assist governing bodies in managing the GIS data necessary for statewide geospatial routing of 9-1-1 calls. Staff anticipates that the resulting proceeding will generate significant discussion in the 9-1-1 community.

The Colorado Behavioral Health Administration severed its contract for 9-8-8 service with Rocky Mountain Crisis Partners in summer 2024 and is transitioning to its new provider, Solari. Staff continues to work with the BHA, serving as a bridge between the 9-8-8 Program and the 9-1-1 Program.

There was considerable 9-1-1 community interest in revising the ESInet Users Group NG9-1-1 Strategic Plan. The nature of the document requires regular revisions to ensure that the Plan reflects the desires of the local agencies and an ambitious, but realistic, vision for the future of 9-1-1 service in Colorado. Staff continues to facilitate workshop-style discussions in the revision process.

The PUC 9-1-1 Advisory Task Force's Legislative Committee continues its work drafting a bill regarding the misuse of 9-1-1, and is working with law enforcement representatives, the District Attorney's legislative group, and others to build support for it in the 2025 session of the General Assembly.

SB24-139 created the 9-1-1 Services Enterprise, which has authority to submit a budget to the Commission for funding through the statewide 9-1-1 Surcharge. This budget will be used for Enterprise Board-approved expenses for the provision of 9-1-1 service throughout Colorado, including items such as 9-1-1 telecommunicator training, cybersecurity, calltaking protocol purchases, emergency notification system expenses, and others. Commission Staff has been tasked by DORA with facilitating the administration of the Enterprise Board.[19] The Governor's Office set the number of Board members at five; a representative of the telecommunications industry and an equal number of representatives of governing bodies with populations above and below 200,000, to include mountain resort communities and communities in the eastern plains of the state.

Commission staff will complete annual reporting requests from the Federal Communications Commission and the National 911 Program.

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), as well as facilitate the meetings of the ESInet Users Group and other committees.
Staff will continue to participate in NENA, APCO, National Association of State 911

[18] See Proceeding 23A-0197T
[19] See full text of SB24-139

Administrators (NASNA), and the National Association of Regulatory Utility Commissioners (NARUC) activities and events.

2. The Current 9-1-1 Service Environment

Structure

A description of the current 9-1-1 service environment is archived and documented on the Colorado 9-1-1 Program website in a document titled "Colorado's 9-1-1 Service Environment."[20] It is also attached as Appendix A. This section highlights changes that occurred during the reporting period.

- The number of primary PSAPs in Colorado decreased by one. Clear Creek County closed its PSAP and contracted with Jeffcom 9-1-1 to receive its 9-1-1 calls and dispatch emergency responders in Clear Creek County. There are now 80 primary PSAPs and four secondary PSAPs in Colorado.[21]

- The number of 9-1-1 governing bodies decreased by one. Jackson County dissolved its 9-1-1 Authority and regionalized with the Larimer Emergency Telephone Authority (LETA). The Jackson County PSAP is still operational. There are now 57 governing bodies in Colorado.

[20] See Appendix A

[21] A primary PSAP is one which receives 9-1-1 calls directly from the public, and a secondary PSAP receives 9-1-1 calls only upon transfer from a primary PSAP.

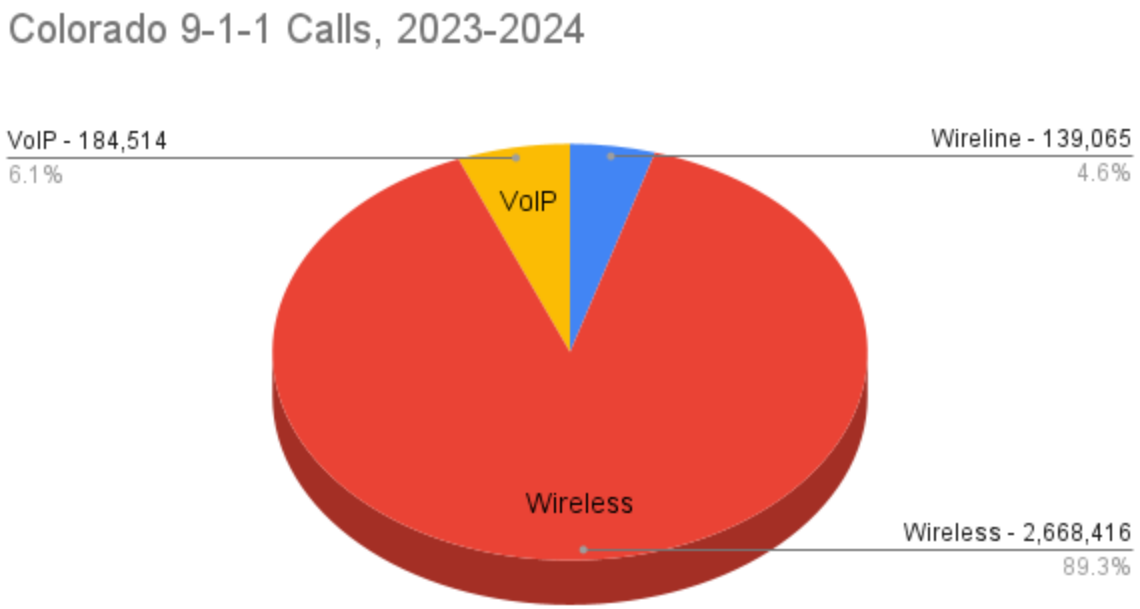


Figure 2.1: 2023-2024 Statewide 9-1-1 calls by type. Total call volume was 3,012,263. This includes initial calls to a PSAP and calls transferred in from another PSAP, resulting in some calls being counted twice.

General Operations

Operations within Colorado's 84 PSAPs are locally controlled. PSAPs often operate as a part of a local law enforcement agency but are sometimes operated as independent agencies of a city or county government, as part of a fire agency, or as a local government operating as a separate legal entity of the state. 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 of one or more law enforcement agencies, fire protection services, emergency medical services, and other agencies. PSAPs also answer a large number of non-emergency calls from the public, often exceeding the number of 9-1-1 calls received.[22]

Commission staff uses its statutorily-provided data collection authority to track trends in PSAP service capabilities.[23] Specifically, staff tracks the adoption of three categories of PSAP services that are generally considered essential to PSAP operations, but which are not

[22] Note: There is an industry trend to move away from the term "Public Safety Answering Point" or "PSAP" in favor of the term "Emergency Communications Center" or "ECC". For the purposes of this report, we continue to use the term PSAP since it is the term defined in statute and specifically refers to ECCs that receive 9-1-1 calls, whereas the term "ECC" can be more broad.

[23] §29-11-102(4), C.R.S. requires 9-1-1 governing bodies to comply with annual reporting requirements established by the Commission for assisting the Commission in meeting federal reporting requirements and data requests and to gather information for inclusion in this report.

universally adopted in Colorado.

Text-to-9-1-1

Text-to-9-1-1 service allows users to send a message by entering "911" in the recipient field of their texting app. No federal or state mandate to provide text-to-9-1-1 exists. Many of Colorado's PSAPS were early adopters of text-to-9-1-1, with some PSAPs implementing as early as 2014. Currently text-to-9-1-1 is available in the jurisdictions of all but three primary PSAPs. The Black Hawk Police Department makes text-to-9-1-1 service available, although the service is not available in other parts of Gilpin County. Durango-La Plata Communications Center makes it available, but the Southern Ute Police Department does not. Each PSAP providing text-to-9-1-1 service is doing so via "interim" methods that bypass the ESInet (the network provided by the BESP to deliver 9-1-1 calls), using either dedicated connections to a Text Control Center (TCC) provider or, more commonly, using the public Internet and a browser-based solution.

The current status of text-to-9-1-1 is illustrated in the map below.

- Since our last report, Jackson, Lincoln, and Phillips Counties have implemented text-to-9-1-1 service, and Huerfano County clarified that it does not receive texts to 9-1-1.
- Starting with this year's data collection, we asked PSAPs not receiving text-to-9-1-1 to indicate whether they are planning to implement this capability. Bent-Kiowa County and Southern Ute Police Department indicated this intention.
- CenturyLink intends to file in late 2024 a tariff amendment to provide text-to-9-1-1 statewide via the ESInet.

For the purpose of this map, a PSAP is considered to have text-to-9-1-1 service even if that service is being provided by another PSAP.

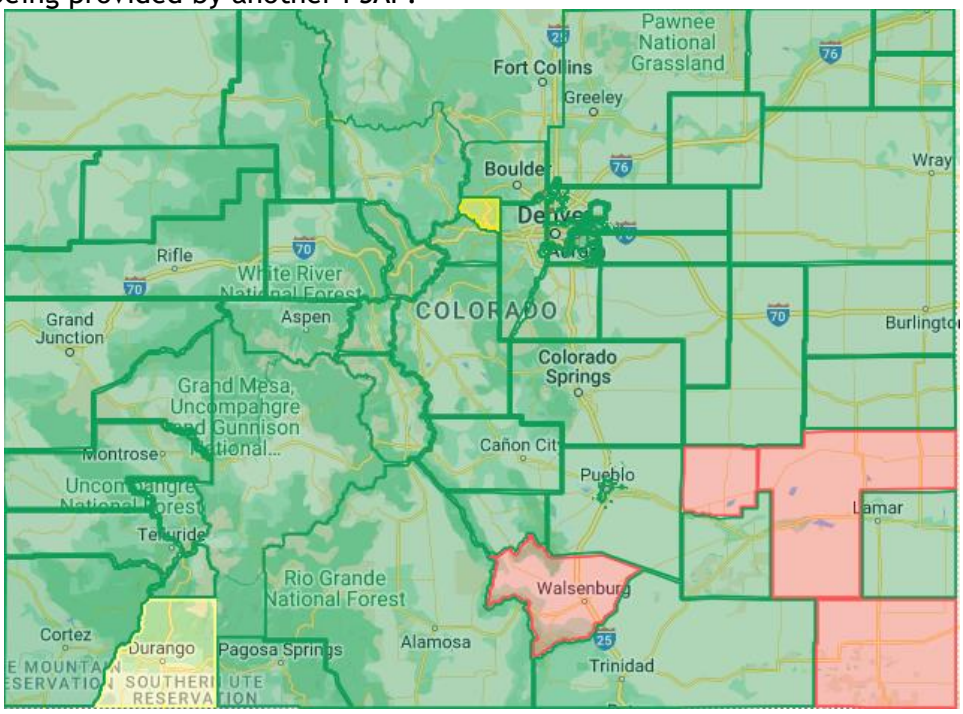


Figure 2.2: Text-to-9-1-1 service in Colorado by governing body.
Red = No text-to-9-1-1 service.
Yellow = Text-to-9-1-1 service offered in some parts of the governing body's jurisdiction.
Green = Text-to-9-1-1 service offered in all of the governing body's jurisdiction.

The availability of text-to-9-1-1 service can mean the difference between life and death for individuals who may be unable to make a traditional voice call. This includes callers who are deaf, hard-of-hearing, or may have a speech impairment, and also includes callers reporting dangerous incidents in which the suspect may still be present, such as a domestic abuse situation or an active shooter. Text-to-9-1-1 may also work in some instances where a cellular signal may not be strong enough to maintain a voice 9-1-1 call.

For these reasons, the Commission's 9-1-1 Advisory Task Force strongly supports implementation of text-to-9-1-1 in every PSAP. Discussions regarding how to encourage and facilitate statewide deployment of the service are ongoing. These efforts are being assisted largely by the Colorado 9-1-1 Resource Center, a non-profit entity created by order of the Commission in 2006 to provide support and informational resources to local 9-1-1 officials.

In the past, the ESInet Users Group has held discussions with CenturyLink regarding the possibility of ubiquitous text-to-9-1-1 being delivered statewide via the ESInet, thereby using the same path as voice 9-1-1 calls. By doing so the service would receive the benefit of being delivered over a secure, dedicated network with that network's redundancy and diversity. It

would allow PSAPs that currently receive text-to-9-1-1 calls via an Internet browser to begin receiving them natively in their Call Handling Equipment (CHE), subject to the equipment supporting that functionality. It would ensure 100% availability to the PSAPs and add a layer of redundancy that could help improve the reliability of the public's ability to contact 9-1-1. PSAPs that wish to continue receiving text-to-9-1-1 via interim methods for additional redundancy could do so. As noted in Section 1 above, CenturyLink has signaled intent to bring this to fruition by adding text-to-9-1-1 to its BES tariff with the Commission.

RapidSOS, a third-party independent company that provides data and location information services via its own proprietary platform, announced in June 2024 that it intends to provide text-to-9-1-1 services via its platform, which is available for free to all PSAPs. All but six of Colorado's primary PSAPs are using RapidSOS, so this may become another solution for PSAPs to receive text-to-9-1-1.

The Task Force's Equal Access Committee also urges the Task Force, the ESInet Users Group, and CenturyLink to identify solutions for statewide deployment of text-to-9-1-1, and is monitoring adoption of this capability.

EMD/PAI Implementation

The use of Emergency Medical Dispatch (EMD) protocols, including the delivery of Pre-Arrival Instructions (PAI), for medical calls is standard throughout most of Colorado, with the service being implemented fully by PSAPs related to 53 of the 57 governing bodies. One PSAP In Otero County (Rocky Ford FD) provides EMD for its service area, but the other PSAP (La Junta PD) does not.

- Since our last report, Lincoln and Jackson counties have implemented EMD.
- Starting with this year's data collection, we asked PSAPs not providing EMD to indicate whether they were planning to implement these protocols. Of the four PSAPs that are not providing EMD, Lake County and Colorado State Patrol-Pueblo indicated intent to eventually implement EMD protocols.

For the purpose of this map, a PSAP is considered to provide EMD/PAI even if that service is being provided by another PSAP on its behalf.

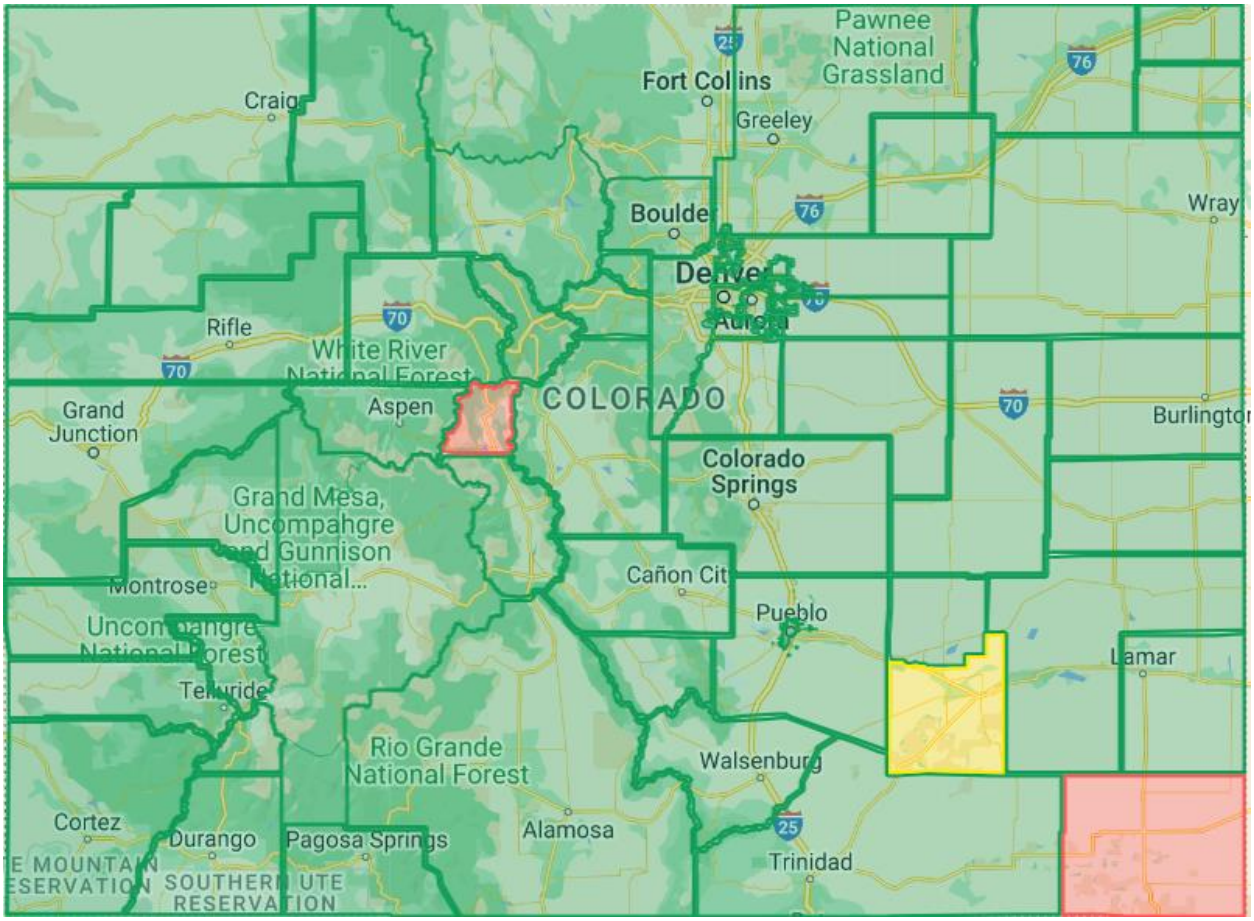


Figure 2.3: EMD/PAI service in Colorado by governing body.
Red = No EMD/PAI service.
Yellow = EMD/PAI offered in some parts of the governing body's jurisdiction.
Green = EMD/PAI offered in all of the governing body's jurisdiction.

Although EMD is not mandated in Colorado, it is a critical service which may make the difference between life and death for callers requesting medical assistance. The ability to provide CPR instructions over the phone, provide instructions to control bleeding, or other instructions to stabilize a patient prior to arrival of emergency medical service personnel, can and does have an impact on patient outcomes.

It should be noted that among the counties denoted in green a variety of different EMD protocol systems are in use. The quality of the protocol system in use may vary from PSAP to PSAP. Most, but not all, PSAPs use nationally accredited protocol systems with both national and local medical oversight.

Language Interpretation for 9-1-1 Calls

Every PSAP in Colorado faces the possibility of receiving 9-1-1 calls from people who do not speak English fluently, or who might be better able to communicate if provided the opportunity to use their native language. Several vendors provide services which allow PSAPs to initiate a three-way call with non-English-speaking persons, and provide a trained interpreter to facilitate communication between the caller and the call taker. Typically, these services can also help identify the language being used by the caller before bringing on an appropriate interpreter.

Currently, 53 of the 57 governing bodies' respective PSAPs use interpretation services. In La Plata County the Durango-La Plata 911 center uses an interpretation service, but the Southern Ute Police Department PSAP does not.

- Since our last report, Prowers County Communications began using a language interpretation service.

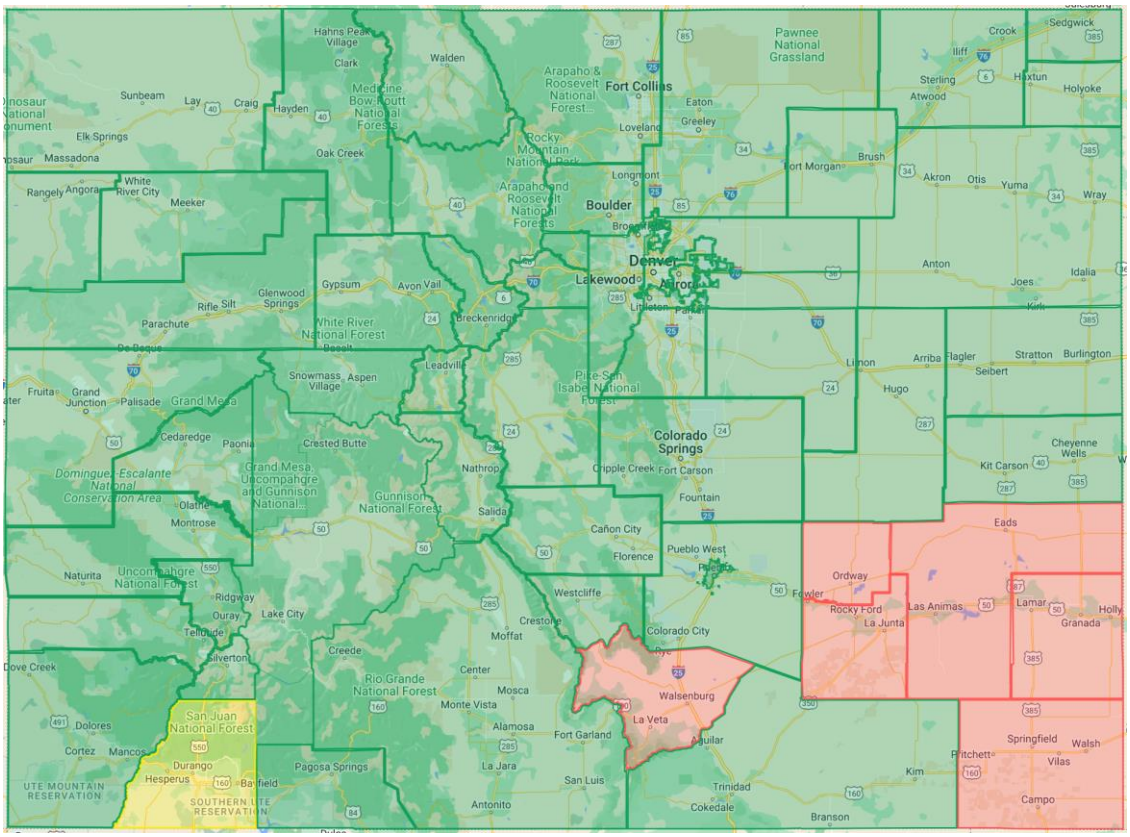


Figure 2.4: 9-1-1 Call Language Interpretation Service Availability by Governing Body
Red = No language interpretation service for 9-1-1 calls.
Yellow = Interpretation service offered in some parts of the governing body's jurisdiction.
Green = Interpretation service offered in all of the governing body's jurisdiction.

Colorado is an international destination for travelers who come to enjoy the state's natural beauty, visit family, or conduct business. It also has a significant resident population which does not speak English. Without the ability to communicate in a variety of languages, PSAPs run the risk of not being able to fully serve a caller, leaving no other option than to dispatch law enforcement to meet the person. In some cases, the PSAP may not even be able to determine the caller's location without interpretation services.

A few of the PSAPs without interpretation services report they have Spanish-speaking dispatchers or law enforcement officers who can assist with translation. This is not considered a sufficient alternative to an interpretation service[24] because it is (1) dependent on those Spanish-speaking personnel being on duty and available when a call needs to be interpreted, (2) does not guarantee that the personnel are sufficiently proficient in Spanish to interpret the call, and (3) does not provide for interpretation of other languages.

Emergency Notification Services

Outbound emergency notifications to the public are provided using different services for different applications, including emergency notifications services (ENS). Local 9-1-1 governing bodies may use 9-1-1 surcharge funds to pay for ENS.[25] However, ENS is not part of the 9-1-1 system and its use and operation by local agencies is not regulated by the Commission.

- During the 2023 legislative session, Representative Elizabeth Velasco and Senators Perry Will and Tony Exum introduced HB23-1237, titled Inclusive Language Emergency Situations. The final version of the bill directed the University of Colorado to conduct a study of available ENS language capabilities, with a final report due to the general assembly by January 8, 2024. The report authors made a number of recommendations, including the adoption of a centralized alerting system, standardizing practices, securing funding to support inclusive alerts, and creating/distributing language and disability access resources. At the time of this report, no further action has been taken with regards to the study and its recommendations.[26]

- All but two governing bodies contract with an emergency notification system provider. The two governing bodies reported having no ENS services.

Accessibility

Access to 9-1-1 services for individuals with accessibility needs is a consideration that must be included in any evaluation or planning regarding the future of 9-1-1 services. There are a number of ways persons with accessibility needs can use the 9-1-1 system in Colorado.

[24] See NENA Standard for 9-1-1 Call Processing
[25] See § 29-11-104(2)(a)(I)(C) and (D), C.R.S.
[26] See the full report at https://hazards.colorado.edu/research-projects/colorado-inclusive-language-and-access-in-emergency-alerts#espanol

TTY, Relay Services, and Other Accessibility Devices

TTY (an abbreviation that originally stood for "teletypewriter") is a method still used by some individuals who are deaf, hard of hearing, DeafBlind, or have speech disabilities. It enables the user to connect a keyboard telephone and type to send and receive responses. The individual on the other end of the call may also be using a TTY device or may communicate through a third-party relay service if using a traditional telephone. Although it is no longer considered 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. Due to the widespread availability of text messaging via mobile devices, and due to limitations of TTY devices, fewer people continue to use TTY.

- In a survey conducted by the PUC 9-1-1 Task Force Equal Access Committee, zero members of the Access/Functional Needs community in Colorado reported using TTY to communicate with 9-1-1.

- The Committee also distributed a survey to Colorado's 9-1-1 community. Out of 82 respondents, 42% reported receiving zero TTY calls in their career. 52% reported receiving between 1-5 TTY calls annually, and 6% reported receiving between 6-25 annually.

Relay services include traditional Telecommunication Relay Services (TRS), Captioned Telephone Services (CTS), Video Relay Services (VRS), and IP Relay Services. Use of traditional TRS has declined in recent years in favor of Internet-based relay services and video relay services that accommodate sign language. Because relay services involve a third party calling the PSAP, location information for the caller is sometimes not readily available.

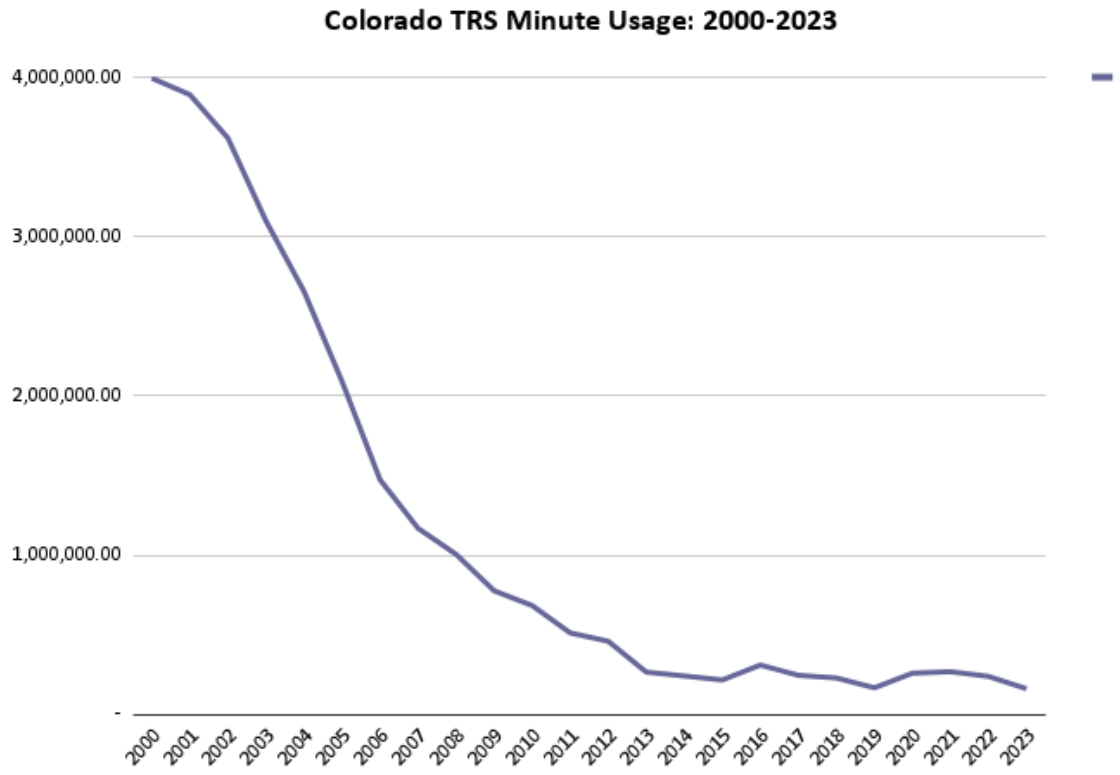


Figure 2.5: Number of minutes of state TRS service usage by year.

There are many other communications methods that a caller with an accessibility need might use, with the choice being relative to the nature of the disability. These include IP-captioned telephone services, video relay services, IP instant messaging, email, voice carry over (VCO) phones, and more. 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

Although text-to-9-1-1 service has applications for hearing individuals, it is an important modern communications accessibility option for callers who are deaf, hard of hearing, DeafBlind, or have a speech disability. As discussed previously in this Section, text-to-9-1-1 service is optional and not universally available in Colorado.

The survey to the Access/Functional Needs Community referenced above noted that the majority of respondents use text as the primary mode to communicate with friends and family.

Real-Time Text (RTT)

The Federal Communications Commission (FCC) also requires providers to provide Real-Time Text (RTT). Real-time Text is the ability for citizens to send and receive text and other characters in real time, as they are typed.[27] It is up to the PSAP to provide accessibility to this service. To the Commission's knowledge, no PSAP is receiving RTT.

Other Considerations Regarding Accessibility

Next Generation 9-1-1 provides opportunities for more consistency in the availability of accessibility functions for 9-1-1 services. It is essential that as NG9-1-1 and related applications or services are implemented the accessibility community is included in discussions to ensure their needs and concerns are addressed and accommodated to the greatest extent possible.

3. 9-1-1 Network Reliability and Resiliency

Current Status

As discussed in Colorado's 9-1-1 Service Environment,[28] Commission authority is restricted to only one portion of the 9-1-1 call flow process. Therefore, certain types of disruptions to 9-1-1 service are **not** captured in the data collected by the Commission. Examples of those include:

- Outages due solely to failure of an originating service provider's network.
- Outages affecting local wireline customers but not affecting a PSAP directly.
- Outages that occur due to a failure of a local network on the governing body or PSAP side of the delivery demarcation point.
- Outages occurring due to an equipment failure at a PSAP, or due to the failure of a third-party hosted service contracted by a PSAP.

With these limitations in mind, the Commission provides the following statistics in regard to outages of the regulated portion of 9-1-1 call flow, known as Basic Emergency Service (BES).

[27] See NENA's "PSAP Readiness for Real-Time Text (RTT) Information Document"
[28] See Appendix A

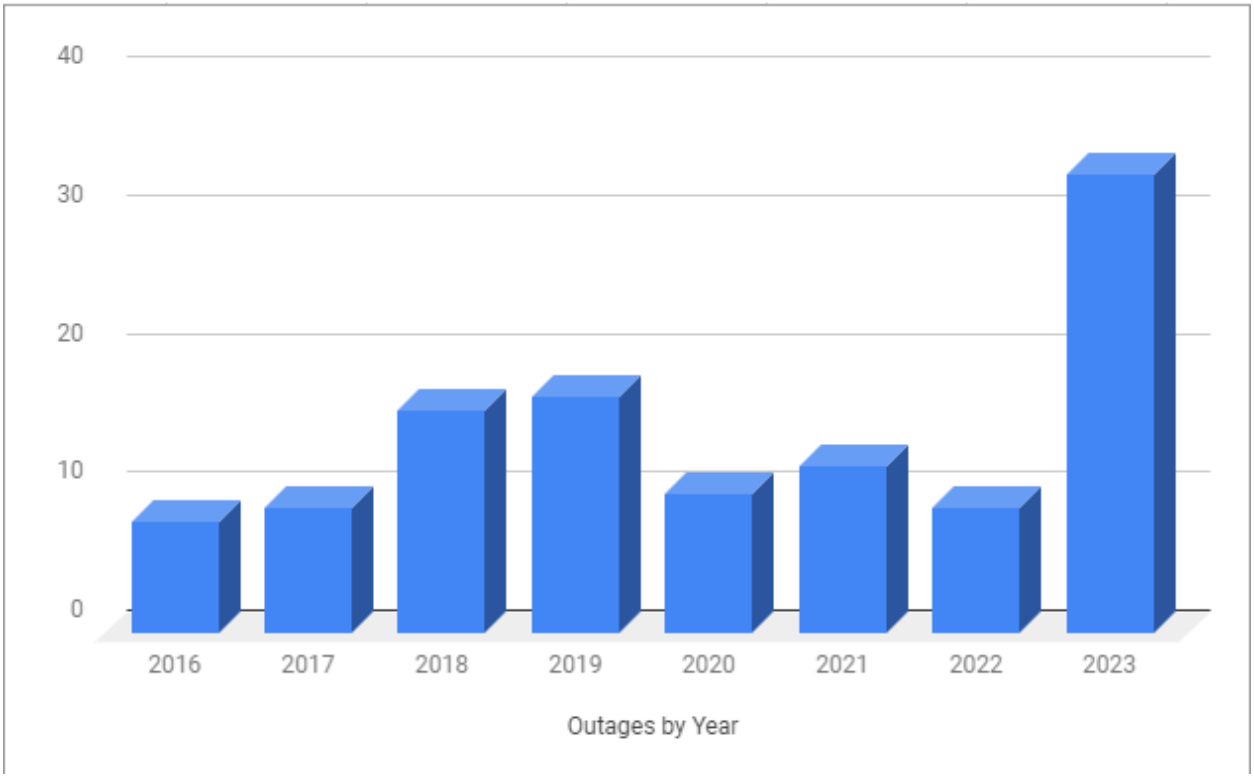


Figure 4.1: BES outages by Year, 2016-2023.

As can be seen in *Figure 4.1*, the total number of outages recorded by Commission staff in 2023 far outstrips any previous year.[29] One reason for this is potentially due to Commission staff being aware of more outages than were previously being reported. Beginning in 2023, CenturyLink began copying Commission staff on all outage notification emails sent to PSAPs, enabling recording of service events that previously may not have been reported to Commission staff.

It should be noted that the recorded outages for calendar year 2023 shown above (33) do not count every notification received by Commission staff. They only include service events that Commission staff determined were likely BES outages under the Commission's rules.

[29] Commission staff recorded 33 outages in 2023 as compared to only 9 in 2022. The previous record year was 2019 with 17 outages.

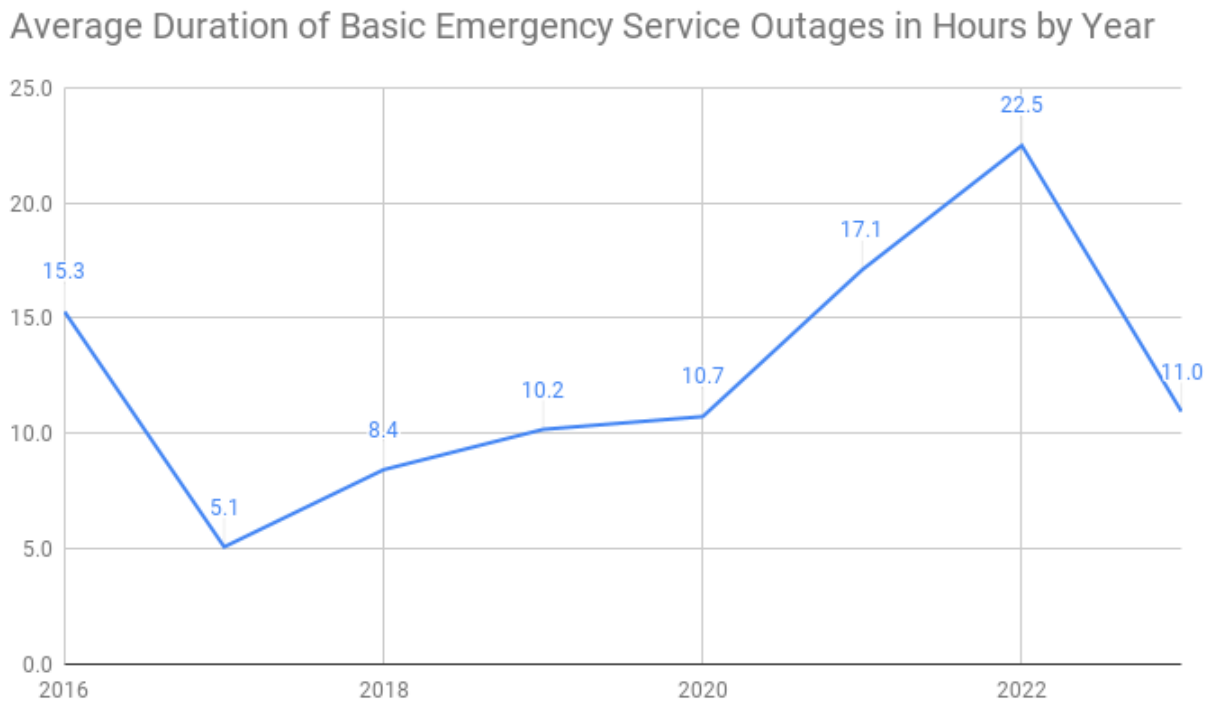


Figure 4.2: Average duration of BES outages in hours.

BES outage duration, as shown in *Figure 4.2*, is measured in hours, with 2022 having the highest average duration of outages on record. The average duration of BES Outages for calendar year 2023 dropped significantly to 11 hours.

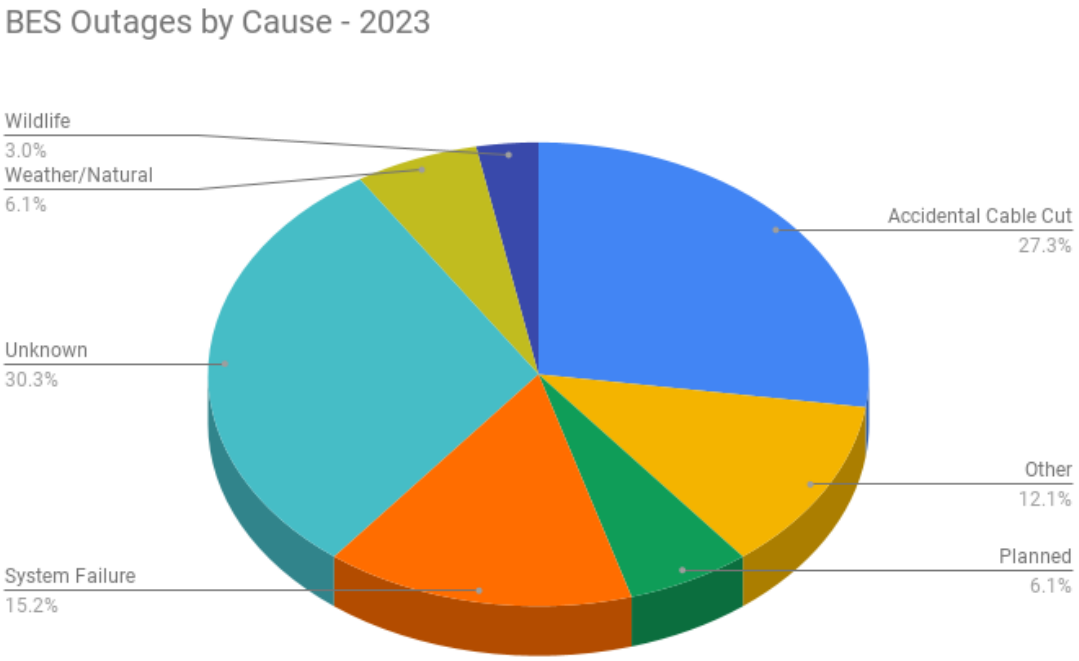


Figure 4.3: BES outages by cause.

Figure 4.3 shows the causes of BES outages in 2023, with the largest portion being "unknown cause" and the second-largest being "accidental cable cut." Commission staff maintain a BES Outage Dashboard that is available to the public.[30]

- The number of outages reported in 2023 rose sharply from previous years. This could be due to a change in reporting (Commission Staff is now copied on all potential outage notifications sent to PSAPs), an increase in the number of outages, or a combination of factors.

- Commission Staff has serious concerns that CenturyLink is unable to determine the causes of a large number of 2023 outages.

- Staff developed an Outage Investigation Repeat Findings Document[31] outlining recurring issues and patterns found as a result of outage investigations over the past reporting year.

- The Commission is aware that CenturyLink has failed to provide bill credits due to any governing body as a result of an outage.

[30] https://sites.google.com/state.co.us/9-1-1-advisory-task-force/outage-dashboard
[31] https://docs.google.com/document/d/1HSPUfa4QSt4OrtjUaI_u0TrPihPst-d_2g4D9xr1XSk

Commission Process for Improvement

Historical information on the Commission's Process for Improvement can be found in Colorado's 9-1-1 Service Environment.[32] Changes implemented since last year's reporting period are listed below:

- On April 24, 2023, CenturyLink filed its initial BES Improvement Plan Application[33] The proposed improvement plan was dependent upon CenturyLink winning federal grant funding, which it did not. The process was held open, and on February 15, 2024, CenturyLink filed a new BES Improvement Plan Application, which resulted in an adjudicated proceeding. The Commission approved the five projects: 2 new fiber builds, 1 project strengthening middle mile diversity, the purchase of a portable generator and accompanying fuel trailer, and upgrading each PSAPs connectivity to Ethernet, which includes adding last-mile diversity. As of this report, the proceeding is still ongoing, as exceptions were filed.
- Late in 2023, Commission Staff opened Rulemaking Proceeding 23R-0577T, Amendments to Emergency Service Outage Rules, in order to strengthen Commission Rules regarding 9-1-1 outages and to address CenturyLink's assertions that:
    - BES network outages don't qualify as BES outages if they impact the ability of 9-1-1 calls to reach the aggregation point of the BES network, treating them as being in the originating service domain rather than the basic emergency service domain, and
    - if 9-1-1 calls can be routed to an alternate PSAP instead of the designated PSAP then an outage has not occurred.
- The Commission adopted the following rule changes in the proceeding:
    - changed the term "BES Outage" to "PSAP service disruption";
    - clarified the definition of the term "Primary demarcation point";
    - requires the BESP to provide PSAPs with at least 24 hours' notice of potential service disruptions due to planned maintenance;
    - requires the BESP to deliver all calls to alternate PSAPs in the event of a service disruption, when possible;
    - requires the BESP to provide callback numbers for calls that were not delivered to the PSAP during a service disruption, without requiring a request from the PSAP for such information, within 2 hours of restoration of service;
    - strengthens the rules regarding the provision of billing credits in the event of a service disruption more than 4 hours in duration, or more than 12 hours in the event of a fiber cut; and

[32] See Appendix A
[33] See Proceeding 23A-0197T.

- clarifies the rules governing Commission Staff's informal investigations of service disruptions.

The adoption of these rules benefits Colorado's 9-1-1 governing bodies by requiring the BESP to provide the telephone numbers of undeliverable calls during service disruptions, requiring the BESP to provide billing credits when the Customer does not receive the service paid for due to disruption, and requiring the BESP to provide advance notice of potential service disruptions due to planned maintenance, which helps PSAPs prepare contingency plans to minimize disruption to their stakeholders.

Finally, as a certified BESP actively providing service, CenturyLink is required by Commission rule 2143(e) to file a contingency plan annually, with the most recent being filed June 3, 2024[34]. The purpose of this requirement is to ensure 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. As a new requirement effective March 13, 2023, the BESP must also provide the results of its most recent 9-1-1 reliability filing with the FCC. Some aspects of this report, including the FCC filing, are typically filed confidentially due to the security-sensitive nature of the information.

Monitoring Outages in the Originating Service Environment (OSE)

As discussed earlier, the Commission is precluded by Colorado statute from imposing outage notification requirements on originating service providers.[35] However, outages in the originating service environment impact the ability of users to call 9-1-1.

The FCC requires originating service providers to transmit 9-1-1 calls,[36] and requires all originating service providers (OSP) to report outages via the FCC's Network Outage Reporting System (NORS). In September of 2022 the FCC began accepting applications from state agencies to gain read-only access to NORS. The Colorado Public Utilities Commission submitted an application and received approval for designated staff to access NORS under the FCC's rules and requirements.

All NORS data is considered confidential by the FCC. It may only be shared publicly in an aggregated form that does not reveal which companies were involved in outages. Commission staff designated to access NORS data must also undertake FCC-approved training regarding the proper use and handling of the confidential data. Violations of these rules could result in the PUC's permanent loss of access to NORS data.

Despite these restrictions, Commission staff believe that NORS data can be a useful source of metrics for the legislature when considering the health of the complete 9-1-1 call flow from caller to PSAP. Because the Commission currently only has statutory authority to require reporting from BESPs about the BES portion of 9-1-1 call flow, any outage that occurs in the Originating Service Environment (OSE), regardless of its impact on the ability of callers to reach 9-1-1, has been absent from reporting on the health of 9-1-1 service.

[34] See Proceeding 23M-0236T.
[35] See § 40-15-401, C.R.S.
[36] See FCC rule 47 CFR § 9.4

With those caveats, the Commission is able to provide the following aggregated statistics from the FCC's NORS:

- From June 2023 through May 2024 there were 1013 confirmed telecom outages in the State of Colorado, averaging 498.9 hours in duration each.

- The previous year did not include a full year of data, collecting only from October 2022 through May of 2023, in which there were 622 confirmed outages, averaging 77.6 hours in duration each.

4. Migration to Next Generation 9-1-1

What Is Next Generation 9-1-1?

Next Generation 9-1-1 (NG9-1-1) is a set of technologies and components that, when implemented, comprise a standards-based approach to Internet Protocol (IP)-based 9-1-1 call delivery that incorporates scalable flexibility, capacity, and security into the 9-1-1 system for the PSAPs of a state or region. The National 911 Program Office has produced a helpful primer video for introducing NG9-1-1 and explaining its benefits.[37]

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 which 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.[38] These can be reviewed in depth in Colorado's 9-1-1 Service Environment.[39]

The industry-recognized basis for NG9-1-1 protocols is the NENA i3 Standard, an ANSI-approved technical standard developed by a large array of stakeholders through the National Emergency Number Association.[40,41] APCO published their "Definitive Guide to Next Generation 9-1-1" in August 2022, which outlines additional considerations regarding implementation of NG9-1-1 and provides a draft scope of work if NG9-1-1 were to be purchased through a Request for Proposal process.[42] It should be noted that due to the purely local funding of 9-1-1 in Colorado, purchase of NG9-1-1 call delivery must currently be accomplished through a Commission-regulated tariff rather than a statewide RFP & contract. Although there is a national standard for NG9-1-1, disagreement exists in the industry about

[37] https://www.911.gov/issues/ng911/video-benefits-of-next-generation-911/
[38] https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf
[39] See Appendix A
[40] https://www.nena.org/page/i3_Stage3
[41] Colorado 9-1-1 Advisory Task Force, "Recommended 9-1-1 Standards". Published May 11, 2022. https://docs.google.com/document/d/1z2U7ABOpiGocRN84kvhYklWtZtxkW-qzF9k2y6Zm2N4
[42] https://www.apcointl.org/technology/next-generation-9-1-1/apcos-definitive-guide-to-next-generation-9-1-1/

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 "Today, we have implemented NG9-1-1." Treating NG9-1-1 as an evolutionary process applicable to the entire 9-1-1 call flow is a more helpful perspective.

NG9-1-1 and FirstNet

FirstNet, the common name for the National Public Safety Broadband Network (NPSBN) 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 PSAP which could forward such data to field responding units. Implementation of the NPSBN does not remove the need for NG9-1-1. They are two separate systems, and the functionalities of both are needed to complete the additional-data chain from the public to the first responders.

Planning, Transition, and Implementation

- Colorado's current states on the TFOPA NG9-1-1 Maturity Model can be reviewed Colorado's 9-1-1 Service Environment.[43] No technological forward progress has been made in this reporting period.

- The ESInet Users Group is in discussion with CenturyLink on terms and pricing for the delivery of text-to-9-1-1 calls via the ESInet, for the provision of Geographic Information System (GIS) data tools to 9-1-1 governing bodies to assist with preparing local GIS data for use in 9-1-1 call routing, and for geospatial routing of 9-1-1 calls within the ESInet. CenturyLink intends to file this tariff amendment in late 2024.

Projected Timeline for Full Implementation

The ESINet Users Group is currently revising its NG9-1-1 Strategic Plan. It intends to include in the final draft different aspects of implementation, organized by timeline, as 1-3 year goals or longer-term goals.[44] Some of the timing is dependent on CenturyLink and its subcontractors to implement the additional components, as well as the telecommunications service providers to implement their components, for attaining full NENA i3 NG9-1-1 status. Full implementation of NG9-1-1 is also dependent upon PSAPs having NG9-1-1-capable call-handling equipment. The ESInet Users Group may propose a timeline for further NG9-1-1 implementation steps, but only CenturyLink can file a tariff amendment to bring those to fruition.

[43] See Appendix A
[44] See https://docs.google.com/document/d/1SbsHfCjbJ_aKAkD8IfGZqRRz6-44-ZBu35BW1DZmXCw

5. Funding and Fiscal Outlook

Costs of Providing 9-1-1 Service

Key point: Based on partial responses to a data request sent to the 9-1-1 governing bodies, Commission staff estimated that at least $122 million was spent by all of the state's PSAPs combined.

The 9-1-1 funding structure in Colorado is fairly static, and is reviewed in Section 7 in Colorado's 9-1-1 Service Environment[45]. As a high-level overview:

- Local 9-1-1 governing bodies are authorized to impose a monthly Emergency Telephone Charge (ETC), which is assessed on phone lines that have a respective service or billing address.[46]
- The Commission annually sets an ETC threshold, and requires governing bodies to obtain approval through an application process before they establish an ETC higher than the threshold.[47]
- The Commission annually sets a statewide 9-1-1 Surcharge amount[48].
- The telecommunications service providers remit ETCs directly to the appropriate governing body and remit the statewide 9-1-1 Surcharges to the State.
- Retailers remit statewide point-of-sale Prepaid Wireless 9-1-1 Charges to the State[49].
- The State proportionately distributes the latter two to the 57 governing bodies after subtracting its administrative fees.[50]

Commission Staff annually issues a data request for calculating the cost of local government 9-1-1 services, which include BES, Emergency Telephone Service, and Emergency Notification Service; and for the total revenues collected by 9-1-1 governing bodies. The data request does not capture costs related to the provision of 9-1-1 service that are housed within municipal, county, or other local government entities, such as HR and IT services. Notable changes occurring in the current reporting period are:

- The passage of SB24-139 created a 9-1-1 Services Enterprise, discussed in detail in Section 7. This Enterprise will produce an annual budget funded by a portion of the statewide 9-1-1 Surcharge, to help pay for needs not covered by tariffed services.

- The results of the data request for 2023 indicate the respondents' cost of providing local government 9-1-1 services was approximately $121,743,925.40. However, nine governing bodies did not provide cost data. Therefore, the actual total cost was likely

[45] See Appendix A
[46] § 29-11-102(2)(a), C.R.S.
[47] § 29-11-102(2)(f), C.R.S.
[48] See § 29-11-102.3(1)(b), C.R.S.
[49] See rule re: Prepaid
[50] The Commission is permitted by statute to keep up to 4% of the revenue received from the 9-1-1 surcharge for actual expenses related to administering the surcharge. (See § 29-11-102.3(3)(c)(II), C.R.S.) Currently the Commission is retaining 2.0%. Similarly, the Department of Revenue is allowed to retain up to 3% of the revenue collected from the prepaid wireless charge. (See § 29-11-102.5(3)(e)(II), C.R.S.)

much higher.[51] Note that § 29-11-102(4), C.R.S., requires governing bodies to respond to annual data requests provided by the Commission, but does not provide penalties for non-compliance.

Costs Per Capita

The total annual cost of providing 9-1-1 service, approximately $122 million as reported by the 9-1-1 governing bodies, divided by the state population results in a per capita cost of about $20.89 per year for 9-1-1 service, sans the costs of the nine 9-1-1 governing bodies which did not respond.[52] This includes all funding sources, not just local ETC, the state 9-1-1 Surcharge, and the Prepaid Wireless 9-1-1 Charge; thereby also accounting for additional funds spent out of county, municipal, and special district budgets.

The amount service users actually pay varies by jurisdiction. As discussed above, local ETC range from 70¢[53] to $4.00[54]. The Prepaid Wireless 9-1-1 Charge was set at $1.81 for 2024, and the state 9-1-1 Surcharge was set at 9¢ for 2024; all per line per month. Although the per capita cost is $20.89 per year based on estimated PSAP expenditures and includes funding sources other than 9-1-1 charges,[55] the annual 9-1-1 charge total that service users pay ranges from $9.48 to $49.08 per line. Prepaid wireless telephone service users pay a portion of 9-1-1 service costs via the point of sale Prepaid Wireless 9-1-1 Charge. With that charge being set at $1.81 for 2024, equivalent monthly purchases would result in an annual total of $21.72.

Funding Sources

To reiterate, funding sources in Colorado are fairly static, and are covered at the beginning of this section and in Colorado's 9-1-1 Service Environment.[56]

[51] Governing bodies that operate PSAPs but failed to provide cost data: Bent-Kiowa 9-1-1, Cheyenne County Emergency Telephone Authority, Crowley County E911 Authority, Custer County E911 Authority, Lake County Emergency Telephone Authority, Otero County 911 Authority, Ouray County Emergency Telephone Service Authority, Pueblo City Council E911 Authority Board, and Pueblo County E911 Emergency Telephone Service Authority Board. In particular, the lack of data from the City of Pueblo and Pueblo County are likely to have caused costs to be significantly underestimated.

[52] This cost reported by the governing bodies may not include all costs related to providing 9-1-1 service. For instance, if the maintenance of the facility that services as the PSAP is provided by a county or municipal government at no cost to the governing body and not budgeted separately for the PSAP, that cost is likely not to be included in this total. Similarly, originating service providers incur costs for delivering 9-1-1 calls to the basic emergency service provider, and those costs are generally passed on to the customers and not captured in this figure.

[53] 9-1-1 governing bodies of Arapahoe County, Cheyenne County, Huerfano County, Moffat County, and San Luis Valley 911.

[54] 9-1-1 governing bodies of Phillips County and Pitkin County; Washington-Yuma 9-1-1 is at $3.25, and those of Gilpin County, Gunnison-Hinsdale, Las Animas County, and Park County are $3.00.

[55] The total statewide cost of $122 million is incomplete because it does not include costs from nine governing bodies that did not respond to the survey. So the actual cost per capita is most likely greater than $20.89 per year.

[56] See Appendix A

Key points:

- *The reported 9-1-1 charge revenues from all sources did not meet the reported costs of providing local government 9-1-1 services in Colorado.*

- *The total reported local government cost of providing 9-1-1 services in 2023 was approximately $122 million. However, nine 9-1-1 government bodies did not report costs, therefore the total cost is likely much higher.*

- *Approximately $113.2 million in revenues were received in 2023 through local ETC, the Prepaid Wireless 9-1-1 Charge, and the state 9-1-1 Surcharge, based on data collected from the local 9-1-1 governing bodies, sans revenues of the nine governing bodies which did not respond. Additionally, not all of the governing bodies that responded provided revenue data.*

- *The state 9-1-1 Surcharge rate set by the Commission for calendar year 2023 was $0.09 per line per month. Revenues from it were $7,199,428.44, of which $7,052,351.52 was distributed to the governing bodies.[57] In contrast, the total statewide costs for BES monthly recurring charges was approximately $5.5 million. Thus the Commission achieved its goal of reimbursing the governing bodies for their costs of 9-1-1 call delivery, with an additional ~$1.5 million that the governing bodies could use for other expenses as allowed under § 29-11-104, C.R.S., including the initial non-recurring costs of a new call information service recently added to the BES tariff.*

- *According to data provided by the Colorado Department of Revenue, approximately $15.7 million in Prepaid Wireless 9-1-1 Charges were collected in 2023.*

- *Based on the response to the Commission's 9-1-1 governing bodies data request in early 2024, staff estimates that approximately $90.3 million in ETC revenues were received in 2023. This estimate is likely low because nine governing bodies did not respond, and of those that did not all provided data in answer to this question. These charges are collected by telecommunications service providers and remitted directly to the 9-1-1 governing bodies. The charges vary across the state, with the current average being $1.97.[58]*

[57] The difference between these two numbers is the amount retained by the Commission to cover actual expenses for administration of the surcharge. Statute allows up to 4% to be retained. The actual amount retained was roughly 1.66%. See § 29-11-102.3(3)(c)(II), C.R.S.

[58] A full list of the rates can be found at https://sites.google.com/state.co.us/telecom-surcharges/non-puc-surcharges

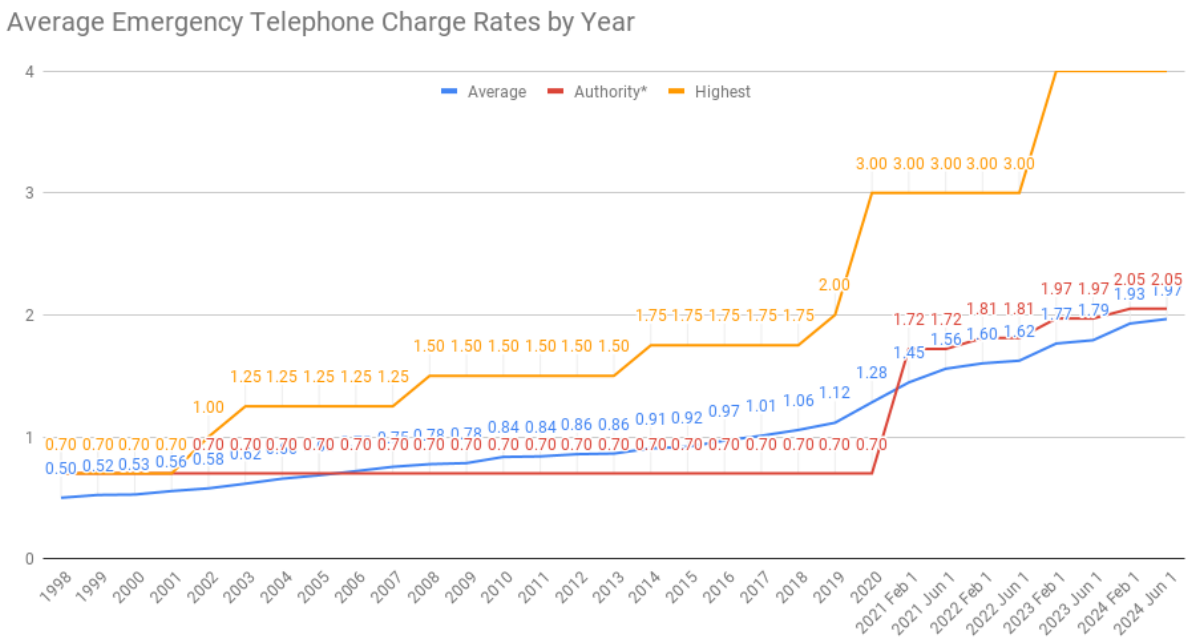


Figure 7.1: Emergency Telephone Charge rate averages in Colorado Since 1998 (blue) compared to the threshold above which governing bodies must apply for rate approval from the Commission (red). Prior to 2021, the threshold was set in statute at $0.70 per line per month.

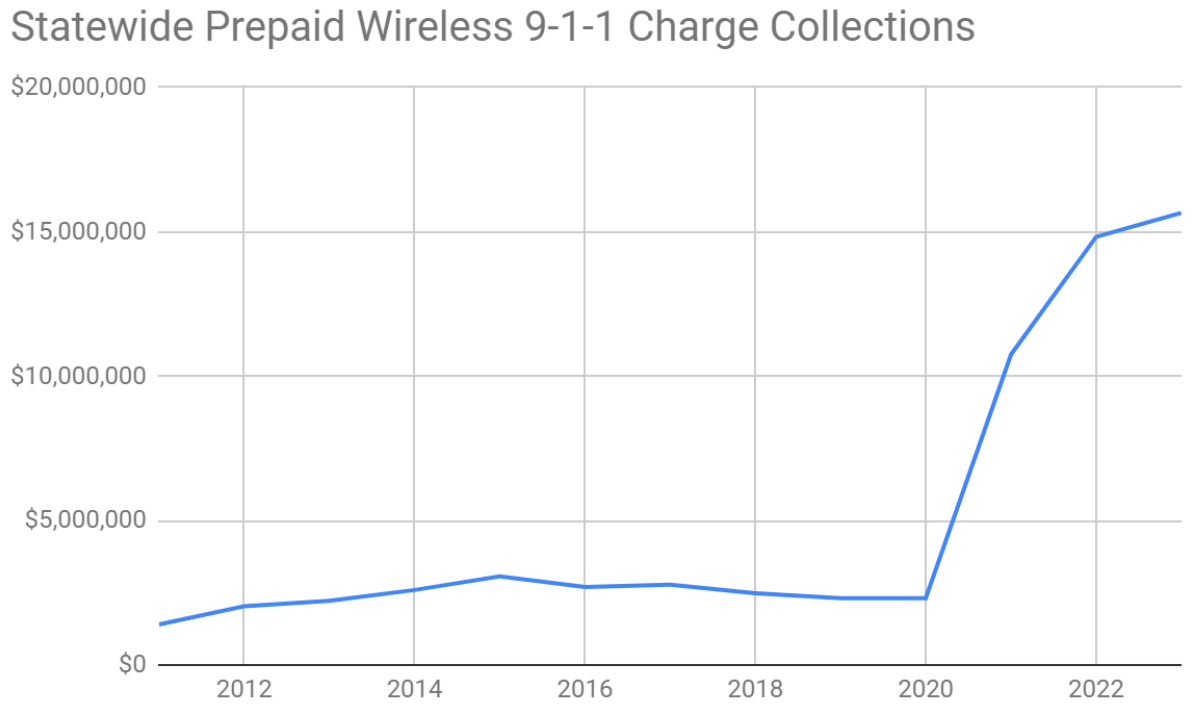


Figure 7.2: Prepaid Wireless 9-1-1 Charge revenues by year. The sharp increase in 2021 was due to changes made by HB 20-1293, which took effect in January of 2021.

Source of data: Colorado Department of Revenue.

Other Funding Sources

Some costs of providing local 9-1-1 services are difficult to categorize, since many are incorporated into county, municipal, special district, or agency budgets, such as personnel wages and benefits, and services for human resources, payroll, legal, facilities, IT, and other administrative needs. This makes it difficult to report the true total costs and expenditures associated with providing 9-1-1 service.

Funding Challenges

Per-line charges remain the primary method for funding local 9-1-1 services, not just in Colorado but nationally.[59] However, this method has challenges.

Potential Line Count Fluctuations Throughout the State

The number of telecom access lines in the state has been increasing. 2020 phone line counts reported to the Commission by the telecommunications service providers numbered at an estimated 5.9 million. For the period of June 2021 through May of 2022 the estimated number of lines reported was 6.3 million, an increase of 5.2% in one year. For the same period from 2022 to 2023 the number of lines reported was 6.6 million, an increase of 4.8%. From 2023 to 2024 the average number of lines reported was 6.7 million, an increase of 1% over the previous year; for a total increase of 11% over the three-year period.

However, this trend could be reversed in the future, and the Commission does not have data to determine whether line counts are increasing uniformly across the state. These factors could potentially be contributing to the higher rural ETC rates. Alternative funding sources may be needed to supplement ETC revenue in rural areas.

Non-Traditional Sources of 9-1-1 Calls

A potential challenge for the per-line charge approach is that in the future a significant number of calls may originate from telecommunications services which do not have monthly billing. As an example, prepaid wireless telecommunications services have already proven a challenge to the traditional monthly charge model, requiring a separate charge applied only to them.

The proliferation of Internet-based sensors and other connected devices may increasingly become a source of 9-1-1 calls in the future, and could eventually represent a sizable portion of all calls. Examples of these include automated alarm systems, home-based Internet-of-Things (IoT) alarm systems, personal medical monitoring devices (including smartwatches that can monitor irregular heart rhythms and more), automatic crash notification systems installed

[59] See https://www.nena.org/page/911RateByState for a list of 9-1-1 fees in other states.

in vehicles, smart cameras that can detect potential crimes in progress, and AI-driven smart speakers.

To date, many of these already access 9-1-1 but do so using an existing smart phone connection for which charge revenue is already being captured. In the future there may be a greater desire by the public for these devices to make requests for assistance directly to the ESInet through an Internet service instead of phone service. If that were to happen the resulting revenue shortfalls would have to be offset by either raising rates on the service users that pay monthly 9-1-1 charges, by shifting more of the costs to local governments, or by adding an equitable 9-1-1 funding mechanism for those new types of 9-1-1 access connections.

The Commission does not currently have recommendations about this for the legislature, but makes note of it for awareness. The potential for a future mismatch between usage and funding sources for 9-1-1 service is not limited to Colorado, and will likely be a growing topic of discussion nationally over the coming decade.

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

Currently all costs for NG9-1-1 deployment are expended through the payments by local 9-1-1 governing bodies: BES tariff non-recurring implementation charges, monthly recurring service charges, and local NG9-1-1-ready equipment and services. Creation of the 9-1-1 Services Enterprise could potentially alleviate some of the challenges of not having a state-level fund for certain statewide 9-1-1 needs. Some required components of NG9-1-1 service, such as GIS data maintained for the purpose, must be implemented on a statewide level. The Commission will need to continue to work with the 9-1-1 community to determine the best way to fund them.

6. Federal Activities and National Trends

National 911 Program

The National 911 Program is housed within the National Highway Traffic Safety Administration's (NHTSA) Office of Emergency Medical Services, and is currently undertaking several activities which can be found at www.911.gov/projects.

- The National 911 Program was created with a 10-year authorization by The Middle Class Tax Relief and Jobs Creation Act of 2012. With the expiration of that authorization, it is unclear if the program will continue to be housed and funded through NHTSA.

The FCC

There are several FCC actions and proceedings of relevance to this report.

- For several years the FCC has maintained a timeline by which wireless carriers are required to improve indoor 9-1-1 location accuracy, including Z-Axis measurements which could be used to estimate which floor of a multi-level building a caller is on. A full timeline of the FCC's phased-in location accuracy improvements is available on the FCC's website.[60]
- In January 2024, the FCC adopted a Report and Order requiring all wireless carriers to implement location-based routing nationwide for wireless 9-1-1 calls and real-time text (RTT) communications to PSAPs. With this approach, 9-1-1 voice calls and RTT messages will be routed based on the location of the caller instead of the cell tower antenna used for the call. Location-based routing will result in most wireless 9-1-1 calls reaching the correct PSAP for their location without first having to be transferred from another PSAP, thereby reducing delays in emergency responses. The Report and Order provides nationwide mobile service providers six months and non-nationwide providers 24 months to implement location-based routing upon request by a PSAP or governing body. For RTT communications to 911, the Report and Order requires all mobile service providers to implement location-based routing within 24 months upon request by a PSAP or governing body.[61]
- On July 18th, 2024, the FCC issued a Report and Order for facilitating implementation of Next Generation 9-1-1 (NG9-1-1). The Order requires OSPs (in two implementation phases) to deliver 9-1-1 traffic in IP-based SIP format upon request by 9-1-1 authorities, and later to deliver 9-1-1 traffic that supports routing, caller location, and transmission of emergency information in accordance with NG9-1-1 commonly accepted standards.[62]

Federal Legislation

Several bills were discussed in the 2022-2023 Annual State of 9-1-1 Report. None of the bills have moved forward in the current reporting period, and no new bills have been introduced.

National Trends

National Next Generation 9-1-1 Status

A good source for the status of NG9-1-1 deployment nationwide is the "National 911 Annual Report," previously titled the "National 9-1-1 Progress Report," published annually by the

[60] https://www.fcc.gov/public-safety-and-homeland-security/policy-and-licensing-division/911-services/general/location-accuracy-indoor-benchmarks
[61] https://www.fcc.gov/document/fcc-adopts-rules-improve-wireless-911-call-routing-0
[62] https://docs.fcc.gov/public/attachments/DOC-403543A1.pdf

National 911 Program.[63] It uses data collected from the states and territories, and notably, other metrics such as the implementation of training standards and EMD protocols.

Other Technological Trends

A technological trend that may have a significant impact on 9-1-1 services is the hybrid use of wireless and satellite services for delivery of text-to-9-1-1. Apple announced that beginning with the iPhone 14 users may text to 9-1-1 in areas without wireless service.[64] In such instances the phone uses satellite connectivity to deliver the text message. This is of particular interest in Colorado where significant areas without wireless coverage still exist. Similarly, T-Mobile announced in August of 2022 that it was entering into a partnership with Starlink to provide texting service without a wireless tower signal.[65] In December 2022, AT&T Mobility announced a partnership with AST SpaceMobile for cellular-to-satellite communications.[66] In May 2024, Verizon Wireless also announced a partnership with AST SpaceMobile, after having previously explored working with Amazon's Project Kuiper for satellite connectivity.[67] If cellular-to-satellite service becomes standard, it is possible that in the future people will be able to request help via 9-1-1 no matter their location, presuming that the satellite coverage is complete and the local PSAP is able to receive the text message.

As mentioned earlier in the report specific to Colorado, many PSAPs nationally are adopting technology which allows them to receive pictures and/or video from callers. These are third-party services which operate outside of the BES network and therefore are unregulated by the Commission. However, they may help bridge the gap between legacy E9-1-1 and NG9-1-1.[68] RapidSOS is a widely-used application for this and a majority of Colorado PSAPs use RapidSOS, though it is unknown which PSAPs have specifically incorporated pictures and video into their call handling. Some Colorado PSAPs are early adopters of new technologies, and several have incorporated the receipt of pictures and video into their call-handling processes.

9-1-1 and Behavioral Health Response

There is ongoing discussion about how 9-1-1 service can be improved, particularly for people with behavioral health emergencies. Implementation of 9-8-8 as the national suicide crisis prevention hotline number helped invigorate these efforts, and a number of PSAPs and law enforcement agencies in Colorado now include mobile crisis response and co-responder

[63] National 911 Program. National 911 Annual Report: 2021 Data. No publication date. Retrieved July 19, 2023. https://www.911.gov/assets/2021-911-Profile-Database-Report_FINAL.pdf.
[64] https://support.apple.com/en-us/HT213426
[65] https://www.t-mobile.com/news/un-carrier/t-mobile-takes-coverage-above-and-beyond-with-spacex
[66] https://about.att.com/story/2024/ast-spacemobile-commercial-agreement.html
[67]https://www.cnet.com/tech/mobile/verizon-partners-with-ast-spacemobile-to-use-satellites-to-boost-coverage-and-fix-dead-zones/
[68] Two of the first PSAPs in Colorado to adopt this technology were the Larimer County Sheriff's Office (https://www.coloradoan.com/story/news/2022/08/31/larimer-county-911-callers-can-share-real-time-videos-with-responders/65464699007/) and the City of Boulder (https://bouldercolorado.gov/news/city-boulder-dispatch-one-first-colorado-be-able-receive-livestreaming-video).

programs as part of their services.

Commission staff and local 9-1-1 agency representatives continue working with the Colorado Behavioral Health Administration's 9-8-8 Program Office and a working group of the Colorado Department of Public Safety, to help inform the discussions from the perspective of the PSAP.

Telecommunicator Training

Telecommunicator training is also a topic at the national level. The National 9-1-1 Program is facilitating a group of interested entities, including NENA, APCO, NASNA, IAED, the Denise Amber Lee Foundation, and NFPA, for updating the National Minimum Recommended Training Guidelines for Telecommunicators. A member of Commission Staff is participating in this group's important work which informs the voluntary national standard, and could contribute to the eventual creation of adopted mandatory standards.

Funding

Nationally, states have a mix of locally imposed 9-1-1 charges, a single statewide 9-1-1 surcharge, or a hybrid of both. Colorado's local ETC rates are neither the lowest nor the highest in comparison to those in other states. The highest charges include $6.00 in parts of Louisiana and $6.40 in parts of West Virginia.[69]

The Colorado state 9-1-1 Surcharge is currently $0.09, which continues to be the lowest in the nation.

In short, Colorado's local Emergency Telephone Charges are high but not the highest, while our state 9-1-1 Surcharge is the lowest in the nation. For more information about 9-1-1 charges please see Section 5.

Commission and Colorado Involvement in National Venues

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

- Commission staff is currently serving as President of the National Association of State 911 Administrators (NASNA).[70] This position is a three-year commitment, beginning with service as Vice-President in the prior year, followed by transition into the position of "immediate past president" in June of 2025.
- Commission Staff presented a session on Traffic Incident Management for Telecommunicators at the 2024 Lifesavers Conference, in conjunction with federal partners at NHTSA and the National EMS Council.

[69] https://www.nena.org/page/911RateByState?
[70] https://www.nasna911.org/

- Commission Staff represented NASNA at the Transportation Research Board's Emergency Responder Transportation Safety Research Summit in November 2023.

- Commission Staff is representing NASNA in the national working group convened to update the National Minimum Recommended Training Guidelines.
- Commission Staff serves as co-Chair of NENA's Education Advisory Board (EAB).

7. Gaps, Vulnerabilities, and Needs

What follows is a list of gaps, vulnerabilities, and needs regarding the provision of 9-1-1 service in Colorado. Potential solutions are also presented with some discussion. Although this document was circulated in draft form and input received and incorporated as appropriate from Colorado's 9-1-1 stakeholders, the entire 9-1-1 community may not be in agreement on the challenges or solutions presented here.

Most of the matters identified below could benefit from the existence of a state-level funding source for certain 9-1-1 related expenses on a statewide basis. A potential mechanism to fund such costs was created by legislation passed in 2024, and is discussed in this section.

Challenges to Be Addressed

Challenges with Responsiveness to Service Disruptions

The Challenge: Through its staff-led informal investigation process, Commission staff identified a number of issues related to the provision of BES, primarily the response by the BESP to service disruptions.

The Details: A number of these issues have been documented in a summary of investigation findings that is regularly updated and available on the Commission's 9-1-1 Program website[71]. These issues vary in nature, often involving delayed response times to resolve service disruptions as well as other lapses in the provision of effective customer service for the local 9-1-1 governing bodies and PSAPs. Other frequent issues involve contradictory or confusing notifications being provided by the BESP to the PSAPs.

Additionally, the company took an interpretation of what constitutes a BES outage contradictory to the one held by Commission staff and much of the local 9-1-1 governing bodies and PSAPs. This resulted in the BESP's failure to provide billing credits to governing bodies or PSAPs when required by Commission rule[72], and failing to notify the Commission of

[71] See Colorado 9-1-1 Program Basic Emergency Service Regulation
[72] See Commission Rule § 723-2-2143(j)(VIII)

outages as they occur with the information required by Commission rule[73].

The Solution: Rulemaking Proceeding 23R-0577T, discussed in Section 3, addressed these issues. The Commission may take enforcement action as appropriate to ensure compliance with these rules.

Recommendation: The Legislature should allow time for the Commission to engage in enforcement actions, if necessary. If these actions do not sufficiently correct the issues , the Commission may provide additional recommendations to the legislature.

Continue Migration to Next Generation 9-1-1

The Challenge: National efforts have been underway for nearly two decades to transition old analog technology 9-1-1 systems to new IP-based 9-1-1 systems, and Colorado should continue to participate in this transition for a number of reasons[74]. This effort is difficult both logistically and financially, and presents particular challenges in Colorado's current 9-1-1 service regulatory environment. Colorado is one of only a few states that provide 9-1-1 service under the tariff model.

The Details: Statewide and regional 9-1-1 systems were originally designed solely for fixed-location wireline 9-1-1 calls, then were "retrofitted" in phases to include location information, deliver mobile wireless calls with wireless location information, and to deliver VoIP calls with differing types of location information: static (fixed-location), nomadic (one Internet connection per session), or mobile (hopping from one Internet connection to another). The legacy 9-1-1 system will become less and less capable of handling all 9-1-1 calls as new and emerging communications technologies become available to the public, such as through personal assistants or smart devices.

The public has become very accustomed to sending pictures, videos, and other types of data from one user to another, which is a capability that legacy 9-1-1 networks lack. The ability to provide these data plus medical, crash telemetry, and other safety systems data to first responders could be extremely beneficial to public safety responses for preservation of life, health, and property. While many Colorado PSAPs are receiving this information via over-the-top solutions, adoption of this technology is not universal, and over-the-top solutions are not considered NG9-1-1.

Additionally, all analog telecommunications services have been gradually transitioning to IP-based services which are generally more resilient, flexible, and cost-effective. Legacy 9-1-1 networks are in the position of becoming "islands" of analog technology in an "ocean" of digital IP-based technologies. This could increase the cost of providing 9-1-1 service due to additional retrofitting, increase the likelihood of failures, and make repairs more difficult.

The Solution: The National Emergency Number Association (NENA) has established technical standards for NG9-1-1. State and local jurisdictions are at various stages of implementing standards-compliant NG9-1-1 systems, with Colorado being neither at the leading nor the

[73] See Commission Rule § 723-2-2143(j)(I)
[74] See Appendix A, Section 3

trailing edge of those efforts. Colorado has implemented an ESInet for delivery of 9-1-1 calls to PSAPs in IP format, albeit currently still using the legacy call flow framework. Much work remains to fully retire the legacy components of Colorado's 9-1-1 system and enable delivery of data types beyond voice-only calls.

This effort is being led by the ESInet Users Group Committee of the Commission's 9-1-1 Advisory Task Force. In August of 2022, the ESInet Users Group adopted a Next Generation 9-1-1 Strategic Plan to help document the group's vision for the future of 9-1-1 call delivery in the state.[75] This document is currently undergoing major revision to suit Colorado's needs.

Most, if not all, features of Next Generation 9-1-1 could be offered statewide through a cost-averaged tariff approved by the Commission, for subscription by the 57 local 9-1-1 governing bodies. This would enable the Commission to offset respective governing body costs by increasing the state 9-1-1 Surcharge rate within its statutory cap of $0.50 per line per month. However, not all features or services may lend themselves to statewide cost-averaging or incorporation into the existing BES tariff. If a different funding mechanism is required to pay for some of these advanced features and services, the potential solutions described at the end of this section may be beneficial.

For example, one of the foundational requirements for full implementation of NG9-1-1 is a statewide Geographic Information System dataset, with the necessary data elements provided in sufficient detail and accuracy for routing 9-1-1 calls to the appropriate PSAP. Geospatial routing is more accurate than, and has other benefits over, the legacy E9-1-1 routing methodology currently in use in Colorado. However, each local 9-1-1 governing body will be responsible for providing their portion of the statewide GIS dataset, either directly or by partnership with a government GIS department or a vendor. If the development and maintenance of such data and amalgamation into a statewide dataset cannot be or will not be included in a future amendment to the BES tariff, then some other funding mechanism would have to be established to implement it.

- In November 2023, the Commission issued a decision distributing the remaining Colorado Performance Assurance Plan funds from an enforcement action, including allocation of $500,000 to the Colorado 9-1-1 Resource Center for a GIS project to create a dataset of refined PSAP boundaries statewide. That project is currently in progress.
- SB24-139 created a 9-1-1 Services Enterprise. The Enterprise has authority to create and submit budgets for consideration in the Commission's annual 9-1-1 charges proceedings, and has broad authority to fund a variety of 9-1-1 initiatives at the state and local levels. The creation of this statewide funding mechanism also provides a pathway for Colorado to furnish matching funding to future federal grants, e.g., for NG9-1-1 implementation, training, GIS, etc.

Recommendation: The legislature should monitor current efforts, including the creation of the 9-1-1 Services Enterprise, to ensure that progress is being made. The Commission appreciates the legislature's support in creating this statewide funding mechanism, and looks

[75] https://docs.google.com/document/d/1SbsHfCjbJ_aKAkD8IfGZqRRz6-44-ZBu35BW1DZmXCw/edit

forward to working with the legislature on future efforts.

No Public Safety Answering Point Performance and Service Standards

The Challenge: As of 2023, Colorado was one of only ten states with no minimum training standards.[76] There is also no statewide standard for operations and performance by Colorado's PSAPs. This potentially results in disparate levels of care for 9-1-1 callers in various jurisdictions.

The Details: As a result of the lack of statewide standards, the level of service varies widely across the state. A person traveling through Colorado could experience different levels of assistance depending on where they place a 9-1-1 call. For example, *some, but not all, PSAPs provide or require*:

- Pre-arrival instructions for medical calls, such as CPR
- Quality assurance on random samples of their calls
- Language interpreter services for non-English speakers
- Text-to-9-1-1 capability
- Minimum training standards for public safety telecommunicators

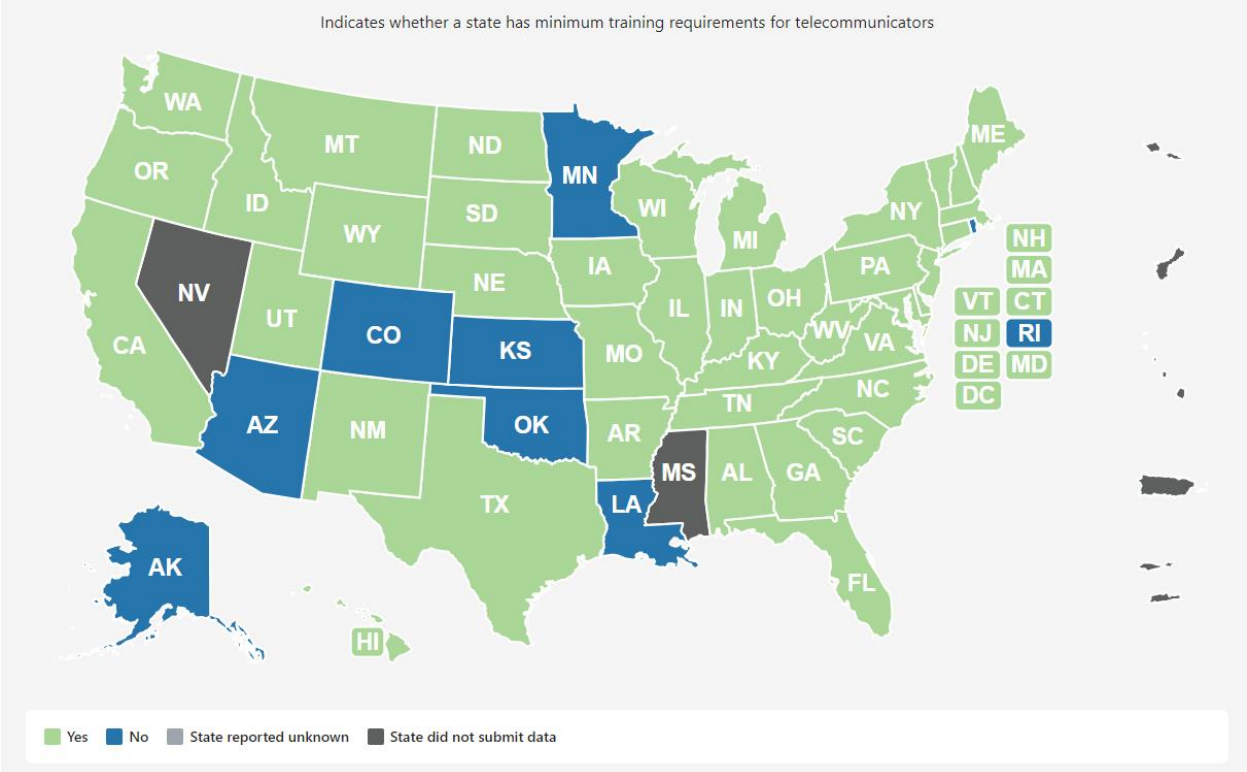


Figure 5.1: States with no minimum training requirements for telecommunicators shown in blue.[77]

[76] https://www.911.gov/issues/911-stats-and-data/
[77] https://www.911.gov/issues/911-stats-and-data/

The Solution: The only solution to a lack of operational standards is to implement standards. Voluntary standards already exist through national organizations such as NENA and APCO. However, adoption of those standards is not consistent. State adoption of such standards and minimum requirements will likely be necessary to achieve a statewide baseline service level.

It is imperative that as Colorado moves forward with technological implementation of NG9-1-1, it must also ensure those operating the technology have a standardized minimum training level, to maintain a minimum quality of service across the state.

All of the service disparity examples above can be funded with local ETC,[78] and 9-1-1 governing bodies may increase their Charges up to a threshold annually set by the Commission.[79] Governing bodies which determine that a Charge greater than the threshold is necessary may file an application for Commission approval to exceed the threshold.[80] Therefore, a funding mechanism for implementation of minimum PSAP operational standards is already in place. Additionally, the creation of the 9-1-1 Services Enterprise presents another opportunity to fund this important and necessary need.

The Commission believes that citizens and visitors expect and deserve a foundational level of service when they call 9-1-1, and that the best way to achieve this statewide is with the implementation of minimum operational standards for PSAPs. The Commission also believes that the State has an obligation to ensure every 9-1-1 caller receives a minimum level of service.

- An amendment to a bill that would have directed the Commission to conduct a collaborative process through which to adopt ***voluntary*** standards was unsuccessful in the 2024 legislature.
- During ongoing discussions at the Commission's 9-1-1 Advisory Task Force meetings and the CO NENA/APCO Managers/Directors Roundtable, it became apparent that support for standards, at least at the voluntary level, is strong. It is also clear that the 9-1-1 community recognizes the need for such standards, and that existing disagreements are about whether the standards should be voluntary or mandatory and which entity should be the curator of such standards.
- The Colorado Training Standards Institute, a body which created and delivers a 40-hour basic telecommunicator course that meets the national minimum voluntary standards, has been tasked to continue the discussion and propose PSAP operational standards for Colorado.

Recommendation: The legislature should consider working with 9-1-1 stakeholders to develop minimum operational standards for PSAPs. Alternatively, the legislature could support future proposed legislation by the Task Force or other 9-1-1 entity establishing minimum training standards.

[78] See the full list of allowable uses of 9-1-1 funds enumerated in § 29-11-104, C.R.S.
[79] See § 29-11-102(2)(a), C.R.S.
[80] See § 29-11-102(2)(c), C.R.S.

No Clear Path Toward Consistent Statewide Cybersecurity Defense at PSAPs

The Challenge: Cybersecurity of PSAPs is largely left to local IT resources, which may vary in their ability to ensure it with respect to systems, equipment, and personnel.

The Details: Although the ESInet provides a number of service benefits, it introduces additional cybersecurity risk. CenturyLink is responsible for cybersecurity on the ESInet up to the network demarc with each PSAP or local 9-1-1 governing body.

PSAPs and governing bodies are responsible for all cybersecurity on their side of the demarc, from their systems and networks to operations and personnel. Those located in urban areas generally have robust information technology support to rely upon, whether internal, external from partner cities and counties, or from vendors. It is unclear whether PSAPs in rural areas have sufficient cybersecurity support, or what can or should be done to ensure they are sufficiently protected. Though implementation of the ESInet provides a great number of benefits, it does introduce potential vulnerabilities to every PSAP on the network if one PSAP does not observe sufficient cybersecurity precautions.

The Solution: The Commission does not have sufficient cybersecurity expertise to fill the gap for PSAPs which may need such assistance. Resources should be directed to this issue. The 9-1-1 Services Enterprise created by SB24-139 may serve as a funding source for this.

Recommendation: Support for cybersecurity efforts at PSAPs may be a topic taken up by the 9-1-1 Services Enterprise created by the passage of SB24-139. **The legislature should monitor the activity of the Enterprise, and consider directing additional resources to this need.**

Growing Disparity in Local Emergency Telephone Charge Rates

The Challenge: Local Emergency Telephone Charge (ETC) rates vary by 9-1-1 governing body, from 70¢ to $4.00; per line per month. The highest rates can generally be found in rural communities, with some rural citizens paying five and a half times more than others for 9-1-1 service.

The Details: The statute directs the Commission to annually set a threshold amount up to which a governing body can set its ETC rate without Commission approval.[81] If a governing body determines that a rate above the threshold is necessary, it may file an application with the Commission for permission to impose the higher rate.

Unfortunately, the statute provides no guidance to the Commission regarding the criteria it can and should use in determining whether or not to approve an ETC-increase application. Traditionally, the Commission ETC-increase applications to ensure that (1) all proposed expenses are allowed uses of emergency telephone charge funds under § 29-11-104, C.R.S., (2) all proposed capital expenditures and large operational costs are sufficiently documented, and (3) budget projections confirm that the rate increase is necessary to pay for all eligible

[81] § 29-11-102(2)(b), C.R.S. This amount is set at $2.05 per line per month for calendar year 2024. The Commission is required to take into account inflation and other factors in setting this threshold annually.

proposed expenses.

This results in a relatively permissive process which can allow ETC increases to very high amounts, particularly in rural areas where the subscriber bases are less robust and therefore higher rates may be necessary to fund equipment and operational costs. With no statutory rate cap, the Commission could potentially see future applications requesting ETCs of $5.00, $6.00, or more, which would make Colorado's rates some of the highest in the nation.[82]

Telecommunications service providers have commented in public venues before the legislature about Colorado's high ETC rates, and the Colorado Cable Telecommunications Association (CCTA) intervened in one ETC Application proceeding before the Commission objecting to an increase in one local governing body's rate to $3.00 per line per month[83]. Additionally, Commissioners have expressed concern regarding ETC Applications requesting rates as high as $4.00 per line per month.

The Solution: The legislature could consider several potential solutions:

- Enabling 9-1-1 Services Enterprise grants. As discussed previously, we are pleased to report that the 2024 General Assembly passed SB24-139 to create a 9-1-1 Services Enterprise. It is authorized to use this budget to pay for needed statewide 9-1-1-related expenses which cannot be added to CenturyLink's BES tariff at the Commission.
    - One of the powers of the Enterprise is to provide 9-1-1 grants to PSAPs and governing bodies, which, if implemented effectively, could help mitigate the need for rural governing bodies to raise their ETC rates to such an extent as seen thus far. Whether the Enterprise chooses to implement a grant program and how the program would be structured will be determined by the Enterprise's Board. At the time of this report, the Department of Regulatory Agencies is in the process of establishing the Enterprise and seating the Board. The legislature could adopt a "wait-and-see" approach to see if this solution becomes available.
- Expanding the uses of the state 9-1-1 Surcharge. The Surcharge is set by the Commission annually, and "must be reasonably calculated to meet the needs of governing bodies to operate the 911 system."[84] However, the statute also implies that the purpose of the Surcharge is to reimburse governing bodies for the cost of "concurrent sessions," which are equivalent to 9-1-1 phone lines used to receive 9-1-1 calls, and are the unit basis by which governing bodies pay for tariffed 9-1-1 Basic Emergency Services.[85] The Surcharge rate is statutorily capped at 50¢ per line per

[82] The only comparable charges in other states can be found in Chicago, which has a $5.00 per line per month local charge, and West Virginia, where charges vary by local jurisdiction and range as high as $6.40. For more information, see www.nena.org/page/911RateByState.
[83] See Proceeding 22A-0476T
[84] § 29-11-102.3(1)(b), C.R.S.
[85] § 29-11-102.3(3)(c)(III), C.R.S.

month,[86] but thus far has not exceeded 9¢.[87] The Commission sets the rate through an open proceeding and requests comments from the public, but to date comments have not provided sufficient evidence for the Commission to establish a rate in excess of what is needed to reimburse tariffed BES costs.

    - The legislature could direct the Commission more explicitly to include an additional amount in its calculation of the state 9-1-1 Surcharge, to provide additional funding to the governing bodies. Doing so would shift some of the costs for 9-1-1 service from local ETC revenues to the state 9-1-1 Surcharge and could alleviate some of the need for governing bodies to raise their ETC rates.

- Imposing a cap on local ETC rates in lieu of, or in addition to, the threshold amount above which Commission approval for an ETC is required. This option by itself is potentially dangerous because the purposes for which governing bodies are approved to raise ETC rates are legitimate, and having no method for obtaining those funds means that those legitimate expenditures will either have to be postponed or abandoned, or the costs for those expenditures will simply be shifted onto county, municipal, and/or special district general funds. ***The Commission does not recommend implementing a hard cap on ETC rates unless it is accompanied by a sufficiently effective local grant program provided by the 9-1-1 Services Enterprise or a supplemental increase to the state 9-1-1 Surcharge***.

Recommendation: The legislature should consider the potential solutions or a combination of them. This could start with waiting for the establishment of the 9-1-1 Services Enterprise and determining whether grants potentially implemented by the Enterprise alleviate the need for continued increases in local ETC rates. Alternatively, the legislature should consider directing the Commission to expand the uses of the state 9-1-1 surcharge to provide additional funding to local agencies and, in combination with the first or second option, consider imposing a cap on local ETC rates.

Conclusion

This report is intended to meet the requirements of § 40-2-131, C.R.S., providing "overall understanding of the state of 9-1-1 service in Colorado" by addressing the listed topics. The goal is to help the reader understand the entire 9-1-1 call flow from service user to the PSAP,[88] and the components and actors that make it work, not just the portion that is regulated by the Commission.

Colorado's 9-1-1 community is, for the most part, highly engaged with each other and actively working to find solutions to the challenges outlined in this report. Through participation in the PUC 9-1-1 Advisory Task Force, its subcommittees, the ESINet Users Group, and other 9-1-1-related organizations, PSAPs and 9-1-1 governing bodies gather to discuss, debate, and

[86] § 29-11-102.3(1)(a), C.R.S.
[87] For calendar year 2024, the rate is set at 9¢ per line per month, an amount calculated to reimburse the governing bodies for their tariffed costs for concurrent sessions. See Proceeding No. 23M-0385T.
[88] For additional information, see Appendix A

decide on solutions that fit their needs and that of their communities, and preserve the ability to make those decisions at the local level. The frontline telecommunicators, who were rightfully recognized as first responders this year, are people who dedicate themselves to answering the calls of those in their deepest hour of need and keeping safe Colorado's emergency field responders. PSAP leaders in Colorado work to staff, fund, and operate their PSAPs to the best of their abilities with the resources they have.

Colorado continues to navigate the transition to NG9-1-1, collaborating with the BESP and each other to find solutions that work for PSAPs and governing bodies.

In the meantime, Colorado's 9-1-1 stakeholders must continue to work to meet citizen expectations. This includes promoting local implementation of text-to-9-1-1 service, improving uniformity of minimum training standards for public safety telecommunicators, and improving the reliability and resiliency of the 9-1-1 network. Although the Commission has authority and is taking action on certain issues, such as reliability and resiliency of the BES call delivery network, it does not have authority to require PSAP adoption of text-to-9-1-1 service or minimum standards for operations and training.

An examination of the challenges discussed in Section 7 of this report reveals a common theme: some are difficult to address without a state-level fund to pay for statewide solutions. Progress has been made in this area with the creation of the 9-1-1 Services Enterprise. Disparities among local ETC are reaching levels that may warrant further examination and rural subsidization. Additionally, funding assistance for rural 9-1-1 governing bodies and PSAPs may be appropriate, whether through the new 9-1-1 Services Enterprise or otherwise.

Finally, the Commission is committed to continuing to work with Colorado's 9-1-1 stakeholders and the legislature to ensure that the 9-1-1 system is reliable, resilient, and meets the needs of residents and visitors. Our partners include the counties, municipalities, certain special districts, 9-1-1 governing bodies, PSAPs, the BESP, and the citizens and visitors who rely on 9-1-1 service. Together, we will continue to develop solutions and strategies to ensure access to high quality ever-improving 9-1-1 service they expect and deserve.

Appendices

Appendix A: Colorado's 9-1-1 Service Environment

Colorado's 9-1-1 Service Environment

This document provides supporting information for the Colorado Annual State of 9-1-1 Report. It follows the same organization structure as the Report.

1. Commission Activity Regarding 9-1-1 Service

This information is found in the current State of 9-1-1 Report.

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 Network Domain**: When a service user dials 9-1-1 the call is initially handled by the caller's telephone service provider (Originating Service Provider [OSP]), which delivers the call to the Basic Emergency Service Provider (BESP). The call may pass through one or more intermediary aggregation service providers before reaching the BESP. As a result of telecom deregulation by the State of Colorado in 2014, this portion of 9-1-1 call flow is only regulated by the Federal Communications Commission (FCC).

2. **The Basic Emergency Service Domain:** The BESP aggregates 9-1-1 calls from all of the Originating Service Providers (OSPs) and their intermediates and routes them to a demarcation point for the appropriate Public Safety Answering Point (PSAP). This is the PUC-regulated portion of 9-1-1 call flow, also described in the Commission's definition of Basic Emergency Service (BES).

3. **The Local Domain:** 9-1-1 calls received from the BESP at the local demarcation point are the responsibility of the local agencies, including the PSAPs and/or 9-1-1 governing bodies. This portion of 9-1-1 call flow is not regulated.

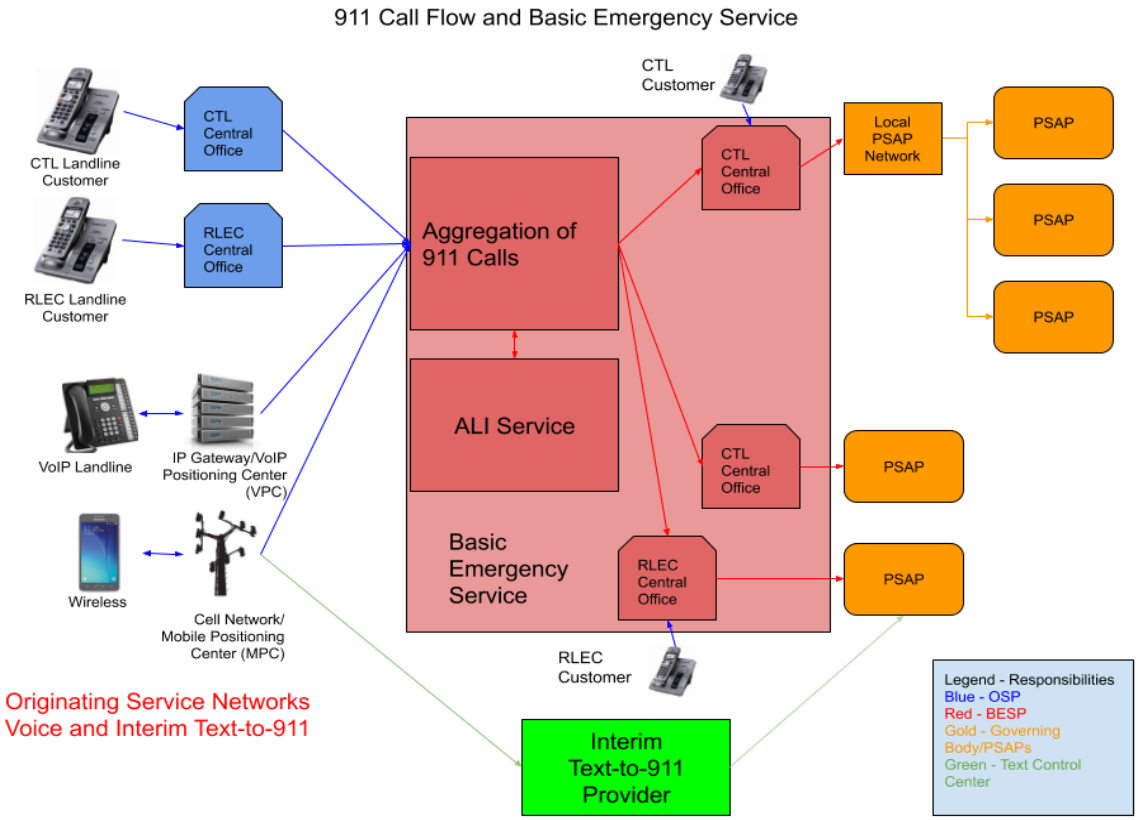


Figure 2.1: 9-1-1 Network Call Flow

The Originating Service Network Domain is on the left side of the chart above, consisting of FCC-regulated interconnected telephone services by Originating Service Providers (OSPs). It includes any vector by which a 9-1-1 call may be made, currently encompassing wireline, wireless, and Voice-over-Internet-Protocol (VoIP) services, and to a lesser extent satellite phones. In the future it may also include vectors from Internet-connected services, such as smart assistants and Internet-of-Things devices.

The Basic Emergency Service Domain is in the middle, where the chart illustrates BES aggregation, routing, and transport of 9-1-1 calls to a demarc for the appropriate PSAP.[89] BES also includes the delivery of the location information that is associated with a 9-1-1 call.[90] CenturyLink[91] is currently the only BESP in Colorado that has an active tariff on file for 9-1-1 call delivery.

[89] § 29-11-101(7), C.R.S.
[90] 4 *CCR* 723-2-2131(i).
[91] CenturyLink QC, also known as Lumen Technologies and Qwest Communications.

Lastly, the right side of the chart represents the Local Domain, in which 9-1-1 calls are received and handled by PSAPs.[92] 9-1-1 calls received at a local demarc may be connected directly to a PSAP's phone system, or they may be connected to a local network operated by a "governing body" for further distribution to a PSAP.[93] These governing bodies collect 9-1-1 Emergency Telephone Charges (ETC) from service users via the OSPs, fund local emergency telephone services and equipment, and in some cases provide technical support and local call delivery networks for PSAPs.

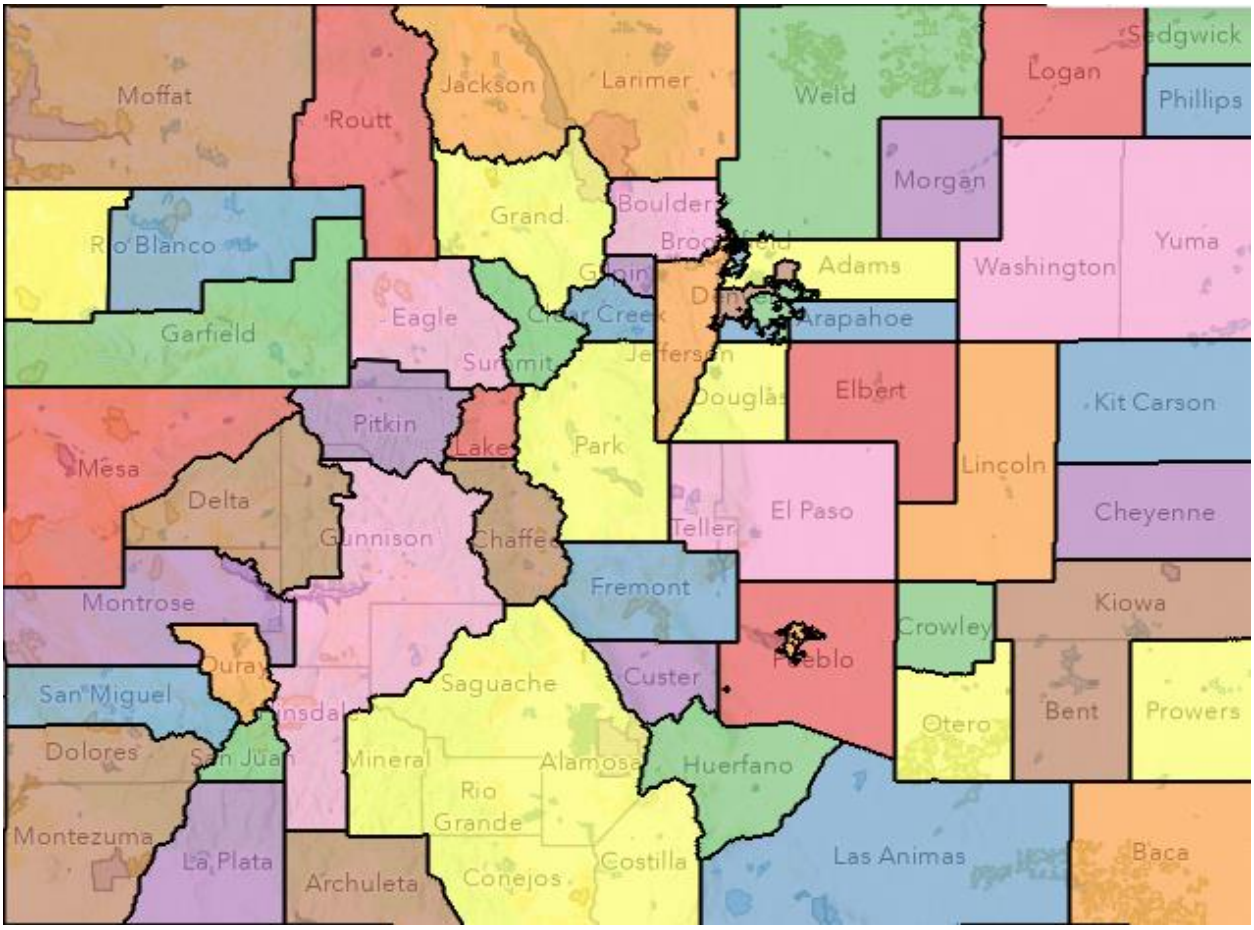


Figure 2.2: Colorado's 9-1-1 Governing Bodies. Each governing body may fund one or more PSAPs.[94]

[92] A full list of Colorado's PSAPs may be found on the Colorado 9-1-1 Program web page. See: https://sites.google.com/state.co.us/colorado911program/home

[93] See 29-11-101(16), C.R.S. A full list of Colorado's 9-1-1 governing bodies may be found on the Colorado 9-1-1 Program web page. https://sites.google.com/state.co.us/colorado911program/basic-emergency-service

[94] An interactive version of this map may be found on the Colorado 9-1-1 Program web page. https://sites.google.com/state.co.us/telecom-surcharges

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

It is important to provide additional details about the three domains of 9-1-1 call flow; and to reiterate which parts are regulated by the Commission, and which parts statutes restrict the Commission from regulating.

A 9-1-1 call begins with a service user dialing 9-1-1 on their wireline, wireless, VoIP, or satellite phone. It must then pass through a variety of private networks, of which some may be for third-party intermediary processing and aggregation, before it is delivered to the BESP. This portion of the network is referred to as the Originating Network, and telephone service providers in this space are known as Originating Service Providers (OSPs). The Originating Network and processing of 9-1-1 calls within it are only regulated by the FCC; not a part of Commission-regulated BES.

The portion of the BESP's network from the point of aggregation from OSPs or their intermediaries to the point that the call is handed off at a demarc for a PSAP is the Basic Emergency Service network. The aggregation, routing, and transport of 9-1-1 calls via this network is what the Commission regulates as Basic Emergency Service (BES).

After the call is delivered by the BESP to the demarcation point with an appropriate 9-1-1 governing body or PSAP, it is no longer part of regulated BES. Any failure that occurs within local PSAP networks or within the PSAPs themselves is outside the scope of the Commission's authority. The Commission has no authority to regulate the operation of PSAPs.

9-1-1 call failures can occur in all three domains. Because the Commission is only granted authority by statute over the BES domain, the other two are not subject to Commission regulation.[95] It is important to note that some portions of CenturyLink's facilities may serve as part of the separate OSN and BES networks, e.g., a segment of fiber optic cable may be used to transmit OSP calls to the BES network's aggregation point (making it OSN domain), and to transmit calls from the aggregation point to the PSAP (making it BES domain). 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. The blue and red lines could be in the same fiber optic cable, or even multiplexed in the same fiber, but still in different functional networks.

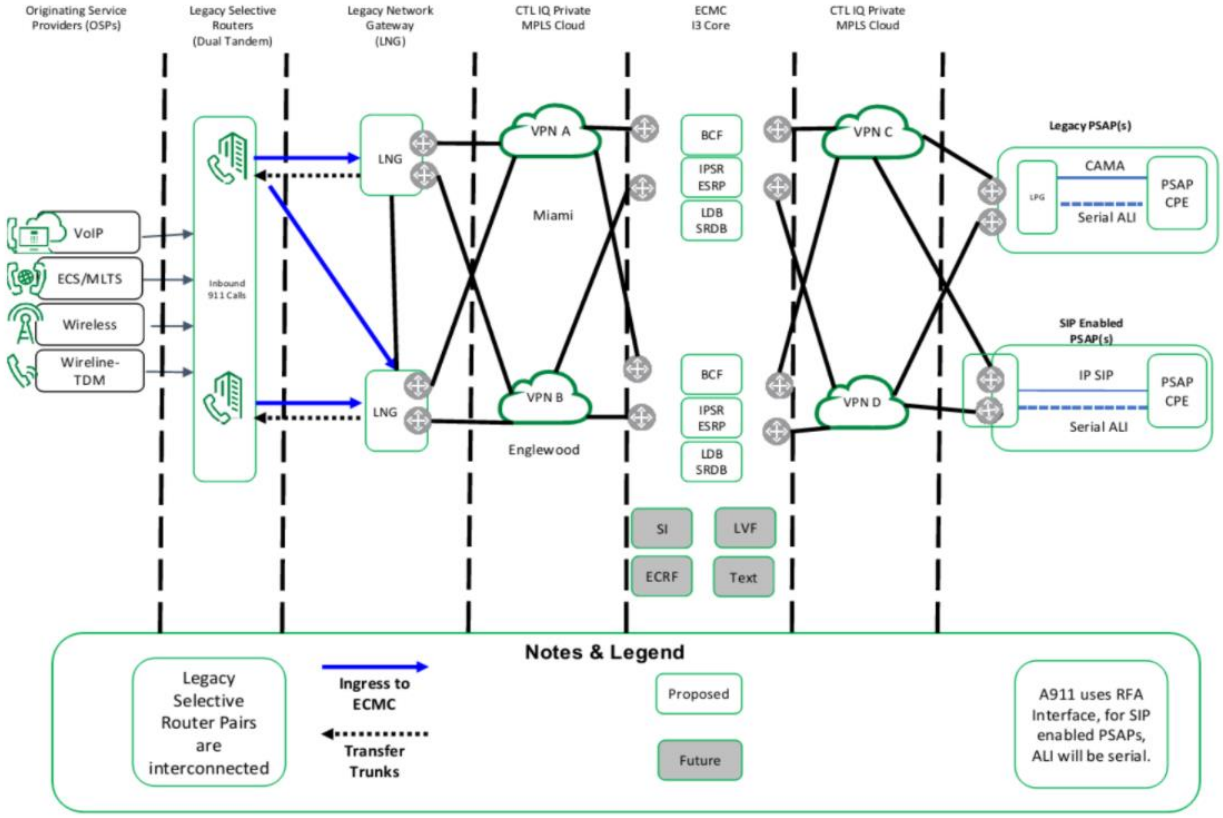
In practical terms, this means that the Commission cannot require reporting, nor impose penalties or requirements, for any outage other than those that impact the BES network. Neither can the Commission impose requirements or penalties, including outage reporting, on the OSPs, PSAPs, or governing bodies, with the exception of requiring governing body annual reporting as allowed in § 29-11-102(4), C.R.S.

Technology

9-1-1 calls are delivered by OSPs or their intermediaries to the BESP at several points of interconnection. Upon receipt, the BES network converts incoming calls to Session Initiation Protocol (SIP) format if necessary. A selective router looks for the phone number or pseudo

[95] § 40-15-201, C.R.S.

mobile phone number in a selective router database (SRDB), and routes the call to the PSAP designated for that number. At some PSAPs the call is then converted back into an analog format for handling by the PSAP's 9-1-1 phone system, also referred to as Call Handling Equipment (CHE). If the PSAP's CHE is capable of handling calls in SIP format this last step conversion is unnecessary. It is anticipated that as older CHE is retired at the PSAPs, eventually all 9-1-1 calls will be handled locally in SIP format.



Legend:

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

Figure 2.3: ESInet 9-1-1 Call Flow with Legend. Source: CenturyLink/Lumen Basic Emergency Service Tariff, Colorado Tariff No. 25

Once received by the PSAP, the PSAP's CHE 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 to the PSAP, such as the subscriber name and address. For wireless and some VoIP calls, the OSP or its agent dynamically populates the ALI data with the caller's location, if known, in the form of X,Y coordinates and/or a dispatchable address.

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 2023-2024 fiscal year all but one PSAP have been migrated to the "transitional" technology, a step toward a NG9-1-1 network. See Section 3 for information about Colorado's migration to NG9-1-1.

Legacy 9-1-1 networks are unable to deliver data types other than voice and ALI data to the PSAP. For example, text-to-9-1-1 service in Colorado is currently delivered separately from the BES network. Text-to-9-1-1 calls are currently routed through a third party called a Text Control Center (TCC) which delivers the call directly to the PSAP. Text-to-911 service delivered via alternative connections rather than an ESInet is referred to as "interim" service because it is considered a temporary solution until full delivery via the BES ESInet is implemented.

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

- Wireline (or landline). These are 9-1-1 calls from traditional wired home or business phones.

- Wireless (or cellular). 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 connecting the call. They may be either static (installed in a specific location), nomadic (meant to be portable to one Internet connection at a time), or mobile (hops from one Internet connection to another without terminating the call).

Multi-Line Telephone Systems (MLTS, also called Enterprise Communications Systems, or ECS), may use either wireline or (more commonly) VoIP call delivery. 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. MLTS can also encompass several geographic locations branching from a single phone system.

An unknown number of calls may also be placed from satellite phones.

All 9-1-1 service in Colorado is considered Enhanced 9-1-1 (E9-1-1), which is distinguished by the use of selective routers for delivery of the 9-1-1 call to the appropriate PSAP based on a wireline or VoIP service address, mobile phone's cell tower antenna in use, or a VoIP current address or coordinates. Perhaps more notably, E9-1-1 allows for the delivery of caller location information with the 9-1-1 call.

In order for a wireless 9-1-1 call to be delivered with location information, the PSAP must be capable of receiving and using such information. Every primary PSAP in Colorado is capable of this, whether the information is Phase I cell tower location or Phase II device coordinates.

General Operations

Operations within Colorado's PSAPs are locally controlled. PSAPs are often operated as part of a local law enforcement agency, but are sometimes operated as independent agencies of a city or county government, as part of a fire agency, or as a separate legal entity of the state. 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, emergency medical service, and other agencies. PSAPs also field a large number of non-emergency calls from the public, usually exceeding the number of 9-1-1 calls received.[96]

3. 9-1-1 Network Reliability and Resiliency

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 paths between two points in the network.*

- *Diversity: 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 network links via geographically separated paths so that a single event, such as a flood or a cable cut, is unlikely to damage both links.*

- *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 Commission-regulated service that includes the aggregation of 9-1-1 calls from OSPs and the routing and transmission of those calls to the demarcation point of a PSAP or local network operated by a 9-1-1 governing body. Location information associated with 9-1-1 calls is considered part of Basic Emergency Service.*

[96] Note: There is an industry trend to move away from the term "Public Safety Answering Point" or "PSAP" in favor of the term "Emergency Communications Center" or "ECC". For the purposes of this report, we continue to use the term PSAP since it is the term defined in statute and specifically refers to ECCs that receive 9-1-1 calls, whereas the term "ECC" can be more broad.

Commission Process for Improvement

In 2013 the Commission initiated an inquiry into 9-1-1 network performance following recent floods and fires[97]. As part of that proceeding CenturyLink filed 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 for outages 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 BES network where it is lacking, particularly as it serves the Estes Park PSAP.[98]

On January 9, 2019, in response to a Commission rule that has since been revised, CenturyLink filed a list of all areas of its BES network lacking redundancy and diversity.[99] On January 29, 2019, 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.[100]

Per the Commission's rules at the time, the result of this process was to be a 9-1-1 Diversity Plan that could be approved by the Commission, associated with either a modification of the existing BES tariff charge or a new tariff service charge. Thus the local 9-1-1 governing bodies would pay for improvements to the BES network's redundancy, geographic diversity, and resiliency[101]. However, on December 29, 2020, Commission staff filed a letter recommending that the proceeding be closed to accommodate a rulemaking to change the Commission's rules about resilience and reliability of the 9-1-1 network. The reasoning was that with the passage of HB 20-1293 the Commission had the new state 9-1-1 Surcharge to help fund governing body costs for the improvements to the BES network, and Commission rules should account for that.[102]

The Commission agreed, ordered the proceeding to be closed, and directed Commission staff to begin preparing a Notice of Proposed Rulemaking on the topic of 9-1-1 network reliability.[103] On the advice of Commission counsel, the new rulemaking was postponed until after completion of the 2021 rulemaking on 9-1-1 funding and audit procedures, which established regulations for the new state 9-1-1 surcharge.

On March 9, 2022, the Commission issued a Notice of Proposed Rulemaking specifically to address BES network resiliency and reliability improvements.[104] Following the

[97] See Proceeding 13I-1147T.
[98] See Decision R14-0303.
[99] See Proceeding 19M-0026T.
[100] See Decision C19-0117-I.
[101] 4 *CCR* 723-2-2143(a)(III).
[102] See https://www.dora.state.co.us/pls/efi/EFI.Show_Filing?p_fil=G_771812&p_session_id= for a direct link to the letter.
[103] See Decision C21-0036.
[104] See Proceeding 22R-0122T.

recommendations of Commission staff, the proposed rules sought to leverage the new state 9-1-1 Surcharge to create a funding mechanism for improvements to the reliability of the BES portion of 9-1-1 call flow. Following issuance of the Notice and receipt of extensive comments from stakeholders, the overseeing Administrative Law Judge directed Commission staff to coordinate workshops to develop consensus-based draft language amending the rules. On December 22, 2022, the Commission adopted the consensus-based rules,[105] and they became effective on March 31, 2023.

Although the changes to the rules were extensive, two primary changes related to BES network resiliency and reliability are currently being implemented. First, 4 CCR 723-2-2143(b) established a BES Improvement Plan process which requires the BESP to file an Improvement Plan with the Commission every two years. Each Plan shall list areas of the BES network that lack diversity, propose to improve certain sections of that network, include pricing and timeframes for the improvements, and propose an additional tariff rate to pay for those improvements. The Commission may approve the Plan in whole or in part, and may separately approve an additional rate to be added to the tariff to pay for those improvements. The Commission will then take that additional tariff rate into consideration when setting the annual state 9-1-1 Surcharge rate for the following year, so the improvement costs are not borne by the local 9-1-1 governing bodies without reimbursement.

On April 24, 2023, CenturyLink filed its initial BES Improvement Plan Application, which is currently under review by the Commission.[106] The tariff charge revenues for the three projects proposed by CenturyLink in the Application were to provide matching funds for federal broadband middle-mile grant projects which would have coincidentally improved BES network diversity. CenturyLink did not receive those grant awards, and instead filed an updated Plan in February 2024. The proceeding is ongoing as of the time of this report.

Second, new rule 2143(k) requires Commission staff to conduct informal investigations into any BES outage that meets certain criteria recommended by the Commission's 9-1-1 Advisory Task Force. The current criteria are:

- Multiple PSAPs affected.
- Details of the outage are unclear from the report.
- Outage over 4 hours in duration.
- Unusual pattern of impact.
- Apparent failure to notify PSAP in a timely manner.
- Repeated outages of a similar nature or in the same area over a short period of time.
- At the request of one or more affected PSAPs or 9-1-1 governing bodies.
- Any apparent violation of Commission rules.

Throughout 2022 and 2023, and into 2024, CenturyLink took the position that network outages don't qualify as BES outages if they impact the ability of 9-1-1 calls to an aggregation point of the BES network, treating such calls as being in the originating service domain instead of the basic emergency service domain. It has taken this position even if the same facility is *also* used to transport 9-1-1 calls from the aggregation point to the PSAP. In addition, CenturyLink

[105] See Decision R22-0811.
[106] See Proceeding 23A-0197T.

has taken the position that if 9-1-1 calls can be routed to an alternate PSAP instead of the primary designated PSAP then an outage has not occurred.

Commission staff, on the other hand, consider both of these situations to be BES outages because both result in a primary designated PSAP not receiving 9-1-1 calls for its service area. As a result of this conflict of interpretation, very few outages were being reported by CenturyLink to Commission staff via the specified notification mechanisms. This, in turn, resulted in nearly every apparent BES outage that Commission staff learned of being investigated through the new process established in Rule 2143(k), because one of the triggers for investigation is "any apparent violation of Commission rules."

In 2023, CenturyLink began copying Commission Staff on all potential outage notifications sent to all Colorado PSAPs. This reduced apparent rule violations regarding lack of notification, but increased Commission Staff awareness of incidents occurring around the state. Thus far, many staff-led BES outage investigations have been completed.[107]

Late in 2023, the Commission opened Rulemaking Proceeding 23R-0577T, Amendments to Emergency Service Outage Rules, in order to strengthen those rules and address CenturyLink's assertions that:

> 1. BES network outages don't qualify as BES outages if they impact the ability of 9-1-1 calls to reach the aggregation point of the BES network, treating them as being in the originating service domain, not the basic emergency service domain and,
>
> 2. if 9-1-1 calls can be routed to an alternate PSAP instead of the designated PSAP then an outage has not occurred.

The Commission adopted the following rule changes in the proceeding:

- Changed the term "BES Outage" to "PSAP service disruption";
- Clarified the definition of the term "Primary demarcation point";
- Requires the BESP to provide PSAPs with at least 24 hours' notice of potential service disruptions due to planned maintenance;
- Requires the BESP to deliver all calls to alternate PSAPs in the event of a service disruption, when possible;
- Requires the BESP to provide callback numbers for calls that were not delivered to the PSAP during a service disruption, without requiring a request from the PSAP for such information, within 2 hours of restoration of service;
- Strengthens the rules regarding the provision of billing credits in the event of a service disruption more than 4 hours in duration, or more than 12 hours in the event of a fiber cut;

[107] Completed investigations may be reviewed in Proceeding 23M-0145T.

- Clarifies rules governing Commission Staff's informal investigations

These rules benefit Colorado's 9-1-1 governing bodies and the public by requiring the BESP to provide the telephone numbers of undeliverable calls that occurred during service disruptions, to provide billing credits when the PSAP or governing body does not receive the service paid for due to disruption, and to provide advance notice of potential service disruptions due to planned maintenance, which helps PSAPs prepare contingency plans to minimize disruption to their stakeholders.

Finally, as a certified BESP actively providing service, CenturyLink is required by Commission rule 2143(e) to annually file a contingency plan, with the most recent being filed on June 3, 2024[108]. This is to ensure 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 BESP must also provide its most recent 9-1-1 reliability filing with the Federal Communications Commission. Some aspects of this report, including the FCC filing, are typically filed confidentially due to the security-sensitive nature of the information.

Work of the 9-1-1 Advisory Task Force Outage Committee
Previously, the Outage Committee of the Commission's 9-1-1 Advisory Task Force conducted investigations into outages that met similar criteria to those now being used to prompt staff investigations. The Outage Committee investigations were informal and voluntary, but generally CenturyLink did participate in the meetings and cooperate with the investigations.

The Outage Committee may still conduct investigations, though they would largely be duplicative of the new outage investigations process Commission Staff outage investigations. Instead the Outage Committee may choose to conduct investigations regarding outages that do not otherwise meet the criteria for a staff-led investigation.

The Outage Committee is also involved in the staff-led investigations, suggesting information to request, participating in meetings between CenturyLink, Commission staff, and the affected local 9-1-1 agencies, and providing input on ways to potentially reduce the likelihood of outages or mitigate their impacts.

4. Migration to Next Generation 9-1-1

What Is Next Generation 9-1-1?

Next Generation 9-1-1 (NG9-1-1) is a set of technologies and components which comprise a standards-based approach to Internet Protocol (IP)-based 9-1-1 call delivery for scalable flexibility, capacity, and security in the 9-1-1 system of a state or region. The National 911 Program Office has produced a good primer video for introducing NG9-1-1 and explaining its benefits.[109]

[108] See Proceeding 23M-0236T.
[109] https://www.911.gov/issues/ng911/video-benefits-of-next-generation-911/

NENA Baseline NG9-1-1 Description

Implementation of NG9-1-1 is a transitional process. The Baseline NG9-1-1 Description document "provide(s) a high-level description of the basic NENA standards-based set of capabilities required to be considered NENA NG9-1-1 during transition."[110] Comprising only one page, it provides a very high-level perspective and is not intended to include everything that could or should be part of an NG9-1-1 system. It is a starting point for understanding the core features, functions, and components of NG9-1-1. By determining which of those Colorado's 9-1-1 system currently meets, we can begin to see what work has yet to be done.

These are the criteria, along with some analysis of Colorado's relationship to them. Their order is altered from the Baseline document for better understanding.

1. **An Emergency Services IP Network (ESInet).** As of this edition of the Report, Colorado's PSAPs have migrated from a legacy analog E9-1-1 network to an Emergency Services IP Network (ESInet). All PSAPs are receiving 9-1-1 calls in Session Initiated Protocol (SIP) format, though some make use of a PSAP Gateway Module (PGM), otherwise known as a Legacy PSAP Gateway (LPG). A PGM converts the SIP calls to legacy analog CAMA format for older PSAP call handling equipment to use. Although the NENA i3 NG9-1-1 standard indicates use of SIP format from the Originating Service Provider(OSP) to the PSAP's call handling equipment, the ESInet can be said to exist despite transitional elements for analog interconnections with legacy OSP networks and PSAP equipment.

2. **Provisioning of authoritative NG9-1-1 GIS location validation databases, for use by Originating Service Providers and location database providers to pre-validate communication device addresses via the Location Validation Function (LVF) for their Location Information Service (LIS) elements of NG9-1-1 (analogous to Master Street Address Guides, or MSAGs).** Authoritative statewide GIS location validation datasets do not yet exist in Colorado. Each local 9-1-1 governing body will be responsible for the provisioning of this data for its service area, to be integrated statewide by the NG9-1-1 service provider. The governing bodies or their designees will also have to resolve GIS-authority boundary conflicts with each other and the NG9-1-1 service provider. GIS dataset creation is primarily a function of the local governments, and the current states of those data vary considerably. In order to make the data usable by an LVF and other core NG9-1-1 services, Colorado will need to fill in the gaps where sufficient data does not exist and resolve GIS-authority boundary issues.

[110] National Emergency Number Association. (n.d.). Baseline NG9-1-1 Description. Retrieved April 30, 2021, from https://www.nena.org/page/NG911_Baseline

3. **Provisioning of Authoritative NG9-1-1 GIS 9-1-1 Call Routing Data**. The analysis of this question is similar to the answer to criteria #2. The local 9-1-1 governing bodies will be responsible for the provisioning of GIS PSAP service boundary data to be integrated statewide by the NG9-1-1 service provider. These boundaries are already maintained by some local governments, but others will have to be created to enable the statewide dataset for GIS-based call-routing. Further, the GIS data providers will have to work with each other and the NG9-1-1 service provider to resolve overlaps and gaps between the PSAP boundaries. As of this edition of the report, the Colorado 9-1-1 Resource Center is developing an RFP to have an initial statewide GIS layer of fully edge-matched PSAP boundaries developed.

4. **Support for legacy analog Originating Service Providers via gateways.** Colorado's current ESInet service supports this functionality, although it should be noted that in a true NENA i3 NG9-1-1 environment such gateways would eventually be retired after all OSPs change to SIP format.

5. **Geospatially controlled IP software call routing.** Operation of the Emergency Call Routing Function (ECRF) and the Emergency Services Routing Proxy (ESRP) depends in part on GIS-validated (LVF) caller locations (LIS) and PSAP service area boundaries. As noted above, the GIS datasets for this may inherently be integrated by the NG9-1-1 service provider, but the local 9-1-1 governing bodies and their GIS partners will be responsible for providing the necessary GIS data. Gaps in the source data and boundary-matching issues will have to be resolved to enable these functions.

6. **GIS data creation to support 2 and 5 above, and associated management tools.** The requirement for GIS datasets to support NG9-1-1 functions necessitates the use of GIS tools and management software to ensure data quality, completeness, normalization, and matching. A common set of 9-1-1 oriented GIS data management tools is not currently available in Colorado, but making such a tool available to all of the state's 9-1-1 governing bodies is currently being discussed between the ESInet Users Group and Colorado's BESP, CenturyLink.

7. **The ability to control call routing based upon a Policy Routing Function (PRF) with standardized methods to define, build, and control Policy Rules.** Currently, the ESInet does not afford this capability to Colorado's PSAPs. However, one aspect of it has been enabled, which is the ability to roll over calls to more than one PSAP at the same time, rather than rolling calls over to one PSAP and potentially overwhelming it before calls roll over to a third PSAP. This feature is called volume-based routing.

8. **Additional data acquisition after call delivery, to facilitate call processing by call taker or other public safety entities.** NG9-1-1 service can enable delivery of many forms of additional data to the call takers and responders, beyond the primary caller information and address or geodetic location. Additional data about the caller, the location, and the call itself can assist call routing and handling, and can aid telecommunicator and responder responses to an incident.[111]

9. **Support for transfer of calls with accumulated call taker notes and added data, or an access key to such data, to any authorized entity interconnected by ESInets.** With some limited exceptions, Colorado PSAPs do not currently have this capability. To achieve this today the PSAP transferring the call and the PSAP receiving the call must use a CAD-to-CAD interface or be using the same CAD system through a distributed or hosted deployment. Theoretically, CAD systems that are designed to NENA i3 NG9-1-1 specifications should be able to transfer data already entered by the call taker along with the call, but to our knowledge this level of standardization does not yet exist.

10. **Ability to interconnect with other NG9-1-1 systems and to interwork with E9-1-1 systems.** Colorado's ESInet currently lacks the capability of transferring calls to neighboring states, regardless of whether they are NG9-1-1 systems (e.g., Kansas) or legacy E9-1-1 systems (e.g., Wyoming). However, this issue is currently being discussed between the ESInet Users Group and Lumen Technologies.

11. **Support for system monitoring, logging, and discrepancy reporting necessary to support troubleshooting and ongoing operation and maintenance.** The CenturyLink tariff currently on file in Colorado provides ESInet service quality objectives which include service availability minimums, jitter of 20 ms or less, packet loss of 0.5% or less, mean opinion scores (MOS) of 4.0 or greater, latency of 42 ms or less, call delivery of 99.999%, and call delivery accuracy of 99.99% or greater. Service availability, jitter, packet loss, and MOS are measured ten times per hour, and statewide performance relative to these metrics are reported quarterly to the ESInet Users Group.

Based on this list and the associated analysis for each criterion, Colorado can be said to meet criteria #1, #4, and #11. Colorado does not meet #2, #3, #5, #6, #8, #9, and #10.

[111] NENA NG9-1-1 Additional Data, NENA-STA-012.2.2017 (f/k/a 71-001)

The FCC's Task Force on Optimal PSAP Architecture (TFOPA) developed an NG9-1-1 Maturity Model which helps illustrate the different states for various aspects or "domains" of NG9-1-1 deployment, governance, and funding.[112] The maturity levels range from lowest to highest as "legacy," "foundational," "transitional," "intermediate," and "end state." In its most recent annual report to the National 911 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 911 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: Transitional
- Network: Foundational
- PSAP Call Handling Systems and Applications: Legacy
- Security: Foundational
- Operations: Foundational
- Optional Interfaces: Foundational

Although there is a national standard for NG9-1-1, disagreement exists in the industry about what actually constitutes "full Next Generation 9-1-1." There may not be a specific point in time when we can specifically say "Today, we have implemented NG9-1-1." Insead, viewing NG9-1-1 as an evolutionary process applicable to the entire 9-1-1 call flow is more helpful.

FCC TFOPA Maturity Model

The maturity model enables states and regional 9-1-1 authorities to gauge the status of their 9-1-1 systems with an "NG9-1-1 Readiness Scorecard" tool and an associated "NG9-1-1 Self-Assessment Matrix".[113]

[112] https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf
[113] Task Force on Optimal PSAP Architecture. (2016). Working Group 2 Phase II Supplemental Report: NG9-1-1 Readiness Scorecard. Federal Communications Commission. https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf

Next Generation 9-1-1 Readiness Scorecard						
Category	**NG9-1-1 Implementation Maturity State**					
	Legacy	**Foundational**	**Transitional**	**Intermediate**	**i3 End State - Jurisdictional**	**i3 End State - National**
GIS Data						
NG9-1-1 Dataset Creation Project Planned		X				
NG9-1-1 Dataset Creation Project in-Progress		X	Optional			
NG9-1-1 Dataset Complete				X	X	X
Data formatted for Location Verification Function (LVF)			Optional	Optional	X	X
Data formatted for Emergency Call Routing Function (ECRF)			Optional	X	X	X
Data formatted for Policy Routing Function (PRF)			Optional	X	X	X
Jurisdictional Boundaries exported to neighboring ESInets					Optional	X
NG Core Service Elements						
Legacy Selective Router Gateway (LSRG)			Optional	X	Optional	Optional
Location Verification Function (LVF)			Optional	Optional	X	X
Emergency Services Routing Proxy (ESRP)			Optional	X	X	X
Emergency Call Routing Function (ECRF)			Optional	X	X	X

Figure 3.1 - Excerpt from the TFOPA NG9-1-1 Readiness Scorecard

Each category of NG9-1-1 readiness has several tasks and states which can be assessed in progression. For example, if we say that an NG9-1-1 Dataset Creation Project has been planned but not completed, then that task could be considered to be at the "foundational" state.

The levels of readiness are defined in the TFOPA report as follows:

- Legacy State - 9-1-1 telephone service is being provided by a traditional incumbent local exchange carrier (ILEC) via circuit-switched voice and Automatic Location Identification (ALI) infrastructure.
- Foundational State - the groundwork and planning for NG9-1-1 implementation has been initiated. NG9-1-1 feasibility studies are being performed, Geographic Information System (GIS) data preparation has commenced, and IP networks may be implemented. NG9-1-1 core services are not yet operational, but their procurement is either planned or underway.

- Transitional State - services have migrated partially from the Legacy State and are provided via an Emergency Services IP Network (ESInet), but call routing is still based on ESNs. And a governance model has been established. This is the first state in which certain Next Generation Core Service elements may be implemented.

- Intermediate State - all i3 Core functions within the control of the 9-1-1 Authority have been implemented and all calls are routed per GIS boundaries and location information (i3 algorithms). Additionally, i3 PSAP multimedia call handling systems (terminating ESRPs) have been implemented. Infrastructure and applications are being refined to incorporate advanced call and data delivery interfaces. Business and performance elements are maturing and are reviewed in regular intervals to optimize operations. Governance agreements are in place and the model is functioning. Systems in the Intermediate State are said to be NG9-1-1 READY.

- Jurisdictional End State - the PSAPs are served by i3 standards-based systems and/or elements, from ingress through multimedia "call" handling. Originating Service Providers are providing direct SIP interfaces and location information during call set-up time. If more than one ESInet exists, they are interconnected and provide interoperability which is supported by established agreements, policies and procedures. Systems in the End State are NG9-1-1 Compliant.

The TFOPA report also includes a final category labeled “National End State”. Since we are applying this assessment to one state only, our best possible status is the Jurisdictional End State.

Colorado is in the **Transitional State**. All PSAPs have migrated to CenturyLink’s ESInet Service. Although IP-based, the service still uses legacy E9-1-1 ESNs to determine call routing. MSAGs are still being maintained and legacy selective routers still process calls where necessary.

The Intermediate State informs the next steps to advance Colorado’s NG9-1-1 implementation:

- The i3 Core functions within the span of control are operational
- All calls are routed per GIS boundaries and location information, using i3 core services
- An i3 PSAP multimedia call handling system has been established
- Infrastructure and applications are being refined to incorporate advanced call and data delivery interfaces
- Business and performance elements are maturing and are reviewed at regular intervals
- Governance agreements are in place and functioning

The industry-recognized standard for NG9-1-1 protocols is the "NENA i3" standard, an ANSI-approved technical standard developed by a large array of stakeholders through NENA.[114,115] APCO published their "Definitive Guide to Next Generation 9-1-1" in August 2022, which outlines additional considerations regarding implementation of NG9-1-1 and provides a draft scope of work if NG9-1-1 were to be purchased through a Request for Proposal process.[116]
It should be noted that local 9-1-1 governing bodies in Colorado purchase NG9-1-1 service through a Commission-regulated tariff, rather than a statewide RFP and contract.

NG911 and FirstNet

FirstNet, the common name for the National Public Safety Broadband Network (NPSBN), 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 PSAP which could forward such data to field responding units. Implementation of the NPSBN does not remove the need for NG9-1-1. They are two separate systems, and the functionality of both networks are needed to complete the additional-data chain from the public to the first responders.

History, Planning, Transition, and Implementation

On August 31, 2018, the Commission approved a jointly-proposed settlement between CenturyLink[117] and a number of local 9-1-1 governing bodies for transitioning the legacy 9-1-1 network to a fully IP-based ESInet. This settlement called for the creation of an ESInet Users Group to be formed as a committee of the Commission's existing 9-1-1 Advisory Task Force, to oversee the implementation and statewide deployment of the ESInet. A final version of the amended CenturyLink tariff at the Commission was filed on December 28, 2018[118], and was subsequently modified through additional filings on May 10, 2019[119] and March 17, 2023[120].

The Commission-approved tariff contained a schedule for each PSAP to migrate to the ESInet over the course of 13 months, starting in October of 2019 and completing in October of 2020. This schedule was revised on a rolling basis and was essentially complete by early 2022.

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[114] https://www.nena.org/page/i3_Stage3
[115] Colorado 9-1-1 Advisory Task Force, "Recommended 9-1-1 Standards". Published May 11, 2022. https://docs.google.com/document/d/1z2U7ABOpiGocRN84kvhYklWtZtxkW-qzF9k2y6Zm2N4
[116] https://www.apcointl.org/technology/next-generation-9-1-1/apcos-definitive-guide-to-next-generation-9-1-1/
[117] CenturyLink QC, doing business as Lumen Technologies, also sometimes filing as Qwest Communications.
[118] See Proceeding 18AL-0916T.
[119] See Proceeding 19AL-0238T.
[120] See Proceeding 23AL-0133T.

The ESInet Users Group has been meeting regularly since 2019 and is instrumental in identifying concerns and issues of the local 9-1-1 governing body representatives that make up the voting membership. It will continue to help resolve ESInet service issues between CenturyLink and the 9-1-1 governing bodies or PSAPs. Commission staff also participate in the meetings. If issues cannot be resolved within the ESInet Users Group, parties may petition the Commission for resolution.

Migration of Colorado's PSAPs to the ESInet was only the beginning, not the end of NG9-1-1 implementation. The ESInet is the foundation upon which the core and advanced NG9-1-1 functions can operate, and with its implementation comes an opportunity for the stakeholder groups to begin planning what they want Colorado's NG9-1-1 system to be. Planning future development of NG9-1-1 service and negotiating the details and costs with CenturyLink is a current task.

Not long after ESInet implementation was complete the ESInet Users Group requested terms and pricing from CenturyLink for additional tariffed statewide ESInet services: delivery of text-to-9-1-1 calls, a 9-1-1 call data metrics system known as ECaTS, GIS-based 9-1-1 call routing, and 9-1-1 GIS data tools to assist 9-1-1 governing bodies with preparing local GIS data for use in call routing. After several workshop discussions a tariff amendment was filed by CenturyLink on March 17, 2023. With the subsequent Commission proceeding adjudicated, ECaTS service is now provided statewide for call metrics and analysis.

The Users Group also monitors ESInet quality of service metrics, including latency, jitter, packet loss,[121] and others to ensure compliance with the ranges specified in the tariff.

A critical component of the planning, transition, and implementation of the ESInet has been ensuring proper funding. As outlined in the tariff amendment approved in late 2018, significantly higher Basic Emergency Service (BES) rates went into effect for the local 9-1-1 governing bodies after their PSAPs migrated to the ESInet. The legacy BES E9-1-1 rates cost 9-1-1 governing bodies approximately $2.9 million per year in aggregate, whereas the costs for BES ESInet rates totaled approximately $5.9 million per year. This sudden need for additional funding prompted 9-1-1 stakeholders, including the Legislative Committee of the Commission's 9-1-1 Advisory Task Force, to begin working with legislative sponsors to implement a solution.

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

The resulting passage of HB 20-1293 created a new statewide 9-1-1 funding mechanism to supplement existing local Emergency Telephone Charges in the form of a state 9-1-1 Surcharge. This enabled the Commission to reimburse the 9-1-1 governing bodies for their monthly recurring ESInet service costs. The 9-1-1 Surcharge can also be leveraged to offset costs of additional statewide features and services, such as the recently added ECaTS, and the remaining components necessary for full implementation of NG9-1-1.

Projected Timeline for Full Implementation

The ESINet Users Group is currently revising its NG9-1-1 Strategic Plan. It intends to include different aspects of implementation as 1-3 year goals and longer-term goals.[122] Some of the timing, however, is dependent on CenturyLink and its subcontractors, as well as the Originating Service Provider (OSP) telephone companies, to implement additional components necessary for achievingNENA i3 NG9-1-1 service.

Most states which have made significant progress toward full implementation of NG9-1-1 have a state-level purchasing mechanism via a Request for Proposals and awarding of contracts, allowing more direct control over the timeline. Colorado currently only has a local purchasing mechanism for 9-1-1 telephone services, through the Commission-approved tariff, although the creation of the 9-1-1 Services Enterprise in 2024 may provide an additional statewide purchasing avenue. Although the tariff model does have benefits over the contract model, it gives more control to the provider for changing or adding new services. The ESInet Users Group may propose a timeline for further NG9-1-1 implementation, but only CenturyLink can file tariff amendments to bring that to fruition.

5. Funding and Fiscal Outlook

Costs of Providing 9-1-1 Service

It is difficult to determine with accuracy the total cost of providing 9-1-1 service in Colorado. Some costs are borne directly by the local 9-1-1 governing bodies, whether directly or as a funding entity for 9-1-1 service. Other costs are borne by the entities that operate the PSAPs. Some of those costs may not even be attributed to the PSAP budget, particularly when a PSAP is housed within a larger facility operated by a county or municipal government.

Each year, Commission Staff issues a costs and revenues data request to all governing bodies. Note that § 29-11-102(4), C.R.S., requires governing bodies to respond to annual data requests provided by the Commission, but does not provide penalties for non-compliance. Current data will be provided in each annual State of 9-1-1 Report.

[122] See https://docs.google.com/document/d/1SbsHfCjbJ_aKAkD8IfGZqRRz6-44-ZBu35BW1DZmXCw

Funding Sources

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

- The state 9-1-1 Surcharge, implemented in January of 2021 after the passage of HB 20-1293. It is set annually by the Commission, and imposed on wireline, wireless, and interconnected VoIP telephone services per line per month.

- Local Emergency Telephone Charges (ETC), imposed separately by the 57 9-1-1 governing bodies on wireline, wireless, and interconnected VoIP telephone services per line per month.[123]

- The state Prepaid Wireless 9-1-1 Charge, which is set annually by the Commission and applied per purchase of service minutes.

- Annual user fees paid by emergency response agencies to PSAPs for dispatching services.

- General funds of counties, municipalities, and Title 32 special districts.

The State 9-1-1 Surcharge

The state 9-1-1 Surcharge was first implemented in January of 2021. Statute directs the Commission to reasonably calculate and set the rate annually "to meet the needs of governing bodies to operate the 9-1-1 system."[124] The rate is capped at $0.50 per "9-1-1 access connection," meaning telephone line, per month.

Because local ETCs and prepaid wireless 9-1-1 charges also provide funding to meet the needs, the Commission has primarily used the state 9-1-1 Surcharge to reimburse the governing bodies for the cost of BES 9-1-1 call delivery to the PSAPs. The tariff fees the governing bodies pay for BES are charged per concurrent session (9-1-1 line to a PSAP). Therefore, the revenues of the state 9-1-1 Surcharge are distributed to the governing bodies based on how many BES concurrent sessions they are purchasing from CenturyLink.[125] The common basis of the concurrent session enables simple calculation of a state 9-1-1 Surcharge rate that will reimburse the governing bodies for those costs.

[123] § 29-11-102(2)(a) and (b), C.R.S.
[124] § 29-11-102.3(1)(b), C.R.S.
[125] A "concurrent session" is a connection to the ESInet. The number of concurrent sessions that a PSAP has determines the number of simultaneous 9-1-1 calls that can be received by the PSAP.

Local Emergency Telephone Charges (ETC)

Governing bodies may impose an ETC rate sufficient for their service needs up to a threshold set annually by the Commission.[126] The effective date of a new rate must be either February 1st or June 1st, and the governing body must provide notice of the new rate to telecommunications service providers at least 60 days prior to the effective date.

Prior to 2021, the threshold for local ETC rates requiring approval by the Commission was statutorily set at $0.70. With the passage of HB 20-1293, the Commission now sets the rate annually, taking into account "inflation and the needs of the governing bodies."[127] The threshold is currently $2.05 per line per month, which is 8¢ higher than the ETC average, as illustrated by *Figure 7.1* in the annual State of 9-1-1 report. As a result, governing bodies have more freedom to determine the appropriate ETC rate for their needs, enabling increased local funding to pay for PSAP-related expenses such as equipment, personnel, and training.

As implied above, governing bodies may file an application with the Commission for permission to impose an ETC rate that is higher than the threshold. However, this enables significant disparities in ETC rates across the state, with rates ranging from $0.70 to $4.00. The statute provides the Commission with very little guidance regarding what criteria should be used when reviewing an application for an ETC rate in excess of the threshold. Traditionally, the Commission has used three tests to evaluate an ETC rate application:

1. Whether the proposed expenses for the use of the ETC revenues are allowed pursuant to § 29-11-104, C.R.S.;
2. Whether the proposed expenses are sufficiently documented;
3. Whether budget projections, based on the eligible proposed expenses, demonstrate the need for the requested increase.

With changes to the statute due to the passage of HB 20-1293, the Commission is also now permitted to take into account efficiency of operations.[128] Comparing the efficiency of an applicant's PSAP operations against a statewide baseline requires an accurate baseline, which is difficult to establish without full participation in the Commission's statewide data collection efforts. Nonetheless, the Commission may exercise this additional authority in the future when considering ETC rates which would be significant outliers from the norm.

Prepaid Wireless 9-1-1 Charge

Prior to the implementation of HB 20-1293 the Prepaid Wireless 9-1-1 Charge was set in statute at 1.4% of the value of the prepaid wireless telecommunications service being sold, which resulted in approximately $200,000 collected per month in 2020. Beginning in January 2021 the charge was changed to a flat rate of $1.38 per transaction, which if paid on twelve purchases annually would be similar to the annual total of 9-1-1 charges on subscription telephone services. No data existed regarding how many prepaid wireless telecommunications transactions were taking place, so it was impossible to predict the revenue to be generated. Revenues of this charge significantly increased after the change to the flat rate. These funds

[126] See § 29-11-102(2)(b), C.R.S.
[127] See § 29-11-102(2)(f)(II), C.R.S.
[128] See § 29-11-102(6), C.R.S.

are currently distributed to the 9-1-1 governing bodies based on wireless call volumes at PSAPs, though discussions are being held about changing the basis to the same as used for BES tariff fees and distribution of the 9-1-1 Surcharge revenues, that being the 9-1-1 concurrent session counts (like 9-1-1 lines) at each PSAP.

Statutes now require the Commission to adjust the Prepaid Wireless 9-1-1 Charge rate annually using a formula that is the sum of the average local ETC rate plus the state 9-1-1 Surcharge rate for the same year.[129] This resulted in a 2022 rate of $1.63, a 2023 rate of $1.71, and a 2024 rate of $1.81.

In previous editions of this report, we expressed a concern that the flat rate per transaction fee could adversely impact low-income individuals who may be forced by circumstances to purchase prepaid wireless minutes in smaller increments, resulting in them paying more than customers who can afford prepaid services in larger quantities with fewer transactions or a subscription service. However, our research indicates that most prepaid telecommunications services are now purchased monthly, in which case the flat rate 9-1-1 charge is in parity with the average of what other consumers are paying in 9-1-1 charges.

Local Municipal and County General Funds

Commission staff is unable to determine from the data provided by the governing bodies how much of the total cost of providing local government 9-1-1 services, which include BES, Emergency Telephone Service, and Emergency Notification Service, was paid either through direct county and municipal appropriations or through agency user fees paid to the PSAPs for dispatching services. However, in most if not all cases PSAP costs are at least partially funded with local funds that are not derived from 9-1-1 charges.

In some limited cases local sales taxes have also been approved for funding public safety communications, including PSAP services. Otherwise, the remaining costs of operating Colorado's PSAPs are paid out of local government budgets. These include personnel wages and benefits, and services for human resources, payroll, legal, facilities, IT, and other administrative needs. It is impossible to calculate the costs of these, and if included in the overall cost they would raise the total significantly.

Other Funding Sources

There are currently no federal or state grant programs specifically for 9-1-1 related expenses, although there is a bill in Congress that, if passed, would authorize up to $15 billion nationwide to promote NG9-1-1 technology deployment and implementation.[130]

[129] See § 29-11-102.5(2)(c), C.R.S.
[130] H.R.1784: NG911 Advancement Act

6. Federal Activities and National Trends

Federal Activities

National 911 Program

The National 911 Program is housed within the National Highway Traffic Safety Administration (NHTSA) Office of Emergency Medical Services, and it is currently undertaking several activities.

- 9-1-1 Datapath: An initiative to create a national 9-1-1 data system that PSAPs could use for standardized classification of calls. It will allow data to be compared nationally regarding PSAP call volumes, types of calls received, types of calls for which first responders are dispatched, etc.

- CAD Assessment Project: Computer Aided Dispatch (CAD) systems, used to track calls for service and field responder activities, are used in almost all PSAPs but their functionality varies widely from vendor to vendor and even among different product lines. This nationwide assessment intends to summarize the current status of CAD systems and challenges for establishing interoperable data-sharing capability between all of them.

- COVID-19 & Other Emerging Diseases: The Program is collecting and making available resources for local 9-1-1 entities.

- Federal 9-1-1 Funding: Primarily refers to the federal NG9-1-1 grant program which has concluded, but this page lists other federal funding resources that could potentially be accessed by local 9-1-1 agencies.

- GIS Assessment Project: Intends to determine the status of Geographic Information Systems data in use by 9-1-1 agencies across the nation, identify the budget, resources, and organizations required to address challenges in current GIS initiatives, and develop strategies for addressing obstacles.

- Next Generation 9-1-1 for Public Safety Leaders: An initiative for educating public safety professionals about the benefits of Next Generation 9-1-1. Its web page contains a number of useful educational videos and other material created or collected for the purpose.

- NG9-1-1 Interoperability: This initiative involves generally supporting efforts of other organizations to ensure interoperability of NG9-1-1 components and systems and other public safety networks. It includes the efforts of the NG9-1-1 Interoperability Task Force to integrate NG9-1-1 and the National Public Safety Broadband Network (commonly referred to as FirstNet), and developing lessons learned through real-world implementations of NG9-1-1 systems and technology.

- NG9-1-1 National Roadmap: A publication which builds on work previously performed by the Federal Communications Commission's Task Force on Optimal Public Safety Answering Point (PSAP) Architecture for interoperability between state and regional NG9-1-1 systems. Commission staff participated in the development of this material.
- Next Generation 9-1-1 Self-Assessment Tool: It can be used by local and state 9-1-1 officials, including PSAP and local governing body leaders, to assess their readiness for NG9-1-1.
- NG9-1-1/PSBN Interconnection: A collaboration with public and private representatives to address the connections between Next Generation 9-1-1 systems and public safety broadband networks such as FirstNet.
- Public Safety Telecommunicator Job Reclassification: 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.

Federal Legislation

A number of 9-1-1 related bills introduced in the 117th Congress did not advance and could be reintroduced in the 118th Congress.

So far, three bills of interest to 9-1-1 stakeholders have been introduced:

H.R.3565: FCC Spectrum Auction Reauthorization[131]

- Summary: Among other things, would allow use of spectrum auction revenues to fund an NG9-1-1 implementation grant program for the states, would require states to maintain a sustainable funding mechanism for NG9-1-1, create an NG9-1-1 advisory board at NTIA, and create an NG9-1-1 Cybersecurity center at NTIA to coordinate with state and local governments.
- Status as of 08/07/2024: Ordered to be Reported (amended) on 05/24/2023, by theHouse Committee on Energy and Commerce..

H.R.2763: Protect 911 Act of 2023[132]

- Summary: Addresses public safety telecommunicator mental health with the following initiatives: (1) developing best practices to identify, prevent, and treat posttraumatic stress disorder (PTSD), (2) developing resources to help mental health professionals better treat telecommunicators, and (3) establishing grants for health and wellness programs in emergency communications centers.
- Status as of 08/07/2024: Referred to the House Committee on Energy and Commerce, on 04/20/2023.

[131] https://www.congress.gov/bill/118th-congress/house-bill/3565
[132] https://www.congress.gov/bill/118th-congress/house-bill/2763

H.R.1784: NG9-1-1 Advancement Act[133]

- Summary: Would allow for the creation of up to $15 billion in grant funding for NG9-1-1 advancement through the sale of spectrum.

- Status as of 08/07/2024: Referred to the House Subcommittee on Communications and Technology, on 03/31/2023.

Because much of the nation has not yet fully implemented NG9-1-1 there is a great deal of interest in H.R. 3565, which is seen as the more likely of the two grant funding bills for NG9-1-1 deployment (the other being H.R. 1784). If the bill were to pass then the National Telecommunications and Information Administration (NTIA) would establish rules for the grant program and issue a Notice of Funding Opportunity (NOFO). Only then could Colorado's degree of eligibility and positioning to take advantage of the grant funding be determined. Because the grant funding would be derived from FCC spectrum auctions, several years might pass before it would become available to the states.

7. Gaps, Vulnerabilities, and Needs

These items will remain in this document until addressed or mitigated. For full discussion, see current year's State of 9-1-1 Report

Challenges to Be Addressed

Challenges with Responsiveness to Service Disruptions

Continue Migration to Next Generation 9-1-1

No Public Safety Answering Point Performance and Service Standards

No Clear Path Toward Consistent Statewide Cybersecurity Defense at PSAPs

Growing Disparity in Local Emergency Telephone Charge Rates

Appendix B: Glossary

[133] https://www.congress.gov/bill/118th-congress/house-bill/1784

These definitions have been adapted from multiple sources, including *4 CCR 723-2-2131*, § 29-11-101, C.R.S., and the *NENA Knowledge Base Glossary*.[134] In a few cases, definitions were written specifically for this report.

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

9-1-1 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 9-1-1 calls.

9-1-1 Call - A request for emergency assistance from the public by dialing 9-1-1 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 to the governing body or PSAP serving the caller's location. 9-1-1 service also includes location information routed to the PSAP.

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

Automatic Location Identification (ALI) - The automatic provision to a PSAP for display, on equipment at the PSAP, of the telephone number and location of the caller.

Automatic Number Identification (ANI) - The automatic provision to a PSAP for 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 demarcation point with a governing body or PSAP, regardless of the technology used to provide the service. The aggregation of calls means the collection of 9-1-1 calls from one or more OSPs or IASPs for the purpose of selectively routing and transporting 9-1-1 calls directly to a demarcation point with a governing body or PSAP. The offering or providing of location information or selective routing directly to a governing body or PSAP is also a 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(i)* or § 29-11-101(7), C.R.S. for the full definition.)

Basic Emergency Service Network (BES network) - the portion of the 9-1-1 call path that begins at the demarcation point between an OSP or IASP and a BESP and ends at the

[134] https://kb.nena.org/wiki/Category:Glossary

demarcation point between a BESP and a governing body or PSAP to provide basic emergency service.

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

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

Emergency Call Center (ECC) - a facility designated to receive and process requests for emergency assistance, which may include 9-1-1 calls, determine the appropriate emergency response based on available resources, and coordinate the emergency response according to a specific operational policy.

Note: The term "ECC" does not have the same meaning as "PSAP," but the two terms are increasingly being used interchangeably.

Emergency Communications Specialist (ECS) - See *Public Safety Telecommunicator*.

Emergency Services IP Network (ESInet) - A managed IP network that is used for emergency services communications, and which can be shared by all public safety agencies. It provides the IP transport infrastructure upon which independent application platforms and core services can be deployed, including, but not restricted to, those necessary for providing NG911 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) - a telephone system which includes network switching, database and Public Safety Answering Point premise elements capable of providing automatic location identification data, selective routing, selective transfer, fixed transfer, and a call back number.

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. This network is operated by AT&T under the oversight of the First Responder Network Authority, which is housed within the National Telecommunications and Information Administration.

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 OSPs for delivery to a demarcation point with a BESP.

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 original switch-based 9-1-1 system design, still largely in use throughout the United States. This design originally used analog CAMA (Centralized Automated Message Accounting) trunks for delivery of 9-1-1 calls, which are capable of delivering only voice and phone numbers to the PSAP. Today, "legacy 9-1-1" systems may include some IP technology and newer types of trunks known as SS7, but are still operated primarily using analog call delivery and tabular databases for routing. Legacy 9-1-1 systems are gradually being replaced with Next Generation 9-1-1 systems, which are fully IP-based and built around open standards developed through the National Emergency Number Association and other standards development organizations.

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.

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; and

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

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 to receive and process 9-1-1 calls from a BESP.

- **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** - an emergency response coordination professional trained to receive, assess, and prioritize emergency requests for assistance, including, but not limited to:

- Determining the location of the emergency being reported
- Determining the appropriate law enforcement, fire, emergency medical, or combination of those emergency services to respond to the emergency
- Coordinating the implementation of that emergency response to the location of the emergency
- Processing requests for assistance from emergency responders.

Sometimes referred to as an "Emergency Communications Specialist" or similar title, and includes personnel who take 9-1-1 calls from the public, dispatched 9-1-1 calls for service to field responders, or both.

Selective Routing: The routing of a 9-1-1 call to the demarcation point with a governing body or PSAP based upon the location information or other factors as agreed upon by the governing body or PSAP. (Note: A "selective router" refers to a specific type of equipment in legacy 9-1-1 networks, but in this document the term selective routing is used more broadly to mean the routing of 9-1-1 calls to a specific PSAP based on either legacy methods such as tabular database or based on NG911 geospatial call routing routines.)

Teletypewriter (TTY) - A device that allows people who are deaf, hard of hearing, or speech-impaired to use the telephone to communicate. The device connects to a telephone and allows users to type messages which are received character-by-character on the receiving end. A TTY is required at both ends of the conversation in order to communicate. TTY devices, although still in use today, are rapidly becoming replaced by a variety of other types of devices. Also referred to as a "Telecommunications Device for the Deaf (TDD)."

Text-to-9-1-1 - *Also* Text-to-911 and SMS-to-911. A service that allows users of 9-1-1 to send a text message directly to "911" from their mobile device and allows that text message to be relayed to the appropriate PSAP. There are interim methods of text-to-9-1-1 service that relay text-to-9-1-1 messages directly to a PSAP while 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 ESInet.

Voice-over-Internet-Protocol (VoIP) - a service that:

- enables real-time, two-way voice communications originating from or terminating at a user's in internet protocol or a successor protocol;
- utilizes a broadband connection from the user's location; and
- permits a user to generally receive calls that originate on the public switched network and to terminate calls to the public switched telephone network.

Appendix C: Participating Stakeholders

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

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

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

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 Homeland Security Advisory Committee's Public Safety Communications Subcommittee

Commission Staff involved in the development and updating of this report consisted of:

- Daryl Branson, PUC telecom program section chief
- Jennifer Kirkland, state 9-1-1 program manager
- Holly Bise, state TRS program manager
- Jolene Sena, telecom surcharge administrator

Appendix D: 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 Colorado Council of Authorities
www.ccoa911.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 911 Administrators
www.nasna911.org

The National 911 Program
www.911.gov

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

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

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

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

The Next Generation 9-1-1 Interoperability Task Force
https://ng911interop.org/
Transform 911
https://www.transform911.org/

Denise Amber Lee Foundation
https://deniseamberlee.org/

Appendix E: 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, and may help legislators better understand issues of concern to their

constituents.

"If my food delivery or rideshare app can find me, why can't 9-1-1?" or "Since my cell phone location is sent to 9-1-1 when I call, why do I have to tell the call taker my address?"

Location services for wireless 9-1-1 calls were developed at a time when the handsets had no location awareness. They relied first on network-based location triangulation, followed later by GPS location calculation. Today, smartphones have several sensors that can be used in combination to determine a much more accurate location for the caller. But because the 9-1-1 system wasn't originally designed to take advantage of handset-based location information, there hasn't been an easy way to deliver this data to the dispatch center. As a result, the location information typically delivered to the dispatch center is sometimes less accurate than handset-based location information that is available to non-911 applications and commercial services. Sometimes it is not available to 9-1-1 at all.

Currently, wireless carriers, handset manufacturers, and even smartphone operating system developers are working to fix this. For example, both Apple and Google have partnerships with a firm called RapidSOS to provide enhanced handset-based location data to dispatch centers. The base level of this service is offered free of charge, though some equipment and software vendors may charge for integrating the service into 9-1-1 call handling equipment.

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

Generally speaking, 9-1-1 location technology has improved greatly over the years but it may never be 100% accurate or reliable. It is extremely useful when there is no other way to obtain the location of the emergency, such as when the caller can't speak or they don't know where they are. However, whenever possible the best practice is for the telecommunicator to ask the caller for the location of the emergency. In most cases, this will be the very first thing asked of a 9-1-1 caller.

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

The short answer is yes. Any wireless phone with a signal is able to dial 9-1-1. The Federal Communications Commission, which has regulatory authority over wireless telecommunications services, requires that the 9-1-1 call be delivered to the appropriate 9-1-1 telephone service provider. However, cell phones without a service contract or prepaid minutes can have limitations. They can call 9-1-1 but the dispatch center will not

automatically receive callback number information like normal. This will prevent the call taker from following up if the call is disconnected before the phone number can be provided verbally. 9-1-1 calls from such phones are also frequently delivered without location information, which could prevent an emergency response if the connection is lost before the location is shared verbally.

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

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

Many dispatch centers in Colorado also provide pre-arrival medical instructions and emergency medical dispatch (EMD) services. These are medical protocol systems developed by medical experts and often overseen by local medical professionals. Their purpose is to help stabilize a patient's condition until emergency medical services arrive, but doing so 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 ability.

Typically, emergency medical services are dispatched early in the call and then EMD is performed while responders are en route, so there is little to no delay due to EMD questions.

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

If you attempt to send a text message to 9-1-1 in an area that does not have the service you will receive a "bounceback" message stating it isn't available and to instead make a phone call to 9-1-1. 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 dispatch centers contract with third party interpreter services to provide language translation. If one is available the call taker can bring on an interpreter for a 3-way call. However, not all dispatch centers use such services.

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

Next Generation 9-1-1 (NG9-1-1) is the standards-based delivery of 9-1-1 calls and other information to a dispatch center via modern Internet Protocol (IP) networks and services. Upgrading the existing legacy E9-1-1 service to Next Generation 9-1-1 service has many benefits, including making the system more resilient and flexible, allowing for dynamic rerouting 9-1-1 calls when necessary, and opening the network to accept other types of data such as medical information, automatic crash notification and metrics, pictures, videos, etc.

NG9-1-1 connects the citizen with the dispatch center.

FirstNet, the commonly used name for the National Public Safety Broadband Network (NPSBN), is a wireless broadband network for public safety agencies that will allow responders in the field to share data and media such as pictures, building schematics, and more. FirstNet connects emergency service personnel to each other, including those at the dispatch center and the various field responders.

The best way to describe Next Generation 9-1-1 and FirstNet together is that both are needed to transmit and deliver data and multimedia all the way from citizens to field responders.