



Report on the State of 9-1-1 Services in Colorado 2015

Prepared by the Colorado 9-1-1 Resource Center

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COLORADO
Department of
Regulatory Agencies
Public Utilities Commission

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Introduction and Disclaimer

The purpose of this document is to provide an overview of the state of 9-1-1 services in Colorado, focusing on the consistency and availability of services as well as operational conditions at Colorado Public Safety Answering Points (PSAPs). Much of the information used to inform this document comes from the Colorado 9-1-1 Resource Center, though other sources are cited as appropriate. Starting with this 2015 edition, this report is being produced jointly by the Colorado 9-1-1 Resource Center and the Colorado Department of Regulatory Agencies.

It is intended that this document will be updated and republished annually. This is the seventh edition. A copy of this report and previous reports can be found at the Colorado 911 Resource Center's [Publications Page](#)¹.

Starting with this 2015 edition, this report is being produced jointly by the Colorado 9-1-1 Resource Center and the Colorado Department of Regulatory Agencies, with input from members of the Colorado 9-1-1 service community. Opinions in this document do not represent the opinions of the Colorado Public Utilities Commission or the state's local 9-1-1 Authorities and Public Safety Answering Points.

There are 97 separate Public Safety Answering Points (PSAPs) in Colorado, including both primary PSAPs (those that take 9-1-1 calls directly) and secondary PSAPs (those that receive 9-1-1 calls transferred to them from a primary PSAP). Much of the information contained in this document is based on data obtained through online PSAP profiles. These profiles allow 9-1-1 Authority representatives and PSAP managers to access and update information for their organization whenever they wish. Since participation is voluntary, the data presented in this report should not be considered definitive. As with a voluntary survey, the return rate and completion rate are incomplete.

Availability and Consistency of Landline E9-1-1 Service

Enhanced 9-1-1 (E9-1-1), strictly defined, applies only to the conventional wired telephone network and refers to selective routing, which is "the process by which 9-1-1 calls/messages are routed to the appropriate PSAP or other designated destination, based on the caller's location information" (National Emergency Number Association, 2011). More commonly, it is thought of by the public as 9-1-1 service which includes Automatic Location Identification (ALI) and Automatic Number Identification (ANI).

On a regular basis, E9-1-1 service using this definition is available everywhere in the state of Colorado.

¹ <https://sites.google.com/site/co911rc/resources/publications>

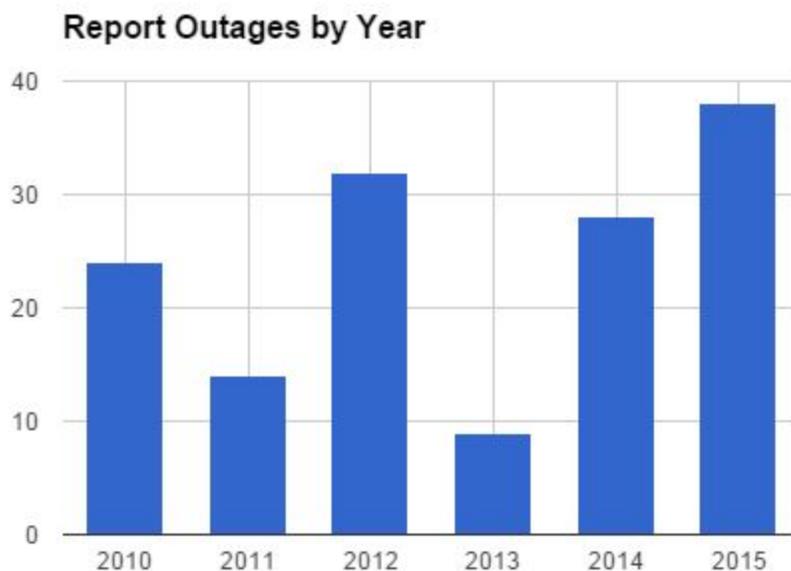
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Barring temporary outages, everywhere there is landline telephone service available, the local Public Safety Answering Point (PSAP) is able to receive ALI and ANI from those 9-1-1 calls.

Throughout the state the consistency of E9-1-1 service is entirely dependent on the reliability of local landline telephone service in any given area. The reliability of landline service, in turn, is dependent on a number of different factors, including but not limited to:

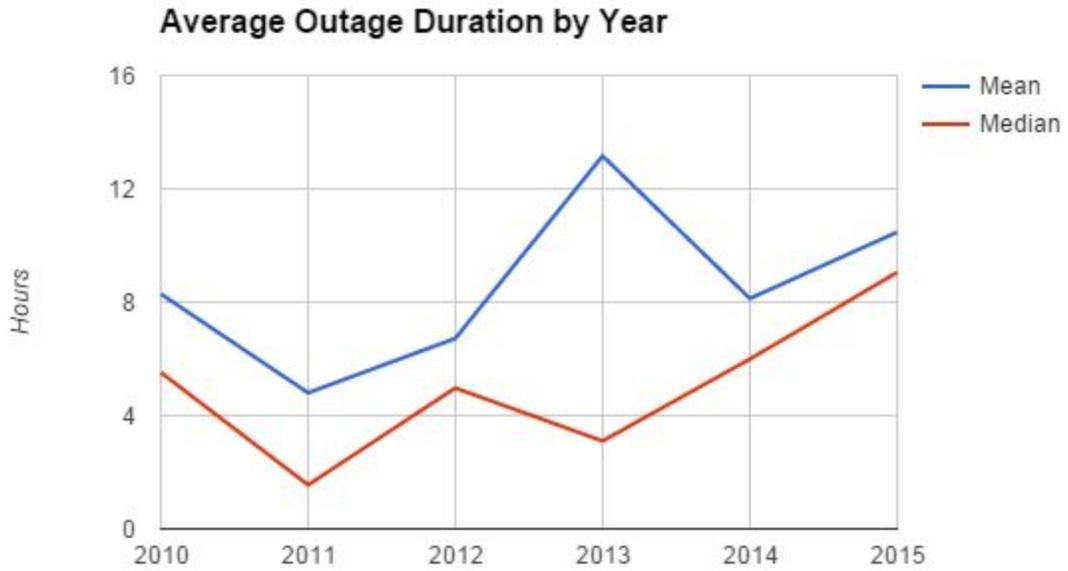
- The degree of diversity of pathways in use by local telephone service provider(s).
- The degree of redundancy of equipment and pathways in use by local telephone service provider(s).

Local exchange carriers in Colorado are required to report outages that affect 9-1-1 access to the Colorado Public Utilities Commission, and PUC staff tracks the outages reported to them. Recently, the PUC digitized its past outage reports to facilitate trending analysis.

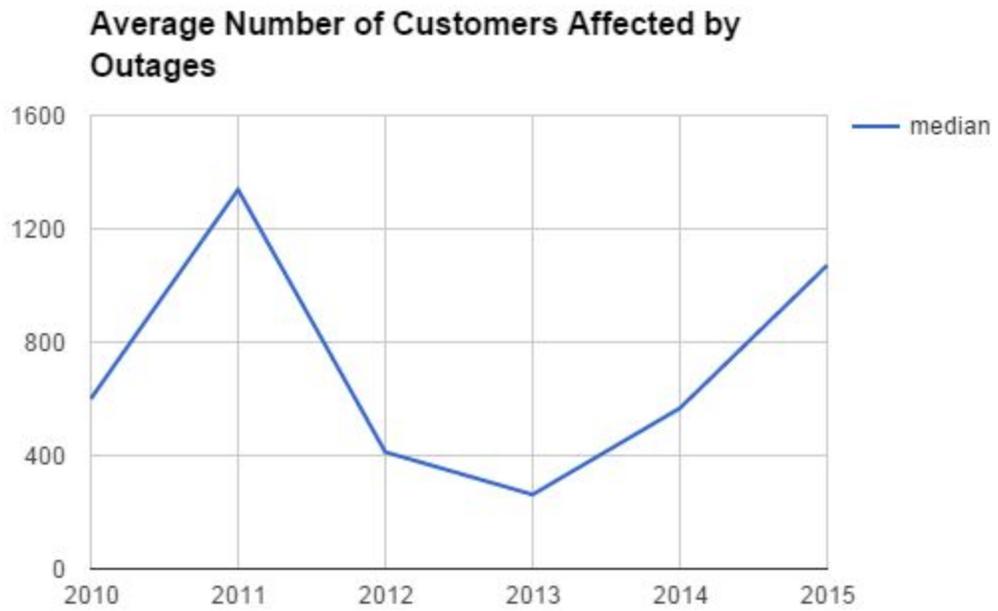


Note: for this and subsequent charts, 2015 reflects the year-to-date at the time of the creation of this report, 10/28/2015.

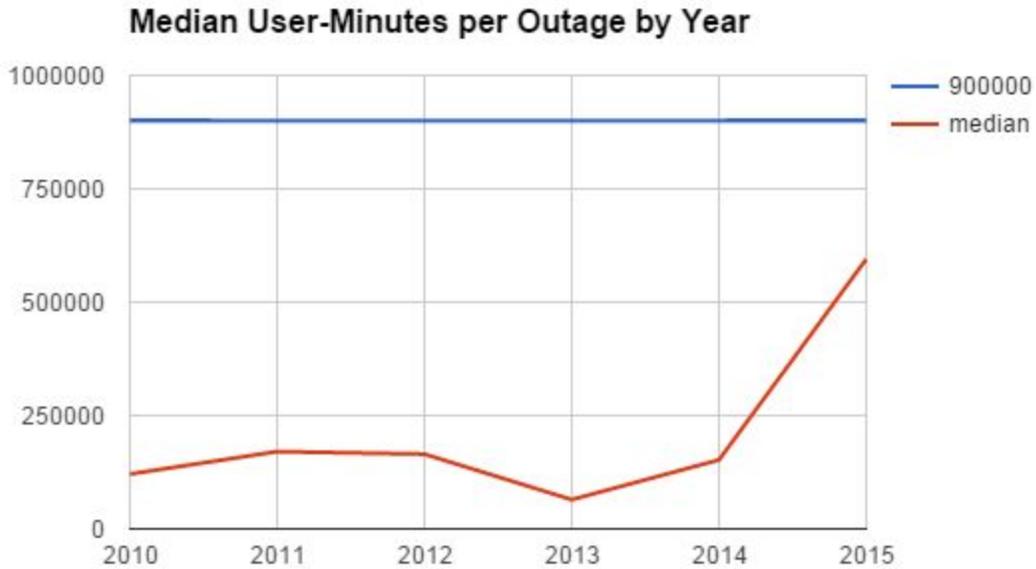
Based purely in terms of number of outages, and with the year not yet complete, 2015 has the highest volume of reports since records began.



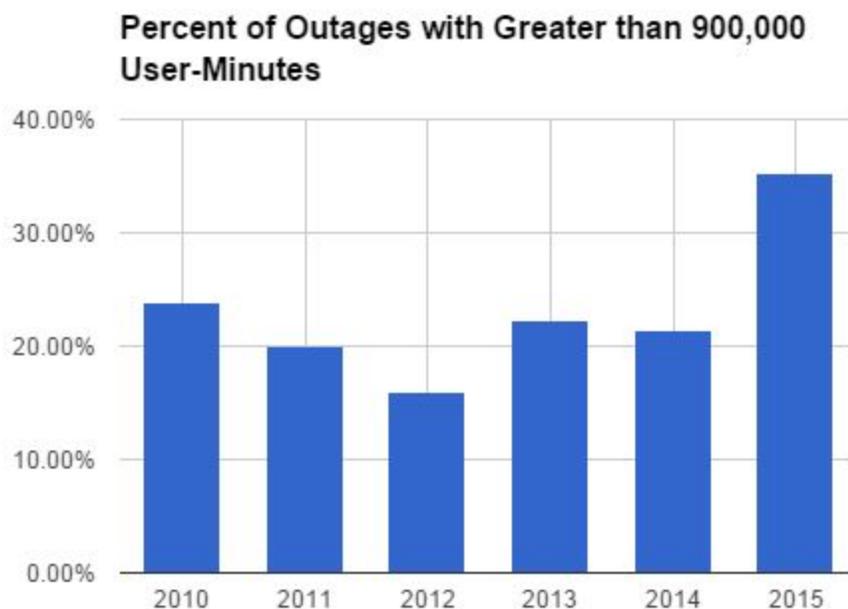
The mean duration of outages is also higher for 2015 than for 2014, and the median duration is the highest since records began.



The median number of users affected by an outage is not the highest on record, but it is higher than the previous two years.



One measure of the impact of a 911 outage is that of *user-minutes*, calculated as the number of users affected by an outage multiplied by the duration of the outage in minutes. 900,000 user-minutes is the threshold requiring reporting to the Federal Communications Commission. By this measure, most outages reported to the Public Utilities Commission do not meet FCC reporting thresholds. However, the chart above shows that the median user-minutes per outage for 2015 is significantly higher than previous years.



The above chart depicts the percentage of reported outages that meet or exceed 900,000 user-minutes. By this measure, 2015 has been Colorado’s worst year on record in terms of high-impact outages.

Since 2015 is the first year this detailed analysis of outage reports has been completed, there are certain questions that cannot yet be answered. First, it is not known how much the higher rates and impacts of outages reflected in the reports are caused by an actual increase in the number and severity of outages. It is possible that the worsening in outage reports actually reflect an increase in outage reporting, rather than an increase in outages themselves.

Second, if the statistics on outage reports reflect a real increase in the frequency of outages and severity of outages, it is not known whether this is an anomaly or the beginning of an unfortunate trend.

See the section [Network Reliability and Resiliency](#) for further information.

Availability and Consistency of Wireless E9-1-1 Service

Overview

Wireless Enhanced 9-1-1 Service comes in two phases. Phase I Wireless Enhanced 9-1-1 Service refers to a situation in which several conditions are met:

- 9-1-1 calls placed by cellular telephone users within the PSAP's service area are routed to the PSAP via their 9-1-1 trunks.
- The PSAP is equipped to receive ANI and ALI data from cellular telephone calls placed to 9-1-1.
- The cellular telephone service provider(s) in the PSAP's service area are capable of delivering ANI and ALI data pertaining to the caller to the PSAP.

Phase I Wireless Enhanced 9-1-1 Service delivers only limited information in the ALI data along with 9-1-1 calls routed to the PSAP. Among other pieces of information, the ALI data includes:

- The name of the cellular telephone service provider.
- The address or a description of the location of the cellular tower that is receiving the cellular call.
- The callback number of the cellular telephone user.

Phase II Wireless Enhanced 9-1-1 requires all of the components listed above, but must also deliver the latitude and longitude of the caller in the ALI data. The data may also include a certainty score. While it is not strictly required for 9-1-1 service to be considered Phase II Wireless Enhanced, it is also generally accepted that some sort of electronic mapping capability within the PSAP is an essential component for the purpose of displaying a caller's location.

A thorough analysis of the availability of Wireless Enhanced 9-1-1 Service requires several considerations. First, the PSAPs in question must be equipped to receive Wireless Enhanced 9-1-1 calls and data.

Second, once the PSAPs are equipped to receive such calls and data, the cellular telephone service provider(s) within the PSAP's service area must be able to deliver calls and data in the Wireless Enhanced 9-1-1 format. This is a more complicated issue since most PSAP service areas are served by multiple cellular telephone service providers and not all providers may have the same capabilities. By rule of the Federal Communications Commission, cellular telephone service providers are required to start delivering Phase I or Phase II Wireless Enhanced 9-1-1 service within six months of being requested to do so in writing by the PSAP. However, it is not uncommon for smaller cellular telephone companies to request extensions to these deadlines. Furthermore, if a new cellular telephone service moves into a PSAP's service area, the PSAP must request that they deliver Phase I or Phase II Wireless Enhanced 9-1-1 Service, and the provider has six months to comply, even if every other company already doing business in the service area is providing Wireless Enhanced 9-1-1 Service for the PSAP.

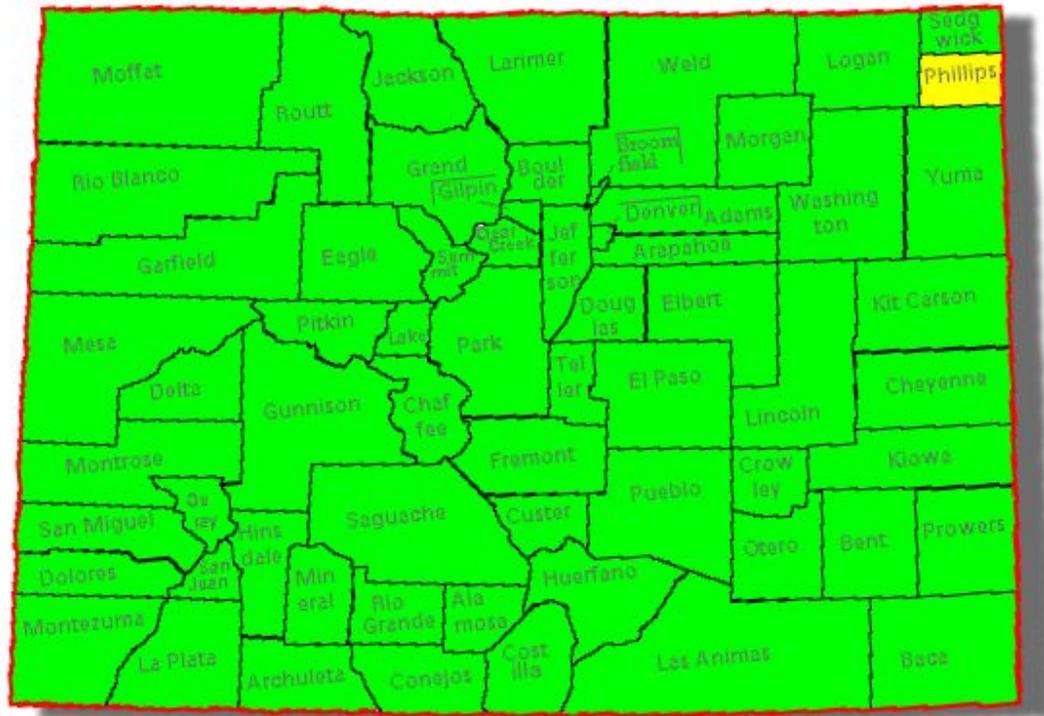
Third, even if the PSAP is capable of receiving Phase II Wireless Enhanced 9-1-1 Service and a particular cellular telephone service provider in the PSAP's service area is technically capable of delivering said calls and data, there are a lot of factors that will determine whether any particular call is delivered as a Wireless Enhanced 9-1-1 call. Cellular providers use GPS or a combination of GPS and other technologies to calculate latitude and longitude of cellular 9-1-1 calls, and heavy cloud cover, heavy foliage, canyon-like terrain, urban canyons (tall buildings), and a number of other factors can affect GPS effectiveness.

Therefore, in discussions of Wireless Enhanced 9-1-1 Service coverage, it should be noted that even if both the PSAP and the cellular telephone service provider are compliant with the requirements for delivering and receiving Wireless Enhanced 9-1-1 calls, not all calls received by the PSAP from that cellular telephone service provider will contain coordinate data for the caller. With that caveat, the most useful way to discuss Wireless Enhanced 9-1-1 Service coverage is in terms of the capabilities of the PSAPs to receive cellular 9-1-1 calls and data. The map below indicates the Wireless Enhanced 9-1-1 capability of PSAPs by County.

Gaps in Phase II Wireless Enhanced 9-1-1 Service

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- - Phase I
- - Phase II



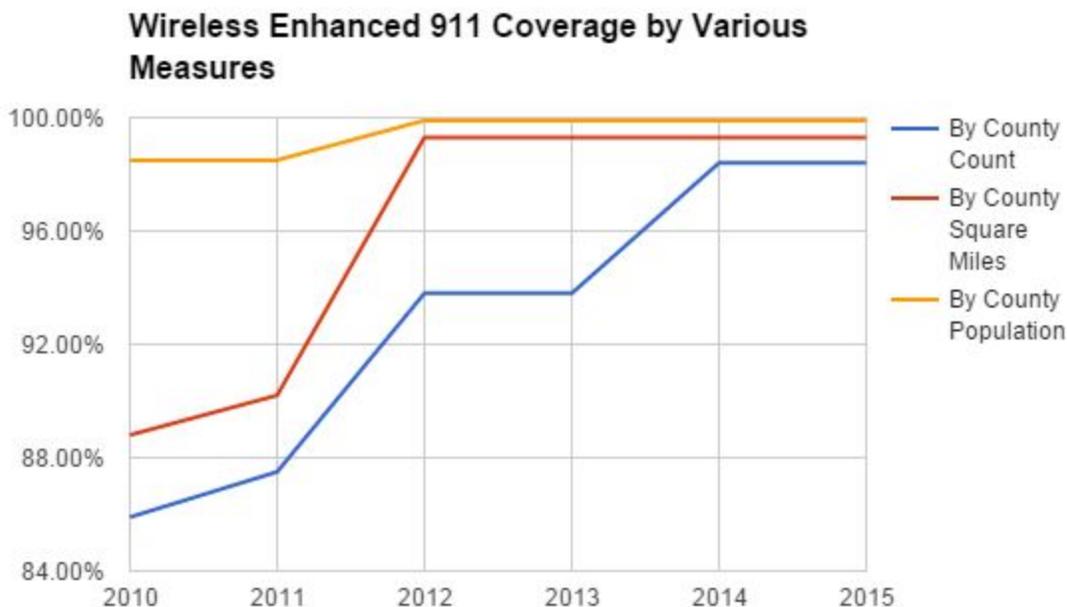
Source: diymaps.net (c)

Figure: Wireless Enhanced Capability by County

The above figure was prepared in June of 2014, but no change has occurred since then. As can be seen, all but one of the state’s PSAPs are Phase II Wireless Enhanced 9-1-1 capable. The capability rate for Colorado is:

- By county count: 98.4%
- By county square miles: 99.3%
- By county population: 99.9%

This marks near-ubiquity of Phase II coverage, and represented significant improvements over the previous several years:



Unfortunately, there is not currently an estimate for when the remaining PSAP in Phillips County, will be Phase II compliant. Phillips County reports that they provide their own ALI database services, which complicates their implementation of wireless enhanced 9-1-1.

Availability of Text-to-911 Service

In December of 2012, the four largest cell phone providers, AT&T, T-Mobile, Sprint, and Verizon agreed to offer text-to-911 nationwide in their service areas by May 15, 2014. The process for beginning to receive text-to-911 service at an individual PSAP is as follows:

1. Once it becomes available, the local 9-1-1 Authority will then be able to request the service for their Public Safety Answering Points (PSAPs) from every carrier offering the service. Different carriers will likely begin offering it at different times. The [Text-to-911 Page](#) on the Resource Center website will be updated with carriers as they begin offering service.
2. Prior to making the request, the local 9-1-1 Authority must determine that the PSAP is capable

of handling the text messages in a format that can be delivered by the carrier. Different options are available for how text-to-911 messages can be received by the PSAP.

3. Once the carrier receives the request, they will have six months to begin delivering text messages sent to 911 to the PSAP.

By the end of June 2015, all carriers are required to provide text-to-911 to PSAPs that request it.

Current Availability of Text-to-911 Service

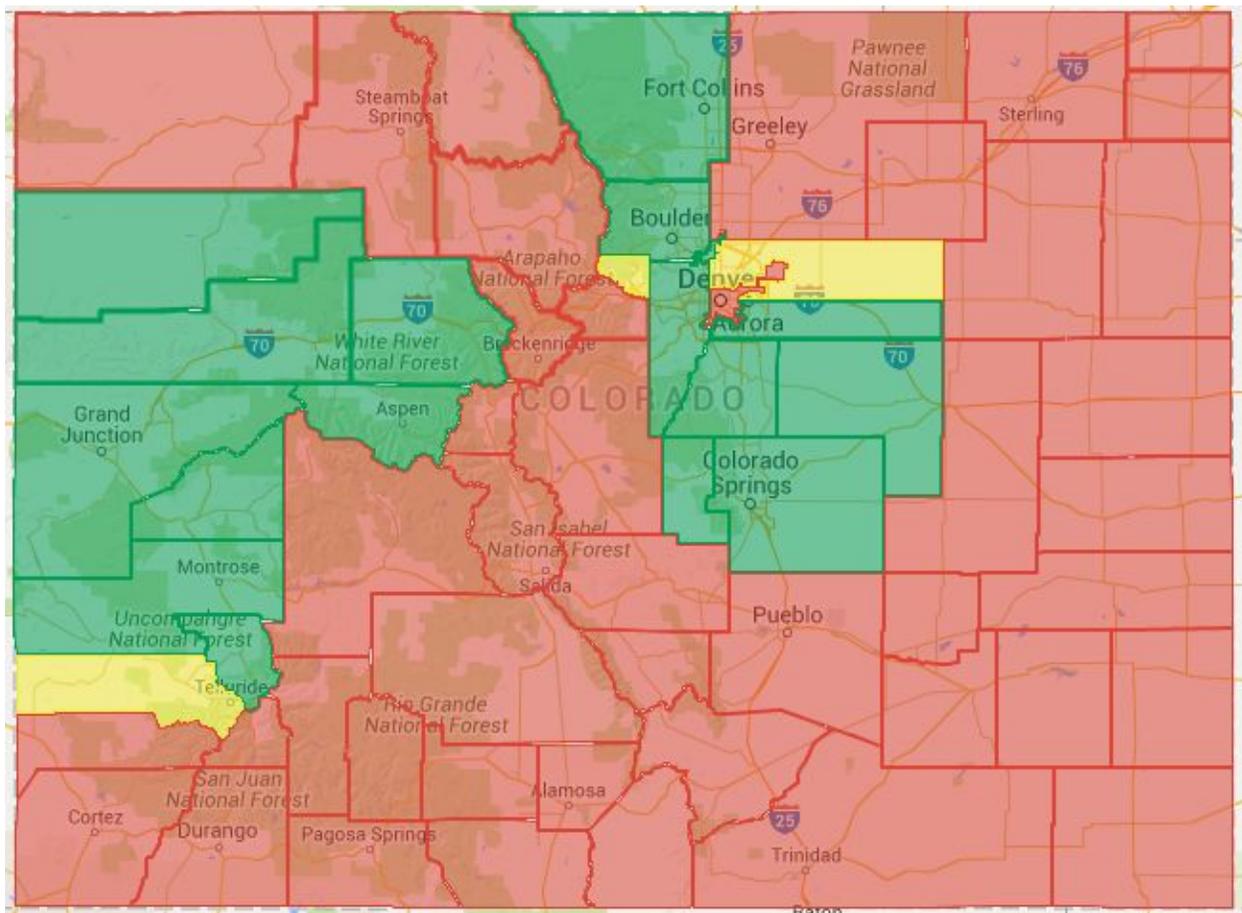


Figure: Text-to-911 availability as of 11/18/15

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

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

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

The Federal Communications Commission also maintains [a registry of PSAPs that have certified that they are text-to-911 ready](#). Registration in the database does not indicate that a PSAP is actively receiving text-to-911 calls, but rather that they are ready for the carriers to begin delivering them. PSAPs may request text-to-911 service simply by registering with the FCC in this database, rather than having to contact every wireless provider separately to request service.

Text-to-911 coverage in Colorado, at the writing of this report, encompasses 62.3% of the state's population, though only 22.6% of its area, indicating that Text-to-911 service is being adopted more rapidly in urban areas.

Text-to-911 Considerations

There are certain things local 9-1-1 Authorities should be aware of prior to attempting to implement text-to-911 service.

- PSAPs may opt to have text messages routed to a different PSAP than cell phone calls.
- Location data may be limited, and is calculated differently than location data provided for cellular voice 911 calls. The limitations on location data and the differences in how it is calculated should be understood by PSAPs implementing the service.
- Once a text-to-911 message is received by a PSAP, any additional texts from that phone will be routed to that same PSAP, even if the caller crosses into another jurisdiction. This is done to maintain the continuity of a conversation between a caller and a public safety telecommunicator. The call can be transferred to another text-capable PSAP.
- All carriers are required to provide a “bounce-back message” in areas where text-to-911 is not currently available. Anyone attempting to send a text message to 9-1-1 in those areas should receive an automated reply advising them to call 9-1-1.
- Text messages sent via “over-the-top” texting applications were not included in the original voluntary agreement by carriers to provide text-to-911 where requested by the PSAP. Interconnected “over-the-top” texting services are included in the FCC order that went into effect on December 31, 2014.
- If the caller is “roaming” on a network other than their own, the call may not be delivered. If this is the case, a bounce-back message will be sent to the caller.
- Interpretation services exist for voice calls received by PSAPs from callers speaking languages other than English, but no such translation service currently exists for non-English text messages.

Prior to accepting text messages from citizens trying to reach 911, PSAPs should have policies and procedures in place for proper processing of texted calls for service.

Text-to-911 Methods

The PSAP may have a choice in how it wants text messages delivered, and different carriers will likely

provide different options. Generally, text messages will be received one of three ways:

- On a separate, stand-alone terminal.
 - Benefits: This method is offered to the PSAP at essentially no cost. The PSAP only needs a terminal to house the browser-based interface on and an Internet connection.
 - Drawback: It is not integrated with the PSAP's phone or computer aided dispatch system. Requires another console, which may not be readily available to all of the call takers in the PSAP.
- In a computer-telephony integration (CTI) system, or computerized phone screen, if the software is able to handle text messages.
 - Benefits: Integration with the PSAPs phone system allows text from the conversation to be saved in the PSAPs native system and possibly transferred to their Computer Aided Dispatch System. Makes texting available to every call taker from their console rather than only being available from one console separately located in the call center.
 - Drawbacks: Requires a text-capable phone system and a secure IP connection from the Text Control Carrier (TCC) to the PSAP, which can be costly for smaller PSAPs.
- As a TTY call. The Text Control Center (TCC) converts text messages to ASCII so that they can be received and replied to using the same equipment the PSAP uses for communicating with callers using telecommunications devices for the deaf and hard-of-hearing.
 - Benefits: Requires no additional equipment at the PSAP.
 - Drawbacks: This option is generally considered the least desirable option, as a 9-1-1 trunk line will be tied up for the duration of the conversation and messages may become garbled if both the caller and the PSAP attempt to send a message at the same time.

Currently, the web-based stand-alone terminal and the direct-IP/CTI method are being used in Colorado.

It should be noted that all of the methods of delivering text-to-911 above are considered "interim" methods until the implementation of Next Generation 9-1-1, which will allow for text messages, along with other types of data, to be delivered to PSAPs via an Emergency Services IP-Network (ESInet). See [Migration to Next Generation 9-1-1](#) for more information.

Network Reliability and Resiliency

Overview

The Colorado 9-1-1 Resource Center distributed a survey to Public Safety Answering Points and 9-1-1 Authorities in December 2013 and early January 2014 at the request of staff of the Public Utilities Commission. Questions in the survey were developed in collaboration between staff and the Resource

Center Executive Director. The results of the survey were included in the 2013 Colorado State of 911 Report and can be viewed as [a separate document](#) on the Colorado 9-1-1 Resource Center website.

Much of the discussion concerning network reliability and resiliency had been prompted by flooding that took place in the counties of Larimer, Boulder, Weld, and other locations that resulted in extensive damage and service disruption, including telecommunications outages that affected 911 service. Because of this, the 911 Authorities most affected by these outages have been instrumental in forwarding this discussion, and the following update was provided for the State of 911 Report by Kimberly Culp, ENP, executive director of the Larimer Emergency Telephone Authority:

9-1-1 Network Reliability and Resiliency

Colorado's Emergency Telephone network was created to connect all corners of our State, our residents and our visitors, to a reliable, robust, and resilient lifeline, 9-1-1.

Colorado has faced numerous widespread disasters ranging from blizzards to wildfires, to floods and tornados. During a disaster, our infrastructure is placed under pressure, it is challenged to perform and expected to deliver a seamless connection from the citizen to the 9-1-1 answering point.

9-1-1 Authorities in Colorado pay millions of dollars every year to the 9-1-1 Basic Emergency Service Provider for 9-1-1 service. 9-1-1 Authorities in Colorado also spend millions of dollars to plan, prepare, and predict risks to the 9-1-1 service delivery. The 9-1-1 Authorities mitigate the identified risks and develop contingency plans, backup scenarios, and mutual aid agreements in an effort to ensure the citizen can reach their 9-1-1 answering point.

In 2013, certain communities in Colorado faced a major natural disaster and the 9-1-1 service failed. In some locations, 9-1-1 was down for days. While the extent and severity of this disaster were vast, the failure of 9-1-1 service called into question the resiliency of the Colorado 9-1-1 network and mandated an examination of that resiliency.

Also in 2013, the FCC completed a comprehensive inquiry [FCC 13-158 Reliability and Continuity of Communications] and developed recommendations following the devastating impacts of the Derecho Storm in June of 2012. This event left millions of Americans without 9-1-1 service and demonstrated significant vulnerabilities in the 9-1-1 network.

In the Derecho report, the FCC concluded that failures in the 9-1-1 network could have been mitigated or avoided through implementation of network-reliability best practices² and other

² See Best practices categorized as critical are those that CSRIC assessed as being most vital to communications network operators, service providers, equipment suppliers, property managers, and public safety authorities, and that "[s]ignificantly reduce the potential for a catastrophic failure of critical communications network infrastructure and/or services (e.g., telecommunication, public safety, energy sector, financial, etc.)." See CSRIC II WorkingGroup 6,

sound engineering principles.³

The FCC report continues stating preventable 9-1-1 network failures during the Derecho Storm put lives and property at risk and revealed that service providers have not consistently implemented vital best practices voluntarily despite repeated reminders and their past claims to the contrary.⁴

The Colorado floods of 2013 generated numerous life safety concerns from 9-1-1 Authorities that remain unanswered. Those concerns include:

- Physical diversity requirements for the 9-1-1 network
- Confirming that the accepted standards of best practice are being used by our 9-1-1 Provider in our 9-1-1 network.
- Lack of a physical audit of our 9-1-1 Provider to ensure vulnerabilities in our 9-1-1 network are mitigated.
- 9-1-1 outage reporting processes to ensure adequate notification to a 9-1-1 Authority when an outage in the 9-1-1 network occurs.

Colorado's 9-1-1 network has provided landline 9-1-1 coverage to our state for many years. During a disaster, the 9-1-1 network must be resilient and reliable. If points of failure in our 9-1-1 network remain unidentified, we fail our citizens.

We are now presented with an opportunity to take steps to ensure when our next disaster strikes, adequate and reasonable steps have been taken to mitigate risks and to strengthen resiliency and reliability in our one universal lifeline, 9-1-1.

Future Network Reliability and Resiliency

As of the writing of this report the Colorado Public Utilities Commission is considering proposed changes to 911 rules that include, among other things, revisions to redundancy, diversity, and reliability requirements. This is being done at the same time that the Federal Communications Commission is considering new 9-1-1 reliability rules. These rules are being considered at the same time that the transition of the telecommunications network from copper-based systems to Internet

Best Practice Implementation Final Report at 7-8 (Jan. 2011), available at

<http://transition.fcc.gov/pshs/docs/csric/WG6-Best-Practice-Implementation-Final-Report.pdf>.

³ See FCC PUB. SAFETY & HOMELAND SEC. BUREAU, IMPACT OF THE JUNE 2012 DERECHO ON COMMUNICATIONS NETWORKS AND SERVICES: REPORT AND RECOMMENDATIONS at 3-4 (PSHSB, rel. Jan. 10, 2013), available at <http://www.fcc.gov/document/derecho-report-and-recommendations> (Derecho Report).

⁴ See In the Matter of Improving 911 Reliability; Reliability and Continuity of Communications Networks, Including Broadband Technologies, PS Docket No. 13-75, PS Docket No. 11-60, Notice of Proposed Rulemaking, 28 FCC Rcd 3414, 3415 ¶ 3 (March 20, 2013) (911 Reliability NPRM).

Protocol is well underway, with most networks in a hybrid form, creating challenges to the development of rules that address the particular needs of both legacy and IP network configurations.

Migration Toward Next Generation 9-1-1

Next Generation 9-1-1 is a generic term referring to the migration of 9-1-1 services from its current infrastructure based in the conventional telephone network to an IP-network based infrastructure. Such a migration would result in a more resilient network, theoretically, and would allow for types of data to be received through the 9-1-1 network that are currently prohibited by current technology, such as text messages, picture and video messages, and other types of data. The first step to implementing NG9-1-1 is the creation of an Emergency Services IP-network (ESInet), and a number of 9-1-1 Authorities have installed or taken actions to install local ESInets, though no large-scale regional or statewide efforts have been made.

The cost of migrating 9-1-1 infrastructure to NG911 is likely beyond the resources of individual 9-1-1 Authorities in Colorado. Alternate funding of the network portion, at least, of the NG911 system in Colorado will likely have to be devised. Options for alternate funding models (or additional funding models, layered onto the existing one) have been discussed by the Colorado 9-1-1 Advisory Task Force, and discussions are currently underway among the 9-1-1 Authorities of the state on this issue.

The Colorado 9-1-1 Resource Center commissioned an NG9-1-1 options study in 2011 to review technological, funding, and governance issues concerning the potential implementation of NG9-1-1 in Colorado. The results of the study were released on Aug 29, 2011. In January 2012, the PUC's 9-1-1 Advisory Task Force held a special NG9-1-1 Summit to talk about the results of the options study and to discuss possible paths forward. The consensus reached in this meeting was to create a new group called the NG9-1-1 Steering Committee, which met monthly to discuss decisions that must be made in order to initiate a transition to NG9-1-1. This Steering Committee ceased activity in early 2013.

In mid-2013, CenturyLink filed a proposed tariff to provide NG9-1-1 services in Colorado. The tariff was later withdrawn pending the finalization of proposed 911 rule revisions, which are currently being considered.

Operational and Administrative Considerations

The working conditions, requirements, training, and equipment found in PSAPs statewide vary widely. It can be expected that such variations in resources may translate into differences in the level of service that can be offered by each individual PSAP.

Equipment

The equipment used in PSAPs statewide varies. Basic equipment categories include:

- **A telephone system** (either manual or computerized).
- **A radio dispatching system**, if the PSAP dispatches as well as answers calls, a scenario that describes every PSAP in Colorado.
- **A Computer Aided Dispatch (CAD) system**, which is used to track calls for service and the status and location of field units. Most dispatch centers have a CAD system, though there are still some that use paper-based record keeping to track calls and field unit status.
- **A backup generator** will be found in every properly equipped PSAP for use in the event of a loss of utility power.
- **An Uninterruptible Power Supply (UPS)** may also be used, sufficient to run essential equipment long enough for the generator to take the full power load.
- **A digital recording system** for all 9-1-1 lines and some or all radio channels is also necessary for accountability, quality assurance, and law enforcement support.
- **Computerized mapping**, if it exists in the PSAP, may be part of a computerized telephone system, part of the CAD system, or stand-alone. As such, it is not tracked separately in the statistics below.

The following data is from online PSAP profiles maintained through the Colorado 9-1-1 Resource Center website. For every category of equipment, the oldest piece of equipment in any PSAP in Colorado is listed, as is the average age of equipment in use in Colorado. For CAD Systems, Phone Systems, and Radio Consoles, we also list “average since last upgrade”, because a CAD system may have been installed in 2006, but had software upgrades and hardware replacement one or more times since then, so looking at only the initial installment year is not as helpful as knowing the time since last upgrade.

Starting this year, we are also including a figure for whether or not the PSAP reports that their phone system is “NG911 Capable.” Whether or not a phone system is capable of Next Generation 9-1-1 functionality may be open to interpretation as there is no official equipment certification program for NG911, but whether the PSAP believes their phone system is NG911 capable may be a useful measure. Also added is a measure of how many PSAPs report having management information systems (MIS) capability with their phone system. This is a feature found in many computerized phone systems that allow for various statistics to be generated concerning call counts by type, duration, time of day, etc.

For primary backup generator and uninterruptible power supplies, we also ask if the PSAP feels that their current system is sufficient to their needs. It is sometimes an issue that as new electronic equipment is installed in a PSAP, a generator or UPS that at one time had sufficient capacity to handle the load in a PSAP may be insufficient to handle the new load.

CAD Systems	Phone Systems	Radio Consoles
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<ul style="list-style-type: none"> ● Oldest: 28 years ● Average: 9 years ● Average since last upgrade: 4 years 	<ul style="list-style-type: none"> ● Oldest: 24 years ● Average: 7 years ● Average since last upgrade: 5 years ● NG911 capable: 84% ● MIS capable: 88% 	<ul style="list-style-type: none"> ● Oldest: 35 years ● Average: 10 years ● Average since last upgrade: 6 years
<p>Console Furniture</p> <ul style="list-style-type: none"> ● Oldest: 25 years ● Average: 8 years 	<p>Primary backup generator</p> <ul style="list-style-type: none"> ● Oldest: 29 years ● Average: 11 years ● PSAPs reporting that their primary generator is insufficient to their needs: 1.7% (1 out of 57 answering this question) 	<p>Uninterruptible Power Supply</p> <ul style="list-style-type: none"> ● Oldest: 23 years ● Average: 8 years ● PSAPs reporting that their current UPS is insufficient to their needs: 0%
<p>Recording System</p> <ul style="list-style-type: none"> ● Oldest: 15 years ● Average: 6 years 		

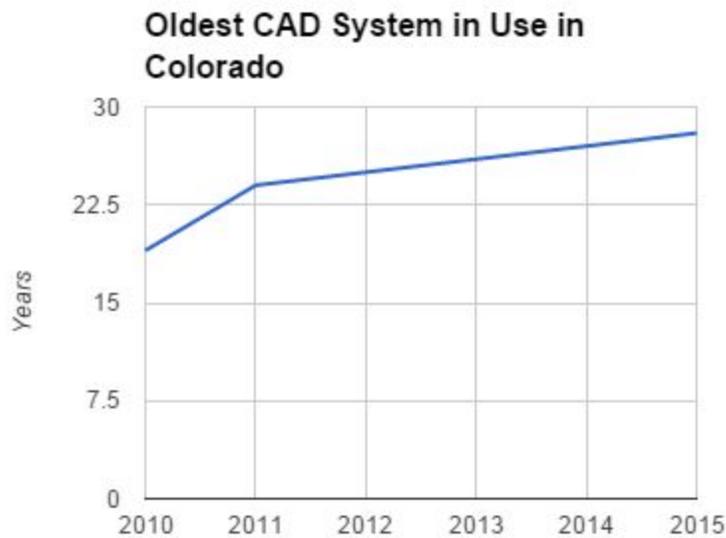


Figure: Oldest CAD System in Use in Colorado, by year

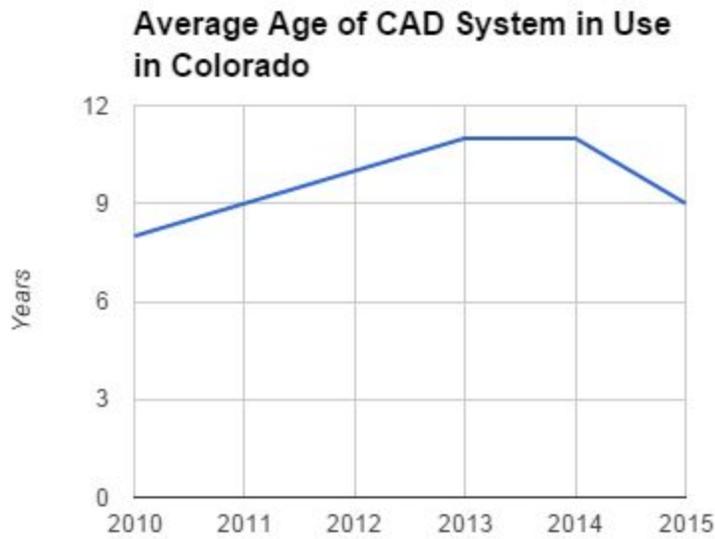


Figure: Average Age of CAD Systems in Use in Colorado, by year

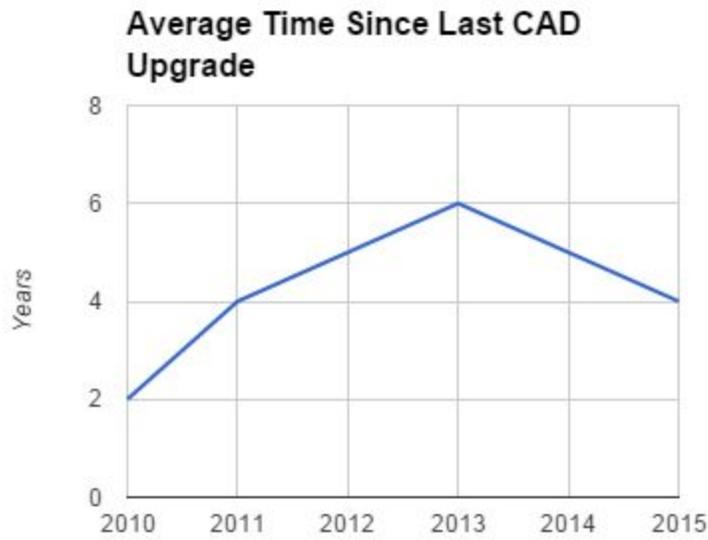


Figure: Average Time Since Last CAD Upgrade among Colorado PSAPs, by year

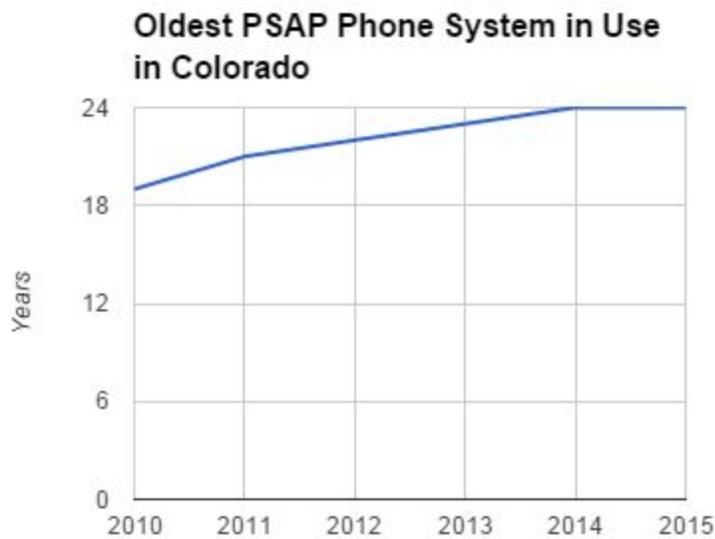


Figure: Oldest PSAP Phone system in Use in Colorado, by Year

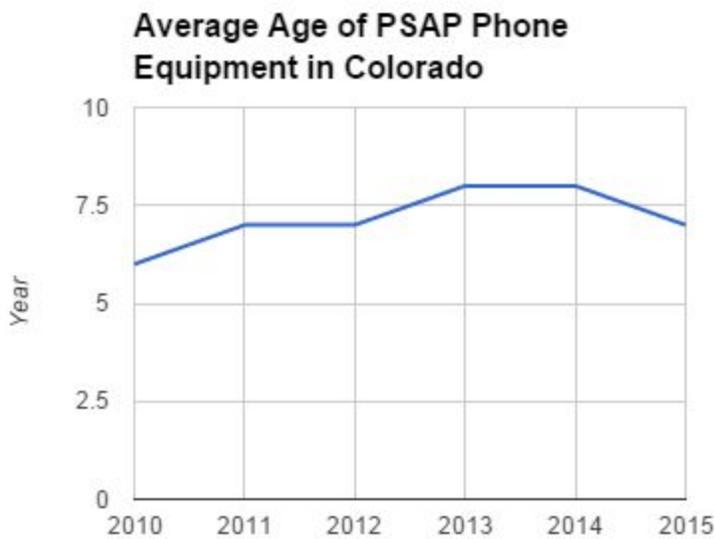


Figure: Average Age of PSAP Phone Equipment in Colorado, by Year

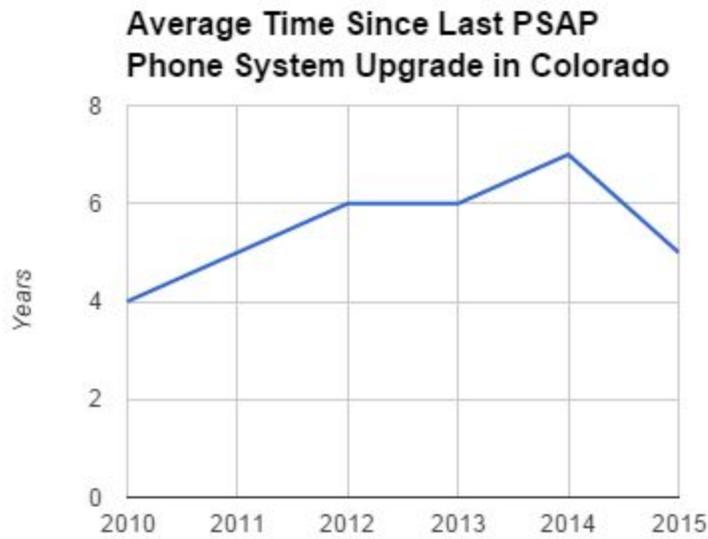


Figure: Average time Since Last PSAP Phone System Upgrade in Colorado, in years

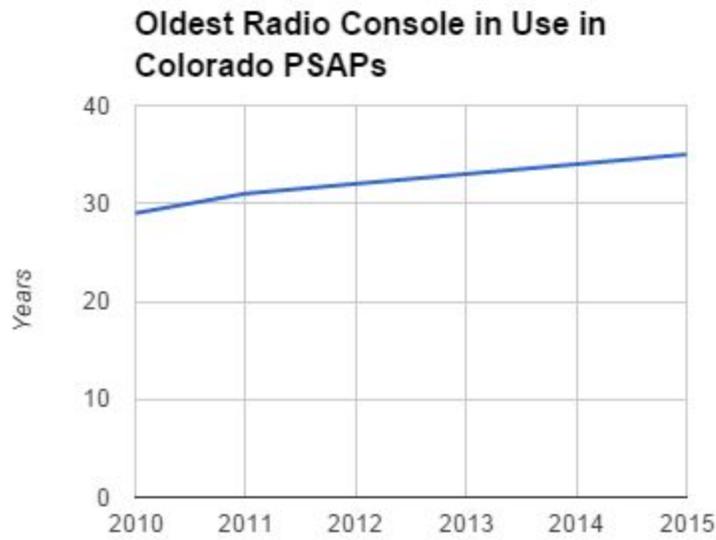


Figure: Oldest Radio Console in Use in Colorado PSAPs, by year

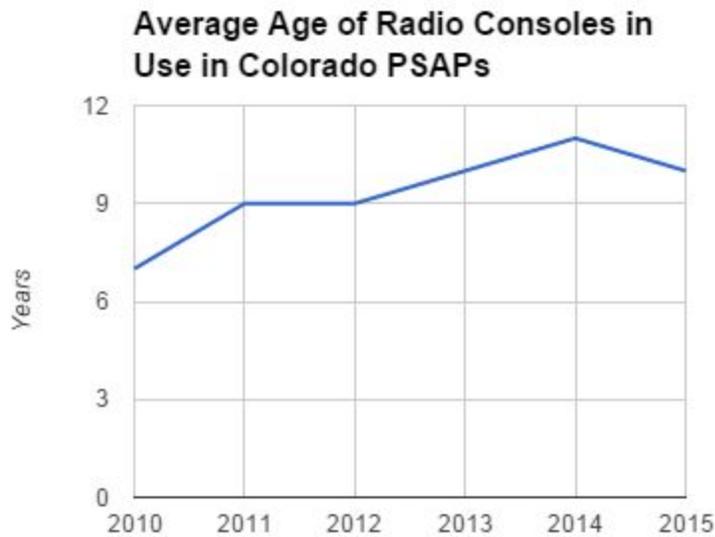


Figure: Average Age of Radio Consoles in Use in Colorado PSAPs, by year

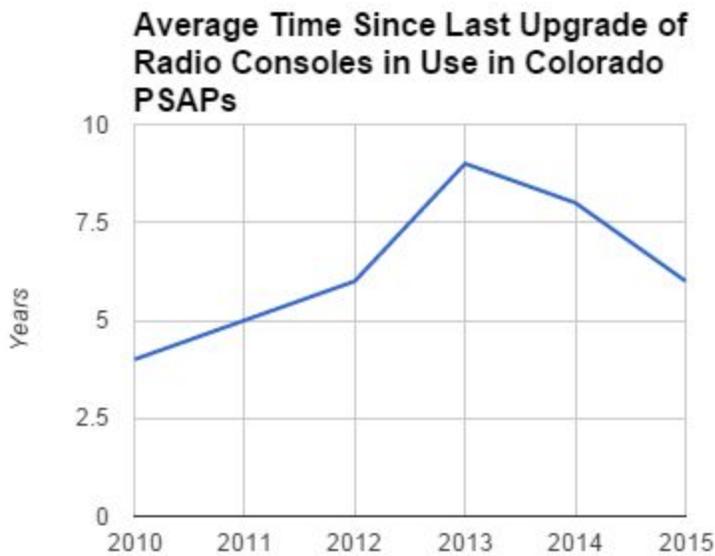


Figure: Average Time Since Last Upgrade of Radio Consoles in Use in Colorado, by year

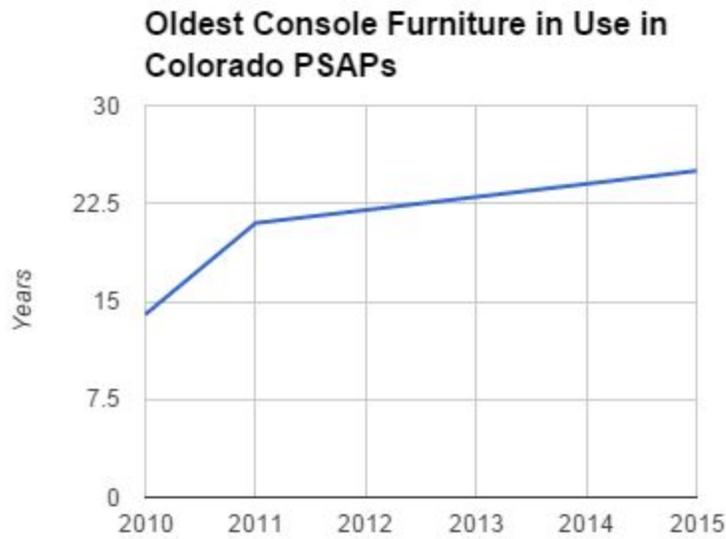


Figure: Oldest Console Furniture in Use in Colorado PSAPs, by year

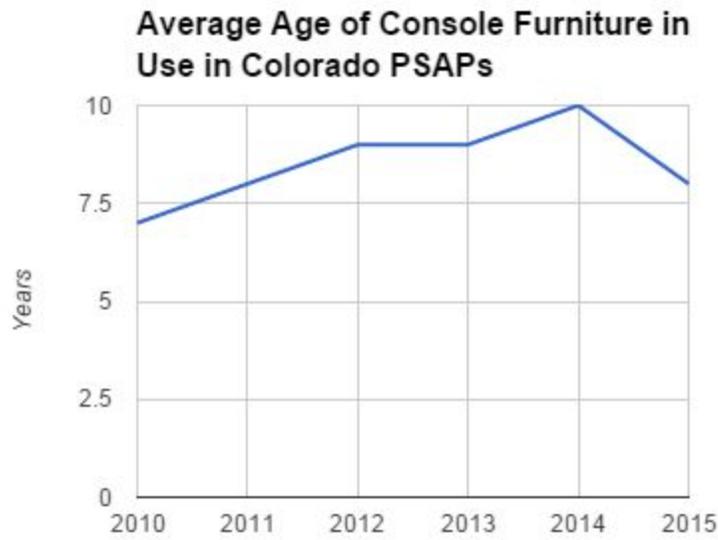


Figure: Average Age of Console Furniture in Use in Colorado PSAPs, by year

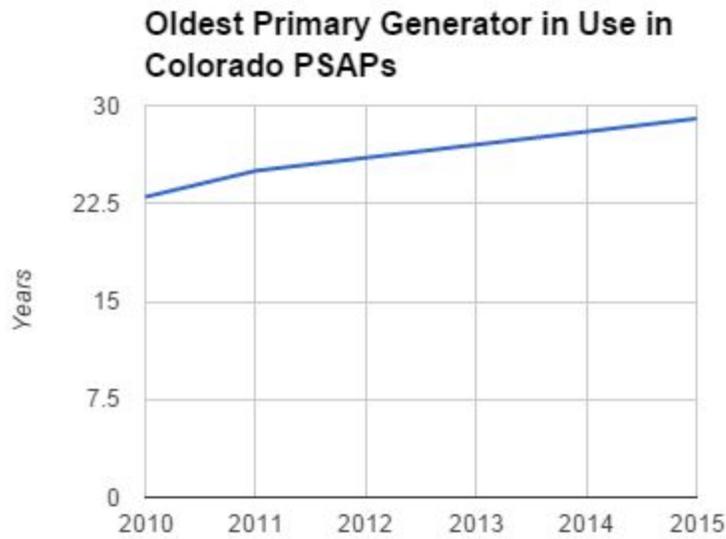


Figure: Oldest Primary Generator in Use in Colorado PSAPs, by year

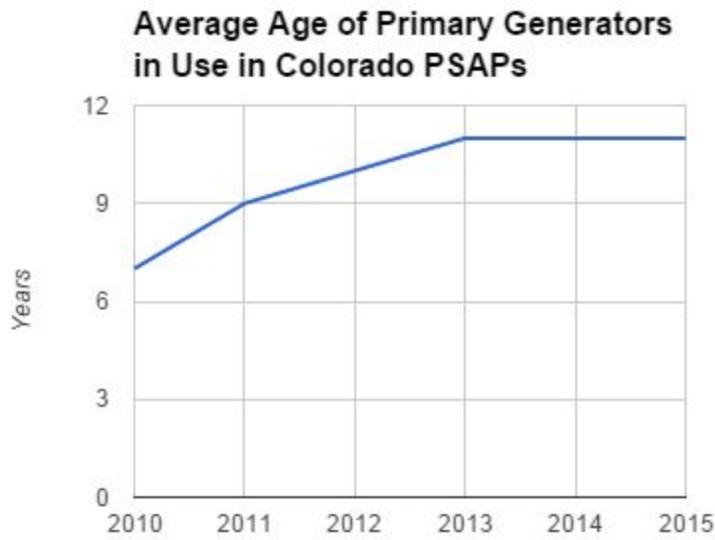


Figure: Average Age of Primary Generators in Use in Colorado PSAPs, by year

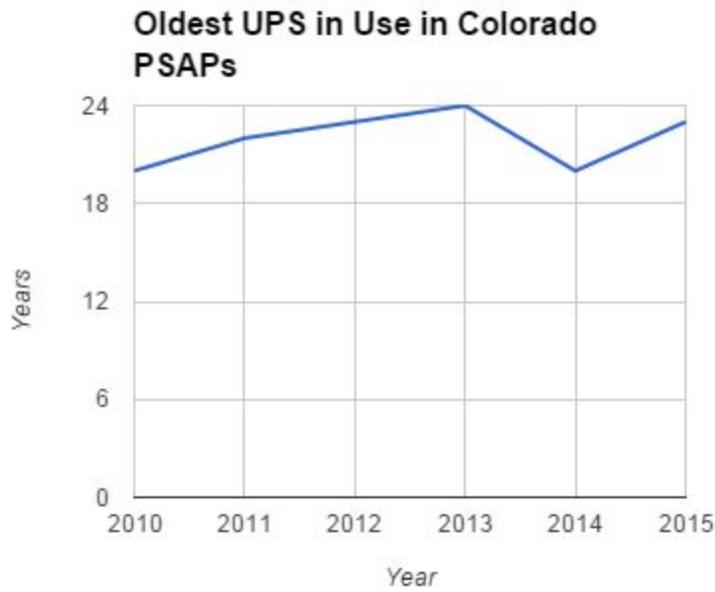


Figure: Oldest Uninterruptible Power Supply in Use in a Colorado PSAP, by year

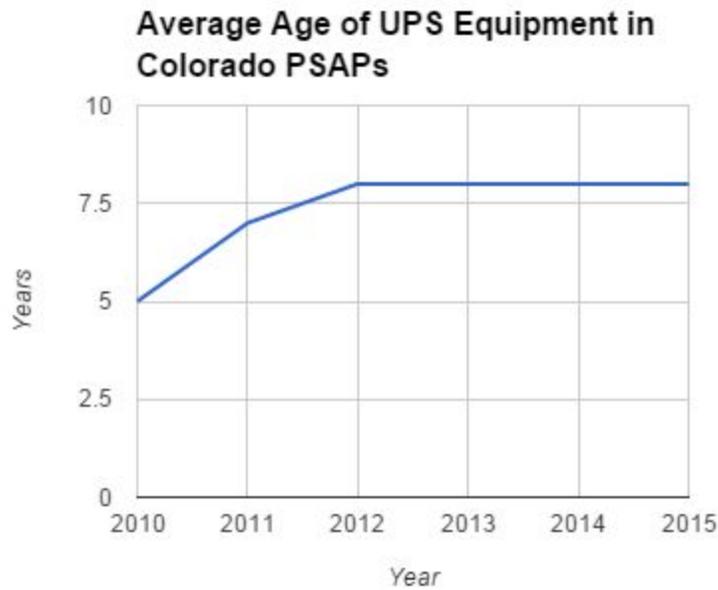


Figure: Average Age of UPS Equipment in Colorado PSAPs, by year

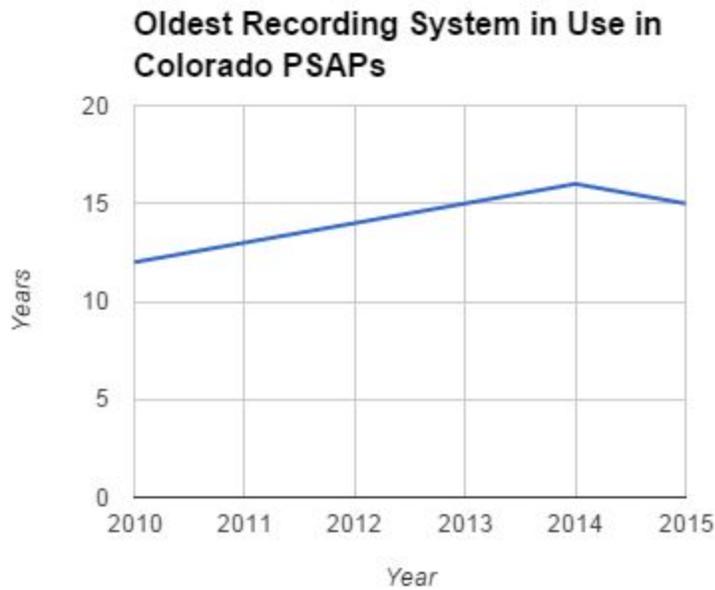


Figure: Age of Oldest Recording System in Use in Colorado PSAPs, in years

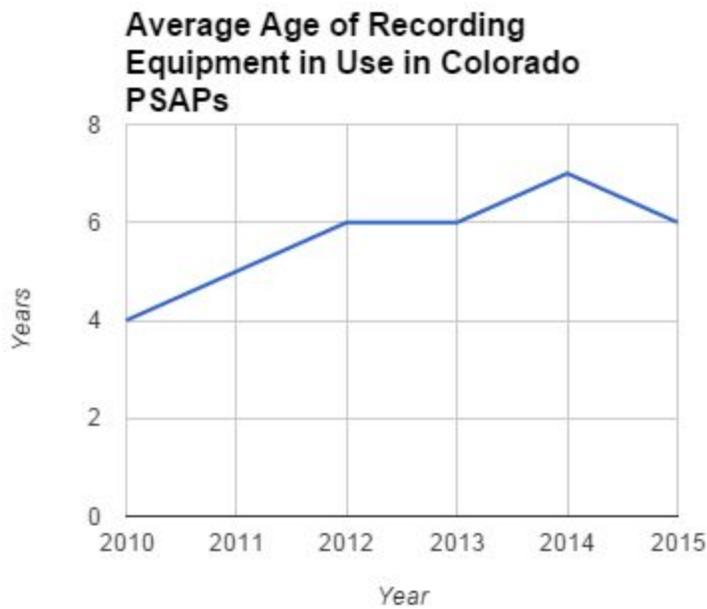


Figure: Average age of Recording Equipment in Use in Colorado PSAPs, by year

Other Equipment and Capabilities

TTY. PSAPs are required by the U.S. Department of Justice, under the Americans with Disabilities Act, to be capable of processing 9-1-1 calls using TTY devices, which are used by individuals with hearing and speech impairments to communicate via text. In many, if not most PSAPs, this capability may be integrated into their computerized telephone interface. In others, a stand-alone TTY device may be used.

TTY devices have largely been abandoned by individuals with accessibility issues in favor of SMS texting via cell phones, but many still have TTY devices and may rely on them in a time of crisis. The National Association of the Deaf also urges its members to keep their TTY devices, with 9-1-1 calling capability as one of the primary reasons⁵.

All PSAPs in Colorado completing this portion of the online PSAP profile report that they do have TTY capability. It is not known how frequently PSAPs test their TTY equipment or have telecommunicators practice using it.

MDTs. Many first responder agencies have mobile data terminals, sometimes called mobile computer terminals, in their vehicles. Most PSAPs have terminals, either stand-alone or integrated with an existing system, allowing telecommunicators at the PSAP to communicate via MDT with responders. If integrated with CAD, MDTs may be used to perform “silent dispatching,” or dispatching units to calls via the MDT rather than verbally over the radio.

Of the PSAPs completing this portion of the online PSAP profiles, 94% report that they have MDT access in the PSAP.

Interpretation Services

A number of services allow a telecommunicator to add in, on demand, a foreign language interpreter to assist with processing calls from individuals that do not speak English proficiently. Of the PSAPs completing this item of the online PSAP profiles, 88% report that they have access to third-party interpretation services.

Equipment Summary

This is the sixth year that equipment age data has been extracted from either surveys or online PSAP profile records. For the second year in a row, there are some signs that equipment ages are perhaps improving in some categories. The average ages of CAD systems, phone systems, radio consoles, console furniture, and recording systems all went down.

The oldest equipment in use in the state, however, continues to be used. The age of the oldest

⁵ National Association of the Deaf. (n.d.). Retrieved November 18, 2015, from <https://nad.org/issues/emergency-preparedness/keep-your-tty>

equipment in use in the state went up or stayed steady in every category except recording systems. This indicates that, on average, PSAPs are increasing the frequency of their equipment replacements, but that the PSAPs using the oldest equipment in the state are continuing to make do with what they have.

Wages

Introduction

The online PSAP profiles contain various data of an administrative nature, as well, particularly related to wages, staffing levels, and turnover rates. Categories of employment for which wage data was collected are below. It should be noted that not every PSAP in Colorado has every category of employee. Most Colorado PSAPs do not have a separate call taker job position, for instance, and smaller PSAPs may not have a designated supervisor, or the supervisor may be the same person supervising field units.

- **Call Taker:** Refers to an employee who has responsibility for answering and/or processing 9-1-1 calls but does not dispatch field units. In dispatch centers that have such employees, the call taker takes and processes the call, enters call for service information into the CAD system, and moves on to the next call.
- **Dispatcher:** Refers to any non-supervisory employee who has responsibility for dispatching calls for service. Dispatchers may, and in most cases do, also answer and process 9-1-1 calls from the public, often at the same time that they are tracking the status of field units. The Federal Bureau of Labor Statistics tracks average wages for public safety dispatchers by state, the most recent figures being for May 2013.
- **Supervisor:** Refers to individuals who supervise dispatch operations for a particular shift but not for all operations within the PSAP. In most cases, these are working positions, in which the supervisor also acts as a dispatcher.
- **Director:** Refers to an individual who is primarily responsible for the overall operation of the PSAP.

In all charts below, inflation rate shown is from July of each year to the previous year.

<http://www.usinflationcalculator.com/inflation/historical-inflation-rates/>



Figure: Average Starting Colorado 9-1-1 Call Taker Wages by Year.

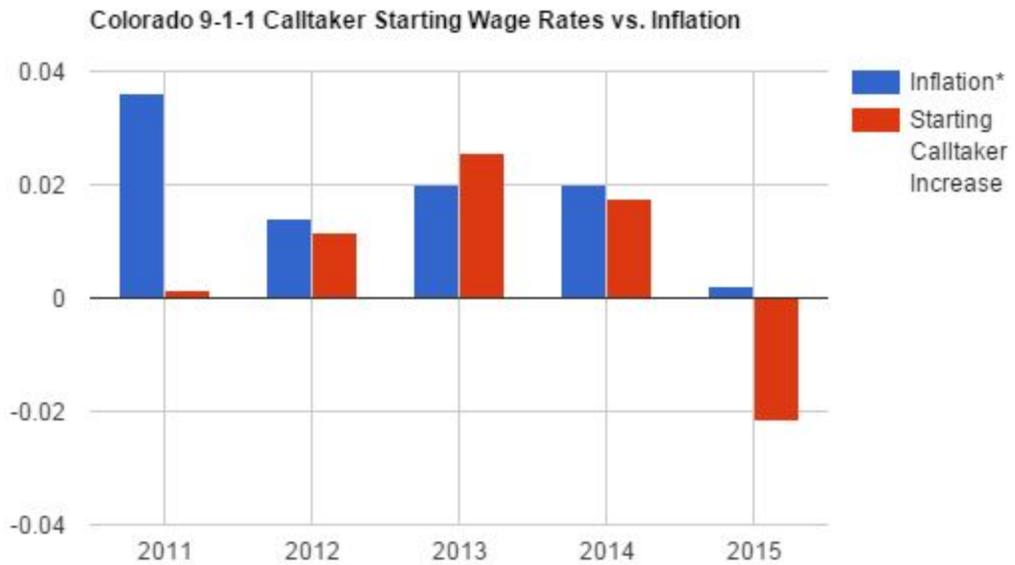


Figure: Average Starting Colorado Public Safety Call Taker Wage Increases vs. Inflation

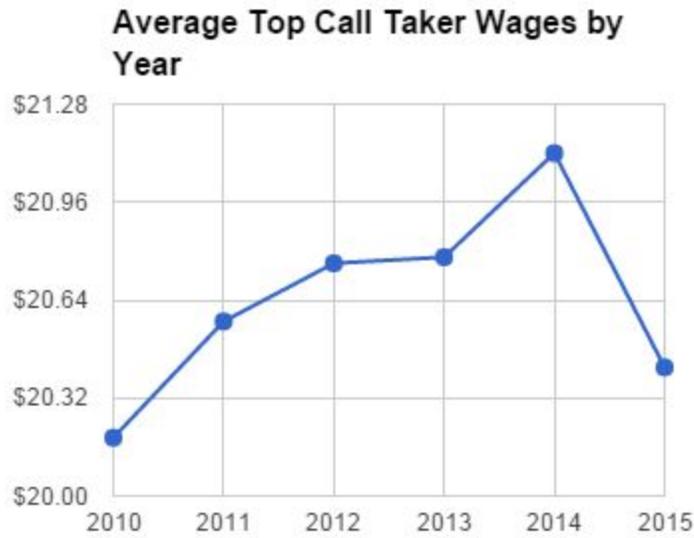


Figure: Average Top Colorado 9-1-1 Call Taker Wages by Year.



Figure: Average Top Colorado Public Safety Call Taker Wage Increases vs. Inflation

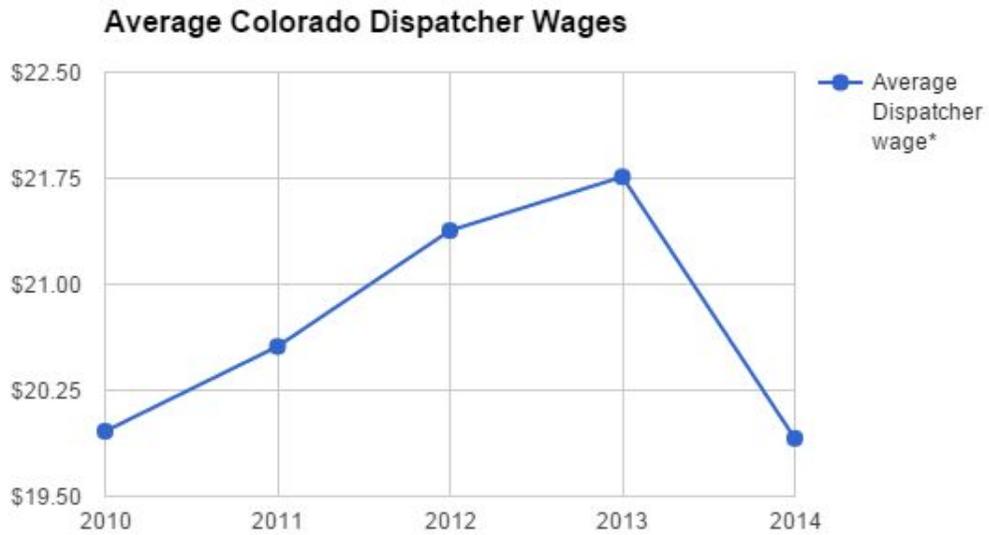


Figure: Average Dispatcher Wages by year
Based on BLS Data for Colorado for occupation 43-5031: http://www.bls.gov/oes/current/oes_co.htm
2015 data not yet available

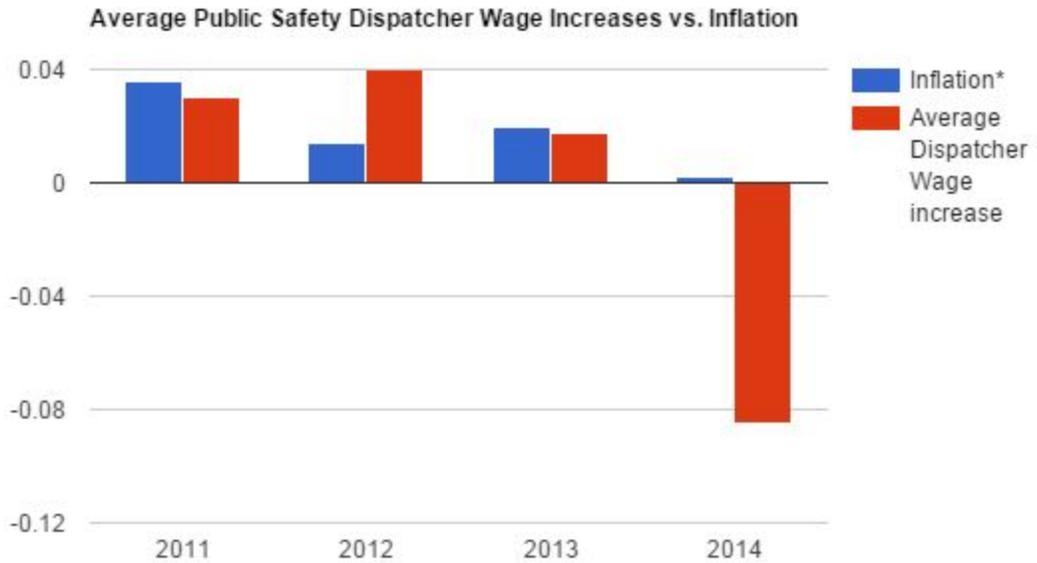


Figure: Average Dispatcher Wage Increases vs. Inflation
 Based on BLS Data for Colorado for occupation 43-5031: http://www.bls.gov/oes/current/oes_co.htm
 2014 data not yet available

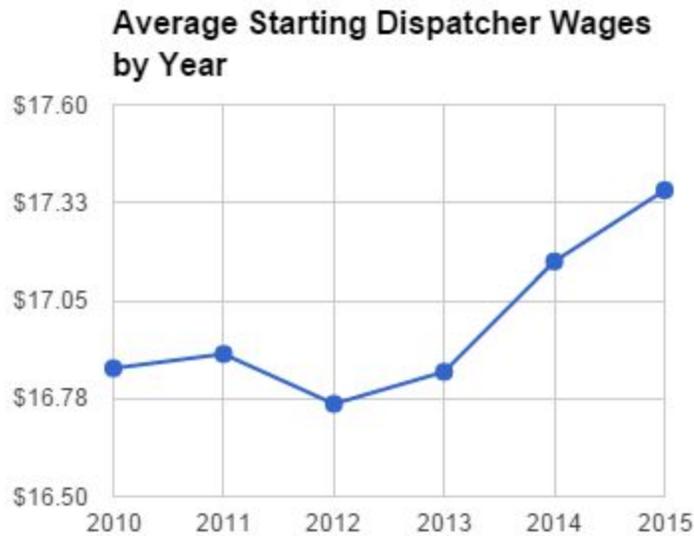


Figure: Average Starting Colorado 9-1-1 Dispatcher Wages by Year.

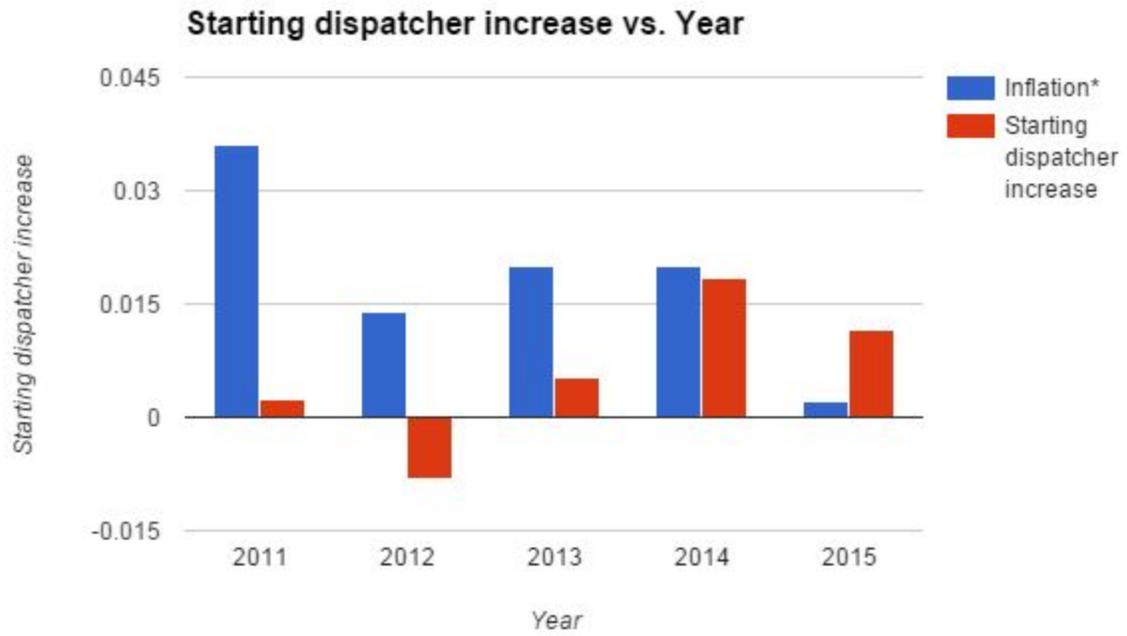


Figure: Average Starting Colorado Public Safety Dispatcher Wage Increases vs. Inflation

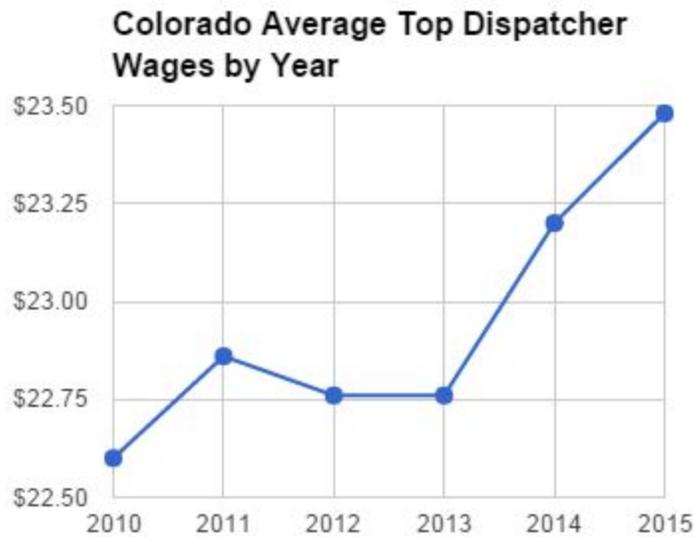


Figure: Average Starting Colorado 9-1-1 Dispatcher Wages by Year.

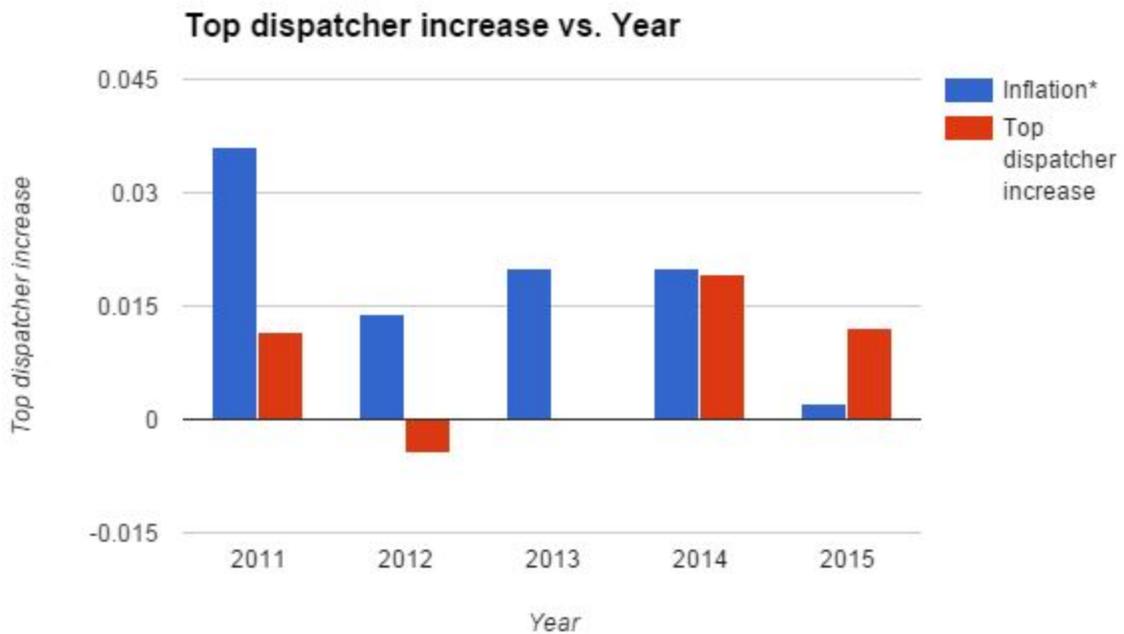


Figure: Average Top Colorado Public Safety Dispatcher Wage Increases vs. Inflation

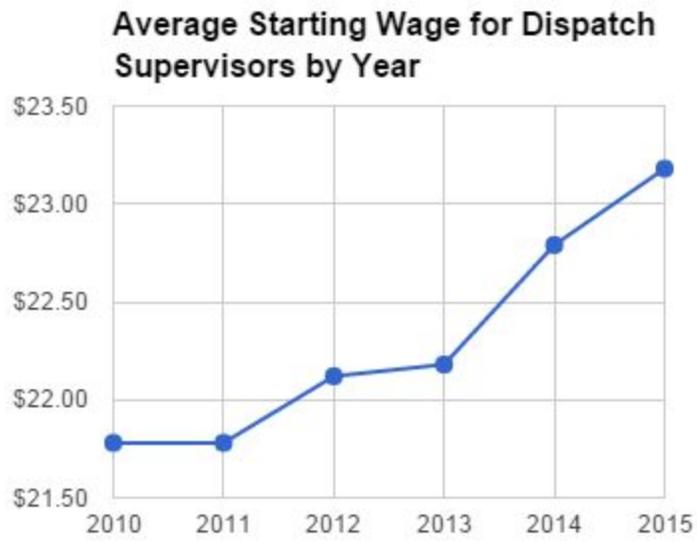


Figure: Average Starting Colorado 9-1-1 Supervisor Wages by Year.

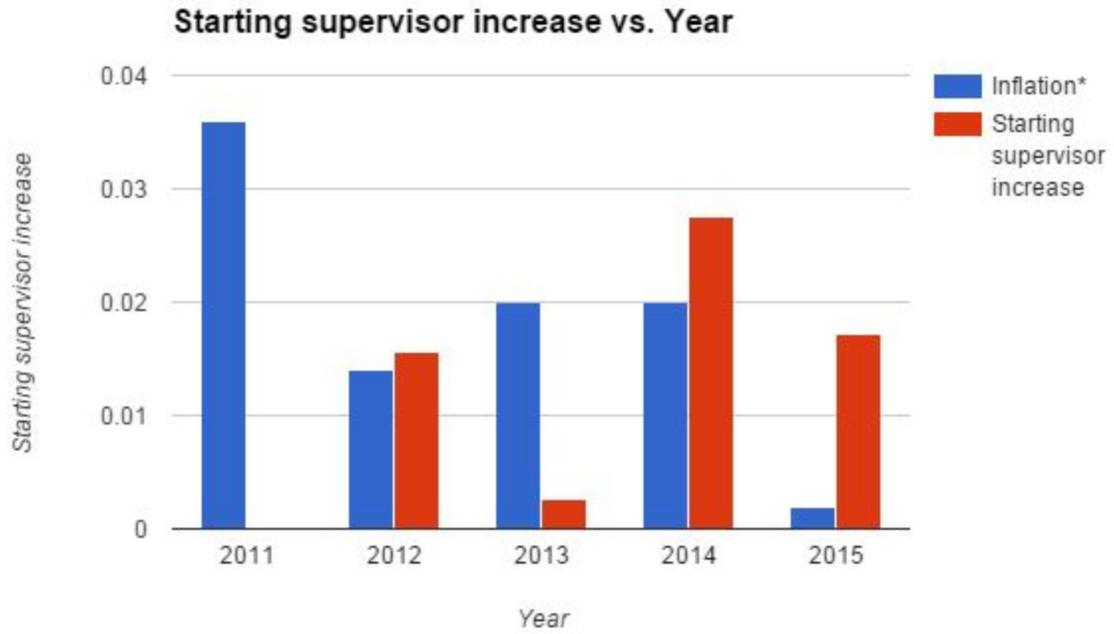


Figure: Starting Colorado Public Safety Dispatch Supervisor Wage Increases vs. Inflation

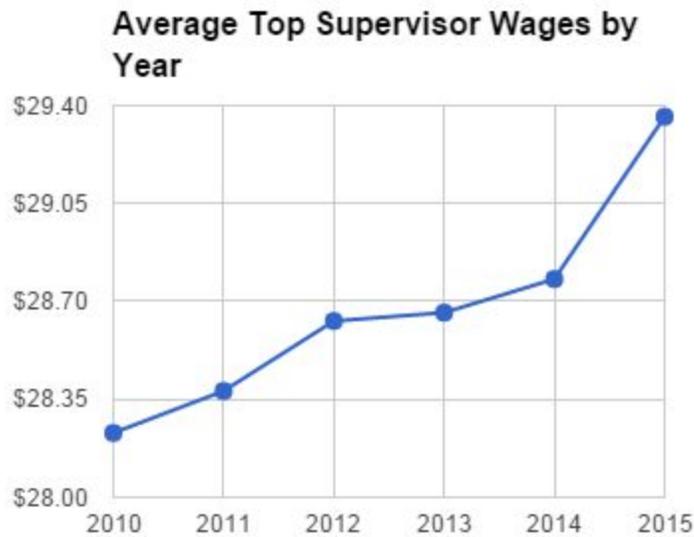


Figure: Average Top Colorado 9-1-1 Supervisor Wages by Year.

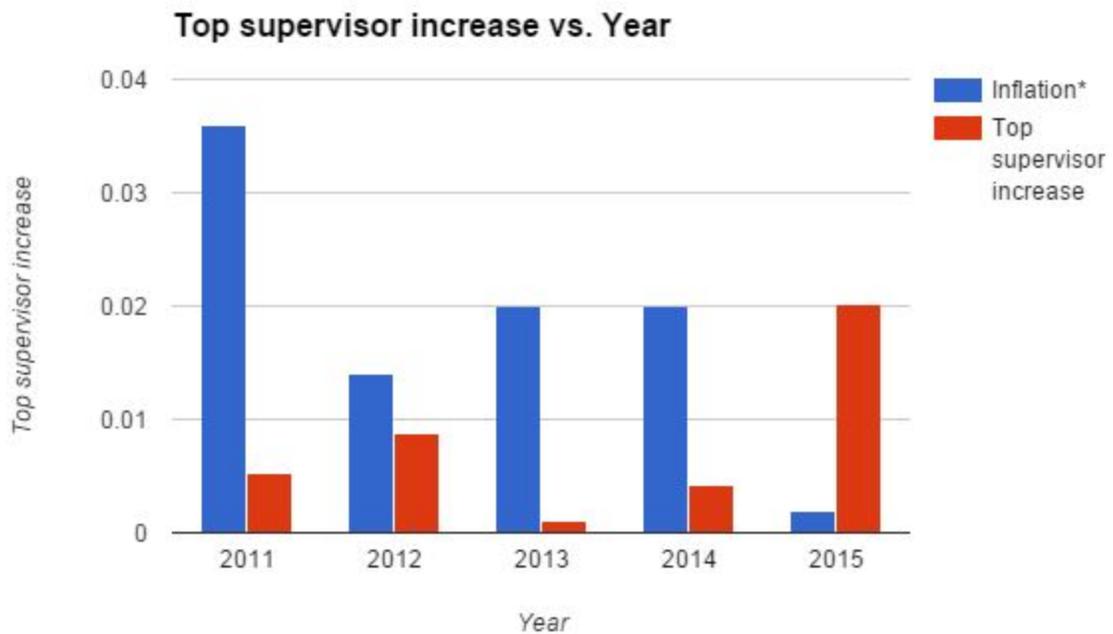


Figure: Average Top Colorado Public Safety Dispatch Supervisor Wage Increases vs. Inflation



Figure: Average Colorado PSAP Director Salary by Year.

Report on the State of 9-1-1 Services in Colorado, 2015

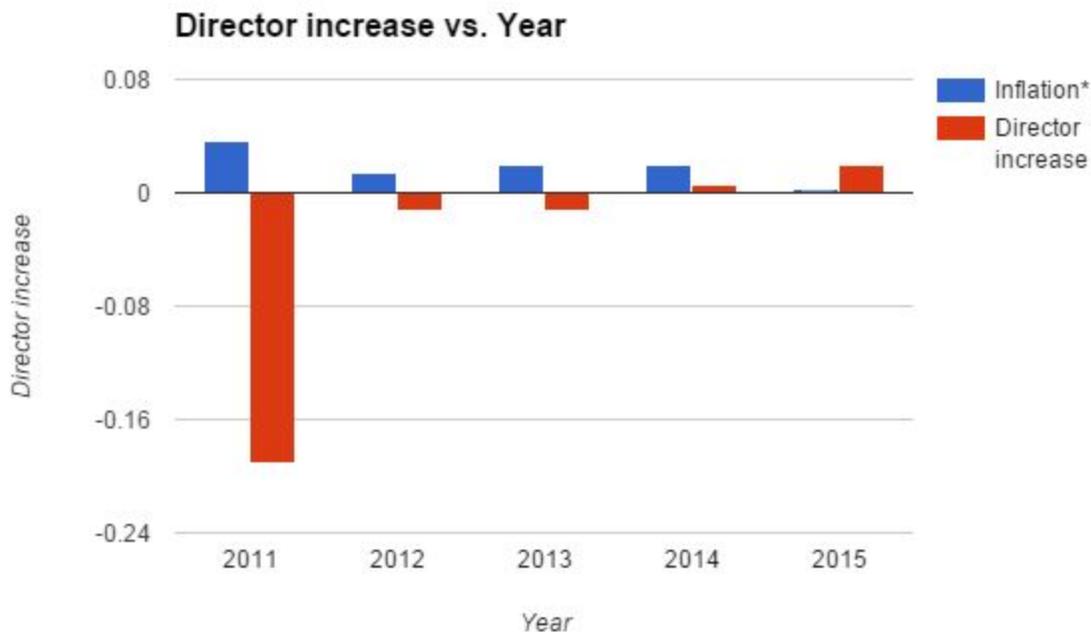


Figure: Average Colorado PSAP Director Salary Increases vs. Inflation

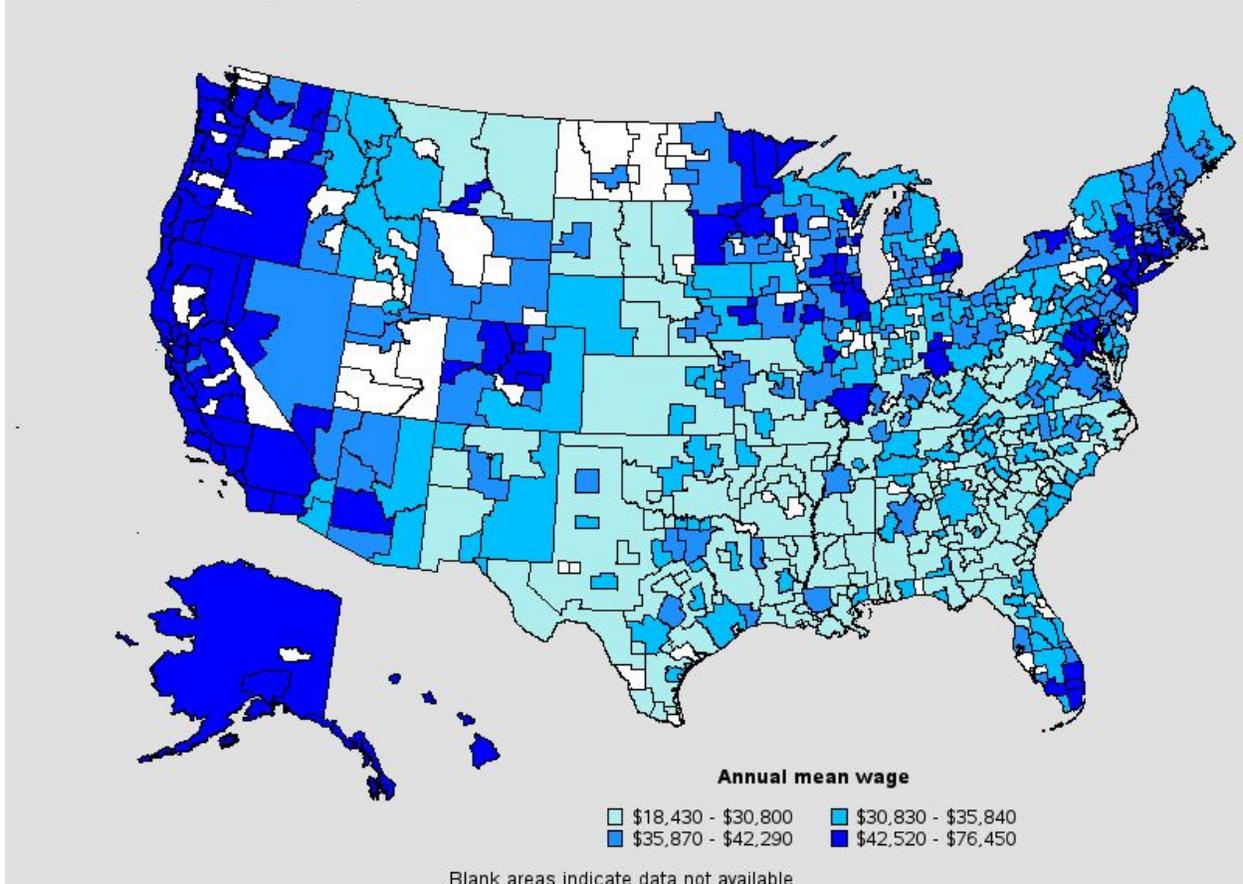
Wages - Statewide

Unless otherwise indicated, wage data in this section was obtained from the Colorado 9-1-1 Resource Center’s online PSAP profiles.

	Call taker	Dispatcher	Supervisor	Director
Starting	\$15.86	\$17.36	\$22.79	
CO average*		\$19.91		
Top	\$20.42	\$23.48	\$28.78	
Current average				\$36.90
National average*		\$18.95		
State ranking		10 th		

Figure: Colorado PSAP Staffing and Salary Data
 * Bureau of Labor Statistics figure for for 2014
http://www.bls.gov/oes/current/oes_co.htm
<http://www.bls.gov/oes/current/oes435031.htm>

Annual mean wage of police, fire, and ambulance dispatchers, by area, May 2014



Source: <http://www.bls.gov/oes/current/oes435031.htm>

Wages by Region

Of the relevant job categories, the Bureau of Labor Statistics only tracks the wages of public safety dispatchers, and if one wishes to examine those wages by region within the state, the BLS only offers their pre-set regions. The most recent figures available are from May 2014. Increases are shown in green, decreases shown in red.

Report on the State of 9-1-1 Services in Colorado, 2015

Area Name	2010	2011	2012	2013	2014
Boulder, CO	\$22.43	\$23.50	\$24.22	\$23.91	\$23.67
Colorado Springs, CO	\$19.32	\$22.05	N/A	\$21.97	\$21.71
Denver-Aurora, CO	\$20.94	\$21.50	\$22.68	\$22.97	\$23.16
Fort Collins-Loveland, CO	\$20.49	\$21.44	\$22.90	\$22.91	\$23.53
Grand Junction, CO	N/A	N/A	N/A	\$24.62	\$25.29
Greeley, CO	N/A	N/A	N/A	N/A	\$18.99
Pueblo, CO	\$19.72	\$20.00	\$20.02	\$19.64	\$19.56
East and South Colorado nonmetropolitan area	\$14.84	\$14.17	\$14.54	\$14.47	\$14.89
West Colorado nonmetropolitan area	\$17.49	\$19.08	\$19.19	\$19.15	\$19.10
North Central Colorado nonmetropolitan area	\$19.19	\$19.94	\$19.84	\$22.18	\$22.63
Central Colorado nonmetropolitan area	\$14.81	\$16.75	\$14.68	\$14.79	N/A

Table: BLS had no figures for regions marked "N/A" in the years noted as such. The most recent data released is for May 2014

Wages by Console Positions

Another useful way to look at wages is by the size of PSAP. A PSAP in a small community may have more in common with a PSAP of similar size in another region than one next door, in terms of the intensity of the call load. This analysis examines wages by the number of phone positions in the PSAP.

	<5	5 - 10	>10
Starting Call Taker	\$14.92	\$17.80	\$15.40
Top Call Taker	\$18.68	\$26.69	\$18.95
Starting Dispatcher	\$16.33	\$18.98	\$17.25
Top Dispatcher	\$21.73	\$27.06	\$22.84
Starting Supervisor	\$20.22	\$26.94	\$23.32
Top Supervisor	\$24.82	\$34.75	\$28.91
Current Director	\$30.05	\$45.63	\$38.92

Table: PSAP Wages in Various Categories by Number of 9-1-1 Phone Consoles at PSAP. Figures in green are an increase over the previous year, and figures in red are a decrease.

Note: all salaries are averages for the category.

Wages Summary

In statewide averages, we saw significant decreases in the average starting and top pay for call takers. This could be due to new PSAPs reporting that hadn't reported before, but this is the first year ever showing a decrease in these categories. The size of the decrease, in particular, is concerning, and bears watching.

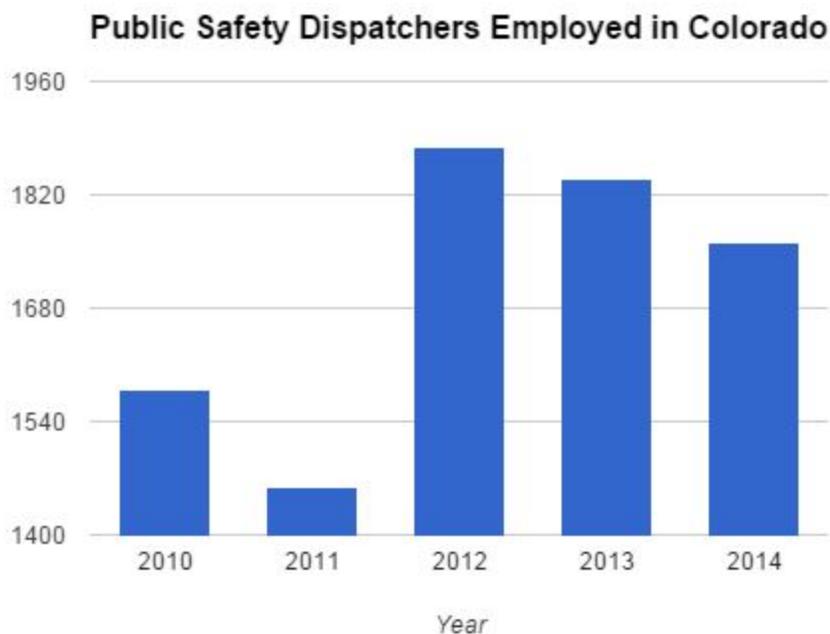
Also, for the first year ever, the Bureau of Labor Statistics is showing a decrease in the average dispatcher wage from the year before. It's important to note that the BLS data is a year behind the rest of the data displayed in this section, but even so it conflicts with the Colorado 9-1-1 Resource Center's data for 2014, which showed increases for both starting and top dispatcher wages. This may also be possible if turnover is higher, since starting and top wages are an indication of salary ranges, but a high turnover rate in the state may mean that more dispatchers are near the low end of that salary range. For 2015, the increase in starting and top dispatcher wages increased faster than inflation. BLS data also shows Colorado dropping from 9th highest paying state for dispatchers to 10th.

Supervisor starting and top wages, as well as director salaries, increased faster than inflation, as well. This year is the first time since the Resource Center began tracking that director salaries increased at a rate greater than inflation.

Reviewing dispatcher wages by region, about half the regions saw increases in the average dispatcher wage, while the other half were stagnant or dropped. By PSAP size there was a marked difference between both small and large PSAPs and medium size PSAPs. Medium-size PSAPs have always shown higher wages and salaries than either small PSAPs (which serve small communities and seem to have more funding issues) and large PSAPs (which have more employees to pay).

Staffing Levels

The BLS reported in 2014 that there were 1,760 individuals employed in Colorado who have responsibility for dispatching police, fire, or EMS field units. This does not include other operational employees, like call takers or supervisors.



This represents a decrease from 2013, which in itself was a decrease from 2012. As Colorado has one of the highest population growth rates in the country⁶, it's unclear why the need for dispatchers would decrease. If the need for dispatchers isn't decreasing, then it may be that positions are remaining unfilled.

General Staffing

The figure below shows number of employees in each quarter of PSAPs. The bottom 25% of all PSAPs, for instance, includes PSAPs with 1 to 9 employees.

	Bottom	2 nd	3 rd	Top
Employees	1-8	9-14	14-21	24-163

Table: Number of Operational Employees in PSAPs by Quartile

The figure indicates that PSAPs in Colorado continue to trend small, with 75% of PSAPs employing 21 or fewer operational employees. This is a decrease from last year, in which 75% of PSAPs had 22 or fewer employees.

⁶ Hende, C. (2015, September 17). Colorado among 10 states with highest population boom; here's the state's fastest-growing metros (Slideshow) - Denver Business Journal. Retrieved November 18, 2015, from <http://www.bizjournals.com/denver/news/2015/09/17/colorado-among-10-states-with-highest-population.html>

Administrative to Operational Staffing Ratio

One way the efficiency of a PSAP can be considered would be to look at the number of PSAP employees retained by the PSAP with no dispatching or call taking responsibility. The higher the ratio of administrative to operational personnel, one could consider the PSAP to be less efficient in terms of staffing.

This can be a useful statistic to consider, though it should be kept in mind that it can also be misleading. Having too low of a ratio of administrative to operational personnel, for instance, may also be a problem in that it may mean that the operational personnel do not have sufficient administrative support. Also, in PSAPs that are part of other agencies, such as a law enforcement agency or fire department, many administrative functions may be filled by personnel in other departments of the parent agency, making the administrative to operational personnel ratio appear deceptively low. Indeed, a number of agencies report having zero administrative personnel.

In general, the larger the PSAP, the fewer administrative positions it has compared to the number operational positions. Statewide, the average for all PSAPs was a ratio of 12% administrative personnel.

	<5	5-10	>10
Admin to Operational Personnel Ratio	12.4%	12.4%	6.6%

Table: % of PSAP Personnel in Administrative Roles by Number of 9-1-1 Phone Consoles

Turnover Rates

Another important factor of the health of a PSAP is the employee turnover rate. The cost of training a new employee until they can operate independently as a dispatcher varies, but is always in the tens of thousands of dollars. During training time, dispatchers-in-training generally count toward maximum staffing allowances, but are not able to work on their own, and even after training is complete they are more likely to need more intense supervision. Some turnover is inevitable and even desirable, but having high turnover can be a heavy drain on experience and resources at the PSAP.

The Association of Public Safety Communications Officials (APCO) has conducted studies of employee retention in PSAPs, called Project RETAINS. The most recent iteration of this project is entitled Staffing and Retention in Public Safety Communications Centers: A Follow-up Study⁷. Because of the dated nature of this data, it is of questionable value as a benchmark for comparison, and the Bureau of Labor Statistics does not keep data on turnover rates for specific occupations. As a result, no national comparison is currently available.

⁷ Association of Public Safety Communications Officials, International. (2009). *Staffing and Retention in Public Safety Communications Centers: A Follow-up Study*. Washington, D.C.: George Mason University.

Of the PSAPs that have completed the staffing section of their online PSAP profile, the turnover rate was 17.6%, a slight decrease from the previous year.

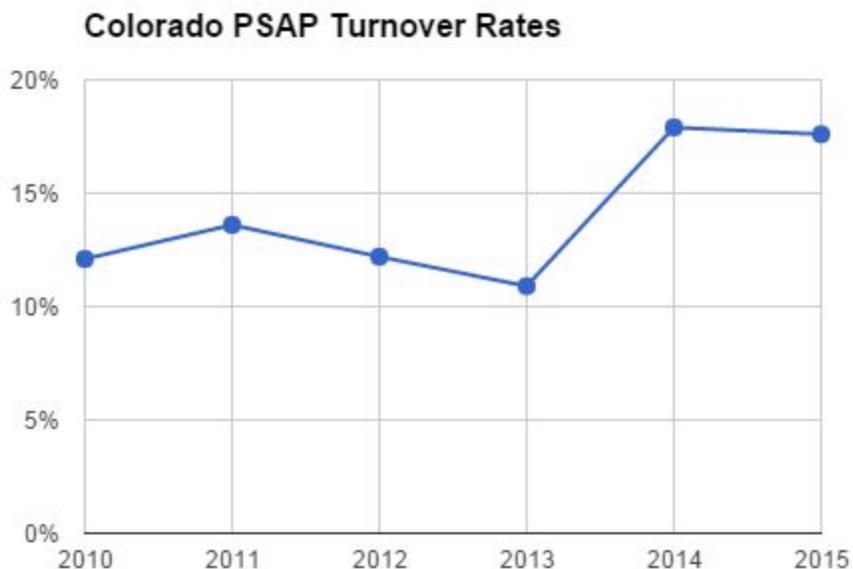


Figure: Turnover rates of operational personnel in Colorado PSAPs, by year.

The figure below examines turnover rates by size of PSAP.

	1-10	11-20	21+
2015	28.9%	14.3%	10.8%
2014	28.1%	19.2%	9.4%
2013	14.0%	10.6%	7.8%
2012	14.5%	12.6%	8.8%
2011	19.4%	17.3%	10.8%
2010	12.1%	11.8%	12.5%

Table: Turnover Rate by Number of Operational Employees

As has been seen in previous years, larger PSAPs tend to have lower turnover rates. For dispatch centers with 10 or fewer employees, 2014 represented a doubling of the turnover rate, and 2015 is slightly higher. With the decrease in turnover in medium-size PSAPs, it now appears that small PSAPs have twice the turnover rate of medium PSAPs in Colorado.

Training

In previous years, online PSAP profiles have collected information about training standards from local PSAPs. In an attempt to keep the online PSAP profile questionnaire to a reasonable length, the section on training was removed so no data for 2015 exists. Instead, the Colorado 9-1-1 Resource Center or the Colorado 9-1-1 Training Standards Committee may conduct ad hoc surveys in the future. However, as the most recent year for training standards information is 2014, it is still current enough to be relevant.

Training standards vary widely through Colorado. While a number of states have set minimum training and certification standards for dispatchers, Colorado has not. Five separate recognized national training standards are being used in Colorado. Additionally, some PSAPs are using their own internal training materials only. While Colorado is not the only state that lacks minimum training standards for dispatchers, the national trend is toward setting the standards, due in part to the efforts of organizations like APCO, the National Emergency Number Association (NENA), and the Denise Amber Lee Foundation.

Topic	2012	2013	2014
Number of classroom hours required for new dispatchers	96.1 hours average, ranging from zero to 360	87.8 hours average, ranging from zero to 360	105.6 hours average, ranging from zero to 480
Number of hours of on-the-job training required for new dispatchers	576 hours average, ranging from 32 to 1080	579 hours average, ranging from 32 to 1000	617 hours average, ranging from 32 to 2000

Table: Training Standards Use for New Dispatchers in Colorado PSAPs

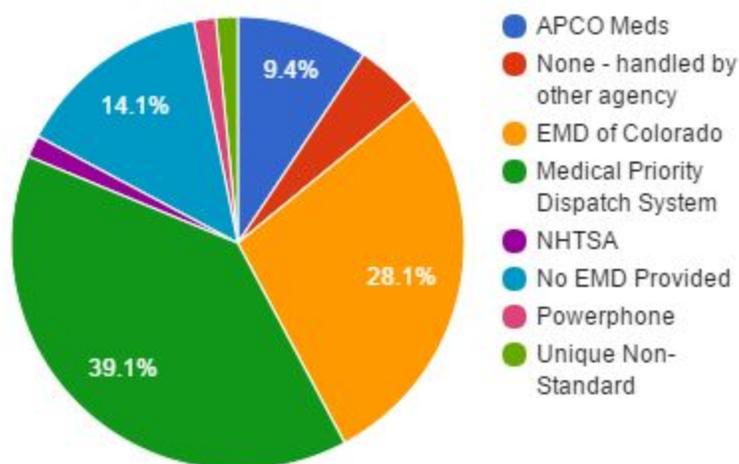
The Colorado 9-1-1 Training Standards Committee reports that they are very close to finalizing the first edition of a basic training program for Colorado which will be offered to PSAPs that wish to send their newly hired dispatchers.

Medical Protocols

The responsible handling of medical calls require set emergency medical dispatch protocols created and maintained by medical professionals, and a number of such systems exist for PSAPs to use. Dispatchers must be trained in the specific protocol set being used by the PSAP. Some states have established one particular protocol set for their state to increase consistency from PSAP to PSAP, though Colorado has not. In some cases, Emergency Medical Dispatch (EMD) protocols are kept in a paper, flip-card format, and in others they are kept as software which may or may not be integrated

with the Computer Aided Dispatch system.

Based on currently available information, there are at least six different standardized protocol sets in use in Colorado, and at least one PSAP is using a protocol set that was designed in-house. Of those that answered the question concerning what EMD protocol they use, eight indicated that they do not use one. In some cases, this may indicate that another PSAP handles medical calls for the area. For instance, the PSAP at Denver International Airport does not use an EMD system because medical calls are transferred to Denver 911. In some cases, however, the lack of an EMD protocol is because there are no medical pre-arrival instructions being provided for 911 callers in that area.



Note that some of the 14.1% of PSAPs that reported “No EMD Provided” may in fact have their EMD service being provided by another agency. This is particularly true of agencies that dispatch law enforcement units only. In those cases, callers with medical complaints are transferred to a fire department dispatcher who performs EMD. Starting with the writing of this report both “None - EMD provided by another PSAP” and “None - No EMD Provided” will be options in the multiple-choice question concerning EMD protocol usage.

Areas of Concern

The online PSAP profiles contain a section where respondents may check whether a particular topic

area is currently an “issue” for their PSAP. In years prior to 2014, a percentage of responding PSAPs reporting a category being an issue was provided, but since PSAPs may choose to only fill out the section if they consider themselves to be having issues, the percentage was possibly misleading. Instead, beginning in 2014, the number of PSAPs reporting a particular category as an issue is shown.

Issue	2014	2015
Staffing	22	24
Funding	19	18
Recruiting	11	14
Training	11	12
Equipment	12	16
Facility	12	11

Table: Number of PSAPs reporting experiencing various categories as an “issue”.

Only 8 PSAPs have indicated that they have no issues.

Additionally, in an “other” category, these items were cited by respondents:

- Gearing up for consolidation/regionalization
- Retention
- Space needs
- Staffing for large incidents

Funding

Running a modern, state-of-the-art 9-1-1 call center is an expensive proposition. There are various aspects to the funding of 9-1-1 call centers that should be considered.

Current State of Funding

Local 9-1-1 authorities set monthly telephone surcharges on landline, wireless, and Voice-over-Internet-Protocol services with regular billing periods, while prepaid cell phone users pay a surcharge on minutes purchased from retailers.

The surcharges set by local 9-1-1 authorities vary from a low of 43¢ per line per month to \$1.75 per line per month. Surcharges up to 70¢ per line per month can be set by local 9-1-1 Authorities without further approval. Surcharges above 70¢ per line per month must be approved by the Colorado Public Utilities Commission. The average surcharge in the state is 92¢ per line per month.

Report on the State of 9-1-1 Services in Colorado, 2015

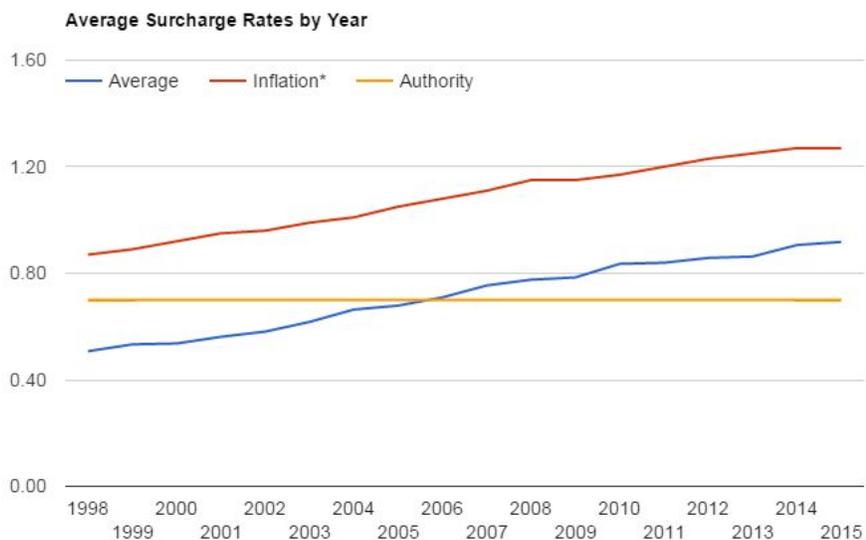


Figure: Average 9-1-1 surcharge rate in Colorado, by year.

In the above chart, the blue line shows the average 911 surcharge in the state, over time. The yellow line shows the maximum rate that local governing bodies are authorized to set without PUC approval. The red line shows what that maximum authorized rate would be if it had been adjusted by inflation since 1990 when the 70¢ rate was legislated. Prior to 1990, the surcharge rate was set at 2% of local exchange service tariffed rates. If the threshold for PUC approval had been adjusted by inflation, it would be \$1.27 in 2015, or slightly higher, depending on whether the CPI or CPI-U is used.

Legislation passed by the Colorado General Assembly in 2010 now requires retailers selling prepaid wireless minutes to remit 1.4% of those sales to the Colorado Department of Revenue minus an allowance for administrative costs. The D.O.R. then distributes the funds to local 9-1-1 Authorities based on their wireless 9-1-1 call volume. Collection rates have been much lower than was predicted by the Colorado 9-1-1 Resource Center based on national figures of prepaid cell phone service adoption and average rates of prepaid minute renewal purchases, amounting to approximately \$2.5 million in 2014. It is possible that the discrepancy may be due to inaccuracies in the initial predictions, failure to attain 100% compliance from retailers, or some combination of the two.

There is no clear correlation between surcharge rate and either the average or median income of the citizens within the 9-1-1 Authority service area, indicating that surcharge rates are neither progressive nor regressive. The figure below is a map of the 9-1-1 Authorities in Colorado, color coded by the current surcharge rate.

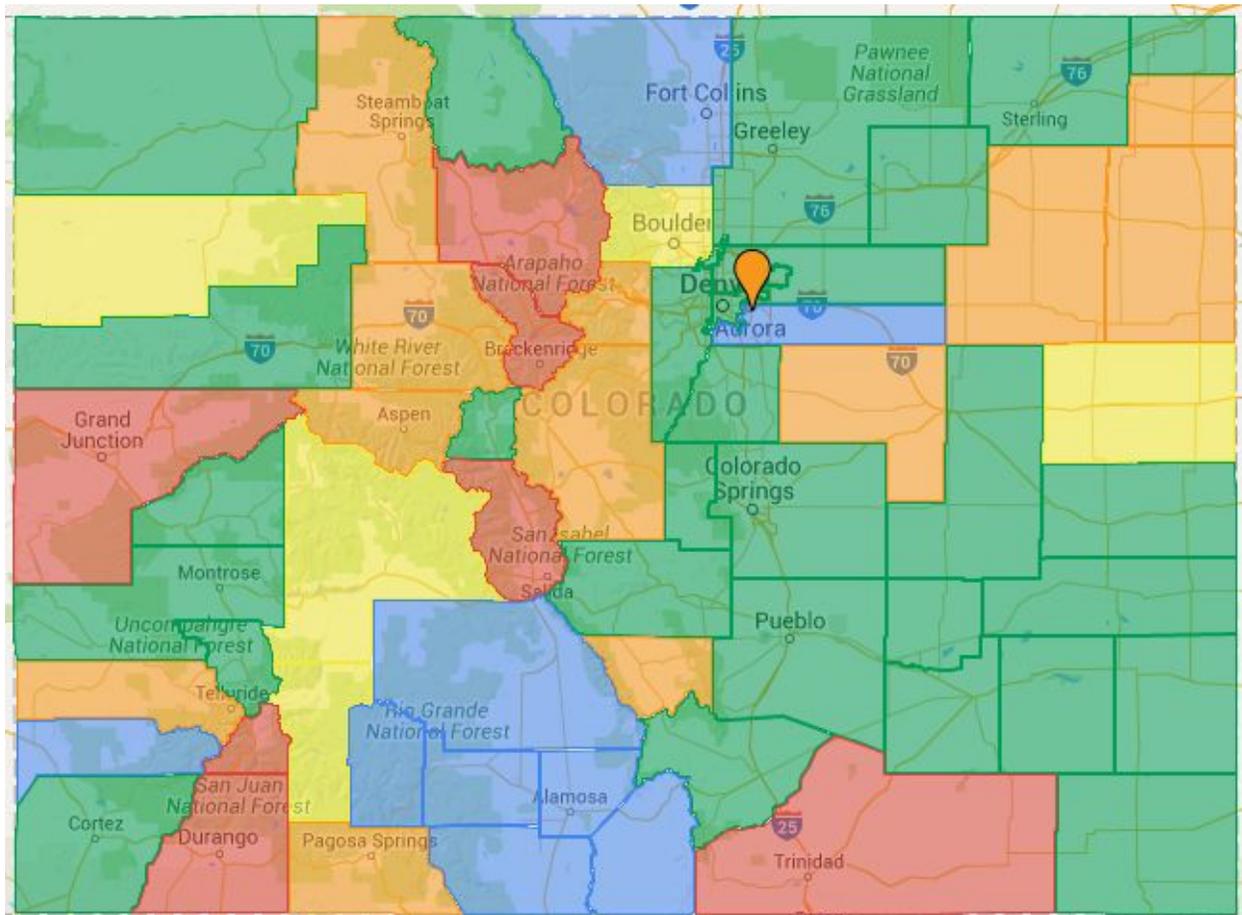


Figure: Surcharge Rates by County

Legend

- Blue - Less than 70 cents.
- Green - 70 cents.
- Yellow - Up to \$1.00
- Orange - Up to \$1.25
- Red - Greater than \$1.25

It is also important to note that funds raised through 9-1-1 telephone surcharges do not fully fund 9-1-1 services in any Colorado PSAP. Most operational costs, and in some cases all operational costs, are funded by municipal and county governments. Throughout the state, the percentage of the operational costs of providing 9-1-1 services that are funded by surcharges varies widely, though it is generally less than half.

Statewide, the Resource Center estimates that \$52.3 million was raised in 9-1-1 surcharge revenues in 2014 (including prepaid surcharge revenue). This estimate was derived by collecting revenues from

individual 911 Authorities then extrapolating for Authorities that did not respond to requests for revenue figures.

Service Type	Total Amount Collected (\$)
Wireline	\$11,217,995 (extrapolated based on partial survey responses from local 911 Authorities)
Wireless	\$32,949,356 (extrapolated based on partial survey responses from local 911 Authorities)
Prepaid Wireless	\$2,594,643
Voice Over Internet Protocol	\$5,495,091 (extrapolated based on partial survey responses from local 911 Authorities)
Total	\$52,257,085

National Funding Sources

There is no regular federal source of funding for local 9-1-1 services. Occasional grants can be obtained for various capital expenses. These grants, however, such as Homeland Security grants, USDA grants, and Justice Department grants, are rarely applicable to 9-1-1 expenses and even then must compete against other eligible projects.

The ENHANCE 911 Act of 2004 provided a unique grant program that was intended to be used for upgrading local 9-1-1 services, authorized for \$250,000,000 per year. Though authorized, no funds were appropriated to the grant program until 2008, when \$43,000,000 was appropriated to be split among the states. In 2009, Colorado was approved to receive \$487,500 for specific projects at PSAPs across the state under the ENHANCE 911 Act, and under the terms of the grant the projects were completed before the end of September 2012.

The U.S. Congress passed a bill in early 2012 that, among other things, included a number of considerations for public safety communications. HR 3630, among a number of other public safety communications projects, included a \$115 million grant program to be administered by the National 9-1-1 Office for implementation of Next Generation 9-1-1. The funds are to come from an auction sale of radio spectrum conducted by the FCC, and other projects must be funded from the sale prior to funds being set aside for the 9-1-1 grant program. This auction successfully raised the funding necessary for this grant program, so the 9-1-1 community is now awaiting for draft rules for the grant

program from the National 911 Program Office, which will be administering the grant.

In addition to funding a Next Generation 9-1-1 grant program, HR 3630 called for \$7 billion for the creation of a National Public Safety Broadband Network. This network is being planned now by the FirstNet. FirstNet has repeatedly discussed the importance of integrating NG9-1-1 with the NPSBN, but it's not known yet what form this integration might take and whether some of the funding for the buildout of network necessary for the NPSBN might also be leveraged for the implementation of NG9-1-1.

Funding Outlook

While the prepaid wireless surcharge statute enacted in 2011 is capturing some revenue from prepaid cell phone users, the amount being collected, for whatever reason, is much less than was estimated by the Colorado 9-1-1 Resource Center. As long as this continues to be the case, local 9-1-1 Authorities in Colorado may expect revenues from 9-1-1 surcharges to remain flat or to decrease.

The U.S. Centers for Disease Control has estimated that 44% of all U.S. households are now “wireless-only”, meaning that they there are no landlines in the home⁸. There are 73.9 million prepaid cell phone users in the United States⁹, or about 22.7% of the population.

A danger for surcharge-based funding models would be if landline subscribers continue to drop, wireless subscribers stop increasing, and more wireless subscribers use prepaid phone (which seem to have a lower collection rate). Such a scenario would result in a drop in revenue collected by 911 Authorities in Colorado. Fortunately, despite the market saturation of wireless phones, the number of wireless phone connections in the U.S. continues to go up¹⁰.

The distribution of 911 funds to the correct 911 Authority can also be a challenge. Individuals whose billing address is in one 911 Authority but live and/or work in the service area of a 911 Authority will pay their 911 surcharges to the Authority responsible for their billing address, even if they live full-time in the other. 911 Authorities serving areas that have a heavy tourism industry are also disadvantaged, since their visitors add greatly to the temporary population of the area, but those visitors do not pay 911 surcharges that can be accessed by the 911 Authority.

Colorado's portion of the \$115 million Next Generation 9-1-1 grant expected from the National 911 Program Office would likely be in the range of \$2.5 million to \$3 million. What would constitute

⁸ Blumberg, PhD, S., & Luke, J. (2014, December 1). Wireless Substitution: Early Release of Estimates From the National Health Interview Survey, January–June 2014. Retrieved November 18, 2015, from <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201412.pdf>

⁹ Bournique, D. (2015, August 4). Second Quarter 2015 Prepaid Mobile Subscriber Numbers By Operator | Prepaid Phone News. Retrieved November 18, 2015, from <http://www.prepaidphoneneews.com/2015/08/second-quarter-2015-prepaid-mobile.html>

¹⁰ <http://www.ctia.org/your-wireless-life/how-wireless-works/annual-wireless-industry-survey>

eligible expenditures will be decided by the 911 Program Office, a joint program of the National Highway Transportation and Safety Administration and the National Telecommunications and Information Administration. The matching requirement for the grant is also unknown at this time though there has been some indication that the grantee obligation may be less than the 50% matching requirement that was in place for the ENHANCE 9-1-1 Act grants.

Efforts of the Office of Information Technology

FirstNet Colorado

The First Responder Network Authority, or FirstNet, (an independent authority of the U.S Department of Commerce, National Telecommunications and Information Administration (NTIA)) is tasked statutorily, with ensuring the building, deployment and operation of a nationwide public safety broadband network (NPSBN) that local, tribal, state and federal agencies can use to share mission critical data with first responders and other public safety entities. FirstNet Colorado, administered by the OIT, and the FirstNet Colorado Governing Body (made up of local, state and tribal representatives) is Colorado's program and governance group tasked with coordinating statewide efforts to plan for the NPSBN. This is relevant to the extent that the availability of Next Generation 911 services could potentially make the NPSBN more useful, and vice versa. While NG9-1-1 essentially involves opening up the 9-1-1 network to transmittal of multimedia data between the public and PSAPs, as well as between PSAPs, the NPSBN provides for potentially more robust capabilities and information sharing between PSAPs and field units, and between field units. The two technologies together would be a much more powerful tool for public safety than either of them alone. Additionally, there exists the potential to share infrastructure between the NPSBN and NG9-1-1.

Since early 2014, FirstNet Colorado has been conducting an extensive education and outreach campaign to inform local, tribal and state agencies and other public safety stakeholders in Colorado about the program and to solicit input on future network objectives. Colorado's initial consultation meeting with FirstNet occurred on January 14, 2015. This was the kickoff to the formal Consultation process where Colorado public safety stakeholders have been providing formal input into the FirstNet network design process, to include but not limited to agency usage, coverage objectives, operational requirements, and potential broadband assets.

Resource Cataloging

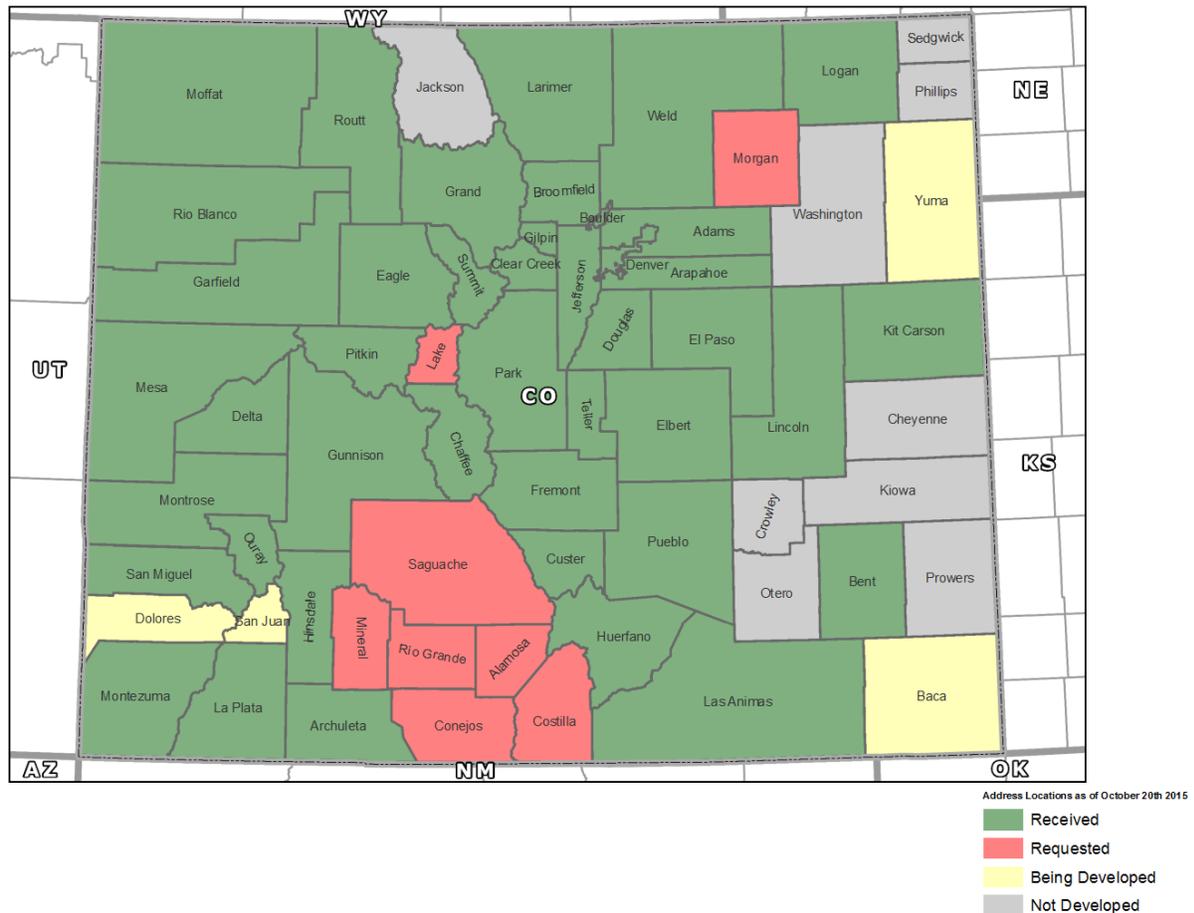
One factor in the cost of building out an NG9-1-1 network is the extent to which existing resources and infrastructure can be used. OIT staff have cataloged the deployment and availability of potential broadband resources throughout the state, including a parallel effort, of mapping broadband

availability statewide. They have identified approximately 7,000 “anchor institutions” across the state, other telecom sites/towers (including the Digital Trunked Radio System (DTRS)) and are surveying and mapping broadband availability for these locations. They are also working on regional plans for “filling in the holes” in broadband coverage.

GIS Coordination

Many states that have moved forward with Next Generation 9-1-1 implementation have started with Geographic Information Systems (GIS) data coordination at the state level. While the routing of calls in traditional 911 networks is database-driven, routing in an NG9-1-1 network is GIS-based, and as such having a comprehensive, highly-accurate GIS dataset for the entire state would be necessary for a full migration to NG9-1-1.

Currently, the OIT is developing statewide GIS datasets with the cooperation and collaboration of the counties. These datasets are being created for a wide range of applications, and include georeferenced site/structure address points, PSAP boundary, and emergency service boundary layers. 54 out of Colorado’s 64 counties have address point locations, representing over 98% of the population of the state. These datasets provide the state the fundamental GIS data components for NG9-1-1 address location verification and emergency call routing. The creation and maintenance of these datasets, coordinated statewide, can lead towards the services needed to support an NG9-1-1 network in the state. Because of increased support from the Governor and Legislature in 2013-2015, OIT can play a stronger role in the coordination and development of GIS data to support NG9-1-1.



State 9-1-1 Plan

The National 9-1-1 Program Office has encouraged individual states to formulate and adopt a State 9-1-1 Plan, explaining current infrastructure and setting a vision and goals for future development. So far, this encouragement has not become a mandate, but it may be required for future federal grants such as the one anticipated from HR3630 passed in 2012.

As Colorado lacks a state office to oversee the development of a State 9-1-1 Plan, the Colorado 9-1-1 Resource Center took the initiative to facilitate and coordinate development of the plan, using volunteers statewide and from PSAPs of various sizes and other stakeholders to write the plan. This plan has since been updated regularly through a public review process.

Ultimately, the Resource Center, as a nonprofit, has no statutory authority to establish an official State 9-1-1 Plan, but the Plan as it exists will be available as an inclusion in grant applications or as a

reference document for Colorado's 9-1-1 professionals.

Conclusion

There is no clear mechanism, at present, for a transition to Next Generation 9-1-1 technology in Colorado, despite repeated efforts among stakeholders to gain momentum. The challenges facing the implementation of NG9-1-1 include questions surrounding funding and governance of NG9-1-1 services.

In the meantime, our current 9-1-1 network needs maintaining. Reporting from local PSAPs indicates that, on average, PSAP equipment is being replaced at a better rate than in previous years, but the oldest equipment in use in the state continues to be employed.

The best, most state-of-the-art technology still does not replace talented, skilled, and experienced personnel, and wage trends for both call takers and dispatchers show decreases that in a thriving economy may not be enough in some communities to retain that human capital.

Finally, the work of the Training Standards Committee is promising and indicates better consistency in the training levels of dispatchers across a state that already has a good history of providing quality training for its public safety dispatchers.

Appendix A: Colorado 9-1-1 Organizational Roster

1. Introduction

This list of organizations with responsibility for 911 service in Colorado is not intended to depict all Colorado 911 stakeholders, but rather major players with some official structure or statutory authority over the delivery of 911 service in Colorado.

2. Colorado Public Utilities Commission

The Colorado Public Utilities Commission has statutory authority over the delivery of 9-1-1 service in the following ways:

- a. Approving local 9-1-1 surcharge rates: CRS § 24-11-102 (2) (b). Local 9-1-1 Authorities may set their surcharge rates up to 70¢ without prior approval from the PUC;
- b. Establishing formula for distribution of wireless prepaid 9-1-1 surcharge funds CRS § 29-11-102.5 (3) (e) (III);
- c. Promulgate rules concerning 9-1-1 dialing capabilities of multi-line telephone systems CRS § 29-11-106 (3);
- d. Regulate telecommunications carriers providing basic emergency service CRS § 40-15-201 (2) (b).

3. 9-1-1 Advisory Task Force

The Task Force is an organization created by order of the Public Utilities Commission (4 CCR 723-2-2145). The duties of the Task Force, as laid out in regulation, are as follows:

- a. Make future recommendations and report to the Commission concerning, but not limited to the development of database formatting standards, processes to facilitate the transfer of ALL data, and the implementation of 9-1-1 services in Colorado;
- b. Consider 9-1-1 service quality and the cost of 9-1-1 service to the PSAPs, both urban and rural, and to end-use customers of 9-1-1 service in developing its report and recommendations;
- c. Investigate and report to the Commission the impact of wireless carriers on PSAPs;
- d. Investigate and report to the Commission the development of new 9-1-1 technologies;
- e. Study and report to the Commission on the overall costing, funding and billing issues of providing 9-1-1 service, including the 9-1-1 surcharge, tariffs, and PSAP equipment costs; and
- f. Monitor and report to the Commission on FCC proceedings that may affect 9-1-1 services in Colorado.

The voting membership of the Task Force consists of local 9-1-1 Authorities, Public Safety Answering Points, Telecommunications Carriers, and representatives of other stakeholder groups.

The current chair of the Task Force is:

Jeff Irvin
Jefferson County Emergency Communications Authority
303-539-9410
jirvin@jceca.org

4. **Colorado 9-1-1 Resource Center**

The Colorado 9-1-1 Resource Center is a nonprofit organization created by order of the Public Utilities Commission (Decision C06-0510). The mission of the Resource Center is “the improvement and support of 9-1-1 emergency communications throughout the state of Colorado. The Resource Center will accomplish this goal by acting as a focal point of information for 9-1-1 Authority Boards and Public Safety Answering Points throughout the state, facilitating discussion and collaboration among Colorado’s 9-1-1 stakeholders, and by conducting research and other activities in the service of the 9-1-1 professionals of Colorado.”

Four of the 5-member Board of Directors for the Resource Center are appointed by the 9-1-1 Task Force.

The current president of the Resource Center is:

Carl Stephens
Garfield County Emergency Communications Authority
(970) 930-1096
stephensc@garco911.com

7. **Local 9-1-1 Authorities**

A 9-1-1 Authority refers to what in statute is described as a "Governing body... the board of county commissioners of a county or the city council or other governing body of a city, city and county, or town or the board of directors of a special district" CRS § 29-11-101 (4). Local 9-1-1 Authorities in Colorado have been established as:

- A local city council
- A county commission
- An organization created by intergovernmental agreement between multiple political entities

A local 9-1-1 Authority receives 9-1-1 surcharge funds remitted directly by telecommunications carriers, prepaid surcharge funds distributed to the Authority by the Colorado Department of Revenue, and authorizes the expenditure of those funds within the guidelines of CRS § 29-11-104.

8. Public Safety Answering Points

In some cases a 9-1-1 Authority funds only one PSAP, although in some cases one 9-1-1 authority funds multiple PSAPs. A PSAP may, in turn, take 9-1-1 calls for and dispatch calls for service for multiple political entities and responding agencies.

9. Local Responding Agencies and Political Entities

Local 9-1-1 Authorities fund some types of equipment and in some cases supplement personnel costs for Public Safety Answering Points, but the remainder of the costs of operating the PSAP is paid by local responding agencies and political entities, such as counties and municipalities.