Report on the State of 9-1-1 Services in Colorado 2011

Prepared by the Colorado 9-1-1 Resource Center

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Contact Information:
Daryl Branson, MPA ENP
Colorado 9-1-1 Resource Center
Voice: 1-970-372-0545
SMS: 1-970-372-0545
Fax: 1-877-221-0682
Toll free: 1-866-332-3082
Email: director@co9-1-1resourcecenter.org

Table of Contents

1. Introduction

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.

There are 98 separate 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). Throughout this document, references to last year's version of this report are made, including data from a statewide PSAP survey conducted over a number of months in 2009. This year, the use of online PSAP and 9-1-1 Authority profiles informed the report. 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 not all section of all of the profiles have been completed. As with a voluntary survey, the return rate and completion rate are not perfect.

It is intended that this document will be updated and republished annually. This is the third edition. A copy of this report and previous reports can be found at the following website:

https://sites.google.com/site/co911rc/publications

2. 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. Wherever 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.

Since all PSAPs in the State of Colorado are capable of receiving E9-1-1 calls, 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).

At this time, there is not enough data to determine the degree of redundancy and diversity in the telephone network infrastructure to make a detailed statement of the reliability of landline E-911 service in every region of the state.

As part of the recent approval of the CenturyLink/Qwest Communications merger, the staff of the Public Utilities Commission is to work with staff of the new merged company to examine redundancy and reliability of the new system.

3. 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 connected to the cellular telephone user.

- 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 include 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 PSAPs 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. By FCC rules, for instance cellular telephone service providers have the option of choosing to use GPS satellite fixes (called the "handset-based solution") to determine a caller's latitude and longitude or, if they prefer, they can use a "network-based solution," which determines the caller's coordinates using multiple cell towers to triangulate the location of the cell phone making the 9-1-1 call. Both methods have benefits and drawbacks, but in many rural areas of Colorado, the network-based solution will rarely result in a caller's location being determined accurately since it requires that the caller's cell phone signal be detectable by at least three cell towers. It is also true, of course, that anywhere a caller is unable to obtain a cellular signal, they will not be able to call 9-1-1 at all, let alone have their call be received by the PSAP with coordinate data.

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. Figure 1, on the following page, indicates the Wireless Enhanced 9-1-1 capability of PSAPs by County.

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

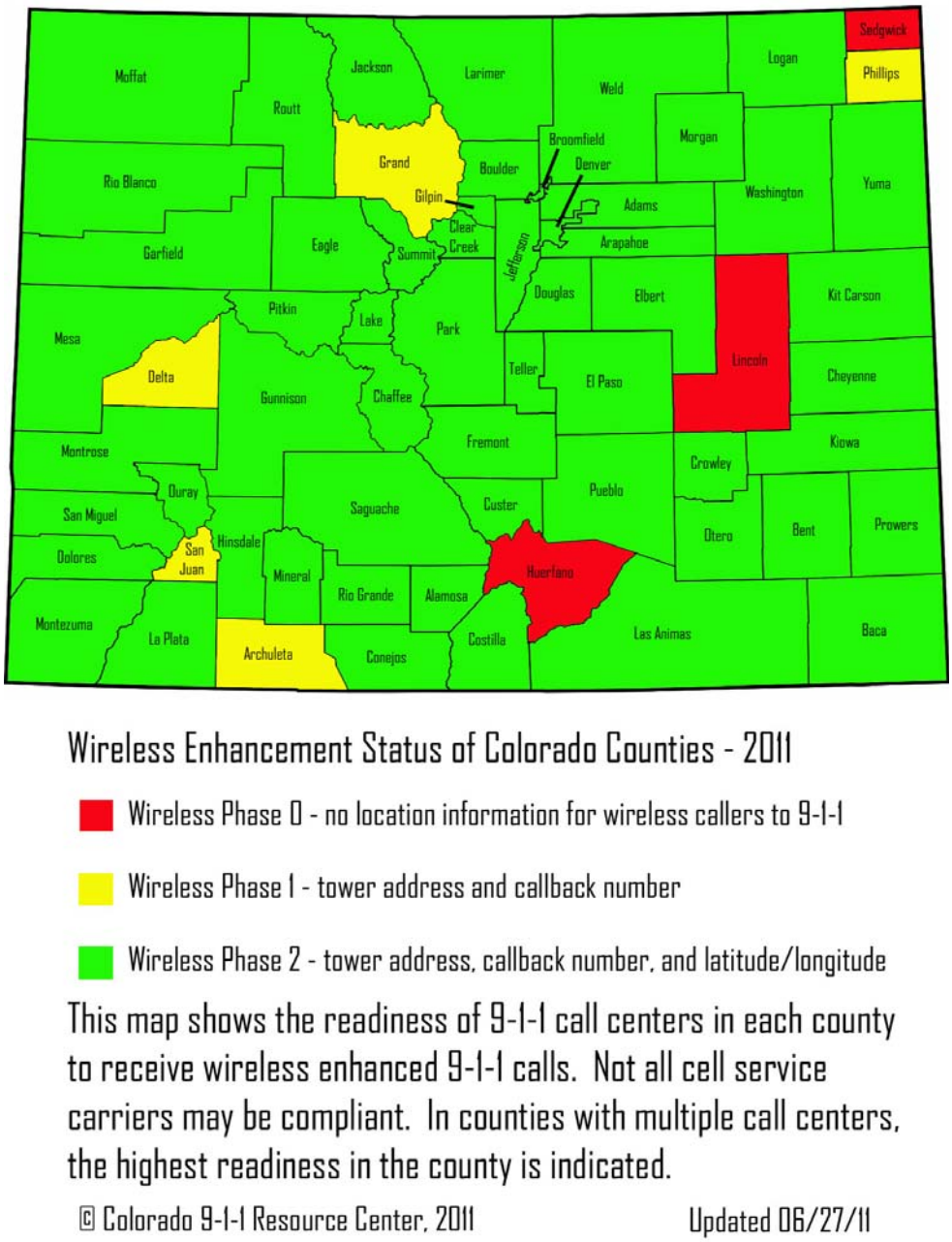


Figure 1
Wireless Enhanced Capability by County

As can be seen from *figure 1*, most of the state's PSAPs are Phase II Wireless Enhanced 9-1-1 compliant. The compliance rate for Colorado is:

- By county count: 87.5%
- By county square miles: 90.2%
- By county population: 98.5%

By number of counties and by square miles covered by Phase II wireless 9-1-1 service this is an improvement over last year.

2010 rates:

- By county count: 85.9%
- By county square miles: 88.8%
- By county population: 98.5%

The reasons for the remaining counties not being Phase II compliant varies.

Archuleta

Archuleta County needs a replacement of their existing CPE and CTI consoles in order to become Phase II compliant.

Baca County

Baca County was listed last year as being Phase I. PSAP Manager Donna Caldwell has reported to me that they are now Phase II compliant. Not all of the carriers in their area are complying, yet, but the PSAP itself is receiving Phase II data from some carriers.

Crowley County

Crowley County was listed last year as Phase I. At that time, they were in the process of having new computer-telephony integration (CTI) installed. Additionally, they received funds for electronic mapping through the ENHANCE 911 Act grant awarded to Colorado in the Fall of 2009. PSAP Manager Leah Fox has reported to me that they are now Phase II compliant.

Delta County

Delta County has Phase II computer-telephony integration terminals, but lacks specific upgrades to its customer premise telephone equipment necessary to receive wireless enhanced 9-1-1 information. Elizabeth Leonard, the MSAG Coordinator, states that upgrades had been planned, but had to be postponed due

to budget cutbacks. PSAP Manager Rob Fiedler states that Delta County is currently Phase I.

Grand County

Grand County was listed last year as Phase II. Discussions with the PSAP Manager Robert Florquist have indicated that the PSAP is actually Phase I. They are in contract negotiations to install a new telephone system that will make the PSAP Phase II compliant, and that installation is expected to be completed by October 1st, 2011.

Hinsdale County

Hinsdale County is dispatched by Gunnison County, and the PSAP in Gunnison County is Phase II compliant. Hinsdale County is, therefore, listed on the map as Phase II compliant. However, there is currently only one cell tower in Hinsdale County, belonging to a third party company that is ostensibly using the network based solution for Phase II compliance, which requires cell tower triangulation in order to determine the caller's latitude and longitude. Until this situation changes, there San Juan County's PSAP will remain Phase II compliant but the PSAP will not receive Phase II data from wireless caller.

The Gunnison-Hinsdale PSAP Manager Charles Dotts has confirmed that this is still the case in Hinsdale County, also pointing out that large parts of Gunnison County suffer from a similar situation, wherein any 9-1-1 call from a carrier that relies on the network based solution is very unlikely to come in as a Phase II wireless call.

Huerfano County

In order to become Phase II compliant, Huerfano County required an upgrade to their CTI and back room telephone equipment. Funds for an upgrade were awarded through the ENHANCE 911 Act grant, and currently efforts are under way to obtain matching funds. No update was received prior to writing this report.

Jackson County

Jackson County has a Phase II compliant telephone system and is listed as such. However, in order to take full advantage of Phase II compliance, the county needs electronic mapping to be integrated into their phone system.

Lincoln County

As of the writing of this report, Lincoln County is still Phase 0. It is not known what is needed to upgrade their equipment. No update was received prior to writing this report.

Phillips County

Phillips County requires modifications to its Master Street Address Guide (MSAG) prior to being able to receive Phase II data. Randy Schafer with Phillips County confirmed that they are currently receiving Phase I data and are working on making the necessary changes to receive Phase II data.

Rio Blanco County

Rio Blanco County is currently working with its wireless providers for them to become Phase II compliant. The PSAP itself is Phase II compliant, and is listed as such on the map. According to PSAP manager Alida Johnson, they are expecting their wireless providers to begin delivering Phase II calls to the PSAP within six months as of the writing of this report.

San Juan County

San Juan County's 9-1-1 calls are received by the Colorado State Patrol PSAP in Montrose. It is unknown at this time what is needed in order for San Juan County to become Phase II compliant. No update was received prior to writing this report.

Sedgwick County

Sedgwick County requires modifications to its Master Street Address Guide (MSAG) prior to being able to receive Phase II data. No update was received prior to writing this report.

4. 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 necessary in any PSAP includes a telephone system (either manual or computerized) and a radio dispatching system. Most PSAPs also use Computer Aided Dispatch (CAD) systems, which are used to track calls for service and the status and location of field units. There are a handful of PSAPs in Colorado that still perform these functions with pencil and paper. Computerized mapping, if it exists in the PSAP, may be part of a computerized telephone system, part of the CAD system, or stand-alone. Properly equipped PSAPs will also have a backup generator for use in the event of a loss of

utility power and an Uninterruptible Power Supply (UPS) sufficient to run essential equipment long enough for the generator to take the full power load. Finally, for accountability, quality assurance, and law enforcement support, a digital recording system for all 9-1-1 lines and some or all radio channels is also necessary. The following data is from a recent survey conducted by the Colorado 9-1-1 Resource Center:

CAD Systems

A CAD system is any software-hardware system that provides tracking capability for calls for service and the field unit status. This is "optional" equipment in PSAPs, but the vast majority of PSAPs now use CAD systems. A number of additional features can also be part of a CAD system, such as integration with local law enforcement Records Management Systems (RMS), computerized mapping of call for service locations, past history information, and more.

- Oldest: 24 years
- Average: 9 years
- Average since last upgrade: 4 years

"Oldest" indicates the oldest system in use as reported by survey respondents. The average is the average age of the systems in use among responding PSAPs. The last upgrade refers to the age of the current installation of the version of the software in use.

Last year, the average age of a CAD system in Colorado was 8 years. The average since last upgrade of an existing system was 4 years.

Phone Systems

Every PSAP has telephone equipment. This may range from a stand-alone handset with an associated display for the caller's address and phone number to a computerized, networked system. Most PSAPs now used computer-telephony integration (CTI) systems, often with integrated mapping displaying the caller's location.

- Oldest: 21 years
- Average: 7 years
- Average since last upgrade: 5 years

Last year, the average age of a 9-1-1 Phone System in Colorado was 6 years. The average since last upgrade of an existing system was 4 years.

Radio Consoles

Every PSAP has radio dispatching consoles. These are base stations allowing the dispatcher to communicate with field units, and they can range from fully hardware-controlled analogue systems to digital computer-based software controlled systems. Most PSAPs are now using software-based systems, which in many instances offer features and an ease in channel selection that cannot be achieved with hardware-only systems.

- Oldest: 31 years
- Average: 9 years
- Average since last upgrade: 5 years

Last year, the average age of PSAP radio console installations in Colorado was 7 years. The average since last upgrade was 4 years.

Console Furniture

Many dispatch centers now use dispatching console furniture ergonomically designed to meet the needs of modern, computerized dispatching equipment and to serve as a comfortable workstation for long shifts. Not all dispatch centers use specially designed console furniture, but it is very common.

- Oldest: 21 years
- Average: 8 years

Last year, the average age of dispatch console furniture in a PSAP was 7 years.

Primary backup generator

A backup generator is essential for continuity of operations in the event of a failure of utility-provided power. In addition to the age of the equipment currently being used, respondents were asked if the current generator they were using as their primary backup was sufficient for their needs. As additional computer equipment is added into the PSAP over time, it is not uncommon for the capacity of a backup generator to become insufficient to run all essential equipment.

- Oldest: 25 years
- Average: 9 years
- PSAPs reporting that their current generator is sufficient to their needs: 93%

Additionally, some PSAPs have secondary or even tertiary backup generators in order to further ensure continuity of service.

Last year, the average age of a primary backup generator in a PSAP was 7 years. The percentage of PSAPs reporting that their current generator was sufficient was 92%.

Uninterruptible Power Supply

Backup generators do not begin running immediately upon a loss of utility power. Battery backup UPS systems are intended to operate essential equipment seamlessly in the event of the loss of utility power until the generator can start and reach full capacity. Ideally, this should be no more than a few minutes, but in the event of a problem with the generator it is best to have a UPS system that can maintain a full load for an extended period of time. Respondents were also asked if their UPS system was sufficient for their needs.

- Oldest: 22 years
- Average: 7 years
- PSAPs reporting that their current UPS is sufficient to their needs: 92%

Last year, the average age of a UPS in a PSAP was 5 years. The percentage of PSAPs reporting that their UPS was sufficient was 92%.

Recording System

Centralized recording systems are necessary for quality assurance of 9-1-1 calls and radio traffic handling. Additionally, copies of 9-1-1 calls and radio traffic are routinely used in civil and criminal cases as evidence.

- Oldest: 13 years
- Average: 5 years

Last year, the average age of a recording system in a PSAP was 4 years.

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 included the following:

Call Taker

“Call takers” refer to employees who have responsibility for answering and/or processing 9-1-1 calls but do not dispatch 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. Dispatchers dispatch the call for service based on the information entered into the CAD system. This is known as "horizontal dispatching," in which one person takes the call and another dispatches it. In high priority calls, this allows for the call to be dispatched while the call taker stays on the line with the caller, providing them with their full attention instead of splitting their attention between the caller and the field units. The use of dedicated call takers is rare among PSAPs, usually reserved only for large PSAPs and some medium-sized PSAPs. In dispatch centers that use call takers, the call takers tend to be paid less than dispatchers. This can be attributed to shorter training times and less reliance on multi-tasking skills necessary to concentrate on one call at a time.

The BLS does not track salary or employment information for this particular type of employee, so no comparison to national averages is possible. The statewide average starting rate for a public safety call taker, according to the online PSAP profiles maintained by the Colorado 9-1-1 Resource Center, is $15.35/hour. This is up only slightly over last year's starting average rate of $15.33/hour. The statewide average top salary for public safety call takers is $20.57, up 1.8% from last year's rate of $20.19/hour.

Dispatcher

"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.

Bureau of Labor Statistics data shows that the average dispatcher wage in Colorado is $20.56/hour, which is up from last year, in which the average public safety dispatcher wage was $19.96/hour. This represents a 2.9% increase. This Colorado average is significantly higher than the BLS reported national average of $17.74/hour, making Colorado dispatchers the 9th highest paid in the nation. This is a drop from 7th place last year.

According to PSAP profiles maintained on the Colorado 9-1-1 Resource Center website, the average starting wage for dispatchers in Colorado is $16.90/hour (a slight increase over last year's figure of $16.86/hour. Profiles show an average top salary of $22.86, a 1.1% increase over last year's figure of $22.60/hour.

The BLS reports that there are currently 1,460 individuals employed in Colorado who have responsibility for dispatching police, fire, or EMS field units. Last year, this number was 1,580, so this year's figure represents a 7.6% decline in the number of individuals employed as public safety dispatchers. In summary, there are fewer dispatchers employed in Colorado this year, but they are being paid marginally better. Because the average starting pay has not increased significantly,

it may be assumed that the higher average pay for dispatchers in Colorado is due to merit or longevity-based pay increases of existing dispatch staff.

Supervisor

Supervisor, in this case, 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.

The BLS does not track salary or employment information for this particular type of employee, so no comparison to national averages is possible. The statewide average starting rate for a dispatch supervisor is $21.78/hour, which is unchanged from last year. The average top pay for dispatch supervisors was $28.38/hour, up 0.5% from last year's rate of $28.23/hour.

Director

"Director" refers to an individual who is primarily responsible for the overall operation of the PSAP. In small and medium-sized dispatch centers in Colorado, it is not uncommon for there to not be a specific person filling this role. Often, the operation of the PSAP falls under the responsibility of a ranked law enforcement officer who is also in charge of other, non-PSAP operations. In many medium or large PSAPs, there will be a specific person who is charged with the overall operation of the PSAP and is dedicated to that purpose.

The online PSAP profiles do not request starting or top salaries for directors, since individuals in those positions are not infrequently contract employees who are paid a negotiated salary. The average shown in figure 3 is per hour, though most are paid salaries rather than wages. The average in Colorado, per the profile entries, is $78,250 annually. This is a significant drop, 19.1%, from last year's rate of $96,699 annually.

It should be noted that the level of responsibility for a PSAP director varies greatly based on the structure and size of the organization, and the pay rate varies accordingly.

The BLS does not track salary or employment information for this particular type of employee, so no comparison to national averages is possible.

Wages - Statewide

Unless otherwise indicated, wage data in this section was obtained from the PSAP survey.

	Call taker	Dispatcher	Supervisor	Director
Starting	$15.35	$16.90	$21.78	
CO average*		$20.56		
Top	$20.57	$22.86	$28.38	
Current average				$37.62
National average*		$17.74		
State rank*		9th		
# employed in Colorado		1,460		

* Bureau of Labor Statistics

Figure 3
Colorado PSAP Staffing and Salary Data

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 rate for the East and South Colorado nonmetropolitan area was the only one to drop. All other rates represent an increase over last year.

Area Name	Hourly Mean Wage
Boulder, CO	$23.50
Colorado Springs, CO	$22.05
Denver-Aurora, CO	$21.50
Fort Collins-Loveland, CO	$21.44
Pueblo, CO	$20.00
East and South Colorado nonmetropolitan area	$14.17
West Colorado nonmetropolitan area	$19.08
North Central Colorado nonmetropolitan area	$19.94
Central Colorado nonmetropolitan area	$16.75

Figure 4
Average Dispatcher Wages by BLS Region

Starting and top wages for the various job categories reported in the online PSAP profiles can be shown by other regional breakdowns, however, including Colorado's nine all hazard regions. *Figure 5* shows average wages broken down by those regions. *Figure 6* shows a map of the regions being used. Where there were no salaries reported for a particular job category in a region, the field has been marked "N/A". No wage data is available for the San Luis Valley region.

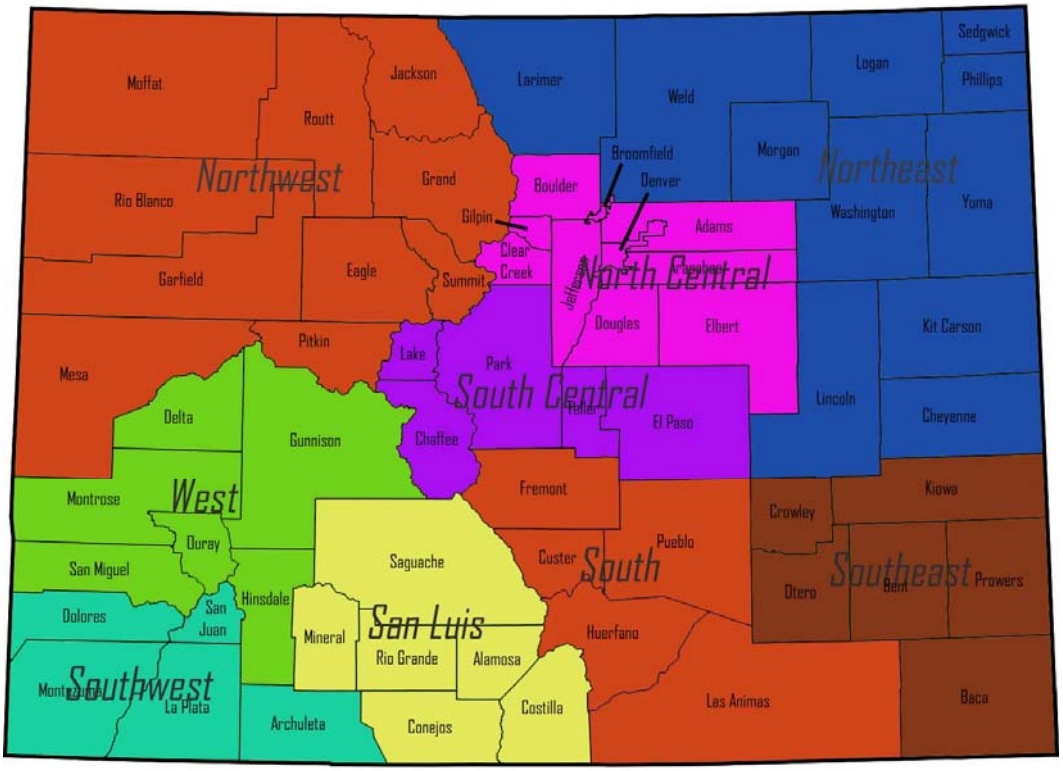
Below each figure is a percentage showing the change over the previous year. Increases are in green, decreases in red. "N/C" indicates no change over the

previous year. "New" indicates there was no data available for this category last year.

	NC	NE	NW	S	SC	SE	SW	W	SL
Starting	$18.77	$12.91	$16.78	$10.00	$12.72	$10.23	$13.35	$15.63	N/A
Call Taker	0.4%	n/c	n/c	n/c	new	n/c	n/c	0.9%	
Top	$27.48	$17.91	$20.39	$10.00	$12.72	$11.68	$21.00	N/A	N/A
Call Taker	1.9%	n/c	n/c	n/c	new	n/c	n/c		
Starting	$19.14	$14.65	$18.06	$13.99	$13.74	$10.89	$13.35	$17.28	N/A
Dispatcher	0.2%	9.3%	1.6%	3.6%	9.0%	n/c	n/c	0.3%	
Top	$26.53	$20.80	$23.21	$22.10	$16.36	$11.84	$21.00	$25.32	N/A
Dispatcher	2.2%	7.8%	0.1%	0.2%	10.7%	n/c	n/c	5.9%	
Starting	$24.56	$19.73	$22.56	$17.14	$16.69	$15.38	N/A	$22.05	N/A
Supervisor	0.8%	7.8%	1.6%	3.4%	n/c	n/c		5.0%	
Top	$33.97	$26.16	$29.55	$24.08	$21.69	$17.22	N/A	$30.66	N/A
Supervisor	2.4%	12.2%	7.7%	3.6%	3.4%	n/c		16.4%	
Current	$41.90	$37.75	$42.94	$25.54	$25.96	$17.08	$28.85	$40.19	N/A
Director	2.7%	n/c	1.3%	n/c	n/c	n/c	n/c	0.3%	

Figure 5
PSAP Wages in Various Categories by All Hazard Regions

It should be noted that changes from the previous year may indicate actual changes in wages for that category in that region, but it also may indicate new participants. Last year's figures were calculated from a voluntary survey, and more PSAPs have participated since the time of the survey.



Colorado All Hazard Regions

© Colorado 9-1-1 Resource Center, 2009 Updated 5/1/09

Figure 6
Colorado All Hazard Regions

Wages by Console Position

In last year's report, an analysis of the relationship between number of 9-1-1 calls processed annually by a PSAP and wages of the personnel at the PSAP was presented. This year, only a handful of PSAPs choose to complete the call load portions of their online profile, so the sample size was insufficient for making any meaningful analysis.

However, a similar analysis can be conducted between the number of workstation consoles in a PSAP and the wages paid to personnel, the number of workstations being a quick way of summarizing the size of the PSAP.

	<5	5 - 10	>10
Starting Call Taker	$15.94	$19.04	No data
Top Call Taker	$20.74	$27.99	No data
Starting Dispatcher	$16.37	$19.59	$18.77
Top Dispatcher	$22.41	$27.41	$24.72
Starting Supervisor	$19.63	$24.01	$26.31
Top Supervisor	$25.72	$33.87	$30.89
Current Director	$35.19	$42.97	$46.11

Figure 7
PSAP Wages in Various Categories by Number of Workstation Consoles at PSAP

Staffing Levels

Staffing can be examined in a number of different ways. PSAP survey results provide some insights.

General Staffing

Before going into further detail concerning staffing, it can be useful to look at staffing levels in general. *Figure 8* 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	2nd	3rd	Top
Employees	**1-9**	**10-14**	**15-21**	**23-163**

Figure 8
Number of Operational Employees in PSAPs by Quartile

The bottom quartile is the unchanged from last year's data. The 2nd and 3rd quartiles are slightly elevated, while the bottom range of the top quartiles went from 21 to 23.

The figure indicates that PSAPs in Colorado continue to trend small, with 75% of PSAPs employing 21 or fewer operational employees. The slight increase in the larger PSAPs may be expected as the population of the state grows and PSAPs must increase their staffing to compensate.

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.

Of the agencies that reported at least one administrative employee, the percentage of PSAP employees who were administrative in their roles is 11.7%. This is up significantly from 8.0% last year. Whatever the reason for the increase in administrative support, the percentage creates an average that PSAPs may use to evaluate their own administrative-to-operational staffing ratios. Another way to examine this ratio is to break it down by the size of PSAP.

	<5	5-10	>10
Ratio	13.8%	11.3%	6.1%

Figure 9
% of PSAP Personnel in Administrative Roles by Number of Workstation Consoles

Figure 9 indicates that larger PSAPs are function with a lower ratio of administrative to operational personnel, with medium PSAPs utilizing a smaller ratio than small PSAPs, and large PSAPs utilizing a much smaller ratio than either small or medium PSAPs. A similar analysis conducted last year utilizing annual 9-1-1 call volume instead of number of workstations indicated PSAPs in the medium category using a higher ratio of administrative-to-operational employees than small PSAPs, but still

showed the large break for larger PSAPs. This break for larger PSAPs suggests and economy of scale allowing a fewer number of administrative personnel to support a larger number of operational employees.

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 Study (2009). This study outlines the results of a detailed survey of PSAPs nationwide, describing overturn conditions in PSAPs, the factors contributing to that overturn, and providing methods for alleviating problem turnover rates. The document is free to APCO members.

The APCO study shows an average PSAP retention rate of 81% (or a turnover rate of 19%). This number was based on the number of employees who left during training and those who left who were completed with training. Specifically, this applied to operational employees, those who had dispatching and/or call taking duties.

Of the PSAPs that have completed the staffing section of their online PSAP profile, the turnover rate was 13.6%. This is higher than last year's figure of 12.1%, but still significantly lower than the Project RETAINS national average of 19%. There are a couple of possible reasons for the difference. First, based on the examination of wages shown earlier in this report, Colorado is the 9th highest paying state in the nation considering the dispatcher wages, down from 7th last year. This higher rate of pay in Colorado may result in lower turnover rates than the national average.

Unfortunately, it is also possible that there are reporting errors in the online PSAP profiles. Since response to the survey is voluntary, some PSAPs have not responded, and those who have responded have not necessarily answered all sections of the survey. PSAPs with higher turnover rates may have been less likely to complete the staffing section of the survey.

Project RETAINS study results also broke out the results by PSAP size. The size categories used by Project RETAINS are not appropriate for Colorado, as the "large"

category used by the project is defined by PSAPs with 75 or more employees, a definition that would apply to only one PSAP in Colorado. *Figure 10* uses a breakdown that makes more sense for Colorado. The "Change" row shows the difference in absolute percentage from last year's figures.

	1-10	11-20	21+
Turnover	19.4%	17.3%	10.8%
2010	12.1%	11.8%	12.5%
Change	+7.3%	+5.5%	-1.7%

Figure 10
Turnover Rate by Number of Operational Employees

The turnover rates for employees in the small and medium-sized PSAP categories show significant increases over last year, offset but a decrease in the large PSAP category. This year, unlike last year, the small PSAP category's average turnover rate topped the national average.

Training

Training standards vary widely through Colorado. While a number of states have set minimum training and certification standards for dispatchers, Colorado has not. 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.

An examination of options for promoting the voluntary adoption of training standards in Colorado has been undertaken and has recently been combined with efforts to write a State 9-1-1 Plan for Colorado. Part of this effort has involved additional surveys of PSAPs in Colorado, followed by adding training data fields to the online PSAP surveys. Initial data collected in this process has indicated an enormous variety in the degree of training being conducted at PSAPs in Colorado.

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.

Based on currently available information, there are at least five different standardized protocol sets in use in Colorado, and at least one PSAP is using protocol a set that was designed in-house.

5. Areas of Concern

In last year's report, a list of equipment needs reported by PSAPs in the statewide PSAP survey was provided, as well as a list of operational needs. In the online PSAP profiles now being used, PSAP managers are provided a list of issues that they have struggled with in their PSAP, including an open-ended "other" field. Not all PSAPs have opted to respond to this section, but of those PSAPs that have checked at least one of these options, here are the results:

Issue	Percentage
Staffing	70.6%
Funding	76.5%
Recruiting	35.3%
Training	29.4%
Equipment	58.8%
Facility	47.1%

Figure 11
Reported as "issues" by local PSAP managers.

Currently, none of the PSAP managers responding to this section of the online PSAP profiles have offered any additional categories.

6. 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

Until recently, Colorado has had no state-level funding of 9-1-1 call centers. 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 $1.50 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 82¢ per line per month.

Legislation passed by the Colorado General Assembly last year 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. Initial collection rates have been much lower than was predicted by the Resource Center based on national figures of prepaid cell phone service adoption and average rates of prepaid minute renewal purchases. 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. However, there is a weak correlation between surcharge rates and population of the 9-1-1 Authority Service Area. *Figure 11* is a scatter plot showing surcharge rates by population of the service area. The figures are from 2010, but since only one authority has increased its surcharge rate in 2011, it will not have significantly changed.

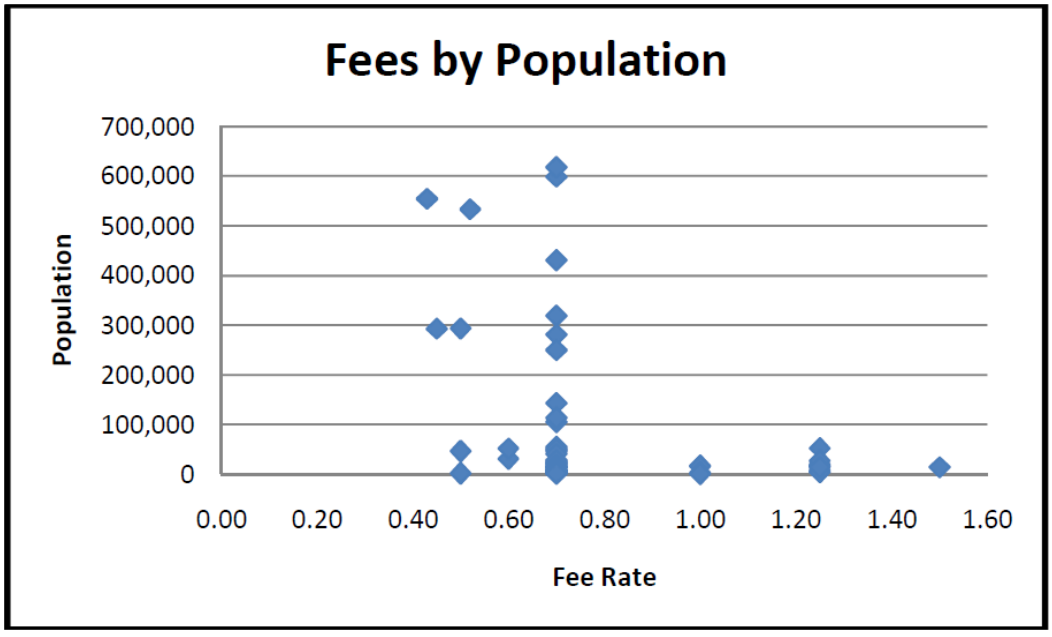


Figure 12
Surcharge Rates by Population of Service Area

There is a correlation of -.339 between the surcharge rates and population, indicating that, in general, the higher the population of the service area, the lower their surcharge is likely to be. Based on this, it can be said that lower-population areas are bearing a larger brunt of the cost of providing 9-1-1 service. On the other hand, unlike states that have statewide 9-1-1 surcharges, it can be said that in

Colorado all funds collected for 9-1-1 are used to maintain and improve 9-1-1 services locally.

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. Currently, there is no good data as to what an average might be, but anecdotally it seems likely to be very low. The remainder of the costs associated with providing 9-1-1 service comes from other sources, most commonly from the budgets of participating agencies, city, or county budgets.

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, though these grants, 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 will be completed before the end of September 2012. Unfortunately, Congress allowed the ENHANCE 911 Act to expire this year. It is unknown if it will be revived, though a bill to do so has been introduced in the Senate and the House.

In order for projects to be eligible under the grant, they had to have the effect of bringing a PSAP or PSAPs closer to being Phase II enhanced wireless compliant or to make the PSAP or PSAPs more ready for participation in an IP-based emergency network. The specific 9-1-1 Authorities that will receive funding through the grant follows:

- *Lincoln County:* Replacement of CTI Consoles for Phase II enhanced wireless compliance.
- *Huerfano County:* Replacement of CTI Consoles for Phase II enhanced wireless compliance.
- *Larimer County:* Installation of a secure broadband network to connect five separate PSAPs.
- *Elbert County:* Installation of a T1 broadband connection between the PSAP and the local telephone central office.

- *Adams County:* Installation of a broadband fiber connection between the Adams County Communications Center and the City of Denver 911 Center.
- *Crowley County:* Installation of electronic mapping display consoles in the PSAP, allowing easier use of Phase II wireless enhanced wireless data to locate callers.
- *Washington-Yuma*: Replacement of customer premise equipment with an IP-enabled CPE at the Washington-Yuma combined dispatch center.

The status of these projects varies. Elbert County, for instance, closed its PSAP following award of the grant, and is unlikely to complete its project, while Huerfano County has reported near completion of their project.

Funding Outlook

While the prepaid wireless surcharge statute enacted this year 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 Wireless Association (CTIA) estimated released the results of their semi-annual survey in December 2010, showing that 96% of Americans are now using cell phones, based on the number of active units divided by the total population of the United States and territories ("Wireless Quick Facts"). 21.1% of those are using prepaid cell phones. 29.7% of American households are now wireless-only, meaning that if compliance rates on the collection of prepaid cell phone surcharges are low, landline and contract wireless users could be subsidizing the 9-1-1 system for a significant portion of prepaid cell phone users.

There are other non-traditional telecommunications services that have proved problematic for the collection of 9-1-1 fees. Some VoIP services, for instance, have argued that they should not be required remit 9-1-1 surcharge fees because they do not meet the definition of an "interconnected VoIP provider" as specified in Colorado statute, despite providing the same functionality as interconnected VoIP providers.

Recently, the Colorado 9-1-1 Resource Center commissioned an NG9-1-1 options study. The results of this study recommended some creative thinking and discussion of funding. Further review of these recommendations by the 9-1-1 Task Force is expected over the course of 2012.

Federal dollars for 9-1-1 are nearly nonexistent. The ENHANCE 9-1-1 Act of 2004 has expired, though the previously awarded grant amounts are still available for already-awarded projects. Occasionally, 9-1-1 related projects can be paid for using grants not specifically designated for 9-1-1. A project for improving

broadband connectivity to a PSAP, for instance, can be included in a BTOP grant. In general, though, very little federal funding has been received for 9-1-1 projects in Colorado, and this is not expected to change in the near future.

7. 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 begun 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.

As has been mentioned, the Resource Center recently commissioned an NG9-1-1 options study 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, and are still being reviewed. A plan has been proposed for furthering discussion of NG9-1-1 migration in Colorado and to further review the recommendations of the study, utilizing the PUC's 9-1-1 Task Force as the coordinating organization.

8. State 9-1-1 Plan

The National 9-1-1 Implementation and Coordination 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 from a resurrected version of the ENHANCE 911 Act.

As Colorado lacks a state office to oversee the development of a State 9-1-1 Plan, the Colorado 9-1-1 Resource Center has taken 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. Significant development of the plan has been accomplished, with the "vision" sections of the plan left to be completed. With the release of the NG9-1-1 options study commissioned by the Resource Center and a perceived need for further dialogue, a proposed plan for further discussions includes the development of consensus on a vision of the future

of 9-1-1 in the state, utilizing the PUC's 9-1-1 Task Force represent the stakeholders to create this vision. If the Task Force approves the plan, the consensus emerging from the resultant discussions will be used to complete the remaining sections of the State 9-1-1 Plan.

Ultimately, the Resource Center, as a nonprofit, has no statutory authority to establish a State 9-1-1 Plan, so the plan developed through this process will need to be adopted officially by the State of Colorado for it to be legitimate.

9. Conclusion

Significant advances have been made in the dialogue among Colorado 9-1-1 stakeholders in 2011. With the release of the NG9-1-1 options study commissioned by the Resource Center, plans for further discussions, and the willingness of various stakeholder groups to participate in the process, 2012 promises to be a year of further advancement for 9-1-1 services in Colorado.

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