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**MEMORANDUM**

January 26, 2016

**TO:** Interested Persons  
**FROM:** Katie Ruedebusch, Research Analyst, 303-866-3001  
**SUBJECT:** State Digital Trunked Radio System

**Summary**

This memorandum discusses Colorado's Digital Trunked Radio System (DTRS). The first section of the memorandum highlights the history and members of DTRS. The next section describes the components of DTRS. The final section notes the funding history of DTRS.

**Colorado Digital Trunked Radio System (DTRS)**

In Colorado, DTRS is a statewide public safety, two-way radio communication system. The system is used by state and local government agencies for day-to-day communications and to improve cooperation and coordination in first responder situations. Agencies rely on the interoperability and flexibility of the system for both emergency and daily operations.

**History.** According to the Governor's Office of Information Technology (OIT), DTRS was created in the 1990s through partnerships with municipal, county, tribal, state, and federal government agencies. In 1998, the Division of Information Technology, which became OIT, began implementing DTRS. By 2002, DTRS included most of the Denver metro area, as well as portions of northeast and southeast Colorado. Today, DTRS provides mobile, in vehicle radio service for approximately 95 percent of state highways.

**Members of DTRS.** According to OIT's 2015 Public Communications Network Annual Report, DTRS has over 82,000 subscriber radios operating, representing over 1,000 state, local, regional, tribal, and federal agency first responders. Eighteen percent of users are from the state government and 82 percent of users come from local, regional, tribal, and federal agencies. From January through September 2015, DTRS handled 71 million voice calls, averaging about 8 million calls a month. Members range from police, fire, and emergency medical services to schools and hospitals.

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No local government or agency is required to use DTRS. DTRS can communicate with some other radio communication groups that are not part of the DTRS system, such as counties and regional networks. According to the State of Colorado Public Safety Radio System-Wide Business Plan Report from June 30, 2015, access to DTRS is open to authorized users and available to all user agencies regardless of jurisdiction.

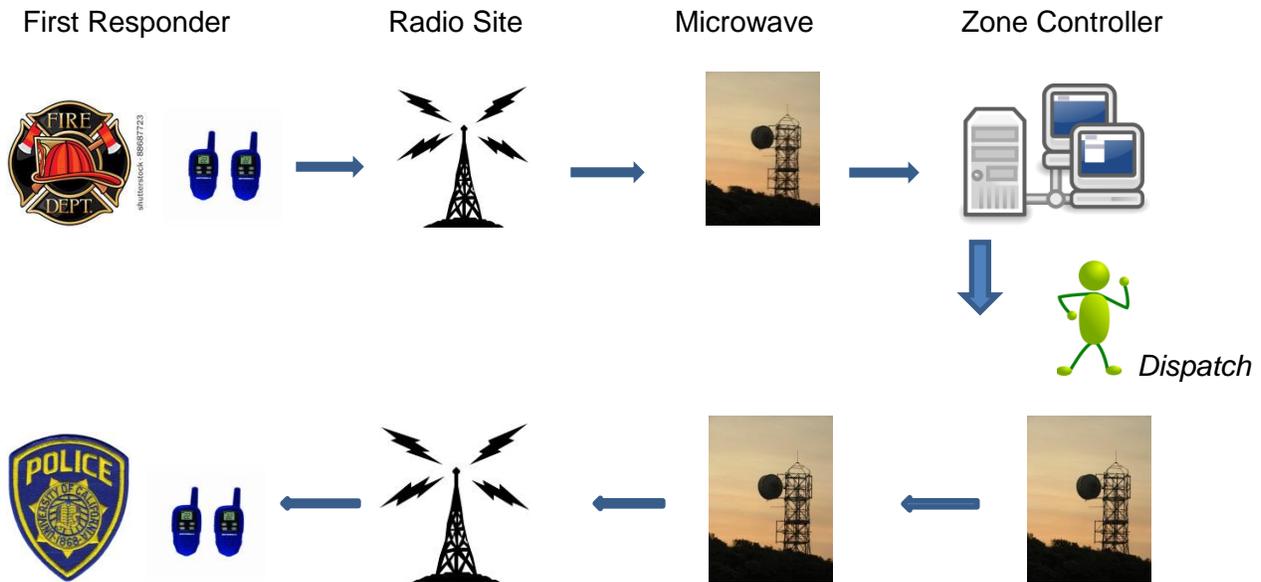
## **Digital Trunked Radio**

Radio communication is critical to connecting first responders across distance and jurisdiction. In order for first responders to communicate more effectively, trunking allows a large number of users to share a limited number of radio frequencies across the state. Digital trunking is able to fill in gaps between communications systems and offers better support for encrypted voice and data. The equipment, software, and radio towers that make up the DTRS are owned by a combination of state and local entities. DTRS is currently managed by OIT's Public Safety Communications Network. The state is responsible for 60 percent of the zone master site controllers and 70 percent of the statewide transmitter sites, with local agencies responsible for the remainder.

**Components of DTRS.** DTRS is a "system of systems." Various components, such as physical infrastructure, software, and hardware, are needed to make the system work. DTRS components include:

- 1,564 repeaters at the 215 active radio transmitter sites located throughout the state;
- five master zone switch controllers:
  - one primary zone controller located in Denver (Zone 1) that processes data sent to four master zone sites; and
  - four master zone sites, which house computer equipment used to control the operations of the radio sites. The state manages and owns two of the four master zone sites, Zone 2 located in Grand Junction and Zone 3 located in Fort Collins. The Pikes Peak Regional Communications Network owns Zone 4, with Pueblo County owning Zone 6 (there is no Zone 5);
- 71 communication dispatch centers, which allow operators to communicate with first responders and facilitate communication between first responders. The state owns nine of the dispatch centers;
- 298 transport backhaul links, which connect the sites to each other. Of the transport links, 262 are privately-licensed microwave paths, 26 are leased circuits, and ten are optical fiber;
- communications software; and
- individual radios.

In addition to the basic components of the system, DTRS includes backup power generators and heating/air conditioning units, along with equipment shelters, at transmitter sites. Also, the system includes inter sub-system interface (ISSI) gateways that allow communication among DTRS users and some non-DTRS users. Below is a simplified visual representation of zone controller routing communications.



## DTRS Funding History

**Capital construction funds.** House Bill 98-1068 created the Public Safety Communications Trust Fund. The bill transferred \$50.0 million from the General Fund to the Capital Construction Fund (CCF) to the new Public Safety Communications Trust Fund to create DTRS. In FY 2008-09, the Public Safety Communications Trust Fund received an addition \$7.9 million from the CCF. Also, DTRS received \$7.4 million from the CCF for software upgrades in FY 2013-14 and FY 2014-15.

**Funding for local government.** Local governments received funding to participate in and upgrade DTRS infrastructure in their jurisdictions. The Division of Local Government in the Colorado Department of Local Affairs, through the Colorado Wireless Interoperability Network Initiative, provided \$35 million in grants to local governments to purchase DTRS infrastructure. The Energy and Mineral Impact Grant program, which was funded by a portion of Colorado's severance tax and federal mineral leases, provided the grants.

**Federal funds.** In addition to state funds, DTRS received federal funding. Much of the federal funds came from the U.S. Department of Homeland Security's State Homeland Security Grant program and Interoperable Emergency Communications Grant program and the U.S. Department of Commerce's Public Safety Interoperable Communications Grant program. According to Joint Budget Committee staff, DTRS received around \$78.5 million in federal funds between FY 1998-99 and FY 2008-09. The federal funds went to both OIT and local government entities.

**House Bill 14-1203.** House Bill 14-1203 established a 12-year, \$3.5 million annual appropriation, beginning in FY 2013-14, from the General Fund or other designated fund to replace legacy radio equipment and hardware at DTRS radio tower sites. The bill also established an annual \$3.7 million appropriation for eight years, beginning in FY 2017-18, from the General Fund or any other designated fund to upgrade and maintain DTRS software.