



**Boulder County Purchasing**  
**1325 Pearl Street**  
**Boulder, CO 80302**  
[purchasing@bouldercounty.org](mailto:purchasing@bouldercounty.org)

**REQUEST FOR INFORMATION**  
**COVER PAGE**

---

RFI Number: **7480-23**

RFI Title: **BCSO Land Mobile Radio Infrastructure Upgrade**

RFI Questions Due: July 14, 2023 – 2:00 p.m.

Submittal Due Date: August 4, 2023 – 2:00 p.m.

Email Address: [purchasing@bouldercounty.org](mailto:purchasing@bouldercounty.org)

Documents included in this package: Submission Instructions  
Specifications  
Signature Page



**Boulder County Purchasing**  
**1325 Pearl Street**  
**Boulder, CO 80302**  
[purchasing@bouldercounty.org](mailto:purchasing@bouldercounty.org)

## **SUBMISSION INSTRUCTIONS**

---

**IMPORTANT NOTE:** Boulder County is not soliciting quotes or services at this time. Rather, the County is seeking information to guide the County's development of a potential request for proposals (RFP) for related services. Boulder County will not make any awards pursuant to this Request for Information and reserves the right to decline to issue any future solicitation. By submitting information in response to this Request for Information (RFI), you acknowledge and agree that the County may use the information to develop scopes of work and other specifications for future projects free of charge. Proprietary or confidential information should **NOT** be submitted. Submissions are subject to public disclosure under the Colorado Open Records Act, 24-72-201 *et seq.*, C.R.S.

### **1. Purpose/Background**

The Boulder County Sheriff's Office (BCSO) is modernizing the Land Mobile Radio (LMR) infrastructure as we shift from reactionary fixes to visionary planning. A modernized system will benefit all our residents and visitors by better supporting public safety workers, including BCSO deputies, 911 dispatchers, volunteer and full-time fire/rescue workers, rangers in Parks and Open Space, our colleagues in Public Works, and many others who serve Boulder County to protect lives and lands. We anticipate that this multi-year project will require building additional new (and renewing existing VHF/800MHz) two-way communications infrastructure sites served by a redundant and reliable public-safety grade IP network. Doing so will transform the traditional LMR sites to "Public Safety Technology Infrastructure" sites, which will combine the latest technology for LMR, public safety wireless broadband, wildfire surveillance camera systems, and other technology as it becomes available to help assure the safety of all within Boulder County. It is the expectation that this environment will immediately include solar power, terrestrial microwave, and satellite components while preparing for other technologies of the future. This effort will result in an effective voice and data system that provides significantly improved coverage throughout the county by leveraging multiple wireless bands and technology, affording interoperable communications locally, regionally, state-wide, and with federal resources in public safety, including fire/rescue, law enforcement, EMS, public works, and transportation services. Building this capacity will greatly enhance our ability to alert residents and visitors of danger and impending disasters, making Boulder County a safer place for all who live and visit here.

## 2. Written Inquiries

All inquiries regarding this RFI will be submitted via email to the Boulder County Purchasing Office at [purchasing@bouldercounty.org](mailto:purchasing@bouldercounty.org) on or before 2:00 p.m., July 14, 2023. A response from the county to all inquiries will be posted and sent via email no later than July 21, 2023.

**Do not contact any other county department or personnel with questions or for information regarding this solicitation.**

## 3. Submittal Instructions

Submittals are due at the email box only, listed below, for time and date recording on or before **2:00 p.m. Mountain Time on August 4, 2023.**

**Please note that email responses to this solicitation are limited to a maximum of 50MB capacity.**

**NO ZIP FILES OR LINKS TO EXTERNAL SITES WILL BE ACCEPTED. THIS INCLUDES GOOGLE DOCS AND SIMILAR SITES. ALL SUBMITTALS MUST BE RECEIVED AS AN ATTACHMENT (E.G. PDF, WORD, EXCEL).**

Email [purchasing@bouldercounty.org](mailto:purchasing@bouldercounty.org); identified as **RFI # 7480-23** in the subject line.

**Americans with Disabilities Act (ADA):** Americans with Disabilities Act: If you need special services provided for under the Americans with Disabilities Act (ADA), please contact the Boulder County ADA Coordinator or Human Resources office at (303) 441-3525 as soon as possible to allow sufficient time for service delivery ahead of applicable due dates.



**Boulder County Purchasing**  
**1325 Pearl Street**  
**Boulder, CO 80302**  
[purchasing@bouldercounty.org](mailto:purchasing@bouldercounty.org)

**BCSO Land Mobile Radio  
Infrastructure Upgrade  
SPECIFICATIONS**

---

**Overall project scope**

The Boulder County Land Mobile Radio (LMR) project is envisioned to both modernize and extend existing public safety communications capabilities within Boulder County. It will simultaneously provide the foundation for an environment that is more evolved to efficiently and cost effectively meet emerging operational and technical imperatives in the future. The scope of this project is to modernize the county's aging VHF radio communications system, enhance coverage in traditionally marginal coverage areas and improving Consolidated Communications Network of Colorado (CCNC) system coverage and capacity through design and implementation of an integrated multi-mode public-safety grade radio communications system.

Given the many natural and man-made disasters that continue to occur in Boulder County, along with the rapid growth of homes, businesses, and government facilities, and an ever-increasing number of recreational visitors, our public safety communications environment has not kept up with the needs to support effective public safety; in particular, our public safety LMR systems (conventional VHF and CCNC 800MHz Digital Trunked Radio System (DTRS)). Historically, we have made patchwork fixes and upgrades to the systems to keep up with the changes, causing the existing LMR infrastructure to now devolve to a point that puts the county at greater risk of local, state, and federal public safety providers operating within Boulder County not being able to communicate effectively in several locations. The most challenging locations include the northwest mountainous region of Boulder County, which serves as the gateway to many tourist and recreation areas, and the Town of Superior, an area of significant residential and commercial growth with no end in sight.

The Boulder County Sheriff's Office (BCSO) is modernizing our LMR infrastructure as we shift from reactionary fixes to visionary planning. A modernized system will benefit all our residents and visitors by better supporting public safety workers, including BCSO deputies, 911 dispatchers, volunteer and full-time fire/rescue workers, rangers in Parks and Open Space, our colleagues in Public Works, and many others who serve Boulder County to protect lives and lands. We anticipate that this multi-year project will require building additional new (and renewing existing VHF/800MHz) two-way communications infrastructure sites served by a redundant and reliable public-safety grade IP network. Doing so will transform our traditional LMR sites to "Public Safety Technology Infrastructure" sites, which will combine the latest technology for LMR, public safety wireless broadband, wildfire surveillance camera systems, and other technology as it becomes

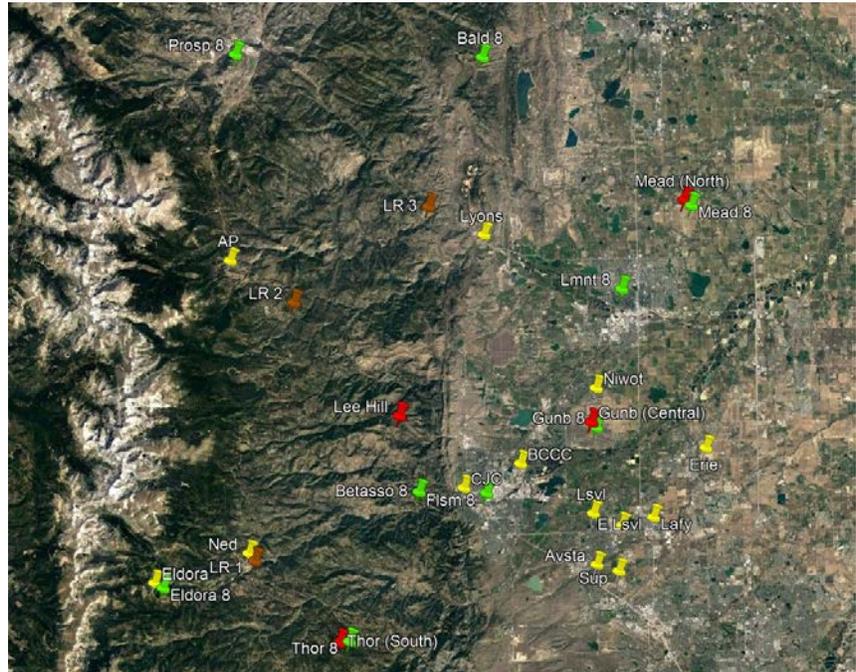
available to help assure the safety of all within Boulder County. It is the expectation that this environment will immediately include solar power, terrestrial microwave, and satellite components while preparing for other technologies of the future. This effort will result in an effective voice and data system that provides significantly improved coverage throughout the county by leveraging multiple wireless bands and technology, affording interoperable communications locally, regionally, state-wide, and with federal resources in public safety, including fire/rescue, law enforcement, EMS, public works, and transportation services. Building this capacity will greatly enhance our ability to alert residents and visitors of danger and impending disasters, making Boulder County a safer place for all who live and visit here.

### **Current LMR and communications systems for first responders**

Boulder County encompasses 740 square miles situated at the eastern edge of the Rocky Mountains with the eastern half of the county in the plains (or “flats” at approximately 5,300 ft above sea level) and the western half in the mountains ranging from the foothills to the continental divide of North America with altitudes up to 14,000 ft. The flats of the county are heavily populated with the cities of Boulder, Longmont, Erie, Lafayette, and Louisville having the bulk of the population of the county’s 330,000 residents. Other areas of the flats are a mixture of agricultural areas with unincorporated subdivisions and the towns of Niwot and Superior. The mountainous west of the county is composed of rugged peaks, deep canyons, and remote lands/wilderness, which makes for very challenging terrain to cover with wireless infrastructure. A large percentage of the mountainous west are public lands held by the United States Forest Service. Various residences are scattered around the mountains with greater populations found in the towns of Allenspark, Eldorado Springs, Jamestown, Lyons, Nederland, and Ward. The mountains of Boulder County are world famous for many recreational opportunities, which brings countless visitors to the area year-round. It has been estimated that there are more than 3.3 million visitors to Boulder County annually.

Boulder County is currently providing public safety LMR communications dispatch and infrastructure support to the unincorporated parts of Boulder County, the cities of Lafayette and Louisville, as well as the towns of Erie, Lyons, Nederland and Superior. We do not provide direct services to the City of Boulder, City of Longmont, or University of Colorado; however, we work with them daily and interoperability is a key consideration for any system evolution. Our current radio communications environment includes our legacy VHF analog conventional radio system and use of the state-wide CCNC 700/800MHz digital trunking radio system. We interoperate with many regional and state entities as well as United States Federal agencies via both systems.

The current Boulder County VHF analog conventional LMR system is comprised of five primary sites (transmit and receive) with 14 auxiliary receive-only sites to provide better system talk-in. Five repeated channels are centrally voted in the Boulder County Communication Center. Connectivity between many of the sites is done with legacy analog circuits, provided by both microwave and leased telco lines. Additionally, our environment includes 15 FCC licensed simplex (non-repeated) radio channels for tactical/direct radio to radio



**Figure 1 Boulder County LMR radio sites in 2023**

*Yellow = VHF RX site, Red = VHF TX & RX site, Green = CCNC DTRS site  
Brown = VHF Link Repeater site*

communications. This is in addition to all of our field units being programmed with all local, regional, state-wide, and national mutual-aid channels authorized for our use when necessary. This system was first implemented in the early 1970's, has had modest expansion and maintenance upgrade over the past decades, and still functions as the critical radio system for public safety within the county, including supporting interoperability with other public safety and federal agencies that operate both within and outside of Boulder County. The capacity and capabilities of our VHF environment is often called to use given the magnitude and location of public safety situations that we encounter. Yet, despite the heavy reliance of our VHF system, we have not kept it up to date as most of the radio equipment that comprises the infrastructure is no longer manufactured or supported by the manufacturer.

Boulder County also utilizes the state-wide CCNC 700/800MHz P25 digital trunked radio system as a component of our public safety communications environment. This system serves over 1000 agencies and 127,000 subscriber devices around the state. The system has over 250 radio sites around the state, six of which are located inside Boulder County and three more Boulder County coverage critical sites located just outside of Boulder County lines. All CCNC sites are diversely and redundantly interconnected either by microwave or fiber providing the required IP connectivity. The CCNC system is heavily used in Boulder County by many of our dispatched agencies on the flats and is also used exclusively by the City of Longmont and state agencies that operate in the county. The City of Boulder operates on a standalone 700MHz DTRS. Access to CCNC by Boulder County is vital for in-county, regional, and state-wide radio interoperability with many other public safety entities. The City of Boulder also has interoperability with entities outside of the City via Boulder County's VHF system and limited use of the CCNC system.

Maintaining and enhancing daily interoperability with all agencies working within Boulder County is one of the key goals for this project. It is also critical that we remain fully capable of working effectively with out of region and federal resources that may be called to respond in time of extraordinary need.

## **Goals and Details**

The Boulder County Sheriff's Office seeks to improve and modernize our existing LMR communications environment to provide more capable and reliable communications in support of fire/rescue, law enforcement, EMS, public works, and other authorized users operating throughout Boulder County. This includes both our local and regional/state/federal interoperability partners.

This initiative encompasses significant coverage and technological enhancements and refresh of our VHF infrastructure, including backhaul capacity, resiliency, and site support systems, as well as improving capacity and coverage of the CCNC DTRS system in non or marginally served areas of the county.

This includes focus on geographic areas of the county where land mobile radio two-way coverage for effective communications with dispatch or other parts of the county is unacceptably poor, particularly when using portable radios. It is our requirement that the resulting system infrastructure should, at a minimum, support 24 conventional VHF and 7/800 MHz channels (local channels, not including interoperability channels) utilizing current, state of the art air interfaces, including a mixture of P25 and traditional analog modes, providing for effective communication with typical public safety grade portable and mobile radios. This scope includes added infrastructure to both existing and presumed new radio sites to support redundancy in overlapping coverage areas should any site become inoperable.

We expect that DTRS sites serving Boulder County be provisioned to support at least 12 simultaneous talk-paths in normal operation and provide local fallback capabilities should system level operation become impaired.

While this document focuses mainly on key radio capacity aspects of our system requirements, it is also envisioned that this project includes implementation of public-safety towers, grounding, shelters, antenna systems, power, power backup, site heating and cooling, back-haul, site and system telemetry, and security monitoring/alarming as part of the overall system. It is also imperative that all required test equipment, test assemblies as well as maintenance and test software be identified and included within the scope of the project. Similarly, training and certification for Boulder County staff should also be identified and included within the scope of this project.

**On the following pages, there are three different elements to this RFI. Vendors are asked to respond only to those elements where they can provide solutions along with approximate costs.**

## RFI Element #1: Backbone Infrastructure

**Purpose:** Create a complete, public safety grade IP backbone network for all site connectivity utilizing a combination of State IP microwave, county IP microwave, and other networks as available. The network shall be reliable, redundant, and proposed with products and technology early in their product life cycle that will be fully supported with expansion capabilities for eight years following implementation.

This effort will focus on replacement of select analog BCSO Microwave and CenturyLink telco paths converging at the Boulder County Communication Center (BCCC).

We seek solutions to

1. Upgrade the analog microwave hop from the BCCC to the existing Louisville tower site. This hop is currently running on a 6GHz Alcatel MDR-8000 radio under FCC license WQHT457 and WNTD904.
2. Add a new licensed microwave path to the existing Superior radio site, most likely from our existing Louisville radio site, to support implementation of a full CCNC DTRS radio site in the future. These are currently working radio sites with shelter and tower. These sites are approximately 3.5 miles apart and appear to have line-of-sight between them from tower antenna mounting locations that are available for use. No path analysis has been performed to date.
3. Add new public utility provided fiber connection to Allenspark Fire Station 5 located in the mountains at 32 Bunce Road in support of implementing a new low elevation DTRS radio site.
4. Convert all current leased analog telco lines (2-wire circuits) providing backhaul from our remote receiver sites to IP backhaul incorporating cost effective, but public-safety grade means. These sites include:
  - Allenspark Fire Station 1 (2 circuits),
  - Lyons High School (3 circuits),
  - Niwot/Somerset Water Tank (4 circuits),
  - Nederland Community Center (4 circuits),
  - Erie/Mountain View Fire Station 6 (4 circuits),
  - Lafayette/Flatirons Community Church (4 circuits),
  - E. Louisville Ballpark Radio Site (2 circuits)
  - Avista Hospital (2 circuits)

These locations are not dedicated radio facilities, nor are they currently what we consider “full” radio sites, as they serve as remote receive facilities only, future Allenspark Station 5 DTRS notwithstanding. This analysis should include all supporting infrastructure required in support of reliable site operation. These locations may be candidates for non-licensed microwave, etc. Consideration should be given to optionally provide redundant backhaul and power to some or all these sites during this process.

- a. These receive only locations are part of our current VHF analog voting system used for five law channels and three fire channels. The audio from these locations is transported on dedicated leased analog two-wire telco lines to our communications center for channel receiver voting, along with other receivers on

dedicated microwave paths. Our current voting equipment uses either JPS SNV-12 or GE Master series voting comparators (analog signal-to-noise voters). The voted audio is then sent to Motorola MCC7500 equipment in dispatch and to remote transmitters (via microwave paths) at several sites for repeated transmit audio.

- b. Note that the receivers located at these locations only provide analog two-wire interface and, depending on the backhaul system selected for these locations, will require the project to include appropriate interface hardware, installation, and calibration necessary to work with the remainder of the analog voting receiver environment in place within the communications environment.

## RFI Element #2: VHF LMR System Upgrade

**Purpose:** To convert the existing Boulder County Communications Center (BCCC) VHF analog conventional radio system to a current technology P25 conventional mode simulcast system.

Project 25 or P25 is the accepted national standard for public safety voice communications. P25 is a digital format capable of being encrypted to national security standards on a channel-by-channel basis as required and supports limited data transmissions. Because the P25 algorithm also performs error correction, communication range is enhanced allowing for clearer transmissions at fringe radio signal coverage areas.

Our current primary dispatch repeater channels utilize a multicast system which is a complicated operating environment that was implemented to enhance coverage of our analog system. This, however, creates confusion to the users as to how to effectively use this, and as such, we continually experience less than acceptable communications in various geographical parts of the county. Moving to a simulcast system will eliminate this user confusion and will improve effective coverage and communications.

We seek solutions to upgrade our current licensed VHF channels (described below) using existing sites available immediately to include:

- 1) VHF P25 conventional simulcast systems with appropriate back-up capabilities for one repeated law channel and one repeated fire channel:
  - SO LAW which currently has three multi-cast transmitters operating on three separate frequencies and 15 receive sites centrally voted.
  - SO FIRE channel has three multi-cast transmitters operating on three separate frequencies and 11 receive sites centrally voted. <sup>1</sup>
  
- 2) VHF P25 conventional repeated channels with appropriate back up for two law channels and one fire channel:
  - SO LAW2 has one primary transmitter, one back up transmitter and 11 receive sites centrally voted. <sup>2</sup>
  - SO LAW3 has one primary transmitter, one back up transmitter and 6 receive sites centrally voted. <sup>2</sup>
  - SO FIRE2 has one transmitter (no current back up but the proposed system should include a mechanism for backup transmit on this channel) and 7 receive sites centrally voted. <sup>1,2</sup>
  
- 3) VHF P25 conventional simplex channels with multi-site voted receive and base station transmit for dispatch for two law channels:
  - SO DATA has one primary transmitter, one back up transmitter and 9 receive sites centrally voted. <sup>2</sup>
  - SO LTAC has one primary transmitter and 11 receive sites centrally voted.<sup>2</sup> Should this not be implemented with simulcast transmit capabilities, a backup transmitter will be required to be implemented for this channel.

- 4) New VHF P25 conventional simulcast repeated channel, SO FIRE3, if frequencies are available from eliminating multicast channels above. <sup>1</sup>

**Notes**

1. *Fire channels will initially operate in analog mode with ability (hardware and software ready) to operate in P25 when all subscriber radios are P25 compliant. We do not intend to run the channels in mixed mode.*
2. *We would entertain the notion of converting these non-simulcast channels into two site simulcast channels for improved coverage and back up transmitter considerations.*

For all sites:

We expect to run one master receive antenna with multi-coupler for several channels if needed with a backup antenna available on site. We are open to transmitter combiners (and multiples at one site) to reduce the number of antennas used if insertion loss is no greater than 3dB and a back-up antenna (tower mounted but manually switchable on site) is available.

The BCSO Communications Radio Shop handles FCC licensing internally and will provide guidance on frequency re-use of existing frequencies, licenses, and sites. Available site location information will be provided in separate KMZ files.

***Pricing details should be broken down to each channel to be upgraded and not bundled together so that the project can be implemented over several years of funding cycles. This said, the first implemented upgrade at a site shall include all necessary shared hardware and not simply add additional stand-alone components, pushing common equipment implementation to a later project phase. We anticipate that the first simulcasted channel to be built out will be higher in cost than following channels due to the required first implementation of common shared equipment to run multiple channels.***

### **RFI Element #3: Radio site plan development for NW site**

**Purpose:** Once land and agreements are in place, Boulder County plans to implement a mountaintop wide area coverage radio site in northwestern Boulder County. We anticipate the location to be located around 8,500 ft elevation between Jamestown and Allenspark. The build will include a tower, site shelter, tower and power-line lightning suppression, grounding, commercial AC power, generator back up, site alarm and telemetry, and other green power technologies in support of multiple communications and other public safety systems. The site must have redundant public-safety grade backhaul. The radio site must conform to R56 standards and be able to support a CCNC DTRS standard 12 channel equipment rack group and antennas, up to eight VHF conventional channel base stations and associated master antenna(s), back-up antennas and switching, antenna filtering as needed, room for fire detection camera equipment and room and infrastructure support (power, backhaul, etc.) to grow other technologies both in the shelter and on the tower. Backup power sources should be able to run the site for at least 2 days minimum. We require new towers to be free-standing three-leg towers. LMR antennas on the tower should have low to moderate gain or possibly even down-tilt as most of the anticipated coverage area will be below the height of the tower. It is the responsibility of the vendor to perform coverage analysis to determine antenna needs to maximize effective ground elevation coverage for portable and mobile radios.

We are seeking approximate cost solutions with the following assumptions:

1. Each location has road access.
2. Adequate power is available either at the location of the site or in the situation of it being up to one mile away.
3. There are no established structures or utility points of presence at the proposed location, i.e., 'greenfield'.

Thank you for providing your insight to our land mobile radio upgrade project. We invite you to share solutions that we may not have addressed and may be of value to our land mobile radio system.



**Boulder County Purchasing**  
**1325 Pearl Street**  
**Boulder, CO 80302**  
[purchasing@bouldercounty.org](mailto:purchasing@bouldercounty.org)

**SIGNATURE PAGE**

Contact Information	Response
Company Name including DBA	
List Type of Organization (Corporation, Partnership, etc.)	
Name, Title, and Email Address of Person Authorized to Contract with Boulder County	
Company Address	
Company Phone Number	
Company Website	

**By signing below, I certify that:**

- I am authorized to bid on my company's behalf.
- I am not currently an employee of Boulder County.
- None of my employees or agents is currently an employee of Boulder County.
- I am not related to any Boulder County employee or Elected Official.
- (Sole Proprietorships Only) I am not a Public Employees' Retirement Association (PERA) retiree.

\_\_\_\_\_  
**Signature of Person Authorized to Bid on  
 Company's Behalf**

\_\_\_\_\_  
**Date**

Note: If you cannot certify the above statements, please explain in a statement of explanation.