



---

# CRIS

---

700/800 MHz & VHF P25 Trunked Radio System

# User Handbook

## **TABLE OF CONTENTS**

CRIS Basics	<u>Pg.</u>
System Description	1
System Manager	2
PSC Rights and Responsibilities	2
User Rights and Responsibilities	2
Operating Guidelines	
Monitoring	3
Permitted Use	3
Communicating on CRIS	3
Programming	3
Emergency Use	3
System Restrictions	4
Talk Group Priority	4
Maintenance	
System Outages	5
Equipment Maintenance	5
System Configuration	
Infrastructure	6
Frequency Plan	6
Trunked Radio Basics	6
Wide Area Trunked Operation	7
Subscribing to CRIS	
Initial Consultation	8
Membership Types	8
Enrollment	8
Equipment	8
Billing and Rates	
Billing Period	9
Rates	9
Exhibit 1: CRIS Rate Structure	10
Miscellaneous	
Common Terminology	11

## **PURPOSE**

This user manual serves as a guide for prospective subscribers, offering instructions on how to request service and grasp the fundamentals of operating on the California Radio Interoperable System (CRIS).

## **CRIS BASICS - Introduction to CRIS**

### **System Description**

The California Radio Interoperable System (CRIS) is a statewide trunked mobile radio system designed to provide state, federal, local, and tribal public-safety with the ability to seamlessly communicate intra-agency and inter-agency across the majority of the State of California.

### **System Coverage**

The CRIS provides coverage along the major traffic arteries throughout the state, as well as the major areas of the state's population and geographical area. To expand and enhance coverage in densely populated areas of California such as San Diego, Sacramento, San Francisco, and Los Angeles, the system will link with existing regional trunked radio systems.

### **Benefits of CRIS**

- **Seamless Interoperability:** The system provides seamless interoperability communications among system users, enabling effective coordination and response among various public safety entities.
- **Improved Radio Coverage:** CRIS improves radio coverage for clients whose radio systems are geographically limited, ensuring reliable communication across a broader area.
- **Priority for Public Safety:** The system provides priority for public safety users while allowing public safety-related agencies to use the system, ensuring that critical communications are given precedence during emergencies.

### **Technical Specifications**

- **Frequency Spectrum:** Operates in the 700/800 MHz frequency and VHF High band.
- **Technology:** Utilizes Project 25 Phase II technology (*a suite of standards for digital voice and data communication systems, allowing radios from different manufacturers (e.g., Motorola, Kenwood) to communicate on a common platform.*), offering advanced features and capabilities for public safety communications. Additionally, it includes full support for Phase II technology, ensuring compatibility and seamless integration with existing systems.

## **System Manager**

CRIS is managed by the California's Governor's Office of Emergency Services, Public Safety Communications (Cal OES/PSC). Cal OES/PSC is the sole party responsible for engineering, maintaining, operating, and modifying the system. Cal OES/PSC is also responsible for ensuring Federal Communications Commission (FCC) licensing is maintained for all equipment in operation. Cal OES/PSC will be the managing agency of all system programming and system keys.

## **PSC Rights and Responsibilities**

Cal OES/PSC authorizes use of the system to federal, state, local, and tribal agencies that serve the public. Cal OES/PSC will monitor the system continuously to determine user compliance with the guidelines set forth in this manual and its revisions.

## **User Rights and Responsibilities**

Federal, state, local, and tribal agencies authorized to use the CRIS system are responsible for coordinating with Cal OES/PSC regarding equipment compatibility, programming, and maintenance of subscriber equipment as needed.

All CRIS users are responsible for their own LTE subscriptions.

## OPERATING GUIDELINES

The following guidelines are to be used when operating subscriber equipment on the system:

### **Monitoring**

The system will be monitored 24 hours a day, 7 days a week (24x7) by the CalOES/PSC Network Operations Center (NOC).

### **Permitted Use**

Only agency radios with current accounts and valid unit IDs assigned by CRIS are authorized to access and communicate using the system. Primary subscribers/users are allocated a dedicated talk group for routine agency radio traffic, including dispatch, in addition to at least one interoperable talk group. Secondary subscribers/users are provided access to at least one interoperable talk group. Secondary users can also communicate on a Primary user's talk group with an approved Talk Group Usage Agreement form ([OES-PSC-606](#)). Secondary users can't dispatch on any talk group.

### **Communicating on CRIS**

Subscribers of the system shall keep all radio communication brief, to the point and limited to official business only. Proper radio etiquette is expected at all times. Subscribers bear responsibility for utilizing the system appropriately in line with established standard protocols. Refer to the Policy on Acceptable Usage at [www.caloes.ca.gov/CRIS](http://www.caloes.ca.gov/CRIS) for further guidance.

### **Programming**

All state subscriber radios will be programmed for use on the CRIS system by Cal OES/PSC technician staff.

System keys may be provided to non-state subscriber agencies or independent private service shops for programming CRIS frequencies into non-state-owned equipment. These system keys must be surrendered immediately upon request by the CRIS System Engineers. Requests for system keys must be made in writing. For more information, refer to the policy on system keys at [www.caloes.ca.gov/CRIS](http://www.caloes.ca.gov/CRIS).

Mobile and portable radio equipment will be equipped with a time-out timer set to a maximum of 3 minutes.

### **Emergency Use**

If an emergency is declared involving a fire, serious accident, medical emergency, or any threat to life or public safety, all participating subscribers should monitor their pre-defined "Interop" emergency channels. Subscribers requesting assistance should transmit on the emergency channel. Please note that during an emergency, access to the system may be limited.

## **System Restrictions**

An "Interop" talk group is intended for interoperable radio communications between agencies, typically during emergencies or non-emergency situations requiring coordinated responses. It should not be used for routine intra-agency radio traffic.

## **Talk Group Priority**

In the event of an emergency or when all channels at a site or within the system are busy, access prioritization will be based on the following criteria:

### **1. Priority One - Emergency Identification**

- a. An "Emergency Identification" occurs when a public safety subscriber calls for immediate assistance by activating an emergency button or switch on their radio equipment.

### **2. Priority Two - Public Safety**

- a. "Public Safety" encompasses the routine, daily radio transmissions of law enforcement, fire service, paramedic providers, and disaster preparedness personnel using the CRIS. Subscribers generally considered non-public safety, but who regularly support law enforcement and fire response agencies, such as the California Department of Transportation (DOT), shall be treated as Public Safety for traffic prioritization.
- b. "Public Safety" also includes CRIS subscribers whose typically lower priorities have been temporarily elevated to address an unusual occurrence or large-scale disaster.

### **3. Priority Three - Non-Public Safety, Special Event**

- a. "Non-Public Safety, Special Event" includes planned events involving public service subscribers participating in activities that go beyond their normal daily operations.

### **4. Priority Four - Non-Public Safety, Regular**

- a. "Non-Public Safety, Regular" includes the normal daily radio transmissions of public service subscribers using the system.

Subscribers may experience limited or no access to the system during an emergency talk group activation.

Note: To ensure the CRIS meets the needs of both Public Safety and Non-Public Safety subscribers in California, Cal OES/PSC reserves the right to modify a subscriber's talk group priority. This may include creating additional talk groups or adding sub-levels to existing talk groups to operate within different priority levels. Subscriber and Administration Fees are not currently being charged. Rates shown are estimates but are subject to change.

## MAINTENANCE

### System Outages

If you are experiencing system trouble or an outage, contact PSC's Network Operations Center (NOC). A system expert is available 24/7 to provide assistance and can be reached at 916-657-9999 or toll-free at 888-657-6577.

### Equipment Maintenance

**State agency subscribers** are required to have equipment maintenance performed by Cal OES/PSC from the time the equipment is placed in service, in accordance with California Government Code 15277 and State Administrative Manual Section 4530.

**Non-State of California agency subscribers** are responsible for the maintenance and repairs of their own radio equipment, including dispatch consoles, base stations, mobile, and portable radios. All equipment used on the CRIS system must be maintained in accordance with FCC Title 47 Part 90 of the Code of Federal Regulations. If a subscriber lacks the resources for installation or maintenance of their equipment, they may enter into a separate agreement for these services through Cal OES/PSC. For more information, contact a CRIS representative.

Non-state agency subscribers seeking equipment maintenance by PSC have two options:

- **Participate in the PSC's Annual Maintenance Program Service (AMPS):** For information on the AMPS, please call (916) 894-5082.
- **Pay PSC's Hourly Service Rate:** Maintenance and repair services are available at PSC's hourly rate, plus the cost of parts and materials.

# SYSTEM CONFIGURATION

## **Infrastructure**

The CRIS is a wide area trunked mobile radio system comprised of a centrally located master core in Sacramento and multiple strategically positioned trunked radio sites throughout the state at predefined locations. The system relies on the California Public Safety Microwave Network (CAPSNET) as its primary data backhaul for the Wide Area Network (WAN) trunked radio system.

The CRIS provides coverage across substantial areas of the state, with ongoing expansion efforts. For the most current expected coverage in your service area, please consult with your PSC Client Engineering representative.

PSC only considers FirstNet as "public safety grade". Other carriers are allowed but they are not officially endorsed.

## **Frequency Plan**

The system operates within the 700/800 MHz band as well as VHF frequencies in the radio spectrum. Transmit and receive frequencies are allocated in sets (Channels) at designated sites to ensure sufficient channel capacity for anticipated planned usage.

## **Trunked Radio Basics**

A trunked radio system offers a reliable and efficient means of enabling multiple subscribers to access the system simultaneously, utilizing a minimal number of frequencies to provide service. This optimizes frequency utilization and minimizes user downtime.

The system incorporates a Master Core, which monitors all active radios affiliated with the various trunked radio sites across the network. When a subscriber radio requests system access through a trunked radio site, the core assigns an available channel for the subscriber's use or alerts the subscriber if all channels at a site are active. As channels become available, they can immediately be reassigned to different subscriber radios, maximizing efficiency.

The core dynamically assigns unused channels as needed, reducing the requirement for additional channels and enabling more subscribers to access the system with a minimal number of channels. Site channel allocation is based on anticipated traffic loading for each site.

Reliability is ensured through various mechanisms, including the ability of a site to operate independently in trunked mode if it loses access to the core. Alternatively, access to the core can be re-routed through the system backbone, utilizing an alternate microwave path if available, to maintain full functionality.

The addition or removal of radios, as well as the setup of user talk groups, can be easily accomplished by entering the required radio information into the system database.

## Wide-Area Trunked Operation

Trunked radio operation involves significant activity occurring without requiring user intervention or awareness. When a trunked radio is turned on, it automatically affiliates with the nearest radio site within the trunked system. During affiliation, the trunked radio communicates its unit identification and the selected talk group chosen by the user.

When a radio user initiates communication by pressing their push-to-talk button, the radio automatically sends a request for a call to be established with other users within the selected talk group. The control system responds by assigning communication resources (channels) at each of the radio sites where users are registered on the requested talk group.

**Figure 1.0 – Sample Talk Group**

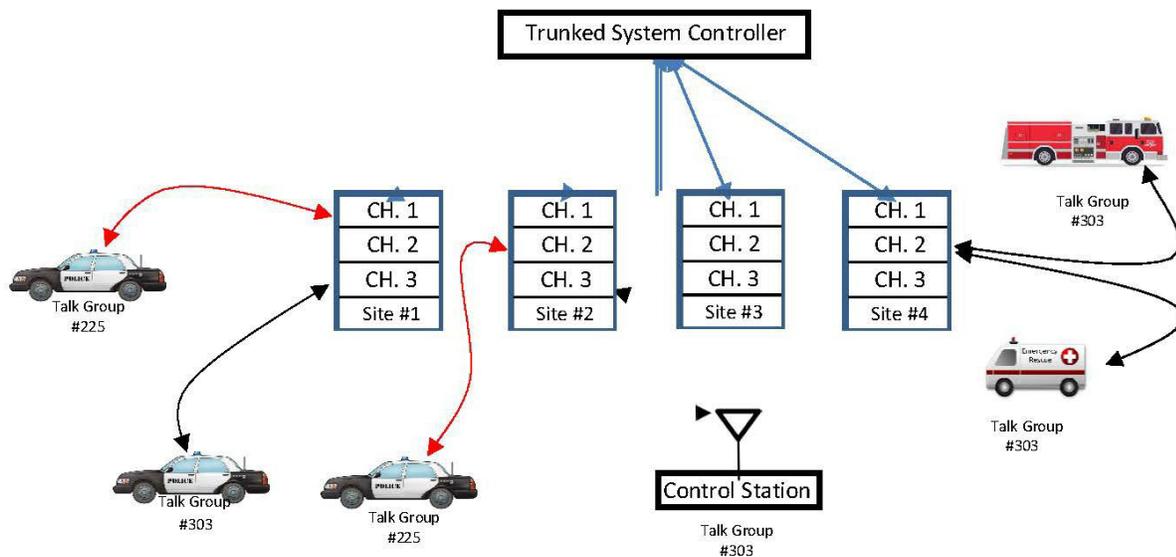


Figure 1.0 shows five vehicles and one control station radio operating on two talk groups. The control system has assigned radio channels at three separate remote sites to establish the call for talk group 303 (Black) and radio channels at 2 sites for talk group 225 (Red).

## **SUBSCRIBING TO CRIS**

### **Initial Consultation**

When an agency is interested in becoming a CRIS subscriber, it should first review the CRIS User Handbook and consult with the Cal OES/PSC Client Engineering Unit (CEU). The CEU contact information can be found at [www.caloes.ca.gov/CRIS](http://www.caloes.ca.gov/CRIS). The CEU will work with the agency to determine if CRIS meets the agency's telecommunications service needs and to clarify any questions regarding the system. This consultation should be completed before any documentation is filled out.

### **Membership Types**

There are two types of subscribers within CRIS:

- Primary Subscriber: Federal, state, local and tribal agency participants that provide public safety (Police, Fire etc.) and require exclusive "talk group/s". Subscribers supporting law enforcement and fire response agencies on a regular basis such as California Department of Transportation (DOT), shall be considered as Public Safety.
- Secondary Subscriber: Federal, state, local and tribal agency participants that provide public safety and require use of the system for interoperable communications; non-public safety agencies that require use of the system for interoperable communications qualify under this category as well. Secondary subscribers can communicate on a Primary subscriber's talk group (allied agency) only with an approved Talk Group Usage Agreement form ([OES-PSC-606](#)). Secondary users can't dispatch on any talk group.

### **Enrollment**

To enroll as a CRIS subscriber, agencies must complete and obtain approval for the CRIS Service Agreement and the OES-PSC-115 form. These forms are available on the CRIS website at [www.caloes.ca.gov/CRIS](http://www.caloes.ca.gov/CRIS).

### **Equipment**

All equipment utilized on the CRIS must adhere to FCC Title 47 Part 90 Code of Federal Regulations and comply with Phase 2 P25 standards. Cal OES/PSC can furnish specifications for agencies interested in procuring compatible equipment. It is recommended that all agencies purchasing new radios ensure they are Phase 2 P25 compliant. Agencies currently using Phase 1 P25 radios should plan for an upgrade to Phase 2.

## BILLING AND FEES

### **Billing Period**

All subscribers will be billed monthly based on the service period, with fees reflecting the previous month's usage.

**State Subscribers:** Invoices for State subscribers using CRIS will be processed through the State Controller's Office via electronic fund transfer from the subscriber agency to Cal OES/PSC.

**Non-State Agency Subscribers:** Non-State agency subscribers will receive monthly invoices and are required to remit payment via check to:

State of California, Governor's Office of Emergency Services  
Attn: Accounting Office  
3650 Schriever Avenue  
Mather, CA 95655-4203

### **Rates**

CRIS is a fee-for-service system, with fees covering operational expenses, maintenance, lifecycle replacement for infrastructure, and future CRIS development.

- **Fee Structure:** Fees for each service period are determined by the number of radios registered on the system. Radios held by a subscriber as a cache will be billed at the same rate as radios used daily. Refer to Exhibit 1 below or the Rate Structure Document at [www.caloes.ca.gov/CRIS](http://www.caloes.ca.gov/CRIS) for detailed information.
- **Administrative Processing Fee:** A one-time administrative processing fee of \$250 is applied for initial activation and enrollment, regardless of the number of equipment being activated on the system.

**Note:** The current fee schedule for activation and monthly services is subject to change. For the most up-to-date fee schedule, please go to the CRIS website.

## Exhibit 1

CRIS Rate Structure Fiscal Year 2020/21

Note: Rates shown are current, as of 2021.

<b>Subscriber Fees</b>	<b>Monthly</b>	<b>Annual</b>
Primary User (Dedicated talk groups and use of interoperable talk groups)	\$26.00	\$312.00
Secondary User (Interoperable and Primary User talk groups; with approval from Primary User, no dispatch communications)	\$0.00	\$0.00
<b>Administration Fee</b>	<b>Monthly</b>	<b>Annual</b>
Charged for each occurrence of Addition/Deletion/Reactivation of a single or group of communications equipment – no limit on number of radios per occurrence	\$250.00	\$250.00

## TERMINOLOGY

**Affiliation-** Radios on the trunked system will send a signal with radio ID and the talk group selected to the master core which in turn registers the radio with the best trunked site available for communications and affiliates the radio with the requested talk group. This occurs when the radio is turned on, when a new talk group is selected, or when the radio selects a new site by checking RSSI levels of tower sites.

**Alias** - A unique identifier that is displayed on when a radio is transmitting on a talk group that is being monitored. The alias corresponds with a specified subscriber ID.

**APCO** - Association of Public-Safety Communications Officials – International, Inc.

**Channel** - A radio channel is normally comprised of a separate transmit and receive frequency. A voice channel will be assigned to an active CRIS talk group by the system controller.

**Channels & Zones** - When a subscriber radio is programmed with a large number of channels, those channels are accessed by the subscriber in two ways: (1) The channel knob, which typically accesses 16 channels, and (2) either a three-position switch or up/down zone buttons on a radio with a display. A large number of channels can be organized into a series of zones.

**CalOES/PSC** - The California Governor's Office of Emergency Services/Public Safety Communications.

**Control Channel** -- Dedicated digital channel at each trunked site that the system uses to communicate with individual radios passing information between the radio and the system controller. The system will use the Control channel for radio affiliation and delegation of a voice channel at a CRIS site.

**Digital Radio Signal** - Analog signal (voice) that is sampled and converted into a series of zeros and ones that are arranged in a specific order to form a digital word. These are then transmitted from digital radio to digital radio and then converted by the radios back into an analog signal that can be heard and understood by the human ear.

**Duplex Repeater** - A repeater system that uses different transmit and receive frequencies. Allowing communications to occur in both directions at the same time.

**Emergency Response Support** - Those who are involved in the critical mission areas surrounding the incident response, such as protecting against the incident, containing the incident, or recovering from the incident.

**Federal Communications Commission** - A board charged with regulating broadcasting and interstate communication by wire, radio, and television.

**FCC Title 47 Part 90 Code of Federal Regulations** - Regulations that oversee the use of equipment and frequencies that operate in the Private Land Mobile Radio Service portion of the frequency spectrum.

**First Responder** - Those individuals in the early stages of an incident who are responsible for the protection and preservation of life, property, evidence, and the environment, including. Emergency response providers include Federal, State, and local emergency public safety, law enforcement, fire, emergency medical (including hospital emergency facilities), and related personnel, agencies, and authorities.

**Interoperable Talk Group** - A talk group that allows communications between multiple agencies involved in response to an incident.

**Intra- Agency Talk Group** - A talk group that allows normal or emergency communications from personnel of the same agency.

**MON** - Monitor button allows the radio to receive an RF signal without tone (CTCSS/DCTSS) protections.

**Out of Range** - Indication of no service available to radio. A long tone at will be heard at regular intervals.

**Project 25 (P.25)** - Is a suite of operating/manufacturing for digital voice and data communication systems standards developed so radios manufactured by different communications companies (Motorola, Kenwood etc.) would be able to communicate on a common platform. The standards address communications suited to public safety and first responders. Project 25 was initiated by the Association of Public Safety Communications Officials, or APCO.

**Queue** - If a subscriber tries to access the trunked system when all channels are busy at a site, the system will put the member in a "queue" or waiting line for the first open channel. The subscriber will first hear the "busy" signal followed by a chirp when a channel is available to transmit on.

**Roaming** - The ability of a radio on a trunked radio system to move from trunked system to trunked system without any interaction by the member.

**RSSI** - Received Signal Strength Indicator.

**SCAN** - Ability of a radio or scanner to continuously monitor multiple channels programmed into to the device and automatically select a channel when activity appears on the channel. The device will go back into scan mode when activity on the scanned channel ceases.

**Site Busy** - Indication that no repeater resources are available at the CRIS site, the radio is affiliated at, accompanied by short, repeated tones, much like telephone busy signal.

**Site Lock** - Optional button that allows member to "lock" radio on a particular site, this prevents the radio from roaming.

**Site Trunking** - Indication that site connectivity to network master controller has been lost. Radio will be operational only in the coverage area of the tower on which it is registered.

**Subscriber** - Any public safety or non-public safety agency, Federal, State, Local or Tribal that has a signed usage agreement with the CRIS.

**Subscriber ID** - Number that system uses to uniquely identify individual radios on a trunked system.

**System Controller** - The network management equipment that directs all activities of the trunked radio system.

**Talk Group** - The trunked radio controller will automatically configure the system so that all radio users that have selected a given talk group may communicate with one another. The system will automatically assign frequencies as required at a given site/s. The TG is assigned in the CORE to identify the communication pathway and for assignment of a voice channel in the system.

**Trunked** - Trunked Radio operation permits a large number of subscribers to share a relatively small number of communication paths or channels. This sharing of communication paths is managed automatically by the system core. Channel selections and other decisions normal handled by the radio operator are made by a computerized switch in the zone controller. Thus, the subscriber needs only to pick up the radio, select a talk group and talk. Channel assignment is automatic and completely transparent to the individual subscriber.

**Zone - Network** – Controller and interconnected radio sites.