CRIS

700/800MHz P25 Trunked Radio System

User Handbook

TABLE OF CONTENTS

PURPOSE

This user handbook provides information to the prospective subscriber on how to request service and understand the basics of operating on the California Radio Interoperable System (CRIS).

CRIS BASICS

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-first responders the ability to seamlessly communicate intra-agency and inter-agency across the majority of the State of California. The system operates in the 700/800 MHz frequency spectrum utilizing Project 25 Phase II technology. 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.

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 system are responsible for arranging with Cal OES/PSC the equipment compatibility, programming, and maintenance of subscriber equipment if needed.

SUBSCRIBING TO CRIS

Initial Consultation

When an agency is interested in becoming a CRIS subscriber, prior to completing any documentation, the agency should review the CRIS user handbook and consult with the Cal OES/PSC Client Engineering Unit (CEU) contact found at the following link www.caloes.ca.gov/CRIS. The CEU will work with the agency and determine if the CRIS will meet the agencies telecommunications service needs or clarify any questions regarding the CRIS.

Membership Types

There are two types of subscriber 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 only 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.

Enrollment

Enrollment to become a subscriber of the CRIS requires the completion and approval of a CRIS Service Agreement and TDe-115 form. The forms can be found on the CRIS web site under www.caloes.ca.gov/CRIS.

Equipment

All equipment used on the CRIS must meet FCC Title 47 Part 90 Code of Federal Regulations and be Phase 2 P25-compliant. Cal OES/PSC can provide specifications for agencies seeking to purchase compatible equipment. All agencies when purchasing new radios should be buying P25 phase 2 compliant and if currently using P25 Phase1 should be planning to upgrade to P25 Phase 2.

The CRIS maintains a cache of mobile radios that are available for short term demonstration deployments of six months or less for potential new subscribers to demo/ test the CRIS system. A maximum of 30 demo radios will be provided. Requests for use of demo radios must be made via a Cal OES/PSC Client Engineering Unit. See CRIS website @ www.caloes.ca.gov/CRIS for the CEU contact number. For questions regarding the demo radio program contact the CRIS outreach representative at (916) 894-5288.

BILLING AND FEES

Billing Period

All subscribers will be billed on a monthly basis by service period. Fees will be billed for prior month's service.

Payment of invoices for State subscribers using CRIS will be scheduled via State Controller's Office electronic fund transfer from subscriber agency to Cal OES/PSC.

Non-State agency subscribers will be billed monthly and will 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; fees cover operational expenses, maintenance, and lifecycle replacement for infrastructure and future CRIS development.

Fees for service period will be determined by the number of radios registered on the system. Radios held by a subscriber as a cache will be billed the same as radios used on a daily basis. Refer to Exhibit 1 below or Rate Structure Document at www.caloes.ca.gov/CRIS.

An administrative processing fee of $250 is applied for initial activation and enrollment on a per occurrence basis regardless of the amount of equipment being activated on the system.

Exhibit 1

CRIS Rate Structure Fiscal Year 2020/21

Note: Rates shown are current, but are subject to change

Subscriber Fees	Monthly	Annual
Primary User (Dedicated talk groups and use of interoperable talk groups)	$26.00	$312.00
Secondary User (Interoperable talk groups only)	$0.00	$0.00

Loaned Demo Mobile Device *	Monthly	Annual
Mobile Device - Refer to policy on demo equipment for additional information.	No Charge	No Charge

Administration Fee	Monthly	Annual
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

*The equipment is owned by Cal OES/PSC and must be safeguarded at all times. If lost or stolen it must be reported immediately to Cal OES/PSC at 916 894-5288. The borrower is responsible for replacement or repair of all equipment and accessories damaged, lost or stolen.

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 Cal OES/PSC Network Operations Center (NOC).

Permitted Use

Only agency's radios with up-to-date accounts and valid unit IDs assigned by CRIS are authorized to access and communicate using the system. A Primary subscriber will have at least one dedicated talk group for routine agency radio traffic, including dispatch, and also have at least one interoperable talk group. Secondary subscribers will have access to at least one interoperable talk group.

Communicating on CRIS

Subscribers of the system shall keep all radio communication brief and to the point. Radio system traffic shall be limited to official business only. Subscribers are responsible for the appropriate use of the system in accordance with adopted standard protocols. Proper radio etiquette is expected on any communications system. See Policy on Acceptable Usage at www.caloes.ca.gov/CRIS.

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 radio programming of CRIS frequencies into non-state owned equipment. System keys must be surrendered immediately if requested by the CRIS System Engineer. Request for system keys must be made in writing. Reference policy on system keys at www.caloes.ca.gov/CRIS.

Mobile/portable radio equipment will be equipped with a time-out timer which is set for no longer than 3 minutes.

Emergency Use

If an emergency situation is declared involving a fire, serious accident, medical emergency, or a threat to life or to public safety, all participating subscribers should scan their pre-defined "Interop" emergency channels. If an emergency arises, the subscriber requesting assistance should transmit on the emergency channel. During an emergency, access to the system may be limited.

System Restrictions

An "Interop" "talk group" shall be used for its intended purposes, which is to allow interoperable radio communications between agencies typically during emergencies

or during non-emergency situations that require a coordinated response between agencies. It shall not be used for routine intra-agency radio traffic.

Talk Group Priority

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

1. Priority One - Emergency Identification

   a. An "Emergency Identification" is defined as the message received when a public safety Subscriber calls for immediate assistance by activating an emergency button or switch on the user radio equipment.

2. Priority Two - Public Safety

   a. "Public Safety" includes the normal, daily radio transmissions of law enforcement, fire service, paramedic providers, and disaster preparedness personnel using the CRIS. Subscribers generally considered non-public safety, but support law enforcement and fire response agencies on a regular basis such as California Department of Transportation (DOT), shall be considered as Public Safety in regards to traffic prioritization.

   b. "Public Safety" also includes the CRIS subscribers whose typical lower priorities have been temporarily changed to resolve 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 subscriber participants that are beyond the scope of 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: In order to ensure the CRIS meets the needs of California's Public Safety and Non- Public Safety subscribers, Cal OES/PSC reserves the right to modify a subscriber's talk group priority which can include creation of additional talk groups or adding sub-levels to the existing groups to operate within the different priority levels.

MAINTENANCE

System Outages

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

Equipment Maintenance

Equipment maintenance for loaned demo radios will be performed by Cal OES/PSC at no additional cost for 6 months.

State agency subscribers are required to have equipment maintenance performed by Cal OES/PSC in accordance to California Government Code 15277 and State Administrative Manual Section 4530.

Non-State of California agency subscribers shall be responsible for the maintenance and repairs of the subscriber owned radio equipment including dispatch consoles, base stations, mobile and portable radios. All equipment used on the CRIS system will be maintained to applicable FCC Title 47 part 90 of the Code of Federal Regulations. If a subscriber does not have resources for installation or maintenance of their equipment, they may enter into a separate agreement for required services through Cal OES/PSC. Contact a CRIS representative to inquire about this service.

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

- Participate in the PSC's Annual Maintenance Service Program. To get information on the AMPS program please call: **(916) 894-5082**
- Pay PSC's hourly service rate for maintenance and repair, plus parts and materials.

SYSTEM CONFIGURATION

Infrastructure

The CRIS is a wide area trunked mobile radio system composed of a master core, located centrally in Sacramento with numerous strategically located trunked radio sites located across the state at specific locations. The system utilizes the California Public Safety Microwave Network (CAPSNET) as its primary data backhaul for the Wide Area Network (WAN) trunked radio system.

Frequency Plan

The system operates in the 700/800 MHz band of the radio spectrum. Transmit and receive frequencies are assigned in sets (Channels) at specific sites to provide adequate channel capacity for anticipated planned communications loading.

Trunked Radio Basics

A trunked radio system is a reliable and efficient form of providing multiple subscribers the ability to access the system when needed at the same time utilizing a minimum number of frequencies to provide the service. This results in maximizing frequency usage and keeping user down time to a minimum.

The system utilizes a Master Core that monitors all active radios affiliated with any of the various trunked radio sites operating throughout the system. When a subscriber radio requests access to the system, through a trunked radio site, the core assigns an open channel for the subscriber to use, or notifies the subscriber radio that all channels at a site are active. Once a channel becomes inactive it can immediately be reassigned for use to a different subscriber radio for use. Based on the premise that all channels at a trunked site are not in use at all times, the core can assign unused channels as requested minimizing the need for extra channels and allowing more subscribers to access the system with a minimum number of required channels. Site channel allocation is based on anticipated traffic loading (expected number of users) for a particular site.

Reliability is also realized should a site lose access to the core the site can revert to stand alone trunked mode and continue operation or access to the core can be rerouted through the system backbone if an alternate microwave path is available to continue full trunking mode.

Adding and removing radios or setting up user talk groups can be accomplished by simply entering the required radio information into the system database.

Wide-Area Trunked Operation

Trunked radio operation involves a great deal of activity taking place without user intervention or awareness.

When a trunked radio is turned on it automatically affiliates with the nearest radio site that is part of the trunked system. In affiliating, the trunked radio communicates

its unit identification and talk-group that has been selected by the user.

When a radio user presses their push-to-talk button the radio automatically requests that a call be established with other users of the 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.
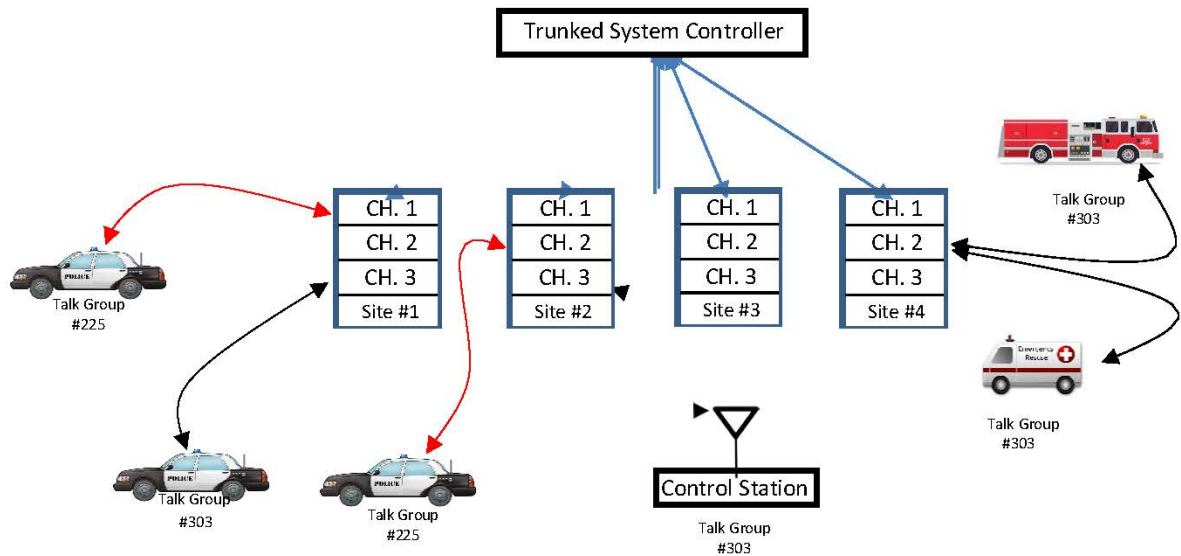
Figure 1.0 – Sample Talk Group

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 in order to establish the call for talk group 303 (Black) and radio channels at 2 sites for talk group 225 (Red).

TERMINOLOGY

Registration/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. In trunked radio operation the operator only needs to request access to the system and the system controller will assign an unused communications channel or the operator can select a predefined talk group and the system controller will assign frequencies for the talk group to use.

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.

Cal OES/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 to identify if the radio is authorized, instruct the radio which channel to operate on or to pass system information such as site busy etc.

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 in to 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 includes: 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.

Simplex - Radio communications that uses the same frequency for both receive and transmit operations.

Site Busy - Indication that no repeater resources are available at the tower the radio is registered 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. Unlike a radio frequency, a talk group does not really exist but is a virtual channel created when a talk group is requested by the users.

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.