



800MHz Digital Trunked Radio System (DTRS) User Guide

For Boulder County Communications

Ver 08152024

This document is intended to be a simple "starter" guide to the most basic terms, features, and principles of the 800MHz DTRS. It is not a fully comprehensive guide however what is covered will satisfy the needs of most users except for specific channels and their purpose.

The "more than you need to know" section: The 800MHz DTRS is a state-wide network of digital radio repeaters located on over 250+ radio sites/towers using the Project 25 or P25 public safety standard. Radio users operate on special channels known as talkgroups. The system also uses a portion of the 700MHz spectrum. The system is tightly controlled by the State of Colorado and governed by a user group known as the Consolidated Communication Network of Colorado or CCNC. Each radio on the system is assigned a unique ID by the State and only specially trained programmers are authorized to program radios with the use of assigned "system keys". Radio models used on the system are carefully tested for compliance to the system standards and only approved models are allowed on the system. Common radio models from Motorola, Harris, Kenwood/Viking, Bendix King, Icom and Tait are approved for the system. The system itself is a Motorola Astro Trunking P25 Phase 1 system.

PLEASE - There is no need memorize the above information and figure out what it means as a basic radio user!

For the sake of simplicity and consistency with legacy radio terms, we will focus on this common terminology only:

Channel

Repeater

800MHz and/or DTRS

Use of the other terms found in the first paragraph tend to cause confusion among many first responders and are not necessary to basic users of an 800MHz radio.

Basic system architecture: Radio sites/towers use multiple shared repeaters to allow communication. Radio sites/towers on the system are networked together much like computers and the internet. An active channel will be assigned a repeater at a radio site/tower when the channel is in use. When done, the repeater is released for another channel to use. Your next transmission may happen on a different repeater and radios on that channel will be steered to that repeater automatically. Your radio will automatically choose the best radio site/tower to use for your location.

Channel Examples: any BC prefixed channel such as BC LAW, BC FIRE, BC LTAC 11, BC FTAC 11 etc.; MAC 1 – MAC 4 plus many others.

How can you tell if your radio is on an 800MHz DTRS channel: When your radio is not receiving or transmitting traffic, you will see the familiar antenna/signal bars symbol in the upper left or right corner of the radio display.



Use cases:

Best Use

- longer distance and wide area communications with others on a team for coordination purposes.
- Good for normal "every day" longer distance communications with normal call load.

Poor use

- Tactical communications when users are near each other.
- During major incidents when demand for airtime is very high on multiple channels.

Watchouts!!

- When there is a high demand for airtime on separate channels, use can result in busy tones and lack of communications.
- Users may not be aware of near system overloading/over-use other than getting frequent busy tones.
- Use in tactical situations can result in desensitization (and failed communications) when users are in close proximity – common for any repeater channel.
- System administrators can take control of the system and deny communications to troublesome channels and radios to restore overall system health and usability.

Talking on the radio: When you press the Push to Talk (PTT button) you will hear what is called a proceed to talk chirp. This chirp means that all radios on the channel have been set to a repeater channel wherever they are and will now hear your radio traffic. Wait for the chirp to end before saying your message.

Channel Scanning: This is an allowed feature of the system however there are limitations. Because the system is comprised of networked radio sites/towers located in diverse areas, there is no guarantee that you will hear channels being scanned other than the channel that your radio is set on for transmit. Radio traffic is only routed to sites that have a radio set to transmit on a particular channel. **Do not** rely on scanning other channels for critical radio traffic that you must hear. Some radios may also be programmed to allow scanning channels not on the DTRS, such as VHF channels. This is known as multi-system scan. Unless you are scanning channels in a casual manner, this can be a very dangerous practice. Delays of 10 seconds or more hearing other channels is not uncommon. Best practice: never use multi-system scanning.

Eavesdrop listening: In this context, this is defined as listening to an incident or situation on a radio channel that you are not directly involved with. While this may be common on non-networked channels (like VHF), this can set up a dangerous situation of overloading the system with channel resource requests which may be limited because of the nature of using shared repeaters. This can prevent use of the system to first responders assigned to an incident and may also impact other users not on the incident simply for your non-critical listening. **Do not do this.**

Channel Dragging: also commonly referred to as talk-group dragging. This is the practice of listening to your home 800MHz DTRS channels (particularly a busy dispatch channel) outside of your normal response area. It can cause the same problems as above and overload the system. **Do not do this.**

Busy System Tone: Sometimes when you press the PTT button, your radio will emit a low toned beep and you will not hear the PTT chirp. This means there is no available repeater for one or more radios on the channel. Let go of the PTT button and wait to hear the PTT chirp. Once the chirp is heard, press the PTT and give your message. If you continue to press and let go of the PTT button, your call will be placed further back in line for an available repeater.

Out of range tone: This low frequency tone will sound every few seconds when you have traveled beyond coverage of the system. The display of the radio will also show “Out of Range”. Try moving your position or location of the radio to gain service.

“Site Trunking” message: This is not commonly seen. It is an indication that the radio site/tower that your radio is affiliated to has lost network connectivity to the remainder of the system. You will be able to talk to other radios who are on the same channel and site/tower that you are connected to but not to anyone else on the network. Often these problems are corrected without your intervention. The radio will try to find another site/tower or service will be restored to the site.