(1-25-12) – Rev -

P25 Enhanced Control Channel Scan Programming Instructions

Harris has three methods of roaming between P25 Trunked sites:

- Fixed Roaming
- Dynamic Roaming
- Enhanced Control Channel (Enh CC)

Fixed and Dynamic Roaming are the original methods developed for Harris EDACS system offering. Although they work in a P25 Network, they do not take advantage of the unique signaling on a P25 Trunked control channel. Enhanced CC is a new method that expands on Dynamic Roaming and the P25 CC signaling to offer a unique solution for P25 Trunked.

NOTE The ProScan feature must be enabled in feature encryption for Enhanced CC Scan to operate with ECP R14A18 and later firmware.

Fixed ROAMING:

In fixed Proscan the radio's personality indicates the adjacent sites for any particular site. The radio will only scan the sites that are in the "Systems being scanned" space in the System Setup Dialog Box within the radio programming software, as shown in Figure 1 below.
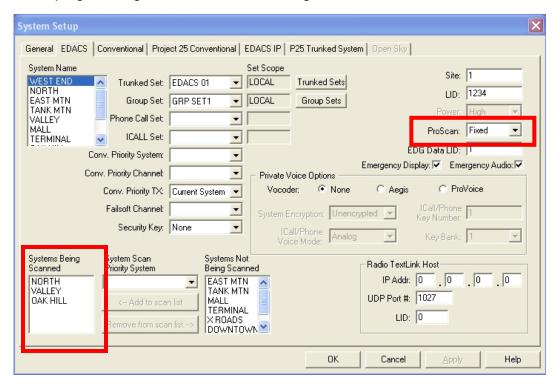

Figure 1 - System Setup Dialog Box

Here the terminal will only scan the systems NORTH, VALLEY and OAK HILL. If the site sends out adjacent site information, and it matches one of the selected adjacent sites then the control channel that site is using will be updated, otherwise it will assume that the control channel is on channel 1 in the trunked frequency set.
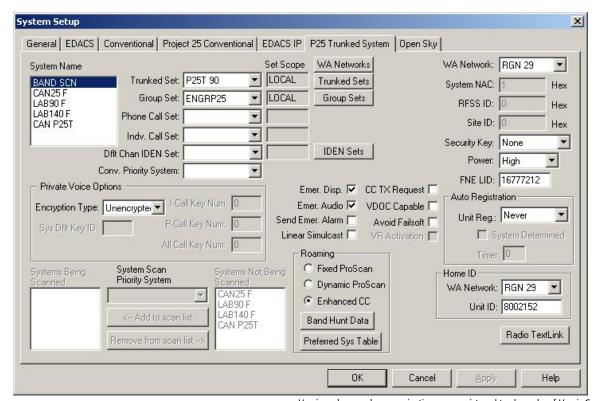
Dynamic ROAMING:

In Dynamic ProScan the terminal builds the adjacent system list from the over-the-air adjacency messages instead of being pre-programmed. The intention of this was to allow networks to change and be rolled out without having to reprogram radios, as well as having a way to change radio behavior from the system. The radio must still have knowledge of the system and its frequency plan, since the dynamic information simply gives site ID and control channel number.

Enhanced CC

In P25 trunking, it is possible to determine the frequency of a channel assignment or adjacent system control channel simply from the data that is part of the control channel signaling. As a result, in P25T there is a third form of ProScan that should be used wherever possible, since it results in a much smaller and cleaner personality and is much simpler for the user to understand.

There is much less information required to construct a personality for Enh CC – the radio needs to know what wide area network and system ID this system is part of, and the highest and lowest frequencies that might possibly be used for control channels but specific base station information is not needed.

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Initial Control Channel Acquisition:

There are three frequency lists that support three hunt modes:

- Short Hunt: This list of channels is built from the adjacency list that the radio receives from the site. This list of channels is saved to non-volatile memory. So when the radio powers back up, it remembers what its last list of surrounding channels were and what its last control channel was. This is similar to a short list of provisioned channels.

- Long Hunt: This is the big frequency set that's programmed into the radio's personality (like a licensed channel list).

- Band Hunt Data: This is a frequency range that is defined in the radio personality. When the radio performs a Band Scan, it will scan this range.

The following process is used to find a control channel:

Step 1:
The radio will power up into a Short Hunt based on its last control channel and its last set of adjacent control channels.

Step 2:
If this Short Hunt fails, or if the radio had nothing in its Short Hunt list, then the radio will do a Long Hunt using the frequencies in its master frequency set.

Step 3:
If the Long Hunt fails, then a Band Scan will be performed. A Band Scan is a method of finding a valid P25 control channel even if the frequency is not preprogrammed into the radio. In order to enable Band Scan the user must select "*Enh CC*" in the Proscan Box of the P25 System Tab. Once this is selected the user will be able to edit the "Band Hunt Data" fields. The user may select a *"Band Hunt Start Frequency"*, "*Band Hunt End Frequency"* and up to three "*Band Hunt Spacing"* frequency increments.

The definitions of the fields are as follows:

- Band Hunt Start Frequency – The frequency where the radio will start to look for valid control channel activity while on a P25 trunked system with "*Enh CC*" selected.

- Band Hunt End Frequency – The frequency where the radio will return back to the *Band Hunt Start Frequency* to look for valid control channel activity while on a P25 trunked system with "*Enh CC"* selected

- Band Hunt Spacing – This is the step size in kHz that the radio will increment through while attempting to find valid P25 control channel activity while in band scan.
  Note: The user may select 2.5 kHz only with a VHF radio.

Normally, the radio should never have to do a Band Scan. But if it does, the radio will perform Band Scan for a period of time equal to the Band Hunt Interval specified under Scan Options (see figure 3 below). When that timer expires, it will go back through the Short Hunt and Long Hunt lists. If it still has not found a control channel, then it will return to Band Scan and pick up on the frequency where it left off.

If the Band Hunt Interval is set to 0 the radio will never drop into band scan – it will run through the long and short hunts but will never show BAND SCN on the display. This is helpful where (for example) we are using this to switch from a simulcast system to the bypass site but there is a delay in the system switch. In most cases the trunked frequency set should contain every possible control channel frequency in the network – it should not just be one or two frequencies.
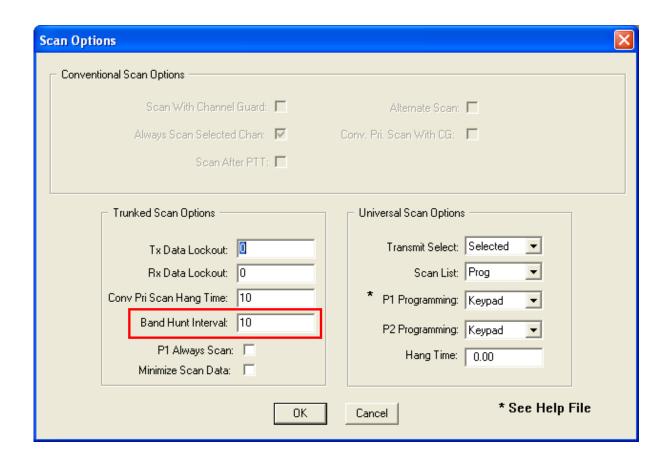

Figure 3 - Band Hunt Interval

The radio will skip over certain frequencies based on the following rules:

- Whenever the radio's unit ID or group ID is denied when registering, the radio will scan for another control channel. The radio remembers the frequencies that it was denied on and will not retry those on subsequent passes.

- It is possible to configure a Preferred System Table of systems that the radio will give an artificial preference to, or to avoid, allowing traffic to be steered to sites best able to handle it.

- If a site is listed in the Preferred System Table as "Never", then the radio will skip over that site and resume scanning after it learns the System/Region ID, RFSS ID, and Site ID. The preferred System Table allows the user to assign a priority level for up to 32 P25 trunked System ID , RFSS ID, and Site ID combinations whenever the selected system has Enh CC selected in ProScan control.

Preferred System Table selection logic

Preference level	Condition	DB Value Advantage
Never	The unit will not lock onto the system. This is a way of site access denying a radio without the system input.	Level = -199dBm (regardless of the signal level)
Least Preferred	No advantage over any other system in the list.	No boost
No Preference		4 dB boost
Preferred		10 dB boost
Always Preferred		20 dB boost

Post Control-Channel acquisition operation

In Enhanced CC operation, once the radio has found a valid control channel, it constantly monitors the adjacent systems and builds the adjacency table based upon this information. When the signal level of an adjacent control channel is better than the current control channel by an amount that exceeds the Switch Delta parameter, the radio switches to the new site and control channel, but does not change system (so the user watching the display will not see any change).

Failsoft avoidance is built into Enhanced CC operation

- If the Failsoft Avoidance box is checked, the radio will avoid using a site that is cut off from the network despite it being better from a signal strength point of view, until there is no alternative. This avoids the appearance of being in service, but being unable to communicate with others on different sites.

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