#5425

Using The Repeater Frequency Function to Eliminate Parallel Repeater Interference in Multipoint Networks

July 30, 2001

When one or more repeaters in a multipoint network are linked into the network directly to the master radio or through a shared repeater, these repeaters are considered to be parallel repeater. See Figure 1 below. Parallel repeaters receive a signal from a common source and retransmit the signal at the same time and on the same frequency. When any radio is linked into the network through one of the parallel repeaters and is located at a position where it can hear one or more of the other parallel repeaters, the signals from parallel repeaters will tend to cancel each other and reduce the overall receive rate at this radio.

The repeater frequency function can be used to eliminate the possibility of interference from parallel repeaters. When the repeater frequency function is enabled, a repeater receives signals on the frequency key of the master or other common signal source and retransmits on a different frequency key determined by the setting of its frequency key selection.

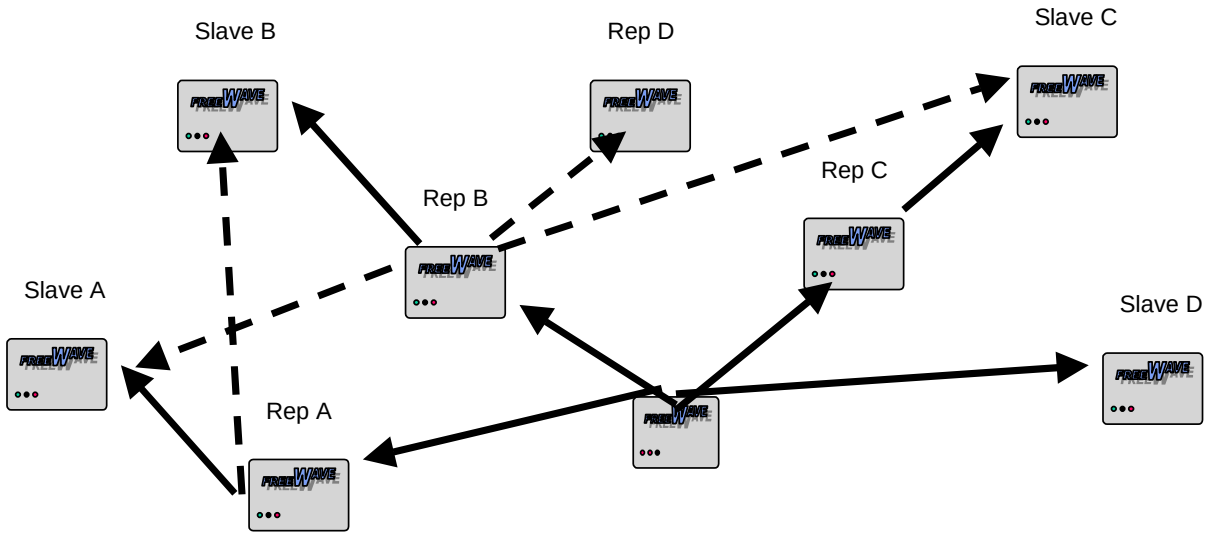

Figure 1

Multipoint network with solid lines showing desired routing paths. Repeaters A, B and C are parallel repeaters. Repeater D is not in parallel. Dashed lines indicate possible interference paths.

FreeWave Technologies, 1880 S. Flatiron Ct., Boulder, CO 80301
Phone: (303) 444-3862, Fax: (303) 786-9948, www.freewave.com
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A FreeWave radio programmed to function as a repeater receives and retransmits data from other radios in the network that are linked to it. In the example network shown in Figure 1, Repeaters A, B, C and Slave D are linked directly to the Master radio. Repeater A provides a link between the Master and Slave A. Repeater B provides a link between the Master and Slave B. Repeater C provides a link between the Master and Repeater D and Slave C. Possible interference paths exist from Repeater B to Slave A, from Repeaters A and C to Slave B, from Repeater B to Repeater D, and from Repeater B to Slave C. The signals from these possible interference paths will tend to cancel the desired signal at the receiving radios.

Referring to the example network shown in Figure 1, any two of the three parallel repeaters will need to have their repeater frequency function enabled to avoid interference. It does not matter which two are changed. For this exercise, we will change Repeater A and Repeater C and leave Repeater B as is.

Using Repeater Frequency with Network ID=255 (Call book method)

1. Select Multipoint Parameters (Menu 5), and enable the Repeater Frequency function by setting menu item 5 to 1 on Repeater A and Repeater C.

2. Escape to the Main Menu and select Radio Parameters (menu 3). Set Frequency Key (menu item 0) on Repeater A to some value other than the setting of the Master radio. Set Frequency Key on Repeater C to some value other than the setting of the Master radio and the setting just made for Repeater A.

   When Repeater A and Repeater C are returned to operation, Slave A will automatically change its frequency key to match the new frequency key of Repeater A. Likewise, Slave C and Repeater D will automatically change their frequency keys to match the new frequency key of Repeater C. It is not necessary to change the frequency keys of these radios. However, the frequency key values displayed in the menus of these radios and in the Multipoint Diagnostics program will not be changed.

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Note: If the serial number of any radio other than Repeater A was listed in Slave A's call book, Slave A would attempt to establish a link to this radio when Repeater A was being programmed. If a link was established to another radio, cycling the power on Slave A will cause it to disconnect and reconnect. If after cycling the power, Slave A is still not connected to Repeater A, reduce the Retry Timeout (Radio Parameters menu item 8) on Slave A to 8 and try again. If Slave A still does not connect to Repeater A, and the other radio is not intended to be used as an alternate path for Slave A, then remove its serial number from Slave A's call book. Likewise, the same condition may exist if multiple serial numbers are listed in Slave C's or Repeater D's call books.

Using Repeater Frequency with Network ID = 0 to 254 or 256 to 4096

Follow steps 1 and 2 in the call book method above.

3. The repeater frequency function requires subnet ID to be set. If subnet ID has not been set on Repeater A, Repeater B and Repeater C, enable subnet ID on these radios. See Figure 2 on page four for an example of subnet ID settings.

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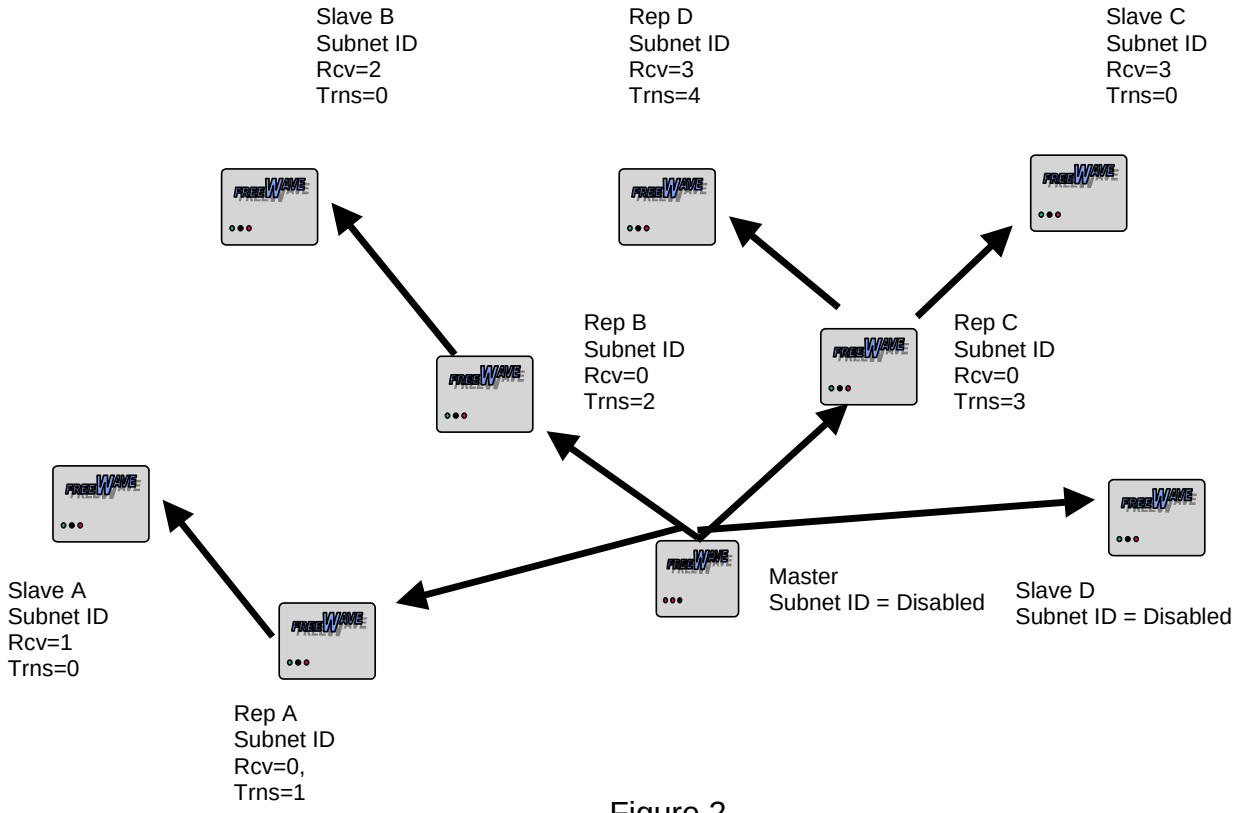

Figure 2
Example of Subnet ID settings

Slave A will automatically change its frequency key to match the new frequency key of Repeater A. Slave C and Repeater D will automatically change their frequency keys to match the new frequency key of Repeater C. As indicated above, the frequency key changes will not appear in menus of these radios or in the multipoint diagnostics program. Unlike the call book method, when Subnet ID is used, there is no possibility that Slave A, Slave C, or Repeater D will link to any other radio.

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