Technical Bulletin CS-16-03

Spectralink 84-Series Handsets using DFS Channels

This technical bulletin explains how to configure Spectralink 84-Series handsets to interoperate in environments using DFS channels on their WLAN.

System Affected

Spectralink 84-Series handsets running version 4.13.0.x067

Description

Many customers deploy their WLAN's to utilize DFS (Dynamic Frequency Selection) channels. These are the bands in the 5GHz spectrum within the UNII-2 and UNII-2 Extended ranges; channels 52 through 140. Because some environments are not able to utilize the UNII-3 range due to regulatory restrictions or other deployment requirements; customers are likely to rely on DFS channels. The DFS bands share the same frequency range of radar systems and as such are heavily regulated to prevent interference with any radar detected. Because of how this process is implemented in both the WLAN and in the clients, there are potential issues when using these channels.

First let's describe how the Spectralink 84-Series handset handles DFS channels so it is clearer as to why we've implemented the changes we have. Because of radar avoidance, the Spectralink handset will not probe on a DFS channel that it has not first heard a beacon on. This assumes that the AP will hande radar detection and avoidance and perform channel announcement, also known as spectrum management, because the handset cannot. Without channel announcement, the Spectralink handset will not even attempt to connect to the AP. Channel announcement being enabled in the AP ensures that the AP's beacons will include the Spectrum Management bit, meaning the AP will actively check for the presense of radar. should radar be detected by the AP there will be a single announcement sent to inform clients of the new channel. However, the Spectralink handset may not hear this information if it is in a sleep period. Hearing it would only invalidate its current AP, causing the handset to begin listening for a new one. It may still choose to return to the AP that changed channel but this will be based on the results of a DCA (Dynamic Channel Assessment) cycle.

Under normal circumstances, for non-DFS channels, the handset will probe for AP's on all configured channels regardless of whether an AP was heard on that channel. But for a DFS channel, we cannot probe first.

So let's assume the AP has channel announcement configured and the handset is setup to use DFS band UNII-2. The AP will beacon at the 102 millisecond beacon interval but it will also be doing radar detection at the same time. During the beacon, the handset must be on that channel in order to hear the beacon from the AP. That means the handset must be performing a DCA cycle to see whether there are AP's present on the handset's configured channels. If the handset has UNII-1 and UNII-2 configured then it will start by probing on the UNII-1 channels which includes a period where the handset probes and then listens. When the handset gets to the DFS channels it will merely listen rather than first probing.

The reason all this is so important to understand first is that the behavior of the handset in standby and in call varies quite a bit. In call behavior is must more aggressive but the handset must still listen for beacons from AP's on DFS channels before transmitting. But when in standby the handset is conserving battery life by sleeping more and not performing roams. In a DFS environment, this could create some issues.

To make standby roaming more aggressive we implemented a new parameter that allows the administrator to set a minimum signal threshold the handset will use to trigger roaming; *device.wifi.noBkgScanRssi="-75".* But this doesn't really help much when using DFS channels because we still can't transmit until we hear an AP. And if the phone doesn't perform a DCA cycle very often because we don't hit the threshold set then you may never get a chance to hear a DFS AP. During the DCA cycle the handset creates a list of candidate AP's that it has heard beacons from or received probe responses from. This list is maintained for 10 seconds before it is considered stale and is dropped. When in call this is fine because the handset is scanning regularly, but in standby the handset will only do a DCA scan every 20 seconds. With non-DFS channel AP's, this is fine because the phone can actively probe for candidate AP's. But this will likely mean that we miss beacons from the DFS AP's out there.

To that end, we've implemented a new parameter to build on the previous one that set the standby scanning threshold. Now we can set the amount of time, in seconds, between DCA scans while in standby. Below is the new parameter along with its default value:

device.wifi.bkgScanDelaySeconds="20"

There are some important impacts that need to be considered with this parameter before changes are made. There is a direct correlation between scan cycles and impact on battery life. The following table explains these impacts:

Condition	***Standby Battery Life (in hours)***
No background scanning	approximately 85 hours
Delay = 20	approximately 63 hours
Delay = 6	approximately 45 hours
Delay = 0	approximately 23 hours

When using DFS channels, we recommend that you set this parameter to a value of "6". This will impact battery life, as shown; but it will also ensure the handset is able to keep a fresh list of DFS channel AP's in its candidate list.

If you're unsure whether to change this value, then please contact Spectralink Support for assistance.

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Warranty

The *Product Warranty and Software License and Warranty* and other support documents are available at http://support.spectralink.com.

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