

- Showing relative power levels across the band, to aid in selecting channels and performing RF planning.
- Troubleshooting to finding the frequency, relative power level, and location of interferers by rotating a single SM, or triangulating from multiple SMs in a geographical area.

The OFDM spectrum analyzer, the FSK spectrum analyzer, and the FSK **Receive Power Level** are all measuring and displaying *peak* power levels. The OFDM **Receive Power Level** is measuring and displaying the *average* power level. In addition, an OFDM SM measures power across 10-MHz channels while an FSK SM measures power across 20-MHz channels.

Due to all this, the reported **Receive Power Level** on an OFDM SM can be 10 to 15 dB lower than the value shown for that channel on the spectrum analyzer. For example, for an OFDM AP transmitting on 5540 MHz, the OFDM SM might show a **Receive Power Level** of -70 dBm while the OFDM and FSK spectrum analyzers show power levels of -54 and -51 dBm at 5540 MHz.

The built-in spectrum analyzer can be very useful as a tool for troubleshooting and RF planning, but doesn't duplicate the accuracy and programmability of a dedicated, high-end spectrum analyzer, which may be needed in some cases.

### 3.6 COLLOCATION OF 5.4 GHZ OFDM WITH STANDARD 5.4 GHZ CANOPY FSK

When locating 5.4 GHz PMP 400 and PTP 200 Series OFDM APs near 5.4 GHz standard Canopy FSK APs (especially on the same tower, but also in the same geographical area), the following practices should be followed to avoid interference between the two systems:

- Plan spacing between OFDM and FSK channels to provide **25 MHz center spacing**, which gives a 10 MHz guard band between the 10 MHz OFDM channel and the 20 MHz FSK channel.
- **Coordinate** Downlink Data %, Range, and Control Slot settings using both the OFDM and the FSK **frame calculators**

The following paragraphs give more details on these recommended practices.

#### 3.6.1 Channel Spacing

Center spacing of 25 MHz between collocated FSK and OFDM APs provides a 10 MHz guard band between the 20 MHz and 10 MHz channels, which has proven useful and needed in field testing. Alternatively, in cases where channel planning is severely restricted and the 10 MHz guard band (25 MHz spacing) is not possible, using vertical separation of 5 feet or more between the OFDM and FSK APs may allow collocation with no guard band (15 MHz spacing) in some deployments.

#### 3.6.2 Frame Calculations and Configuration Settings

Interference between collocated Canopy systems can be avoided by following two practices:

1. Use a CMM. This synchronizes frame start, so that all collocated APs begin transmitting at the same time each 2.5 millisecond frame.
2. Use the frame calculators in each module, OFDM and FSK (the frame calculators are different, as frame details are different) to select Downlink Data %, Range, and Control Slots for each system that produce "Rec SEQ Start" values that are within 300 bit times. This ensures that all collocated APs end transmission each frame before any collocated AP begins to receive.

When collocating only Canopy OFDM APs together, or collocating only Canopy hardware-scheduled FSK APs together, the simple practice of setting the Downlink Data %, Range, and Control Slots the same on all APs ensures they won't interfere with each other. (These parameters are set on the "Configuration => Radio" page of the AP.) However, due to the different "physical" layer between Canopy OFDM and Canopy FSK, this doesn't necessarily work when collocating OFDM and FSK together.

You will need to use frame calculators on both the OFDM and FSK modules, as they are different frame calculators. For the same Downlink Data %, Range, and Control Slots, the frame calculators give different results. Use of the frame calculators is similar to the previous use when collocating software-scheduled and hardware-scheduled APs.

**Procedure 1: Finding collocation values using Frame Calculators**

1. Using the "Tools => Frame Calculator" on an OFDM module, enter the desired Downlink Data %, Range, and Control Slot settings, click Calculate, and observe the "Rec SEQ Start" value.
2. Using the "Tools => Frame Calculator" on an FSK module, enter the desired Downlink Data %, Range, and Control Slot settings, click Calculate, and observe the "Rec SEQ Start" value.
3. Iterate, usually adjusting the FSK Downlink Data % and the OFDM Downlink Data % values by a few percent each time, until the "Rec SEQ Start" times of all collocated modules are within 300 bit times of each other.
4. Configure the OFDM modules using the resulting OFDM values, and the FSK modules using the resulting FSK values.

===== end of procedure =====