



# CHAPTER 12

## Device Finder

In **Device Finder** mode, Cisco Spectrum Expert Software acts as a lightweight portable probe which enables you to quickly track down the location of a specific interfering device. Essentially, your Cisco Spectrum Expert Software-enabled laptop acts as a wireless “sniffer.”

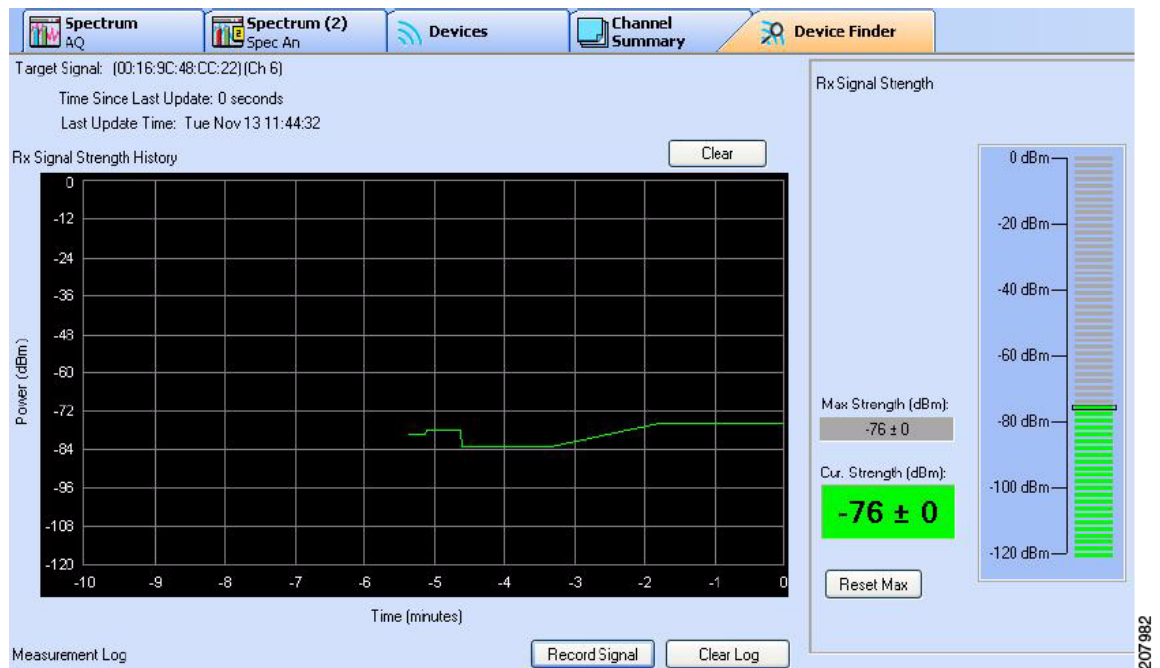
### Device Finder Mode

This section presents a summary description of how to put **Device Finder** to work. Detailed instructions are presented in the next section.

- From the **Devices View** or the **Active Devices** tree, select the device that you wish to locate.
- Carry the Cisco Spectrum Expert system to different locations in the network environment.
- At each location, use Cisco Spectrum Expert Software to measure the signal strength from the device of interest.

Device	Signal Strength (dBm)	Signal Strength (%)
Wi-Fi APs (In-Network) [91]		
(00:07:85:B3:58:24) (Ch 2)	-79.0	
(00:0D:ED:97:DF:7)		Find This Device
(00:0F:34:46:BB:8)		What is This Device?
(00:13:5F:0E:CB:2)		
(00:16:9C:48:CC:2)		Unknown
(00:16:9C:48:CC:2)		Known
(00:16:9C:48:D9:8)		
(00:16:9C:4B:F8:5)		<input checked="" type="checkbox"/> In-Network
(00:16:9C:90:EF:1)		Export Data

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- Using these signal strength measurements, identify when you are closer to—and further from—the device of interest. Essentially, the signal strengths indicate when you are “getting warmer” or “getting colder” in terms of getting near to the signal source of interest.

Based on these measurements, you can then home in on the location of the intruding device.

- You can also use the **Measurement Log** to record RF signal strength levels at specific locations. If the “hotter/colder” approach is proving problematic—which may happen if, for example, the signal is intermittent—the log keeps a record of where different RF levels were recorded. You can use this information, possibly with the help of a map of your network space, to triangulate the location of the interfering device.

## Working With Device Finder

To use the **Device Finder**, follow these steps:

- Step 1** In **Devices View**, or on the **Active Devices** tree, select the device you wish to locate. Then right-click on the device name, and select **Find This Device** from the pop-up menu.

Device	Strength (dBm)	CPU (%)
Wi-Fi APs (In-Network) [91]		
(00:07:85:83:58:24) (Ch 2)	-79.0	
(00:0D:ED:97:DF:7)		Find This Device
(00:0F:34:46:BB:8)		What is This Device?
(00:13:5F:0E:CB:2)		
(00:16:9C:48:CC:2)		Unknown
(00:16:9C:48:CC:2)		Known
(00:16:9C:48:D9:8)		
(00:16:9C:48:F8:8)		<input checked="" type="checkbox"/> In-Network
(00:16:9C:90:EF:1)		Event Data

- Step 2** The device is now listed in the **Device Finder**.

Target Signal: 052405765564 (Ch 6) -- 052405765564 (Ch 6)  
 Time Since Last Update: 1 seconds  
 Last Update Time: Sun Jan 21 16:20:00

**Step 3** The **Signal Strength History** graph shows a moving plot of the signal strength. This plot makes it easy to visualize when you are walking to or away from the signal source.



**Note** The plot does not automatically reset if the signal is lost.

The **Rx Signal Strength** meter also provides a real-time indicator of the signal strength from the device of interest, and is an additional tool in determining whether you are “getting warmer” or “getting colder” in terms of tracking down the interfering device.

At moments, you will record a signal of special interest. The signal may suddenly peak or drop off, or you may be systematically recording the signal at carefully planned locations.

**Step 4** To maintain a record of the signal of interest, select the **Record Signal]** button, or press the **<Spacebar>**.



Cisco Spectrum Expert Software records the current signal strength and the time in the **Measurement Log**. For a **Description**, Cisco Spectrum Expert Software uses the device name as a default value.

Time	Description	Rx dBm
04:28:38 PM	West Atrium	-47 ± 0
04:25:41 PM	South Conference Room	-46 ± 0
03:51:43 PM	East Conference Room	-46 ± 0
03:50:22 PM	North Conference Room	-48 ± 0
03:49:20 PM	Base Station 1 - Conference Room	-45 ± 1

**Step 5** Type in a description of where the measurement was taken. Press the **<Enter>** key on your keyboard to confirm your description.

**Step 6** You can also edit the location information in the **Measurement Log** at a later time. Simply double-click on the description and then key in your new description; then press **<Enter>**. (Pressing **<Esc>** cancels any changes you are making.)

## Additional Device Finder Features

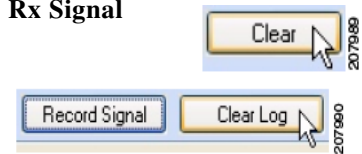
The **Device Finder** has the following additional features and capabilities:

- **Stop Finding**—You can stop tracking the interferer by selecting the **[Stop Finding]** button. It is a good idea to do this after you have found the interferer of interest, since it reduces the drain on system processing resources.
- **Reset Signal Averaging**—If you select the **[Reset Signal Averaging]** button, Cisco Spectrum Expert Software no longer uses prior signal values to calculate the average signal strength. Instead, Cisco Spectrum Expert Software only calculates average signal strength from "now" forward, where "now" is when you select **[Reset Signal Averaging]**.

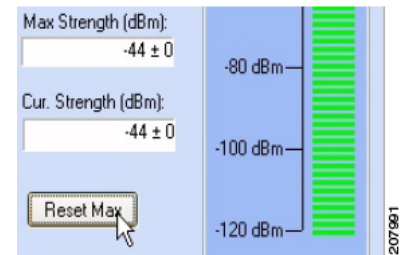


If you are moving around—or changing the orientation of a directional antenna—this command will cause the signal averaging measurement to restart, so you don't display data that may be representative of the prior position/orientation. A great deal of filtering is applied to provide accurate measurements, and this can help Cisco Spectrum Expert Software to respond more quickly, and not be biased from prior measurements.

- **Clear Signal Strength History**—Select the **Clear** button over the **Rx Signal Strength History** plot to clear the plot.
- **Clear Measurement Log**—You can clear the **Measurement Log** of all data by selecting the **Clear Log** button above the log.
- **Delete A Single Log Entry**—You can also delete an individual row from the **Measurement Log**. Simply select the entry, and then press the **<Del>** key on your keyboard. Then select **Yes** in the confirmation dialog box.
- **Reset Maximum Signal Strength**—If you select **[Reset Max]**, Cisco Spectrum Expert Software deletes the current value for the maximum signal strength; Cisco Spectrum Expert Software then ascertains, starting from "now", the maximum interferer signal strength measured from this time forward.



- **Reset Max** only clears the **Max Strength** text box, and the black rectangular box in the vertical signal meter that indicates the highest strength seen. Use the **[Clear]** button (above) to clear the plot.



## “Divide And Conquer” Search Strategy

To minimize your effort, and maximize your chances of locating the interferer, we recommend that you use a “divide and conquer” search strategy (also known as “rectangular bisection”). We illustrate the strategy, first with the omni antenna, and then using the directional antenna. To use this process, you will greatly benefit from using a physical map of your network space.

### Omni Antenna

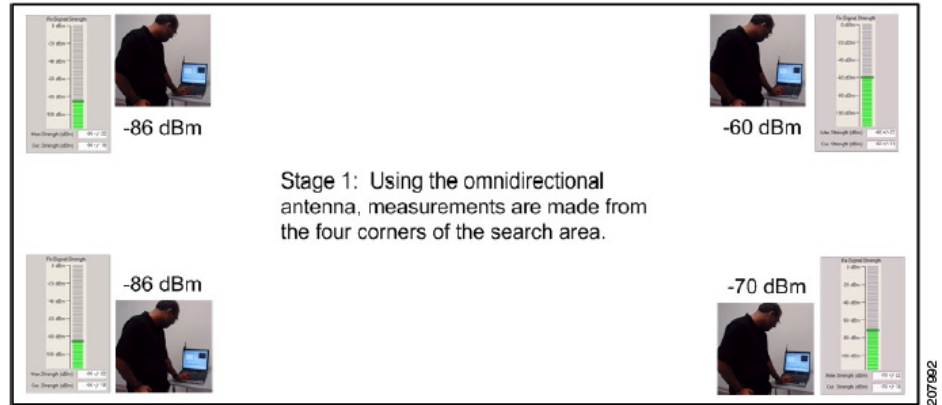


#### Note

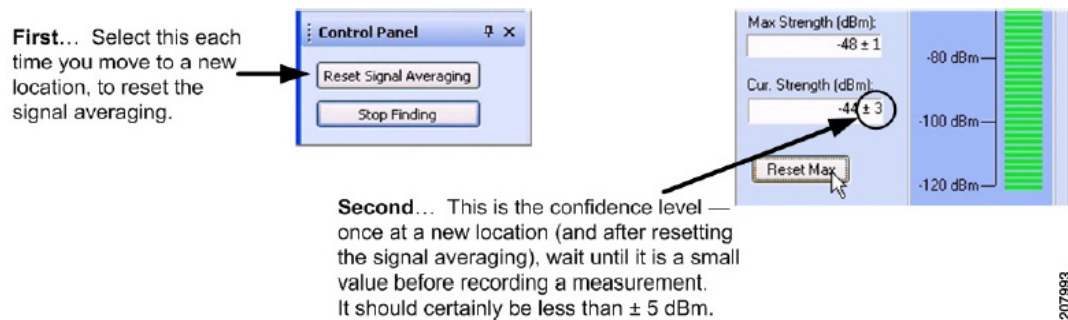
It is possible to hit a “blind spot” when using **Device Finder**. This is a location—typically a corner of a large building—where you may not get any measurements at all. If you find you are spending more than 30 seconds at any one spot, without getting an updated device reading, you should move away from that spot and try a different location.

For purposes of simplicity, assume that your interfering device is located somewhere within a large rectangular office space (which might measure, for example, 50' by 150').

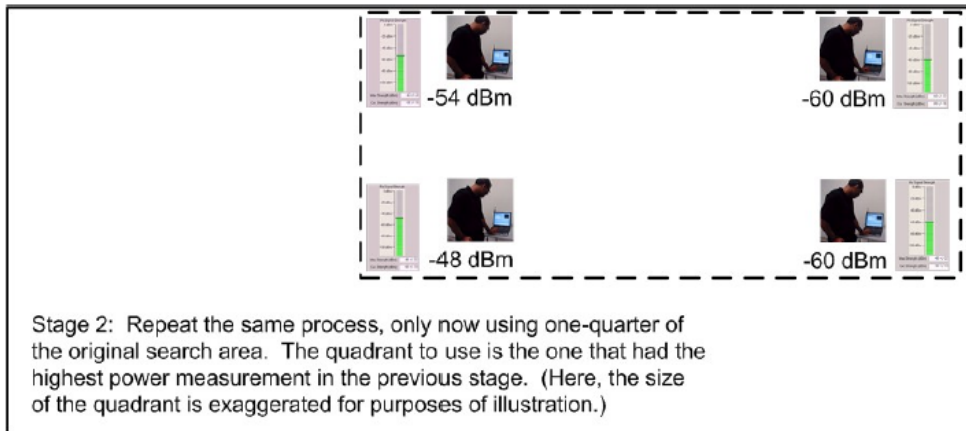
- Step 1** Go to each of the far corners of the office space, and measure the signal strength from the interfering device of interest. Take note of which corner of the office yields the highest signal strength. (A printed map of your office space can be helpful for jotting down data.)



- Note** Each time you move the Cisco Spectrum Expert system to a new location, select the [Reset Signal Averaging] button on the Device Finder. Then, at each test location, wait for the confidence level to settle to a small value—ideally less than  $\pm 3$  dBm, but certainly less than  $\pm 5$  dBm—before recording the signal strength.

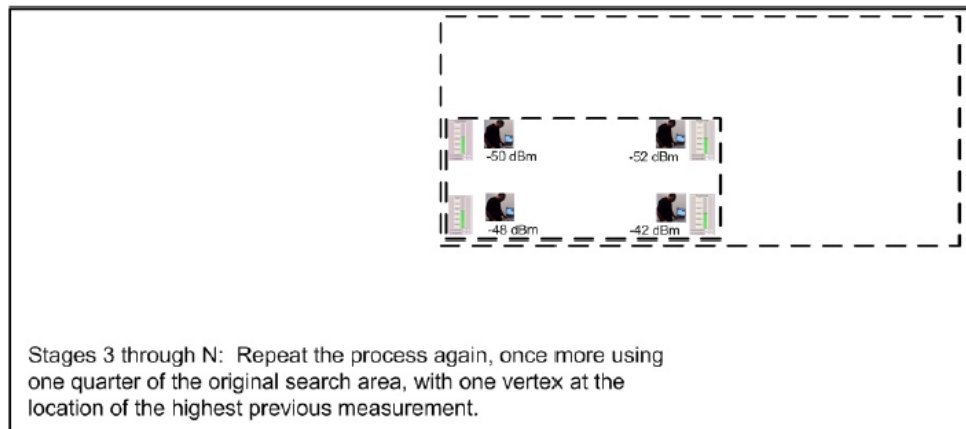


- Step 2** In the corner which has the largest signal strength, map out a rectangular sub-search area comprising one quarter of the total office space.



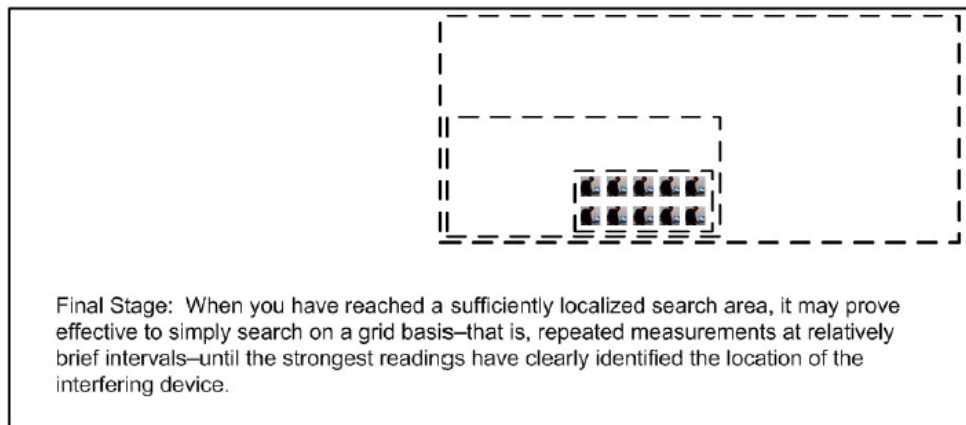
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**Step 3** Repeat this process, as necessary to localize your measurement.



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**Step 4** By repeating this process, you will be able to home in on the location of the interfering device.



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## Directional Antenna

It is possible to hit a “blind spot” when using **Device Finder**. This is a location—typically a corner of a large building—where you may not get any measurements at all. If you find you are spending more than 30 seconds at any one spot, without getting an updated device reading, you should move away from that spot and try a different location.

The advantage of using the directional antenna is that you can save yourself a substantial amount of walking, because four measurements at a time can be made from one central location. See “[Directional Antenna](#)” for more information.

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- Step 1** Once again, assuming a rectangular office space, take your Cisco Spectrum Expert Software laptop to the center of the office space. Use the directional antenna, with **Device Finder**, to determine the signal strength coming from your interferer, as measured in each of four directions. For each measurement, the antenna should be pointed towards each of the four corners of the office.



**Note** Again, here, each time you point the antenna in a new direction—as well as when you move to a new location—select the [Reset Signal Averaging] button on the Device Finder. Then, wait for the confidence level to settle to a small value (at most  $\pm 4$  dBm) before recording the signal strength.

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- Step 2** Once again, map out a rectangular sub-search area comprising one quarter of the total office space for the corner which has the largest signal strength. Again, you only need to make measurements from one spot, pointing the antenna towards four different directions.
- Step 3** Repeat, again making measurements in the quadrant with the highest power reading.
- Step 4** Once again, you will learn from experience whether the final measurements are best made by a continued process of rectangular bisection, or whether the final measurements should be made on a systematic grid of a local area.
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## Detecting Narrowband Devices

Interfering devices fall into two RF categories, narrowband and wideband. By the very nature of wideband transmissions, the signal strength from a wideband device—as measured at any one location—tends to be consistent. (If the directional antenna is in use, the signal strength from a wideband device will tend to be consistent, at a given measurement location, and for a given direction in which you point the antenna.)

By contrast, narrowband devices have certain signal peculiarities. Small changes in the physical environment—changes which have nothing to do with the device emitting the signal—can cause large fluctuations in the signal strength. For example, the simple movement of people or furniture can change the way a narrowband signal is reflected throughout the enterprise space, resulting in changes in signal strength as measured from some distance away.

Fortunately, most interferers are wideband, which makes life easier for users of Cisco Spectrum Expert Software. However, there are some interferers, such as some FM phones and TDD phones, which are narrowband devices. The signal from these devices can vary significantly over the space of just a few inches. As a result, there are some simple antenna tricks to use when searching for such devices:

- **Omni antenna**—If you are using the omni antenna (including the built-in antenna on the Cisco Spectrum Expert Sensor card), it can be helpful to slowly, physically sweep the Cisco Spectrum Expert Software laptop in an arc along several inches, until you achieve the maximum signal strength.
- **Directional antenna**—If you are using the directional antenna (Wi-Fi only), a similar trick applies. With the laptop resting in place (such as on a cart), and with the antenna pointed in a desired direction, you can slowly sweep the antenna along an arc of roughly 30 degrees to 45 degrees, centered on the primary direction of interest, until you achieve the maximum signal strength.



Solid line indicates main direction of interest for signal measurement. Dotted lines indicate approximately 45 degree arc of measurement through which the antenna should be moved.

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