**C H A P T E R 5**

# Cisco Spectrum Expert Software Overview

> **Note** If your computer has an 802.11 interface, it should be enabled in order to detect Wi-Fi devices. If you are connected to an AP or ad-hoc network through the 802.11 interface, you will occasionally see strong signals on the spectrum plots that are measurements of your own 802.11 transmissions. But as long as your network transmissions are not excessive, Cisco Spectrum Expert Software will still operate correctly in the presence of these signals.



*Figure 4-1: The Cisco Spectrum Expert Software*

## Status Bar

The Cisco Spectrum Expert Software has a **Status Bar** at the bottom which may be toggled on and off using **View > Status Bar**. The **Status Bar** displays the following information:

- Current antenna in use

- System uptime
- User band selections
- Current mode—Live, Playback, or Recording.

**Note**    See "Spectrum Recording and Playback" for more information.

**Note**    If Spectrum Expert does not detect a local WLAN card, the message "Wireless LAN Card Not Detected" in displayed in the status bar.

## Active Device Tree

The **Active Device** tree shows all access points, ad-hoc networks, and interferer devices currently detected by Cisco Spectrum Expert Software. The tree is normally on display on the left side of the application, but can be toggled on and off by selecting **View > Device Tree**. See "Active Device Tree" for more information.

## Cisco Spectrum Expert Software Tabs and Operational Features

These five modes of operation are accessed by selecting any of the five tabs running across the top of the application display: **Spectrum**, **Spectrum (2)**, **Devices**, **Channel Summary**, and **Device Finder**. Table 5-1 shows the relationship between the display tabs and the application's operational capabilities.

*Table 5-1    Cisco Spectrum Expert Software Operational Features*

| Display Tab | Reference | Comments |
|---|---|---|
| Spectrum<br><br>Spectrum(2) | See "Spectrum Tabs, Plots, and Charts Overview", "Using Spectrum View Plots", or See "Using Spectrum View Charts". | Each Spectrum tab can display a mixture of Spectrum Plots and Charts. The application provides two Spectrum tabs, allowing for two different, user-configurable, default configurations of Plots and Charts. |
| Devices | See "Working With Devices View". | Detailed information on detected devices. Unlike the **Active Devices** list, this will also show historical devices (i.e., devices which are no longer active). |
| Channel Summary | See "Working with the Channel Summary". | Summary of RF activity on all monitored channels. |
| Device Finder | See "Device Finder Mode". | Cisco's "sniffer" for locating unwanted RF devices. |

# Control Panel

Several of the viewing modes have specific controls which enable you to fine-tune the features of the display. For example, one of the **Spectrum Plot Controls** panel is shown at left. Normally, the **Control Panel** automatically comes into view when you select an appropriate mode, such as **Spectrum** mode (see "Using Spectrum View Plots"), **Devices** mode (see "Device Finder Mode"), or **Device Finder** (see "Working With Devices View").

- If the **Control Panel** is not displayed, select **View > Control Panel**. Select the same menu option to toggle the **Control Panel** off.

- In the **Spectrum** view, each plot or chart has its own unique controls. If the **Control Panel** is showing but the controls for the plot or chart of interest are not displayed, click on the plot or chart of interest. The appropriate controls will then be shown on the **Control Panel**.

- You can adjust the size of the **Control Panel** and the **Active Devices** view by placing the cursor over the line which divides them, left-click and hold the mouse button, and drag up or down.
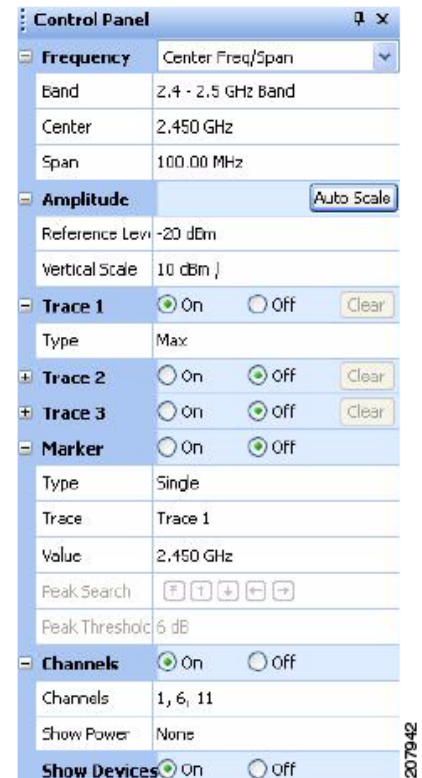
# Hiding/Unhiding the Active Devices List and Control Panel

You can use options on the **View** menu to hide or display the **Active Devices** tree and the **Control Panel**. You can also use the mouse to control the display of the **Active Devices** tree and the **Control Panel**, as illustrated here.

> **Note**    This guide shows examples of the **Control Panel**, but the techniques apply to the **Active Devices** tree as well.
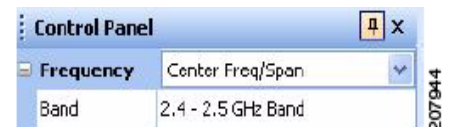
## Close

You can close the **Control Panel** or **Active Devices** tree by clicking the **Close** button.
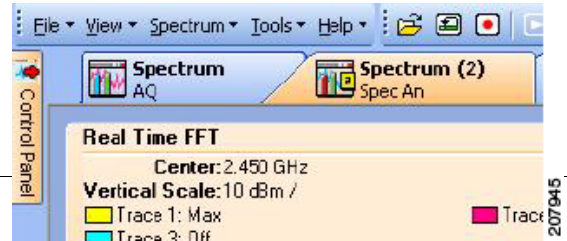
## Auto-Hide

You can hide the **Control Panel** or **Active Devices** list by clicking the **Auto-Hide** button, which has a small push-pin symbol on it.

Hiding the **Control Panel** allows more room for other display features (such as a larger view of the **Spectrum** tab shown at right). However, a small vertical **Control Panel** tab is still shown at left.



> ✎ **Note**    If you *hover* (without clicking) the mouse pointer over the vertical tab for the Control Panel, the Control Panel is temporarily restored to view. This allows you to make changes or make selections on the **Active Devices** tree.

> ✎ **Note**    To restore the **Control Panel/Active Devices** tree to permanent status on the display, click the **Auto-Hide** button.

# Menu Options

The Cisco Spectrum Expert Software has the following menu options.

## File Menu

The **File** menu offers the following options:

- **Open Capture File**—Allows you to play back a previously recorded Cisco Capture File. See "Spectrum Recording and Playback" for more information.

- **Save Replay <u>A</u>s**—Captures Instant Replay spectrum data to a Cisco Capture File for later playback. See "Spectrum Recording and Playback" for more information.

- **I<u>n</u>stant Replay**—Enables a 1 to 60 minute replay of stored running FIFO capture data.

- **<u>R</u>ecord Capture File**—Captures spectrum data to a Cisco Capture File for later playback. See "Spectrum Recording and Playback" for more information.

- **<u>S</u>top Capture File**—Terminates the recording of spectrum data.

- **<u>C</u>onnect To Sensor**—Allows you to select a different Sensor card or to open a CSC file.

> ✎ **Note**    Select the **Browse** button to locate the CSC file of interest.

> ✎ **Note**    Some Sensor cards automatically use the external antenna if one is connected, and will override any contrary setting here.

> ✎ **Note**    If you expect to use these settings in the future, check the **Automatically Use These Settings Next Time** box.

- **Import Settings—**Allows you to import Local Settings into Spectrum Expert.

- **Export Settings—**Allows you to export Local Settings into Spectrum Expert.

- **E<u>x</u>it**—Closes the Cisco Spectrum Expert Software.

# View Menu

This menu provides access to most of the main Cisco Spectrum Expert Software features:

- **Spectrum**—Enables you to create a variety of plots and charts which provide real-time views of RF activity. You can save your configuration of plots and charts. See "Using Spectrum View Plots" for more information.

- **Spectrum (2)**—The same as with Spectrum; you can create a variety of plots and charts, and save your configuration.

- **Devices**—Shows all RF devices detected by Cisco Spectrum Expert Software. See "Working With Devices View" for more information.

- **Channel Summary**—Shows RF activity—such as power levels, and the presence of 802.11 and interferer devices—on a channel-by-channel basis. See "Working with the Channel Summary" for more information.

- **Device Finder**—Enables you to track down the location of interfering devices. See "Working With Device Finder" for more information.

- **Active Devices**—Shows all access points, ad-hoc networks, and interferer devices currently detected by Cisco Spectrum Expert Software. See "Active Devices" for more information.

- **Control Panel**—Toggles the **Control Panel** on and off. The **Control Panel** sets the details of your view in several different modes: **Spectrum View**, **Devices View**, and **Device Finder**. See "Control Panel" for more information.

- **Status Bar**—Provides various system status information and user band selections. Use this menu option to toggle the **Status Bar** display on or off.

# Spectrum Menu

This menu is only visible when the **Spectrum** or **Spectrum (2)** tab is selected.

- **Add Plot**—Adds one of the available plot types.

- **Add Chart**—Adds one of the available chart type.

- **Remove Selected Items**—Removes the currently selected plot or chart from the display. (You must first select a spectrum plot or chart for this menu option to be active.)

- **Pause Selected Items**—Freezes the display of data on the currently selected plot or chart.

- **Resume Selected Items**—Only shown if you first select a plot or chart which was previously paused. Resumes the real-time update of data for that plot or chart.

- **Zoom In/Out**—Maximizes or minimizes the size of a selected plot or chart.

- **Export Selected Items Data**—Captures and exports data from a specified spectrum plot or chart and saves it to a file.

- **Cut**—Deletes the currently selected spectrum plot from the display and pastes it to the clipboard.

- **Copy**—Captures the currently selected plot or chart.

- **Paste**—Retrieves a spectrum plot or chart from the clipboard and pastes it in the display area.

- **Select All Items**—Selects all spectrum plots and charts currently displayed on the spectrum tab.

- **Open Spectrum View Configuration**—Once you have configured plots and charts on one of the two **Spectrum** tabs, you can save the plot/chart configuration. This enables you to easily restore the same configuration at a later time. See "Saving and Restoring Spectrum View Layouts" for more information.

- **Save Spectrum View Configuration**—See "Saving and Restoring Spectrum View Layouts" for more information.

- **New Spectrum View Configuration**—See "Saving and Restoring Spectrum View Layouts" for more information.

See "Using Spectrum View Plots" for more information.

## Tools Menu

This menu provides access to the **Settings** dialog. The **Settings** dialog has five panels:

- **Sensors and Antennas**—Selects which Spectrum Sensor card (and, in some cases, which antenna) the Cisco Spectrum Expert Software uses for spectrum data acquisition.

- **Console Settings**—Modifies the date and time on the Cisco Spectrum Expert Software, configures the Spectrum view to use for playback, enables the Instant Replay feature, selects the Default AP Category (In-Network or Unknown), and modifies the color of the plot's background.

- **Band and Channel Settings**—This panel determines, by Regulatory Domain (USA, Japan,.), which RF bands and channels are monitored for RF activity and reported on by Cisco Spectrum Expert Software. The default setting is to monitor the channels indicated on the **802.11b/g Channel Settings** panel. However, there are also options for other predefined 802.11a bands, including the US Public Safety Band and user-selected channels in middle and upper bands as well.

- **Alert Settings**—Used to enable or disable security and performance alerts for an interferer type or category.

- **SNMP Option / Cisco WCS Settings**

  - **SNMP Option**—Cisco Spectrum Expert Software has an ability to send SNMP traps when it detects interfering devices. This screen is used to configure the trap filters and threshold levels that will trigger the sending of an SNMP trap. The **Settings – SNMP Option** screen is used to configure the trap filters and threshold levels that will trigger the sending of an SNMP trap.

✎ **Note** The SNMP Option icon appears in the Cisco Spectrum Expert Software standard version. See "SNMP Option Settings" to configure the SNMP settings.

  - **WCS Settings**—The WCS-enabled Cisco Spectrum Expert Software provides the ability to send and receive Air Quality (AQ) data using the Cisco proprietary mode of streaming communication between Cisco Spectrum Expert Software and a Wireless Control System (WCS). The **Settings - Cisco Option** screen is used to configure the sending of data to the WCS.

✎ **Note** The WCS Settings icon appears in the Cisco WCS-enabled Cisco Spectrum Expert Software version. See "Cisco WCS Settings" to configure the WCS settings.

See "Local Settings Overview" for more information.

## Help

- **Help Topics**—Provides access to the Cisco Spectrum Expert Software Help system.

- **About Cisco Spectrum Expert Software**—Provides copyright and version information for the Cisco Spectrum Expert Software.

- **About Spectrum Sensor Card**—Provides technical data for the Sensor card currently in use.

- **Capture File Properties**—This option is active when a CCF file is playing and will display file information when invoked.

# Spectrum Recording and Playback

The Mobile software enables you to record spectrum data in Cisco Spectrum Capture (CSC) files. You can then play these files back at a later time. Each CSC stores the following information to disk:

> **Note**  Cisco Spectrum Capture files are subject to a size limitation of 512 MB. You should estimate CCF file size growth at a rate of 6 MB per hour/per band selected when considering the 512 MB size limitation.

- **Active Devices**—A list of active devices vs. time, plus all information needed to reproduce the **Devices View** and any of its subviews and columns for all monitored bands during playback. (During playback you will be able to change columns and see meaningful information that changes with time, just as with live mode.)

- **Spectrum Plot Data**—All information needed to reproduce any of the Spectrum Analyzer plots (except **Power vs. Time** and **Power vs. Frequency** – these plots will not be available during playback). You can adjust the settings for the other plots and charts during playback.

- **Spectrum Chart Data**—All information needed to reproduce any of the spectrum charts during playback.

- **Reference Information**—This includes the date and time of capture, the Windows user/login name, and the Sensor card revision and serial number.

The diagram at right shows the controls used for spectrum recording and playback:



The controls are described briefly below:

- **Record**—Opens a dialog box where you can define the name and file location of a CSC file. Upon closing the dialog box, recording begins automatically. You can also initiate this operation by selecting **File ‡ Record Capture File**.

- **Open**—Opens a previously captured CCF file for playback. You can also select **File ‡ Open Capture File**. Use the **Open Capture File** dialog box to select the recording of interest.

- **Playback**—Once you have opened a CSC file, select this to start playback.

- **Stop**—Stops the recording process, and also stops the in-progress playback of a CSC file.

- **Go Live**—Returns you to live mode. Any playback or recording that was in progress is halted.

- **Slider Control**—You can use this control to move to any particular time during the playback interval.
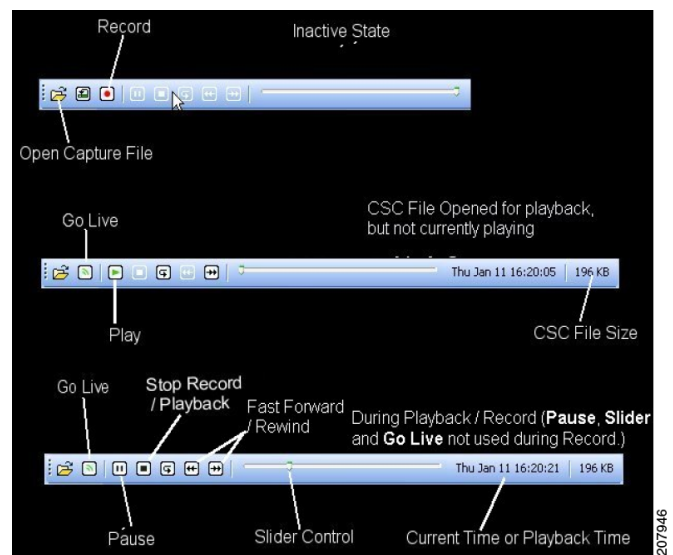
You may select any combination of Spectrum Analyzer plots or charts during playback.

Just as in a live spectrum session, you can right-click within the display area to get pop-up menus used to navigate to specific information. Additionally, you can use all other plot icons and features, such as adding, moving, zooming, and removing a plot or chart during playback.

**Note**    The **Power Vs. Time** and **Power Vs. Frequency** plots are not supported during playback.

# Spectrum Instant Replay

The Instant Replay feature allows you to review the most recent spectrum information up to the past 60 minutes, without having to record it in a CCF file, and play it back much as if it were being viewed live for the first time without interrupting receipt of current spectrum information. Spectrum information of interest viewed as an **Instant Replay** may then be saved as Cisco Spectrum Capture (CCF) files to share information on what is happening in the spectrum.

The screens at right show the two access methods used for Instant Replay.

Navigate from **Tools > Settings > Console Settings** to display the **Instant Replay** settings options as shown at right. The controls are described briefly below and detailed instructions on Instant Replay Settings, Initiating an Instant Replay and Converting an Instant Replay to a CCF can be found in the Online Help.

**Enable Instant Replay of the last**—Select to enable the Instant Replay function.

**Minutes**—Select the length of the Instant Replay (range 1 to 60 minutes).
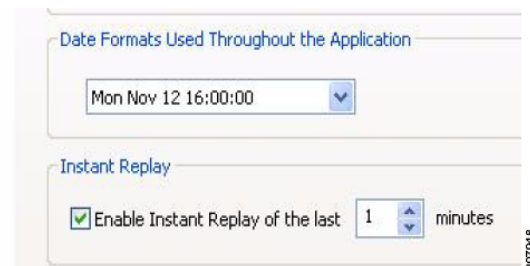
# What If I'm Not Seeing Any Data?

It may happen that you are viewing one of the Cisco Spectrum Expert Software displays, such as a spectrum plot, but you are not seeing any data; or data is missing for part of a plot. (For example, some of the channels on the plot have spectrum data, and others do not.) Or, you may know perfectly well that some kind of interfering device is present in the environment, but the **Devices List** and/or **Device Finder** are not detecting it.

## Sensor Card Not Properly Inserted

One possible cause of this problem could be a complete lack of communication between the Sensor card and the Cisco Spectrum Expert Software. Normally, however, if communication is lost with the Sensor card, the Cisco Spectrum Expert Software will present a warning message, and then shut down.

To resolve such problems, check to ensure the Sensor card remains properly seated in the card slot.

## Faulty Configuration Settings

Another possibility is that, while you have set your spectrum plots to display certain channels or bands, your configuration settings for Cisco Spectrum Expert Software as a whole do not include those channels/bands.

To determine if this is the problem—and to rectify if—you need to check your **Channel Settings** and **Monitored Bands** under the Cisco Spectrum Expert Software's **Settings** panel. See "Local Settings Overview" for more information.

## Erroneous Scale Settings

With the spectrum plots (see "Using Spectrum View Plots"), it is possible you may fail to see any data if you have an amplitude setting that is inappropriate for the actual data being monitored. For example, suppose you are monitoring the RF duty cycle, and have the vertical axis amplitude set to range from 0% to 100% (the default setting). If in fact the actual duty cycle values are very low (say, ranging from 0% to 1% or 2%), you may not see any data.

This can be a particular problem with the **Swept Spectrogram** plot, where RF power values and duty cycle values are mapped to colors. If all the measured data falls in a very narrow range compared with the **Color Scale**, you may see nothing but a solid block of a single color – in fact, you are seeing the correct data, but it seems as if you are seeing no data at all.

Selecting the **[Auto Scale]** option on these plots should normally correct this problem, but sometimes it helps to manually adjust the measurement scale.

## Wrong Antenna Settings

Another possibility is that you may have an internal Sensor card with an external antenna, but you are using the Sensor card's internal antenna. (This might account, for instance, for why you might fail to see some interfering devices you expect to see.) Check your **Sensors and Antennas** settings. See "Sensors and Antennas " for more information.

## Miscellaneous Device Issues

There are various RF effects that can prevent or partly hinder device detection. These are discussed in detail in the "Working With Devices View" section.