



CHAPTER 8

Spectrum Plots

The **Spectrum Plots** use graphical displays to provide detailed, low-level views of the RF spectrum. The plots are based on data from the SAgE chip embedded in the Sensor card. (SAgE is Cisco's spectrum analyzer on-a-chip, containing advanced, on-board support for real-time processing of spectrum data.) This chapter describes the information displayed in each plot.



Note

For information on Spectrum Charts, see [“Using Spectrum View Plots.”](#)

Using Spectrum View Plots

For information on creating spectrum plots, pausing and resuming the display, and saving plot configurations, see [“Spectrum Tabs, Plots, and Charts Overview.”](#) For information on how to fine-tune data displays for each plot, see [“Spectrum Plot Controls.”](#)

Plot Content

Spectrum View offers five different types of plots. You can view a tooltip list of active devices by mousing-over the trace area of a Cisco Spectrum Expert Software plot. More information is available in the Online Help.

Frequency-Based Plots

There are four plots which offer different views of RF power as a function of frequency. For these plots, the entire plot is updated once per measurement interval (approximately once per second):

- Real Time FFT Plot
- Power vs. Frequency
- FFT Duty Cycle
- **Swept Spectrogram**—Combines a time- and frequency-based view of the RF spectrum.

Time-Based Plot

This plot shows the variation of an RF metric over time.

- **Power vs. Time**—Plots data based on short time intervals (milliseconds). Mainly used for pulse detection.

Real-Time FFT Plot

A **Real-Time FFT** plot displays the RF power as a function of frequency—a Fourier transform of the RF spectrum. The data is direct data from SAgE. The plot can provide three different views: the average power (**Avg**) read during the most recent measurement interval; the maximum power (**Max**); or the maximum power detected at any time since the plot began running (**Max Hold**). This plot can also display the integrated channel power for each RF channel in RTFFT plots on a trace-by-trace basis by selecting the **Channels On** radio button in the Control Panel and using the **Show Power** drop-down box to select which channel trace should display the Integrated Channel Power.



Note

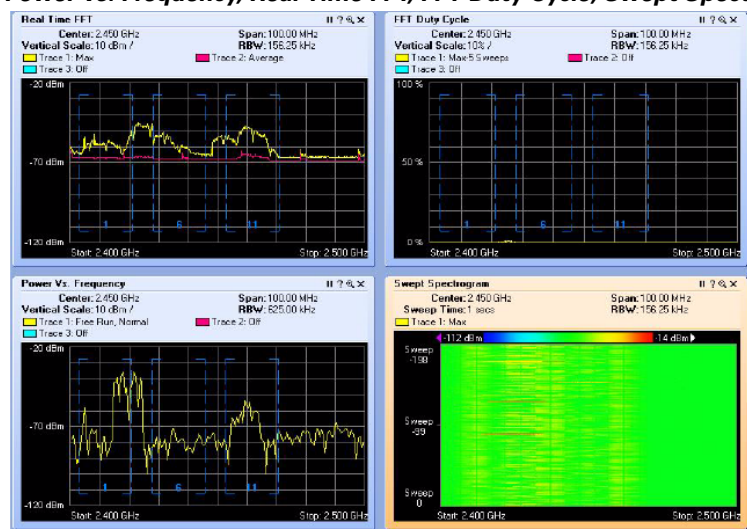
Integrated Channel Power is the sum of all the signals present in an RF channel. Signals are added in the mw domain and the sum is converted to dBm for display. Integrated Channel Power is disabled when an user selects “None” from the combo box. By default, the channel power of Trace 1 is displayed. The text color of Integrated Channel Power is the same as the color of the corresponding trace data. Integrated Channel Power is viewable only when RF channel bars are displayed.

See “[The Real-Time FFT Plot Compared with the Power vs. Frequency Plot](#)” for more information.

Power vs. Frequency

The **Power vs. Frequency** plot is also a Fourier transform of the RF spectrum, showing the amount of RF power detected at various frequencies. The difference between this plot and the **Real-Time FFT** plot is that the **Power vs. Frequency** plot is generated based on an analysis of SAgE data. This means that data can be aggregated and combined in various ways that are not possible with direct SAgE data, the basis for the **Real-Time FFT** plot. This plot can also display the integrated channel power for each RF channel in RTFFT plots on a trace-by-trace basis by selecting the **Channels On** radio button in the Control Panel and using the **Show Power** drop-down combo box to select which channel trace should display the Integrated Channel Power. Four spectrum plots are shown below.

Figure 8-1 *Power vs. Frequency, Real Time FFT, FFT Duty Cycle, Swept Spectrogram*



**Note**

The highlighted plot (with an orange background) is the current selected plot. To pause the selected plot, click **Spectrum > Pause Selected Items**.

**Note**

This **Power vs. Frequency** plot is only available if you are connected through the local sensor card. If you are connected through an AP, this option is greyed out.

FFT Duty Cycle

The **FFT Duty Cycle** plot displays the percentage of the time that the ambient RF signal is 20 dB above the noise floor. (This is represented on a per-frequency bin basis.) The **Duty Cycle** for the **FFT Duty Cycle** plot includes all RF energy, both from 802.11 devices and interferers.

Swept Spectrogram

The **Swept Spectrogram** is a different presentation of the data shown in the **Real Time FFT** and **FFT Duty Cycle** plots. Each colored horizontal line in the **Swept Spectrogram** plot displays the RF power or duty cycle as a function of frequency, as measured over the time period of one sweep in time (typically one second). The power or duty cycle values in each sweep are mapped to a range of colors, and displayed in a scrolling or "waterfall" display. This allows you to observe the FFT signals over historical time, and easily see signals with shifting frequencies and various durations. (You select between the power or duty cycle metrics using the **Control Panel**.)

See "[Interpreting The Swept Spectrogram Plot](#)" for more information.

**Note**

The color legend for the **Swept Spectrogram** is only displayed if there is enough room on screen. Depending on your display resolution, and on how many plots you have open at once, you may need to close some other plots in order to see the mapping of colors to power levels.

Power vs. Time

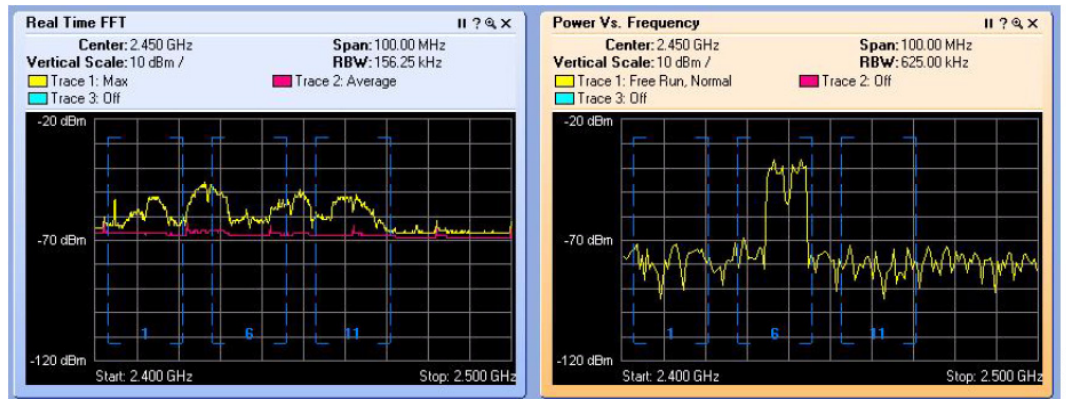
The **Power vs. Time** plot displays the RF power as a function of time. The time scales involved are very brief—microseconds or milliseconds—so the plot is mainly used to observe RF pulse activity.

**Note**

This **Power vs. Time** plot is only available for use if you are connected through the local sensor card. If you are connected through an AP, this plot is disabled.

The Real-Time FFT Plot Compared with the Power vs. Frequency Plot

Figure 8-2 Real Time FFT Compared to Power Vs. Frequency



Both the **Real-Time FFT** plot and the **Power vs. Frequency** plot show the RF power as a function of frequency, at a given moment in time. However, the two plots differ in important respects:

Table 8-1 Real Time FFT Compared to Power Vs. Frequency Plots

Property	Real Time FFT Plot	Power Vs. Frequency Plot
Data Source	SAGe Hardware —Raw spectrum data is collected on the SAGe chip inside the Sensor card. Statistical analysis is performed directly by SAGe’s onboard hardware. This enables very fast analysis of large quantities of spectrum data, but with the limitation that the parameters of the analysis are hard-coded into the design of the SAGe chip.	SAGe plus Microprocessor Software —Raw spectrum data is provided by the SAGe chip in the Sensor card and is then analyzed by software running on the CPU inside the laptop. This software analysis of the spectrum data provides greater flexibility in the analysis, but with the trade-off that less data can be analyzed in a given time frame.
Dwells	FFT analysis is performed on only 20 MHz of the band at one time. Each 20 MHz span is referred to as a dwell . By measuring several successive, adjacent dwells, it is possible to construct a plot which is essentially similar to a Fourier transform of the entire band (2.4 GHz, 5 GHz, 900 MHz, and so on.).	
Bins and Bin Sizes	Each 20 MHz dwell is divided into 128 bins, where each bin is 156 KHz wide. A power measurement is provided for each bin. The number of bins, and the bandwidth of each bin, is fixed.	With advanced software analysis, the number of bins, and the bandwidth of each bin, is user-defined, so you can achieve much finer granularity in your power measurements. For example, a single bin can be as narrow as about 9.7 KHz. To get the number of bins (data points on the plot); divide the span being measured by the RBW. For example, a 20 MHz span, with an RBW of about 20 KHz, will have about 1000 points (bins) on the plot.

Property	Real Time FFT Plot	Power Vs. Frequency Plot
Number of FFTs Per Plot	The Real-Time FFT Plot is updated once per second. Each plot is actually an average over the 5000 FFTs performed by SAgE during each dwell.	The software-based Power vs. Frequency calculations generate only one FFT per second. That one FFT is shown in the Power vs. Frequency plot (which is updated once per second, to reflect the new FFT). If you have set the plot to show an Average over all FFTs, the calculation is based on an average of several preceding FFTs that were plotted; but each successive second in real time only contributes one new FFT to that average ¹ .
Max Mode	One of the plotting options is to display the maximum RF power seen during the measurement interval. This is possible because the maximum power can be selected from among the 5000 FFTs.	A maximum power plot cannot be created, because actual data is available for only one FFT per second (rather than having data for 5000 FFTs, as with the real-time plot).
Advantage of Using This Plot	Because the plot shows an average of all 5000 FFT measurements made by SAgE in a second, you are more likely to see spectrum results from devices that are frequency hoppers, or bursty transmitters.	You can achieve much finer control over the granularity of the spectra that you see.
Disadvantage of Using This Plot	You cannot control the granularity of the spectrum.	Since you only see one FFT for the entire one-second measurement interval, you are less likely to see either frequency hoppers or bursty devices.
Playback Mode	This plot can be played back historically, as well as viewed in real time.	This plot can only be viewed in real time, not historically.
Primary Application	The primary use of this plot is for looking at broad RF spectrum activity, covering an entire band. This is useful for tasks like site surveys and initial network deployment.	The primary use of this plot is for troubleshooting, particularly for identifying and analyzing the spectrum behavior of an unknown interferer. It is often most effective when looking at less than a full band.

1. This footnote applies to **Power vs. Frequency** plots only, and not to the **Real-Time FFTs**. When you create the **Power vs. Frequency** plot, the very first plot shows a single FFT. And—again, assuming the plot is set to be in “Averaging” mode—the second plot adds one new FFT, and averages that with the FFT from the first plot. Each second, one more FFT is added to the average. However – the average is not performed over all preceding FFTs, but only for a more limited number, those included in a process known as “video averaging.”

Interpreting The Swept Spectrogram Plot

This section provides an illustrated discussion of interpreting the visual display in the **Swept Spectrogram** plot. Color coding is used to indicate intensity of either RF power or RF duty cycle (depending on which you choose to plot, using the **Spectrum Plot Controls** panel).

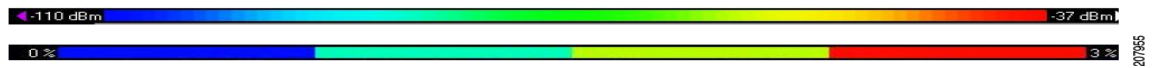
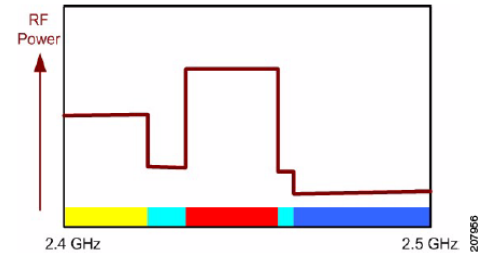


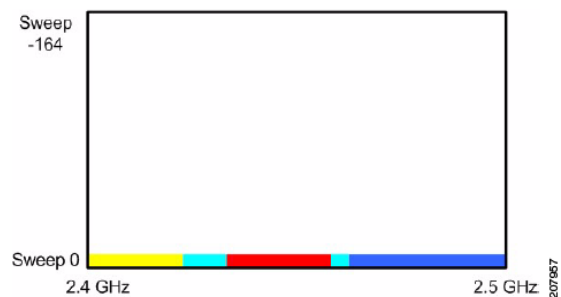
Figure 7-2: Swept Spectrogram Color Mappings For RF Power (top) and Duty Cycle (bottom)

Shown here is a comparison of how the same RF power measurements might look if plotted using a standard line graph—with the height of the graph indicating the RF power—compared to using colors on a straight line as a means to indicate power levels. Here, blue is less power, yellow is more power, and red is the most power.



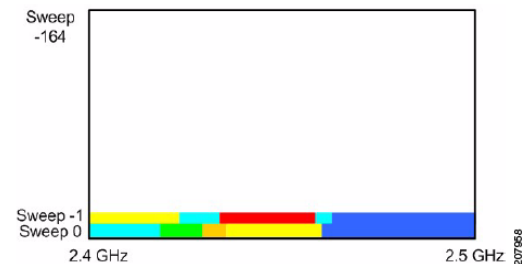
Time $T = 1$ This is the very first sweep you would see on starting the plot. It represents the RF power (average power, or maximum power, or duty cycle power, per your selection), as a function of frequency — and at the present moment.

The amount of power at each frequency is represented through the color coding scheme.

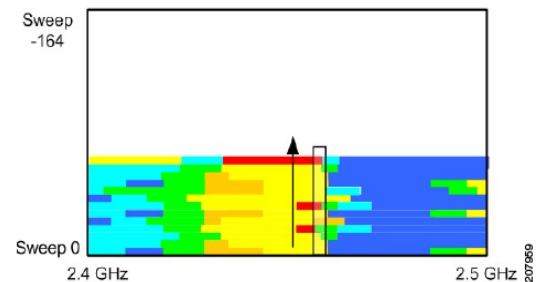


Time $T = 2$ In the next measurement interval (typically one second later), the previous measurement “slides up” one level, becoming sweep -1.

A new sweep, representing “now”, replaces it at the bottom, becoming the new sweep 0.



Time $T = n$ We continue, measurement interval after measurement interval, with older measurements of the RF power sliding up, and the latest “now” appearing at the bottom. By mentally visualizing a vertical “slice” of the graph, you can see how the power levels have changed at a selected frequency going back in time. (The UP arrow points from the present to the past.)



What If No Data Is Showing?

The section on “What If I’m Not Seeing Any Data?” discusses several potential reasons that you may see no data, or appear to be seeing no data, in Cisco Spectrum Expert Software. This section describes, in summary form, one particular issue unique to the spectrum plots: incorrect amplitude settings.

With spectrum plots, you may fail to see any data if the range of the amplitude setting, the lowest and highest power values shown on the plot, is inappropriate for the actual data being monitored. This can be a problem with any of the plots, but particularly with the **Swept Spectrogram**, 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.

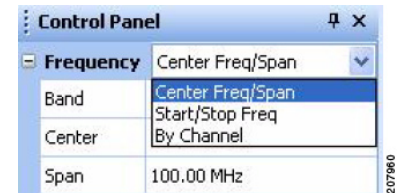
Selecting the [**Auto Scale**] option on these plots should normally correct this problem, but sometimes it helps to play manually with the measurement scale. See “[Amplitude](#)” for more information.

Spectrum Plot Controls

The plot **Control Panel** lets you fine-tune the data presented by the plots. Each plot has its own plot-appropriate controls. However, many of these controls are common to more than one plot. This section discusses the typical controls. The online help fills in additional plot-specific details.

Frequency and Bandwidth To Monitor

Several plots provide measurements of the RF power (average power, maximum power, and so on.) as a function of frequency. The RF frequencies are presented as a range across the horizontal axis. **Frequency** settings enable you to establish the range of X-axis. Even for the time-based plots, however, you can still set the band and/or channel that Cisco Spectrum Expert Software will monitor.



You can select the frequency to be monitored based on a **Center Frequency** and **Span**, based on a **Start/Stop** frequency, or based on specific **Channels**. You then use the **Band/Channel** drop-down menu to select a particular **Band** or **Channel** to monitor.

Once you have made a selection, the application automatically fills in default values for the **Center** frequency and **Span**, or the **Start** and **Stop** frequency. However, you can edit these default values.

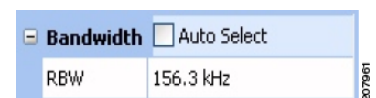
- If you change the default **Center** frequency and frequency **Span**, or the **Start** and **Stop** frequencies, you may no longer be plotting entirely in channel or in band. However, Cisco Spectrum Expert Software will NOT permit you to set frequencies that are outside the hardware capabilities of the Sensor card technology. In this sense, the technology is error proof.
- You can change the bands available here—that is, the bands shown on the **Frequency** menus—by changing the **Monitored Bands** settings (**Tools > Settings > Monitored Bands**). See “[Monitoring](#)” for more information.
- You can change the channels available here by changing your **Channel Settings** (**Tools > Settings > Channel Settings**). See “[Band and Channel Settings](#)” for more information.



Note

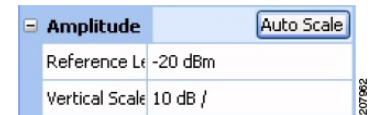
Cisco Spectrum Expert Software will only make available, for selection here, those channels which you have selected under **Channel Settings**, provided those channels also fall within the bands you have selected under **Monitored Bands**.

Bandwidth – The **Power vs. Frequency** plot also has a **Bandwidth** setting, which determines the size of each bin for RF power measurements. See “[Power vs. Frequency](#)” for more information.



Amplitude

Amplitude settings enable you to set the scale for the vertical axis. The exact measurements will depend on the type of measurement being made. For example, RF power measurements are in dBm, while duty cycle measurements are in percentages (since the duty cycle is typically defined as the percentage of time an RF signal is above some threshold value; or the percentage of time an RF signal is detected from a network device or interferer).

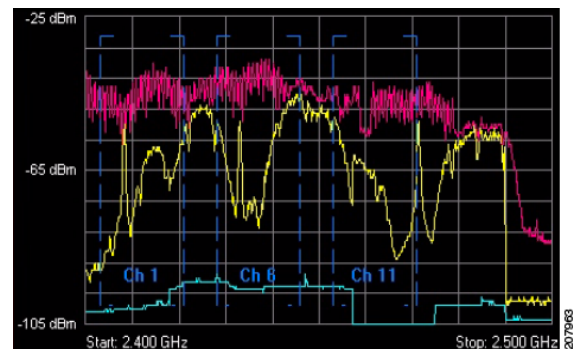


- **Reference Level** refers to the value at the top of the vertical axis.
- **Vertical Scale** refers to the change in value represented by each tic-mark on the vertical axis.

In general, the bottom of the scale is **Reference Level – (10 * Vertical Scale)**.

Example: If the **Reference Level** is -25 dBm, and the **Vertical Scale** is set to 5 dBm, then the top of the scale is -25 dBm, while the bottom of the scale is $-25 \text{ dBm} - (10 * 5 \text{ dBm}) = -75 \text{ dBm}$.

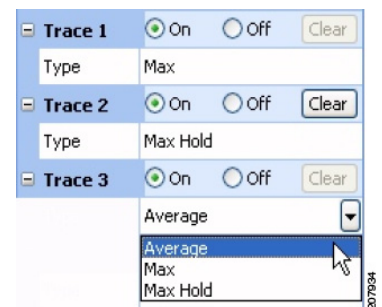
Auto Scale – If you select **[Auto Scale]** the application automatically selects the optimum calibration for the vertical scale, based on recent power measurements.



Trace Settings

A **Trace** is the line which actually plots the RF data of interest.

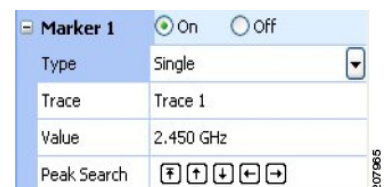
- You must select the **On** radio button for at least one **Trace**, in order to see any data at all.
- For some plots, you can have more than one **Trace**, and you can select the type of data each trace displays (such as **Average** RF power, **Maximum** RF power, **Max Hold** RF power, **Max – 5 Sweeps**, and so on.). The Online Help describes these options in detail.
- **Max Hold** maintains a display of the highest RF power measured since you began the current session. The **[Clear]** button deletes the **Max Hold Trace**, and starts a new maximum power trace, starting from the moment when **[Clear]** is selected.



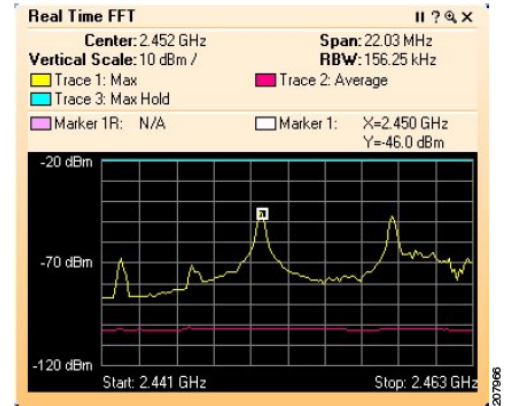
Markers

A marker is a small icon on the plot which “rides” the graph at a particular point along the X-axis, in other words, at a particular frequency. The marker moves up and down according to the movement of the graph at that fixed point. The marker is the small red box riding the bottom trace in the plot shown here:

- **On / Off**—Indicates whether the marker is on or off, that is, in use at all.



- **Type**—A **Single** marker is just that, one marker that “rides” the trace. If you select **Delta**, you will initially still see a single marker on the plot. However—with a quick “mouse hand”—you can grab the marker with your mouse pointer (click and hold on the marker), and slide the marker to a second location on the plot. You now have two markers riding the trace, so that you can see the difference in behavior between two different frequencies.
- **Trace**—For plots that allow more than one trace, use the drop-down list box to select which of the traces the marker will ride.
- **Value** – Indicates where along the X-axis (the frequency or time axis) the marker should ride the plot.



Moving The Marker With The Mouse—You can indicate the frequency value using the Value text box. However, once the marker is visible on screen, you can grab the marker (click and hold the left mouse button), and drag the marker to a new location (a new frequency or time).

Peak Search—With the marker **Peak Search** mode, the plot is continually updated with the value of the peak marker as the spectrum plot is traced to identify the peak during each cycle. This feature is selectable for both **Single** and **Delta** markers and works with RTFFT, FFT Duty Cycle, and PvF spectrum plot functions. **Peak Search** is selectable for the highest peak, next peak up, next peak down, next peak left, and next peak right.

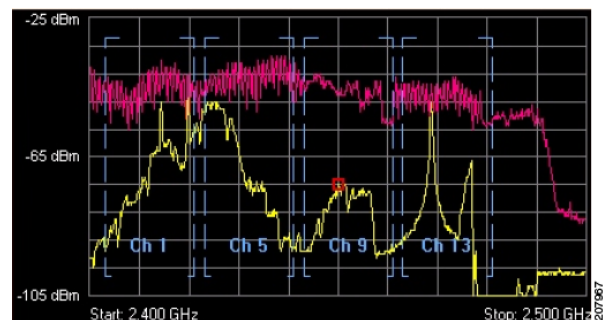
- Highest Peak
- Next Peak Up
- Next Peak Down
- Next Peak Left
- Next Peak Right

Setting The X-Axis Position of Delta Markers

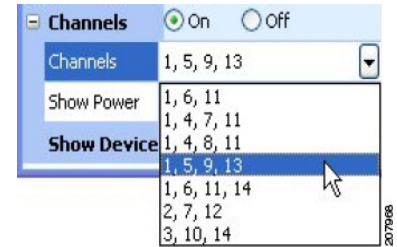
For more extensive instructions on setting the X-axis position of dual markers, see the Cisco Spectrum Expert Online Help, in particular the topic *Setting Marker Positions*.

Channels

Some of the spectrum plots use frequency values on the horizontal axis. On these plots you have, as an option, the ability to superimpose bracketed indicators of channels.



You can turn the display **On** or **Off** using the **Channels** radio buttons. The channels shown will be the ones appropriate for the band you are currently monitoring, taking into account any **Regulatory Domains** you have selected under **Channel Settings**. See “[Band and Channel Settings](#)” for more information.



Show Devices—The **On** and **Off** radio buttons allow you to enable or disable the display of devices associated with each channel as you mouse over the frequency trace in a plot.

**Note**

Even if you turn on the **Channels** indicators, they will only be shown if fully within the span of the plot.

Other Plot Control Panel Settings

Power vs. Time

The **Power Vs. Time** plot is used to display short burst of RF activity, known as pulses.

- **Sweep Time**—This sets the time scale over which pulse activity is measured. Specifically, it sets the range of the X-axis, which will run from a low value of **–Sweep Time** up to the present. You can use the spin control to change the setting, or type in a value directly. Type “**ms**” for microseconds and “**us**” for milliseconds. For example: **150 us**.

The plot also has a specialized **Bandwidth** setting:

- **RBW**—Determines the span of the spectrum monitored for power. This works in conjunction with the **Center Frequency** setting for the same plot. The low end of the monitored band is **Center Frequency – RBW/2**, and the high end is **Center Frequency + RBW/2**.

**Note**

This is not the same definition for **RBW** that applies for the **Power vs. Frequency** plot (discussed below), where **RBW** sets the bin size for the X-axis.

The **Power vs. Time** plot also has a series of **Trigger** settings. **Trigger** criteria determine both what kinds of RF pulses are displayed, and when the display is updated.

- **Trigger Type**—This determines when the plot is updated.
- **Free Run**—RF energy (in your selected bandwidth) is sampled on a continuous basis, and data is “dumped” to the screen as it is available. This means the display is updated on a nearly constant basis, and data is shown whether or not any RF pulses are detected.
- **Single**—This catches a single pulse only. The display is only updated when an RF pulse is detected which matches your **Trigger Threshold** criteria (discussed below). If you select **Single**, you must then click on **[Arm]** (discussed below).
- Once such a pulse event is detected, it is displayed on the plot, and the plot is then frozen – no further activity is displayed. To catch any further pulses, you click again on **[Arm]**.
- **Continuous**—The plot is only updated when Cisco Spectrum Expert Software detects RF pulses which match your **Trigger Threshold** criteria. However, after detecting a pulse, the plot automatically “re-arms” itself, meaning every time a new pulse comes along, the plot is updated with new data. (Once again, of course, the pulses are only shown if they also fall within the bandwidth you have indicated, using the options above.)

- **[Arm]**—If you have selected a **Trigger Type** of **Single**, select **[Arm]** to tell the Cisco Spectrum Expert Software to be on the lookout for the next pulse that comes along.
- **Trigger Threshold**—This indicates the minimum power that an RF pulse must attain in order to register as a pulse, for purposes of this plot. In order to be counted as a pulse at all, for purposes of this plot, an RF pulse must exceed the amount of power you indicate here. Units are in dBm, where 0 dBm is equivalent to 1 milliwatt.

For example, if you indicate -10 dBm, then a pulse which reaches -5 dBm will be displayed, while a pulse whose maximum power is only -12 dBm will not be displayed.

**Note**

Once the trigger line is shown on screen (as a white horizontal line), you can also change the setting by clicking-and-holding on the line with the mouse, and dragging it up or down. The current **Threshold** is displayed on the plot, just above the line.

- **Trigger Delay**—This adjusts the centering of a pulse on your display. The default value is 0, and with this setting the beginning of an RF pulse is always centered on the midline of the time axis. If you set this to a positive value, the beginning of the RF pulse is offset to the left. If you set this to a negative value, the beginning of the pulse is offset to the right.
- **Power Vs. Frequency Plot Bandwidth**—The **Power vs. Frequency** plot has a **Bandwidth** setting, which determines the size of each bin for RF power measurements. A "bin" is the smallest span of spectrum for which power measurements are displayed.
- **Auto Select**—If you select this check box, Cisco Spectrum Expert Software automatically picks the optimum bin size. The value selected by the application will vary depending on the total bandwidth you choose to measure (using the **Frequency** settings).
- **RBW**—**RBW** stands for resolution bandwidth. Effectively, the bin sizes for RF power measurements will be just slightly larger than the value that you enter here. (So, for example, if you enter 60 kHz, your bins will be roughly 70 to 90 kHz wide.) You can only enter a value here if you first unselect the **Auto Select** check box.

**Note**

This is *not* the same definition for **RBW** that applies for the **Power vs. Time** plot (discussed above), where **RBW** sets the size of the total bandwidth being monitored.

When you enter a value for **RBW** for the **Power vs. Frequency** plot, Cisco Spectrum Expert Software may auto-adjust your entry to the nearest valid value. The formal definition of **RBW** is the 3 dB bandwidth of the spectrum analyzer detection filter. The **RBW** determines the minimum frequency spacing that is allowed between two pure frequencies, in order for the frequencies to actually be distinguished as separate signals.

Example: If **RBW** is set to 70 kHz, then two signals which are separated by only 60 kHz in frequency will appear as one signal, with a combined power measurement for both signals.

- **Total Number of Bins**—The total number of bins is approximately the **Span** being monitored divided by the **RBW**.

For example, if a 100 MHz span of the spectrum is being viewed—and if that span is divided into bins of 2 MHz in size—then the plot displays 50 separate power readings, indicating the power detected in each separate 2 MHz bin.



Note The minimum number of bins is never less than 16, and the maximum number of bins on the plot is at most 1024. If you try to establish settings for the **Span** and **RBW** which would cause higher or lower bin values, Cisco Spectrum Expert Software will auto-adjust the **RBW** or **Span** setting to bring the number of bins within the allowed range.

The **Power Vs. Frequency** plot also has a series of **Trigger** settings, similar to those for **Power Vs. Time**:

- **Trigger Type**—This determines when the plot is updated. Use the drop-down list box to select one of the three options.
 - **Free Run**—RF energy (in your selected bandwidth) is sampled on a continuous basis, and data is “dumped” to the screen as it is available.
 - **Single**—The display is only updated when RF energy is detected which matches your **Trigger Threshold** criteria (discussed below). If you select **Single**, you must then click on **[Arm]** (discussed below).
 - Once such RF energy is detected, it is displayed on the plot, and the plot is then frozen – no further activity is displayed. To catch any further activity, you click again on **[Arm]**.
 - **Continuous**—The plot is only updated when Cisco Spectrum Expert Software detects RF energy which matches your **Trigger Threshold** criteria. However, the plot automatically



“re-arms” itself, meaning every time an RF energy comes along which exceeds the **Trigger Threshold**, the plot is updated with new data.

- **[Arm]**—If you have selected a **Trigger Type** of **Single**, select **[Arm]** to tell the Cisco Spectrum Expert Software to be on the lookout for the RF energy which exceeds your **Trigger Threshold**.
- **Trigger Threshold**—This indicates the minimum RF power must be seen in order to update the plot. Units are in dBm, where 0 dBm is equivalent to 1 milliwatt.

For example, if you indicate -10 dBm, then RF energy which reaches -5 dBm will cause the display to be updated, while RF energy below -10 dBm does not result in any update.



Note **Using The Mouse**—Once the trigger line is shown on screen (as a white horizontal line), you can also change the setting by clicking-and-holding on the line with the mouse, and dragging it up or down. The current **Threshold** is displayed on the plot, just above the line.

Swept Spectrogram

The **Swept Spectrogram** plot uses colors to represent RF power levels. The Color Scale options enable you to map the “highest color” and “lowest color” to specific power levels.

Here, the color **Blue** has been mapped to -110 dBm, while **Red** has been mapped to -30 dBm.

Values below the minimum value (-110 dBm, in this case) are automatically mapped to **Purple**, while values above the maximum value (-30 dBm here) are automatically mapped to

Color Scale		Auto Scale
Maximum	-30 dBm	
Minimum	-110 dBm	

**Note**

Color Scale Visibility: For the **Swept Spectrogram**, the color scale is only visible when there is enough room to display it on screen. Depending on how many plots you have open, and on your display monitor resolution, you may need to close some plots to see the color scale.

[**Auto Scale**] serves the same purpose as elsewhere – it chooses appropriate upper- and lower-values based on recent power measurements.

FFT Duty Cycle Plot

For the **FFT Duty Cycle** plot, the scale of the Y-axis is based on a **Maximum** and **Minimum**, where (typically) the **Maximum** would be 100%, and the **Minimum** would be 0%.

