# Chanalyzer Lab

metageek

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spectrum analysis software

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# Control Your Wi-Spy

Chanalyzer Lab allows the user to manually configure all of the Wi-Spy's settings, including the ability to manually specify frequency range, step size, and span. Users can also create and save custom configurations, view duty cycles at any frequency, and create frequency and amplitude markers.

# What is a Wi-Spy?

A Wi-Spy is a portable USB spectrum analyzer, similar to a cable tester, but for wireless applications. It displays all radio energy in a frequency range, such as the 915 MHz, 2.4 GHz, or 5 GHz public spectrum. Unlike a Wi-Fi card, the Wi-Spy is a fine-tuned piece of hardware that shows non-Wi-Fi activity emanating from devices like microwave ovens, automation systems, bluetooth, cordless phones, wireless security cameras, or anything else operating wirelessly in those frequencies.  It also helps users determine a viable channel for network communications.

# What is Chanalyzer Lab?

Chanalyzer Lab turns data collected from a Wi-Spy into colorful graphs that will help users determine if they are experiencing interference. Live data is shown in the top pane, and a scrolling amplitude history called the "Waterfall View" is shown immediately below.

# System Requirements

- Wi-Spy 2.4x, Wi-Spy DBx, Wi-Spy 900x or Wi-Spy 950x hardware
- Microsoft® Windows 7, Vista, or XP (SP3) (64 and 32-bit)
- Microsoft® .Net 3.5 framework (or better)
- USB Port 1.1 (or better)

# Installation

**1) Download Chanalyzer Lab Software**

   http://www.metageek.net/products/chanalyzer-lab/download
   1. Open the downloaded file and double-click the installer.
   2. Follow the installer prompts.
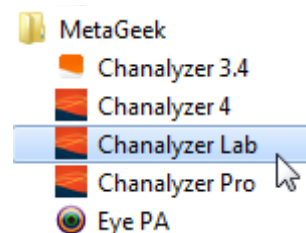
## 2) Run Chanalyzer Lab

Click on the start menu to access the "MetaGeek" directory.

Click **Start --> All Programs > MetaGeek**.

Select **Chanalyzer Lab** to launch the software.

## 3) Plug in a Wi-Spy

Chanalyzer Lab requires a Wi-Spy 2.4x, Wi-Spy DBx, Wi-Spy 900x or Wi-Spy 950x USB Spectrum Analyzer. You can remove a Wi-Spy from a USB port at any time without ejecting.

# Navigation

Chanalyzer Lab provides controls for browsing Wi-Spy sessions or recordings.

## Timeframe Navigation

To move to a specific position within the session, click-and-drag the playhead along the time bar.  You can also click-and-drag the highlighted slider region to easily adjust the timespan shown in the Waterfall view. Timespan adjustments allow users to narrow-in on anomalies and moments in time. The playback buttons are used to Play, Pause, Rewind, and Fast Forward while viewing a capture. The up and down arrows in the playback controls can also aid in selecting smaller time spans in the waterfall navigation.
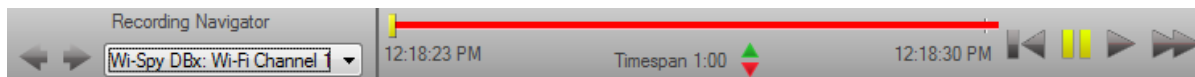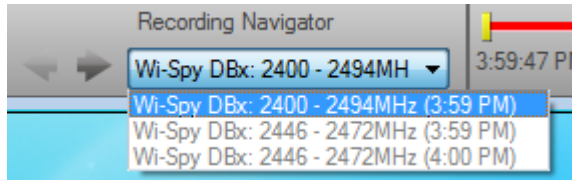
## Device Selector

Chanalyzer Lab continuously logs data from multiple sources when connected to your computer. When more than one Wi-Spy is connected to the computer at the same time, a "Device Selector" dropdown box will appear in the lower left corner of the Chanalyzer Lab window. The top most device in this list will be whichever Wi-Spy you plugged in first. With a Wi-Spy 2.4x and Wi-Spy DBx both connected, you can record both the 2.4 and 5 GHz spectrums simultaneously.
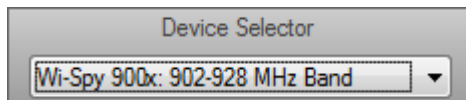
## Recording Navigator

Each time a user selects a new frequency range in the Wi-Spy configuration menu, the previous data will be saved as a session in the recording before the application switches to a new range.  All previous session data will be available to view after you've saved and re-opened the recording.

When opening a recording in Chanalyzer Lab, the Sessions are selected from the dropdown menu in the lower left corner.



## Active Session Navigator

The Active Session is displayed in the dropdown Recording Navigator. When multiple Wi-Spy devices are connected, Chanalyzer Lab can simultaneously log the 915 MHz, 2.4 GHz, and 5 GHz spectrums; simply select the DBx from the Recording Navigator, then the "Full 5 GHz Band" option from the **Wi-Spy** menu.

# Overview Pane

This pane, located in the top of the display window, contains the Waterfall and Density views. The Density View displays how often a signal is detected at a specific amplitude. After a short time of gathering data, patterns begin to emerge in the Density View.

A density map view enables the user to quickly identify packet-based and analog patterns that may be interfering with your network.
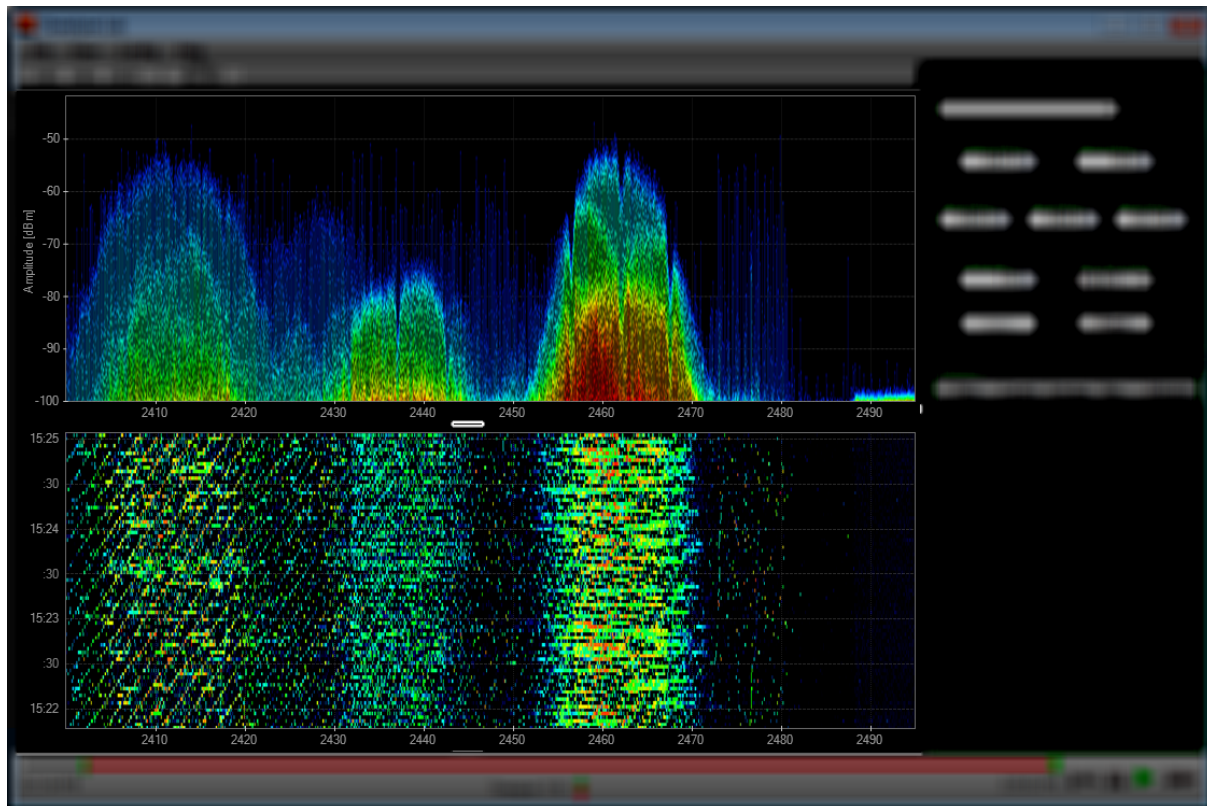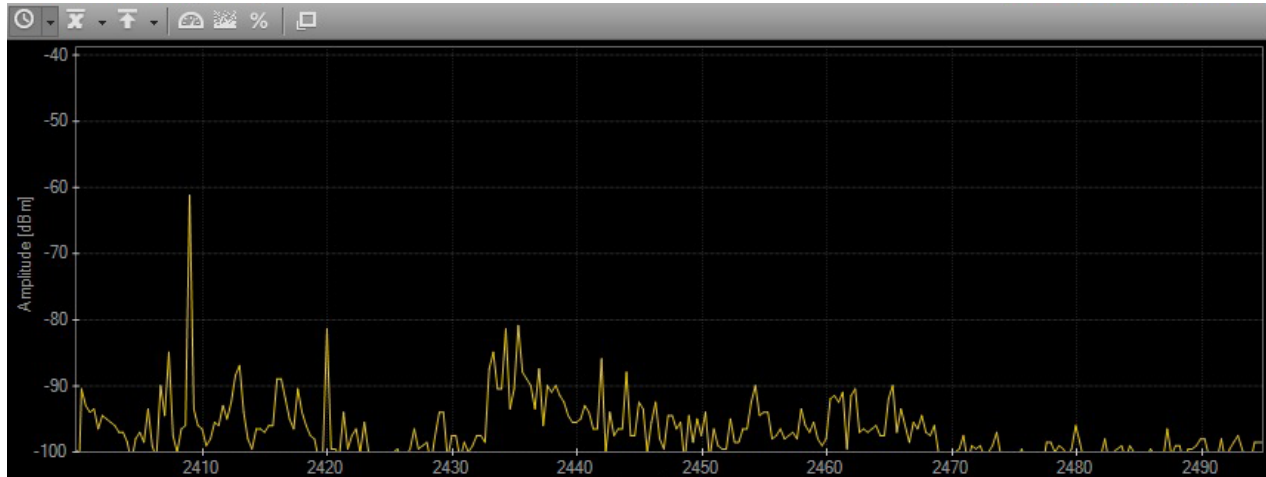


## Display Options

The Density View has several view options. All of the display options can be toggled on and off as needed. These options are shown as buttons under the FILE menu. Hover over each icon with your mouse and a tool-tip description will appear. Users can employ any combination of these options to troubleshoot more efficiently.

## Current

The current display option represents the received values at the most recent reading in the time span. By default this will be real-time unless the user has changed the time span settings to previously captured data.
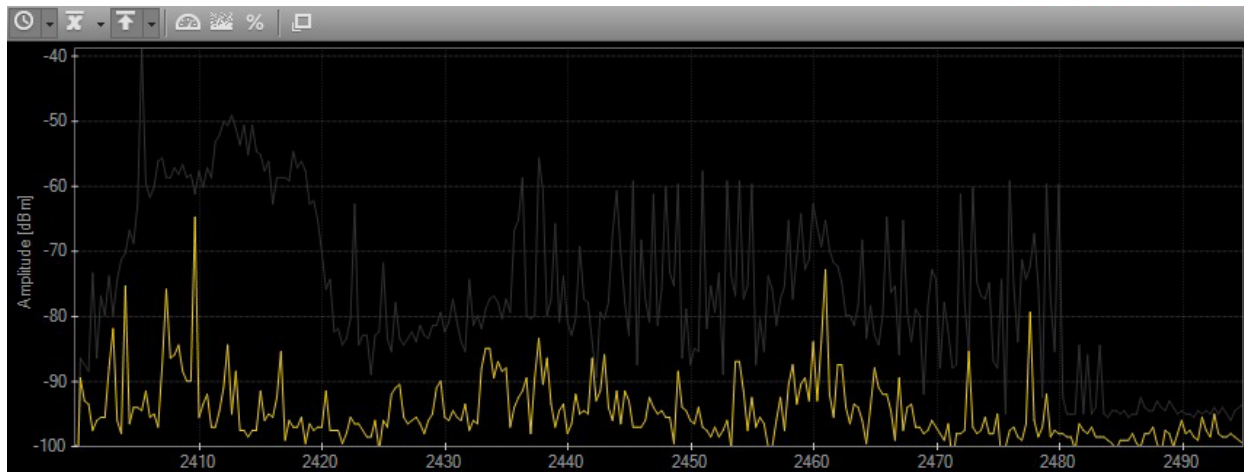


## Average

The average display option represents the average of the received spectrum activity in the selected time span. For example, if the time span is 1 minute, the average will be calculated in the rolling 1 minute.
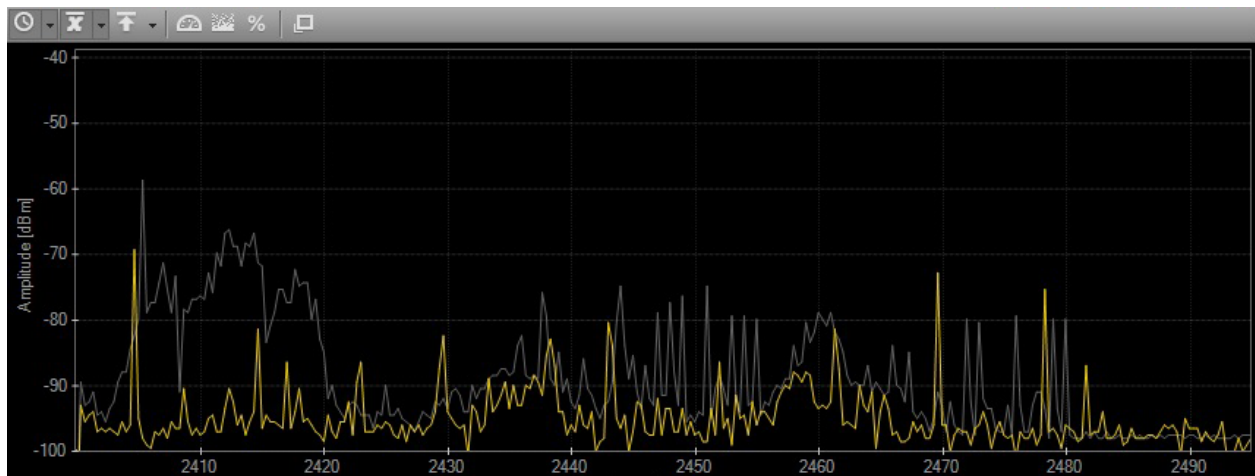
## Max

The maximum display option represents the maximum values received from the Wi-Spy across the band in the selected time span.



## Color by Amplitude

Chanalyzer Lab creates a density map of the most used frequency amplitude points in the selected time span. The less trafficked frequency points appear more transparent, while high-use frequencies appear more bright or intense.

Chanalyzer Lab uses color to represent amplitude height. Reds indicate higher amplitude and dark blues represent lower amplitudes.
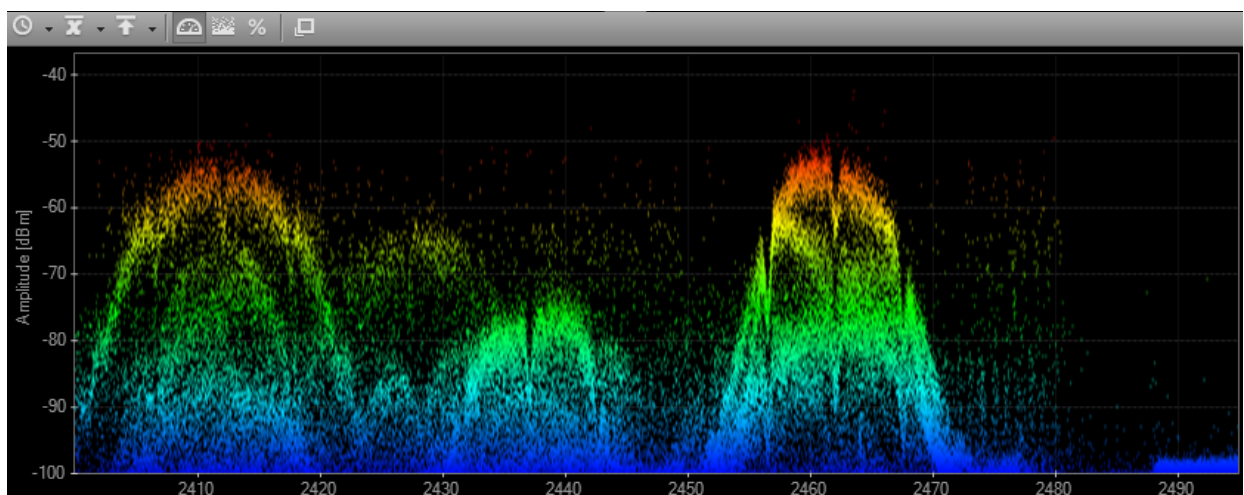
## Color by Density

The more often a signal is detected at a specific amplitude and frequency, the brighter the point on the graph becomes. High density signals are represented by red, and low density signals are represented by dark blue.
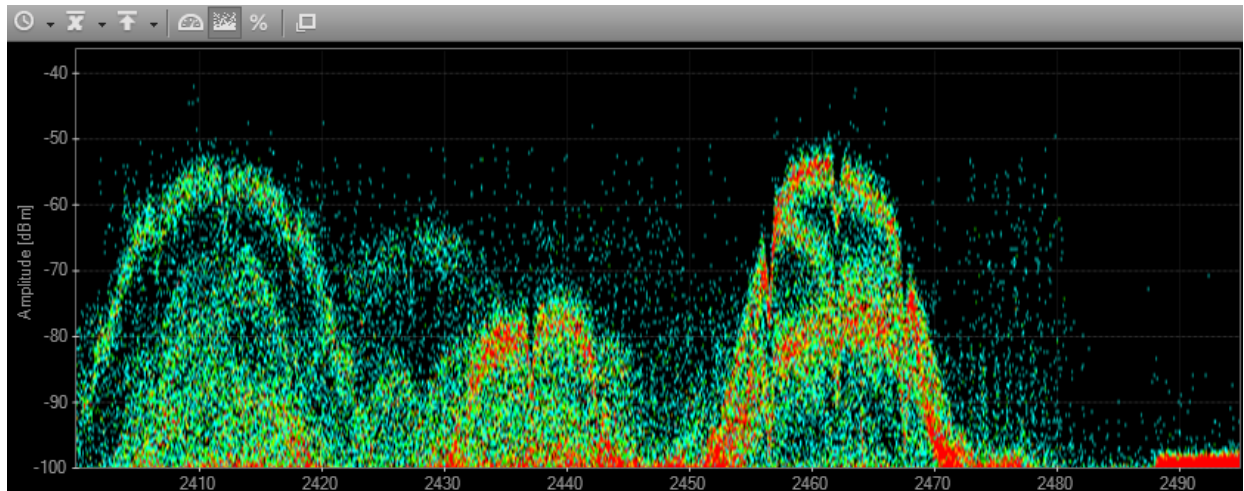


## Color by Utilization

This view emphasizes how constant noise is across the spectrum. At any given point, Chanalyzer Lab assigns a color based on how much of the energy in a range of time is above that point. If 50% of all the activity is above an amplitude point, Chanalyzer Lab colors it red. This display option is especially useful in understanding how constant interference is within a given range of time.
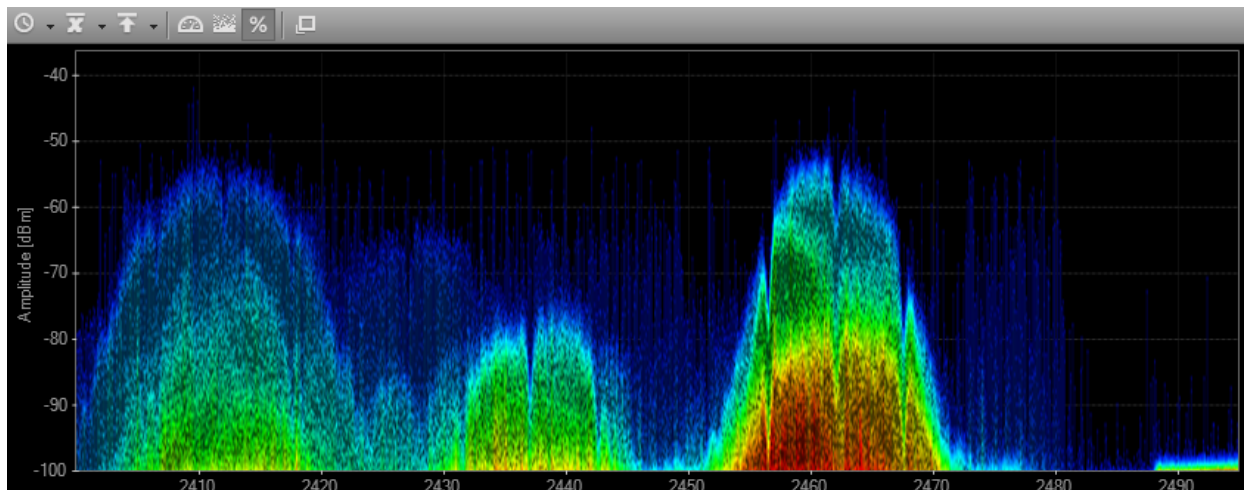
## Inspector

This creates a hovering box above the cursor that displays specific numbers regarding a particular frequency amplitude point.
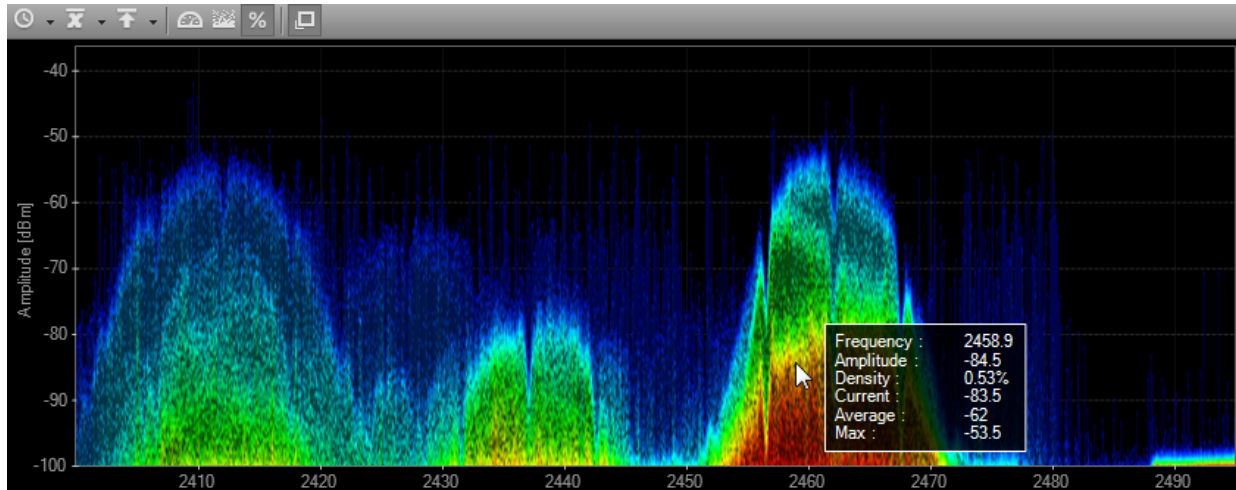


## Waterfall View

This view graphs amplitude over time for each frequency in the selected ISM band. The Waterfall View uses a color scale to represent amplitude levels– low are dark blues, while high amplitudes are bright red.  This emphasizes instances where wireless devices like cordless phones or microwaves may have changed the spectrum.  For example, when a microwave is started or a cordless phone changes channels, it is very noticeable in the Waterfall View.
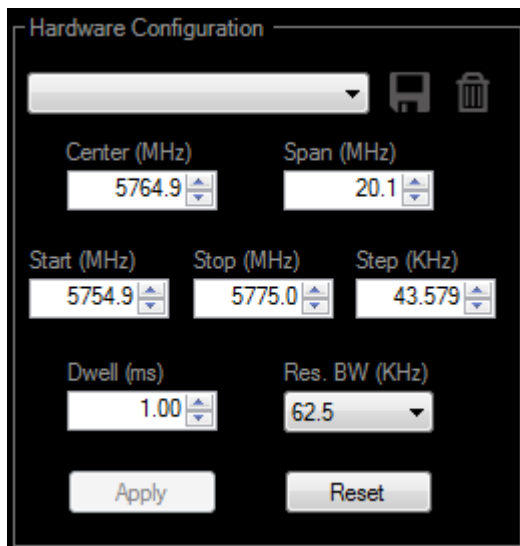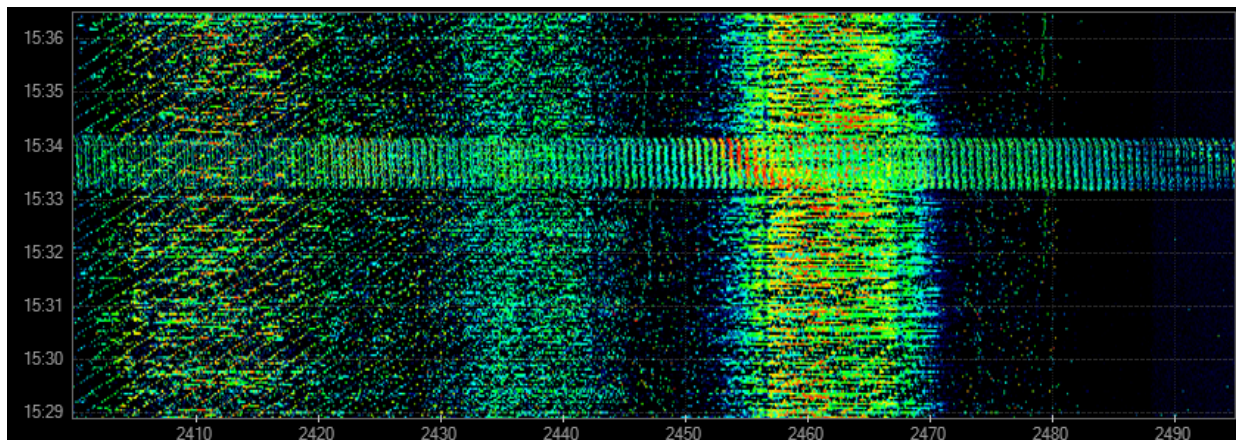
# Wi-Spy Configuration Settings

The Chanalyzer Lab software operates similar to a DVR. It will automatically save all of the Wi-Spy data it has seen since the program was initialized.

If the user changes frequency range, the old data will be stored into a session within the Wi-Spy capture if you select SAVE before switching to a new frequency range.  When opening a previously saved recording with multiple sessions, the user will navigate between them using the **Recordings Navigator** in the bottom left corner.

There are two methods to change the start and stop frequencies displayed in Chanalyzer Lab. Click and drag the mouse across the frequency range you would like to view in high resolution or use the pre-defined Wi-Spy configurations in the main menu under **Wi-Spy**.
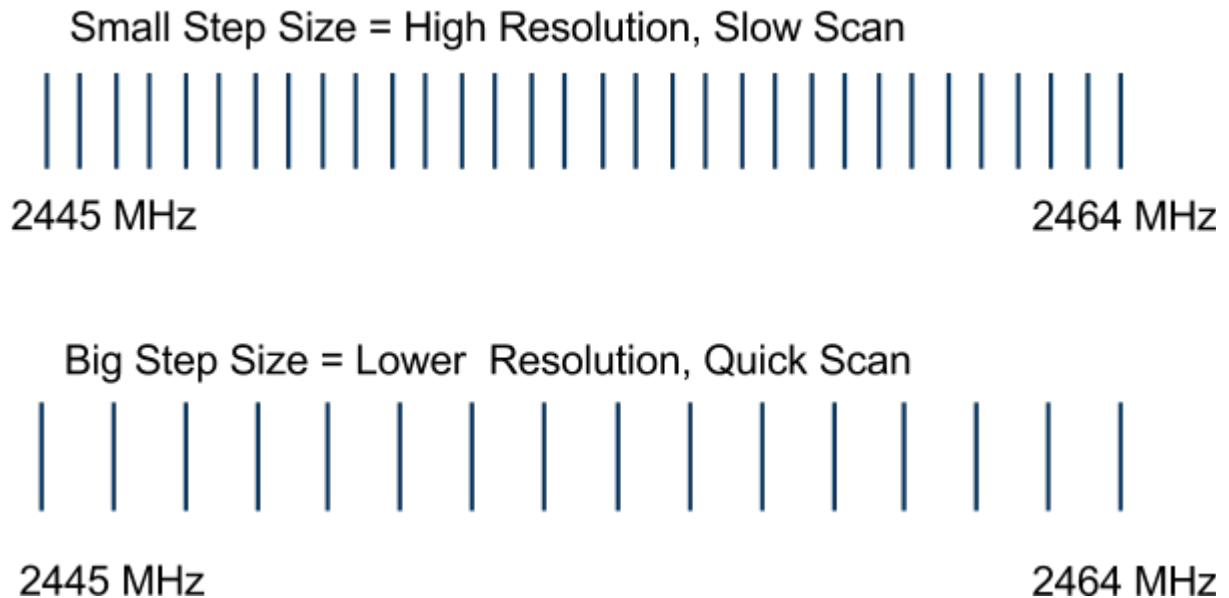
**Manual Hardware Configuration**



There are two methods in manually selecting the frequency range for the Wi-Spy configuration. You can enter a center frequency and select the frequency span or step width.  For example, if you entered 5775 into the Center Field and 20 for the span it would leave 10 MHz on both sides of the center frequency.  Alternatively, you can enter the start and stop frequencies.  The Step Size and the Span are configured to automatically display at least 10 data points.

**Step Size**

The step size defines the resolution displayed in the overview pane. To adjust the resolution, increase or decrease the step size. A small step size will create a high resolution capture but it will increase the length of time it takes to finish a sweep. A large step size will lower the resolution but will decrease the sweep time.

The default settings are optimized for both speed and resolution.

Small Step Size = High Resolution, Slow Scan

|||||||||||||||||||||||||||||||||||

2445 MHz                                                2464 MHz

Big Step Size = Lower  Resolution, Quick Scan

| | | | | | | | | | | | | | | | | |

2445 MHz                                                2464 MHz

**Dwell Time**

To control the amount of time the Wi-Spy spends at each step, increase or decrease the value in the Dwell field.

## Resolution Bandwidth

Resolution Bandwidth is closely tied to the step size of the spectrum analyzer. The filter bandwidth resolution determines how wide the spectrum analyzer will listen at each step. If the resolution bandwidth is the same width as the step size, some transmissions will be omitted from the capture.  By default, Chanalyzer Lab will keep the resolution bandwidth to 125% of the step size.
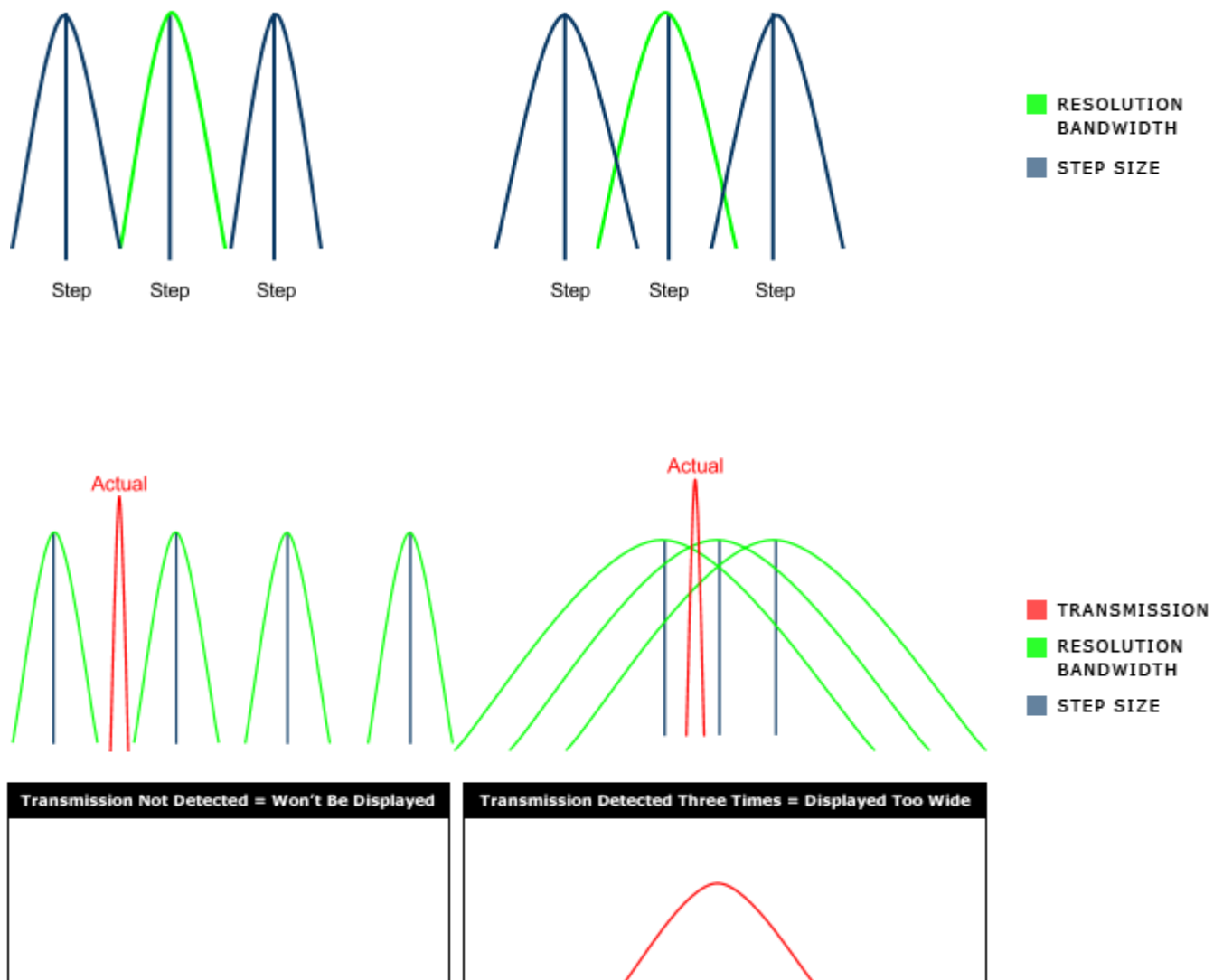
## Click-and-Drag Wi-Spy Configuration

To view a higher resolution of a smaller frequency range, click, hold down the mouse button, and drag across to highlight range you would like to view. Upon releasing the mouse button a contextual menu will appear, that will give you the option to click "Zoom". Chanalyzer Lab will then store the previous data in another session and start a new one. You can view it at any time by clicking on the session navigator.
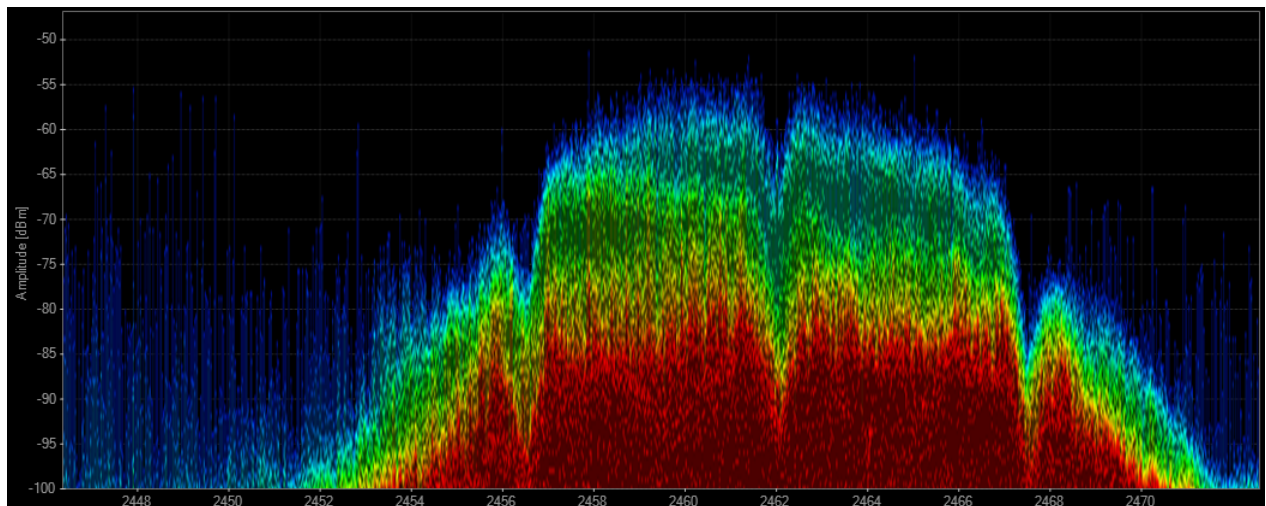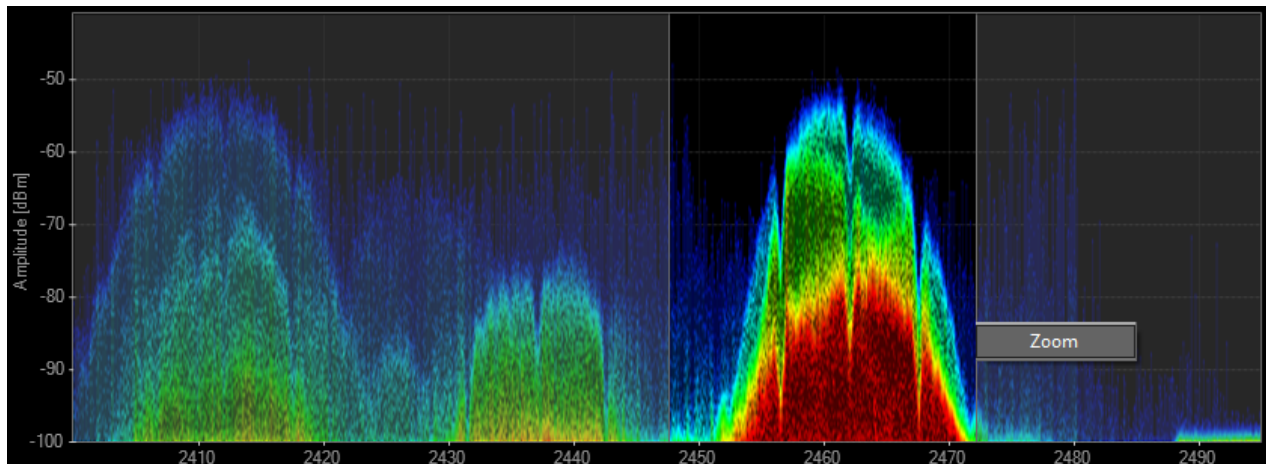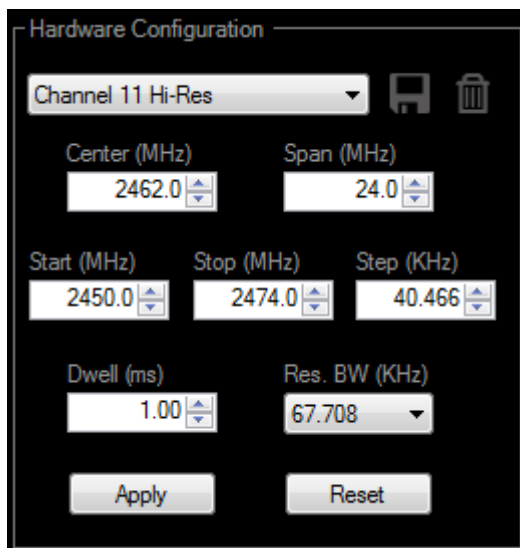
## Wi-Spy Configuration Presets

There are two locations to choose frequency presets. In the Hardware Configuration Panel in the top right, the user can select from the default presets as well as their own custom configurations
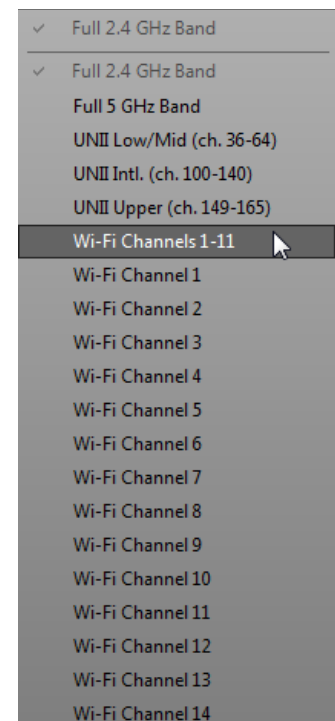
### Custom Configurations

Users can save configuration presets that are quickly accessible from the drop down menu. Once the configuration has been applied, the drop down will appear empty. To save the configuration click the **SAVE** disk icon. Give the preset a name, and it will appear in the drop down.

To remove a preset, select it from the drop down menu and click the trash can.
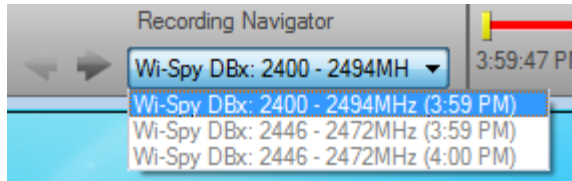
### File Menu Configurations

Chanalyzer includes pre-defined zoom settings that have been optimized for speed and resolution. Access these shortcuts in the top main menu under **Wi-Spy.** Choose the Wi-Fi channel range you would like to monitor.

## View a Previous Capture

Since Chanalyzer Lab continuously logs all spectrum data, configurations and settings are stored in a unique session recording before it switches to a newly selected configuration. This data can be viewed at any time by saving and reopening the saved file.  However, if you exit the application without saving, all the previous session data will be lost and no longer viewable.

Viewing a previous capture will interrupt the current live capture session.  Also, when viewing previous captures, use the Recording Navigator feature which will display all available recordings.



## Return to Previous Wi-Spy Settings

Chanalyzer Lab saves the most recently used Wi-Spy configurations in the main-menu. To return to a previous setting, use the main menu **Wi-Spy** option to return the previous setting.
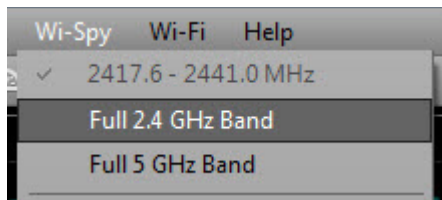
# Markers

Chanalyzer Lab can measure current, average and maximum values for specific frequencies selected by the user.  To create a marker right click in the overview pane and select "Create New Frequency Marker."
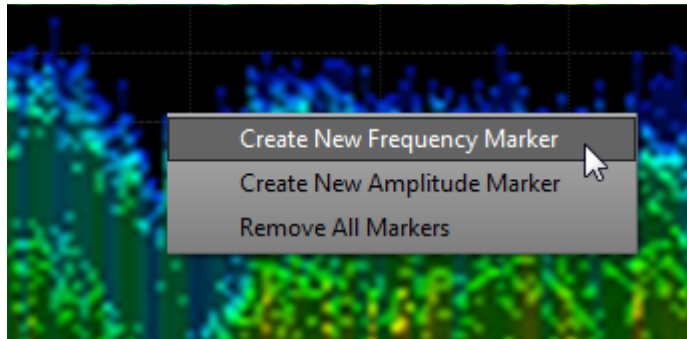


Chanalyzer Lab will build a table on the right-hand side where it will measure the current average and max for each frequency. These values are dependent on the time span selected.



| | Freq | Current | Average | Max | Utilization |
|---|---|---|---|---|---|
| 🟥 | 2461.8 | -62.0 | -67.5 | -60.0 | 38.30% |
| 🟧 | 2456.5 | -81.0 | -78.5 | -71.0 | 36.17% |
| 🟨 | 2467.3 | -101.5 | -85.5 | -79.5 | 2.13% |

# Export to CSV

To export the raw values in the selected time span, use the file menu and select "Export As" and then select "CSV." This will export the time span currently in display. If you wish to export the entire session capture, adjust the time span to the beginning and end of the capture.
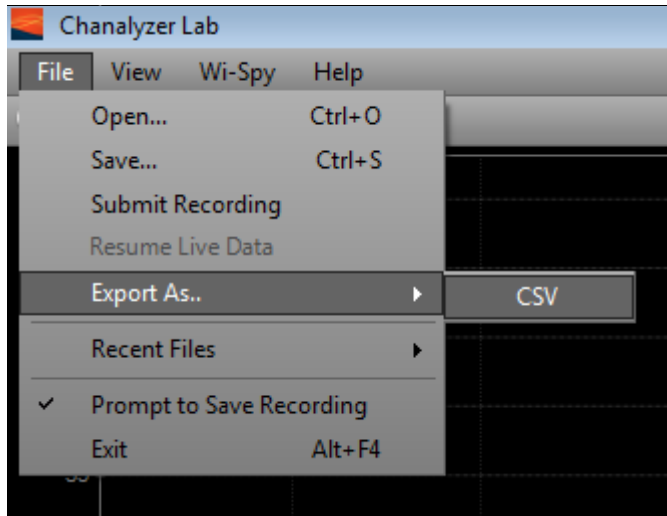


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