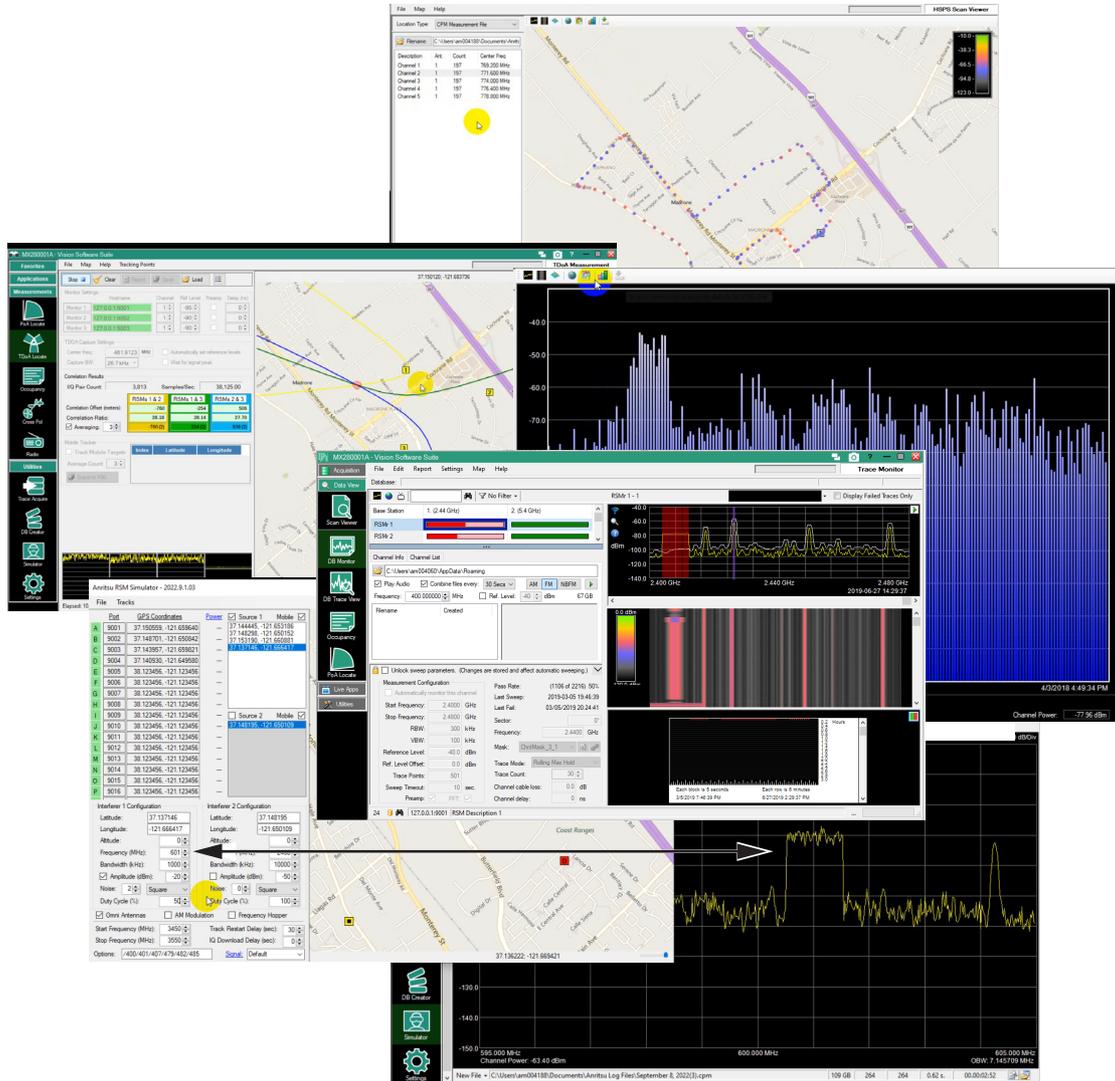


User Guide

Vision™ MX280001A Remote Spectrum Monitor Software



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Chapter 1 — General Information

1-1 Introduction

Vision™ is a software application suite that runs on a PC/laptop using the Windows operating system. The Vision software monitor and Vision locate features enable the identification and removal of interference signals that degrade network capacity.

Vision includes accumulating historical spectral data to inform spectrum policy, satellite reception interference detection, and monitoring for illegal use of spectrum. Once an interference signal is identified, Vision uses various algorithms to geo-locate the position of the signal of interest.

The Vision software platform works with the Spectrum Analyzers with their options shown in [Table 1-2](#) to automate the process of collecting measurement data. For a brief description of the application options, see [“Vision Program Overview” on page 1-4](#).

Additional Documentation

This Vision User Guide is part of a set of manuals that describe remote spectrum analyzer functions and their use with Vision. The various instrument types and documentation are listed [Table 1-1](#), and are covered in the user manuals for your model. Refer to instrument product page for more information.

Table 1-1. Additional Documentation

Document Part Number	Description
10580-00435	MX280001A Vision Programming Manual
10100-00064	MS27x0xA Important Product Information, Compliance, and Safety Guide
10580-00419	MS2710xA Remote Spectrum Monitor User Guide
10580-00420	MS2710xA Maintenance Manual
11410-00898	MS27100A Spectrum Monitor Module Technical Data Sheet
11410-00853	MS27101A Indoor Remote Spectrum Monitor Technical Data Sheet
11410-00847	MS27102A Outdoor Remote Spectrum Monitor Technical Data Sheet
11410-00854	MS27103A Remote Spectrum Monitor Technical Data Sheet
10580-00480	MS27201A Remote Spectrum Monitor User Guide
10580-00481	MS27201A Remote Spectrum Monitor Programming Manual
10580-00482	MS27201A Remote Spectrum Monitor Maintenance Manual
11410-02833	MS27201A Remote Spectrum Monitor Technical Data Sheet
10100-00069	MS2090A Important Product Information, Compliance, and Safety Guide
10580-00444	MS2090A Field Master Pro, Spectrum Analyzer User Guide
11410-01000	MS2090A Field Master Pro Technical Data Sheet
10580-00428	SpectraVision User Guide

Document Conventions

The following conventions are used throughout the MX280001A documentation set.

Terms

Throughout this user guide, the term "Spectrum Analyzer" is used to represent all Anritsu instruments that support the MX280001A Vision software. This includes all Remote Spectrum Monitors, MS2090A Field Master Pro, MS2080A Field Master and MS2089A Site Master instruments installed with Options 400, 401 and 407.

Dialogs

The Vision dialogs examples displayed in this User Guide are common for all Anritsu spectrum analyzers.

Instrument and Options

The available instrument and Vision enabled options are listed in [Table 1-2](#).

Table 1-2. Instrument and Vision Enabled Options

Model	Option/Description
MS2710xA	MS2710xA-0400 Enable Vision Monitor ^a MS2710xA-0401 Enable Vision Locate (requires Option 400) MS2710xA-0407 Enable Vision High-Speed Port Scanner MS2710xA-0486 Vision Coverage Mapping (requires Option 407)
MS27201A	MS27201A-0400 Enable Vision Monitor MS27201A-0401 Enable Vision Locate (requires Option 400) MS27201A-0407 Enable Vision High-Speed Port Scanner
MS27200A	MS27200A-0400 Vision Monitor Enabled MS27200A-0401 Enable Vision Locate (requires Option 400) MS27200A-0407 Enable Vision High-Speed Port Scanner
MS2090A	MS2090A-0400 Enable Vision Monitor MS2090A-0401 Enable Vision Locate (requires Option 400) MS2090A-0407 Enable Vision High-Speed Port Scanner
MS2080A	MS2080A-0400 Enable Vision Monitor MS2080A-0407 Enable Vision High-Speed Port Scanner
MS2089A	MS2089A-0400 Enable Vision Monitor MS2089A-0407 Enable Vision High-Speed Port Scanner

a. Option 400, Enable Vision Monitor, now includes the measurements that were formally offered in Option 479, Vision AM Demodulation/FM Deviation, and Option 485, Vision Spectrum Occupancy.

Frequency Settings

When using the Vision programs and setting frequency parameters, the maximum frequency setting Vision provides is the maximum allowed on the measuring instrument up to 54 GHz. Vision does not verify the maximum input frequency range of the measuring instrument.

1-2 Vision Software Remote Monitoring Description

Vision software provides signal measurement data in a variety of formats including real-time spectrum trace data, spectrograms, tables and plots. In addition to interference detection, spectrum monitoring is also used to identify the types of signals present in the environment, characterize signal quality, and continuously scan frequency channels for signal activity. The Vision software application features include:

- Multiple monitor management
- Spectrum history accumulation
- Threshold setting, alarm generation, email alerts
- Searchable database
- Automated report generation
- Geo-location for interference View real-time signal activity throughout network

Also included in this user guide:

- Vision software installation instructions
- Exercises that illustrate the use of vision

- Vision simulator program
- Geo-map creation
- Occupancy report generator
- IQ capture and IQ file converter
- Play AM/FM demodulated signals
- TDoA stand-alone application

1-3 Vision Program Overview

The Vision program provides a set of robust signal interferer monitoring menus to monitor, track, identify, capture, and record signal interference. Signal monitoring is also performed by setting masks and limit lines set at selected power levels to check and capture potential interferer power level violations. Some of the menus below are used interactively when monitoring and analyzing.

DB Creator: The DB (Database) Creator provides a menu consisting of user-set base stations, channel setup definitions, and mask definitions used for the Trace Monitor menu and Trace Acquire menu.

See [Chapter 3, “DB Creator”](#).

Trace Acquire: The Trace Acquire menu runs continuously in the background, talking with the spectrum analyzers to acquire, store, and archive failed and passing sweep traces in a database located on the remote PC/server. Vision Acquire collects traces from multiple Spectrum Analyzers located at base station sites. The trace collection is periodically configured by the user. Vision Acquire also maintains the database of traces by archiving them, removing old ones, and compacting and compressing the database. Vision Acquire can be setup to receive email trace-monitoring status notifications and set alarm notifications when a trace fails a set threshold. See [Chapter 4, “Trace Acquire”](#).

Trace Monitor (Option 400): The Trace Monitor menu analyzes the database where measurements are collected to show date/time stamped trace information, spectrograms, and intuitive ways to monitor for interference signals. See [Chapter 5, “Trace Monitor/Trace Viewer”](#).

PoA Locate (Option 401): The PoA Locate menu performs geo-location for signals of interest. The monitor coordinate area provides the algorithmic region of the suspect signal include the Power of Arrival. Capture live traces from a remote monitor or scroll through to analyze traces from database data while looking at location estimates. See [Chapter 6, “PoA Locate \(Option 401\)”](#).

TDoA Locate (Option 401): The TDoA menu supports three active monitors to perform a Time Difference of Arrival measurement and identify a stationary or moving target’s signal longitude and latitude coordinates. Use a user-selected map to provide a geo-locate approximation of the interferers signal location. Averaging can be set to pinpoint an interferer location. Setup the TDoA program to monitor interferer capture settings to provide correlation results. Mobile tracking can be performed using an spectrum analyzer in a car, drive the area, and observe the results when parked. For site planning, use the TDoA Locate menu with the provided Simulator program to setup monitoring parameters and demonstrate interferer scenarios.

See [Chapter 7, “TDoA Locate \(Option 401\)”](#).

Port Scanner (Option 407): The Port Scanner menu runs as an independent program for rapid scanning multiplexed RF IN ports. Many sweep channels can be monitored and viewed at once in a real time view. Traces can be viewed in tabular view or trace view format. The tabular data provides a user defined set of parameters defined from an Add Channels dialog. The trace parameters set for viewing are user selected from a Table Display Columns list, such as frequency, limits masks, marker and delta markers, live channel power readouts for each channel, pass rate and more. Toggle the tabular defined channels to a trace view and view all the available channel traces simultaneously with the set defined parameters.

See [Chapter 8, “Port Scanner \(Option 407\)”](#).

Scan Viewer: The Scan Viewer menu provides tools for viewing saved .cpm (channel power measurement) files and spectrum analyzer measurement files. CPM files created by Port Scanner contain many RF sweep traces that include sweeps at multiple frequency bands and from multiple spectrum analyzers. Use Scan Viewer to review all of the traces in multiple views and explore the data as a set. See [Chapter 9, “Scan Viewer”](#).

Radio: The Radio menu contains the AM/FM Measurements for the spectrum analyzer with Option 400 installed. The function “Streaming Audio” is option controlled. It is accessed via the Vision API. Radio uses the Vision API to stream audio from spectrum analyzer. If accessing a Spectrum Analyzer without Option 400, it will not function. The AM/FM option provides analysis information included AM modulation quality and FM deviation metrics. See [Chapter 10, “Radio \(Option 400\)”](#).

Occupancy: The Occupancy menu provides tools to set power threshold levels to determine whether a given frequency channel is to be considered occupied. The analysis provides a basis to determine that noise and very low-level signals can be eliminated from the analysis. See [Chapter 11, “Occupancy”](#).

Cross Polarization: Cross Polarization monitors two antennas measuring the same signal, one turned 90 degrees relative to the other. Determine the difference in receive power between 2 antennas by tuning the position of an antenna for maximum benefit. Cross polarization measurements can be made with a multiport RSM or by using two RSMs. See [Chapter 12, “Cross Polarization”](#).

Simulator: The monitor simulator is used to demonstrate and practice using Vision. The Simulator responds to the complete sub-set of commands that Vision uses to activate a set of spectrum analyzers monitors and coordinate their responses to a simulated stationary or moving target. A user selected map is loaded from the Simulator program providing visual tools for geo-locating and tracking the source. You can run multiple active simulators on the same PC with each simulator representing a different monitor in a database. Each simulator can be started with a command line reference to a control file to set the sweep parameters, GPS location, installed options, and other parameters. See [Appendix A, “Simulator”](#).

1-4 Map Sources

Maps geo-locate the spectral monitors and display mapped positions of interferer signals using Power of Arrival (PoA) and Time Distance of Arrival (TDoA) algorithms in the Vision applications. There are many map sources available.

Users may want to use their own mapping solutions. Some map source suggestions are:

- MapQuest – <https://www.mapquest.com>
- Map Puzzle – <https://www.mappuzzle.se/>

Geo-Location techniques and loading maps in Vision are explained in [Chapter 13, “Geo-Location Techniques”](#) and [Appendix B, “Load Maps”](#).

1-5 Installing Vision

System Requirements

Listed below are the minimum requirements for running the Vision software monitor program.

- Quad Core Processor, 2 GHz or faster clock speed
- Microsoft Windows 64 bit operating system
- 8 GB of RAM
- Windows 11
- 100 GB of hard-disk space (1 TB recommended)
- Microsoft.NET Framework 4.8.1
- LAN connection to all remote sensors

Installation Procedure

1. Download Vision to the PC from the Anritsu MX280001A product page:
<https://www.anritsu.com/en-us/test-measurement/products/mx280001a>

Note In order to install Vision, Microsoft .NET 4.8.1 must be installed on your PC. If .NET 4.8.1 is not present, the Vision installer will prompt you to install this program. The download of Microsoft .NET 4.8.1 is free of charge. Insure that you download the Web Installer version of .NET.

2. Run the installation program.

The installation process will include several installation screens as shown in [Figure 1-1](#).

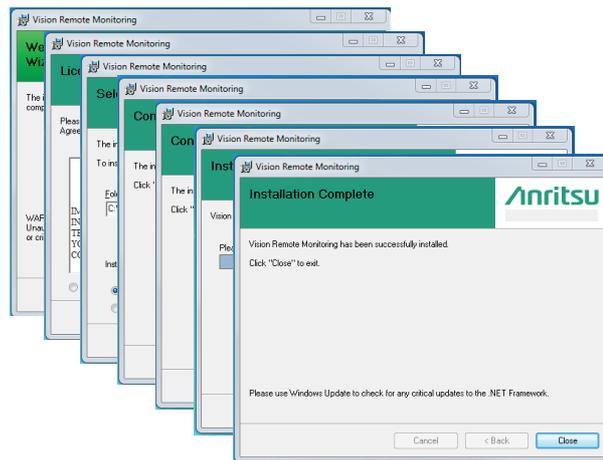


Figure 1-1. Vision Installation Screens

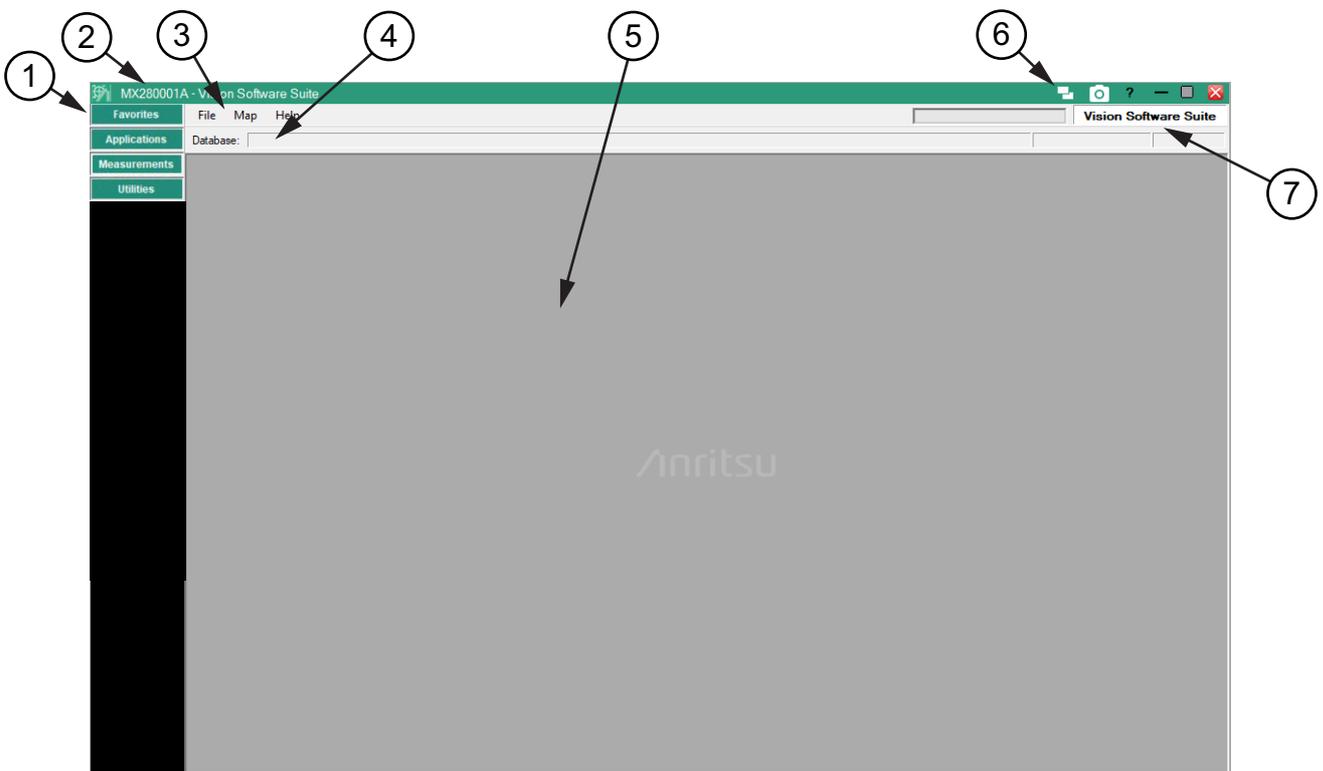
Vision Programs

Once the applications are installed, they can be accessed via desktop shortcuts or from the Windows Start menu. Two programs are available: Vision Acquire and Vision Monitor.



Figure 1-2. Start Menu Desktop Icons

Click the Vision Monitor icon to display the opening screen as shown in [Figure 1-3](#).



1. Menu Tabs: Four menu tabs are available: Favorites, Applications, Measurements, and Utilities.
2. Title Bar: Displays the MX280001A Vision Software Suite.
3. Menu Bar: The menu bar contains submenus that apply for each opened menu tab.
4. Database: Provides the active folder/file path.
5. User Interface Window: Each menu and submenu provides the user interface in this window.
6. Title Bar Utilities: Provides a pop-out active window button image capture, and Help menu.
7. Displays the title of the active menu or submenu.

Figure 1-3. Vision Software Suite Opening Screen

1-6 Database Conversion

"Older versions of Vision (2018.9.1 and earlier) used a different database format. If you have archived data files and want to recover that data, you will need to convert the database to the newer format. To convert your data, use the Vision Database Converter. This can be launched from the Utilities | Settings menu page." If you choose to continue to update Vision software, a Vision Database Converter will appear as shown in [Figure 1-4](#).

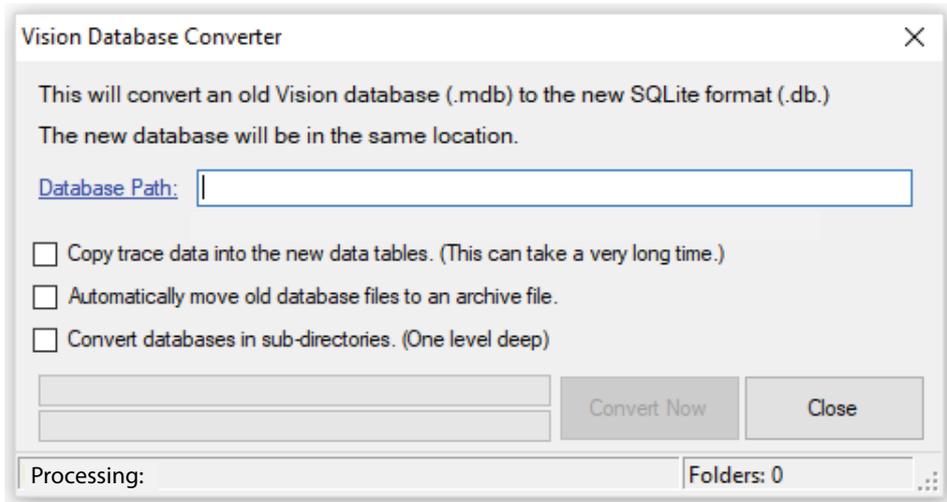


Figure 1-4. Vision Database Converter Dialog

The Vision Database Converter performs the database conversion with your selected preferences to convert the old Vision database (.db) to the new SQLite format (.db).

The database conversion selections are:

Database Path: Click the default path that appears or browse to enter a database path.

Copy trace data into the new data tables: Click this check box to copy the trace data accumulated into the new data tables. Note that copying a large set of trace files may consume a lot of time.

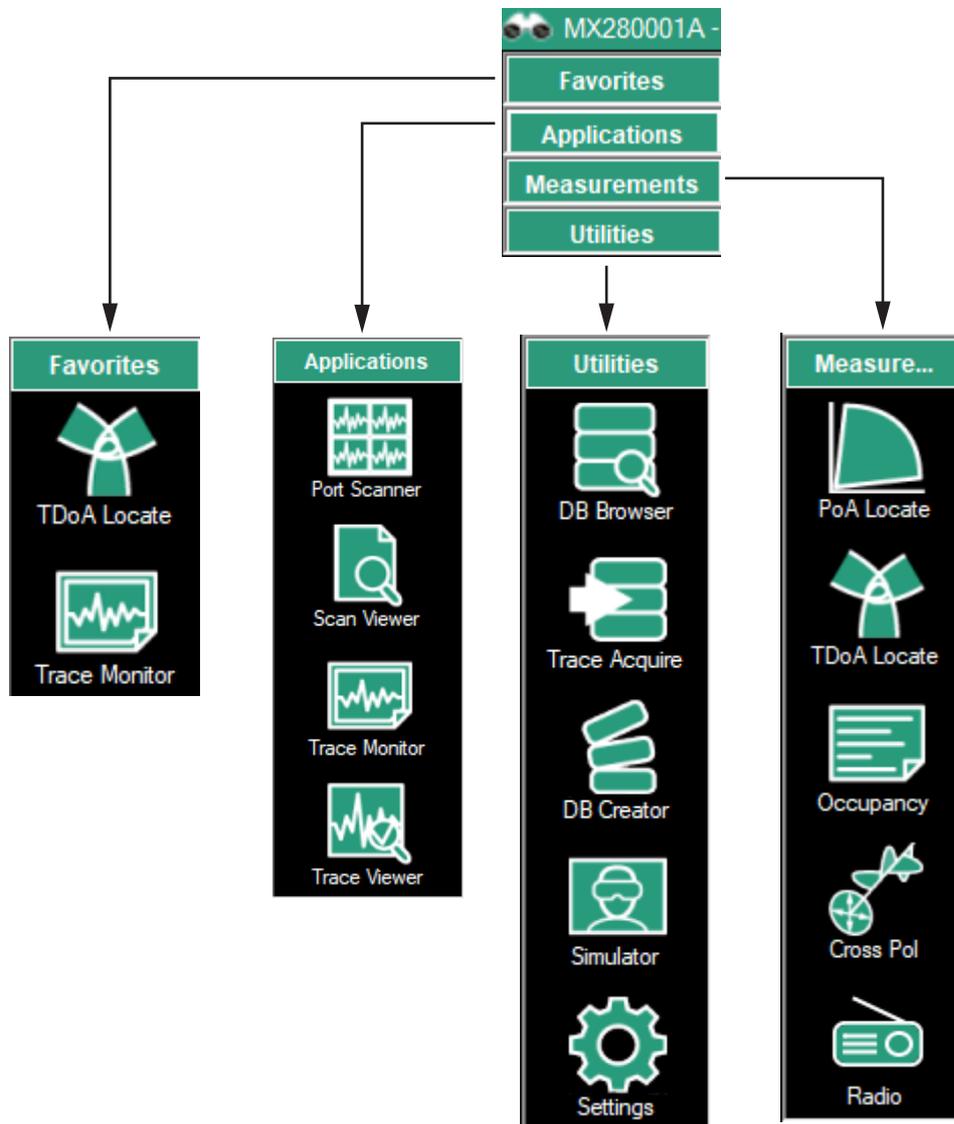
Automatically move old database files to an archive file: Click this check box to automatically move old data files to an archive folder.

Convert databases in sub-directories: Clicking this check box will convert only one level deep sub-directories.

Chapter 2 — Basic Operation

2-1 Vision Menus

The vision menus provide the setups, applications, and measurements user interface screens shown in [Figure 2-1](#).



1. Favorites Menu - See ["Favorites Menu"](#) on page 2-5.
2. Applications Menu - See ["Applications Menu"](#) on page 2-2.
3. Utilities Menu - See ["Utilities Menu"](#) on page 2-4.
4. Measurements Menu - See ["Measurements Menu"](#) on page 2-3.

Figure 2-1. Vision Menus

Applications Menu

The Applications menu is described in [Figure 2-2](#).

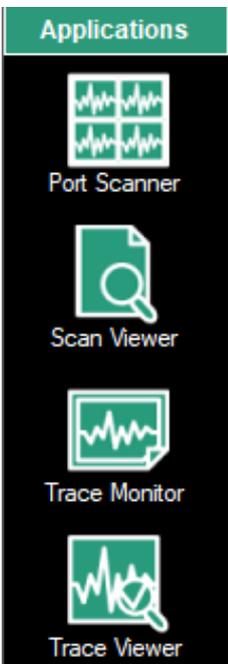
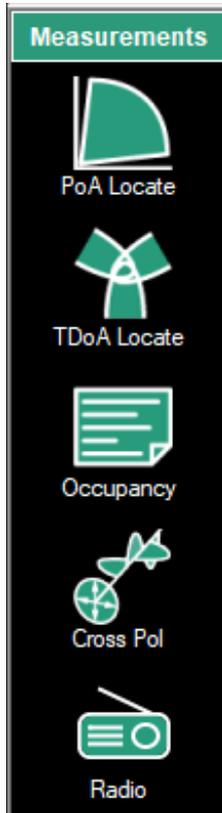
 <p>The Applications menu is a vertical list of four icons on a dark background. At the top is a green header with the word 'Applications' in white. Below it are four green icons: 1. A grid of four waveform plots labeled 'Port Scanner'. 2. A document icon with a magnifying glass over it labeled 'Scan Viewer'. 3. A single waveform plot labeled 'Trace Monitor'. 4. A waveform plot with a magnifying glass over it labeled 'Trace Viewer'.</p>	<p>Port Scanner: The Port Scanner quickly monitors the channel power on any number of channels using Anritsu's Spectrum Analyzer with Option 407 installed. See Chapter 8, "Port Scanner (Option 407)".</p> <p>Scan Viewer: Provides tools for viewing saved CPM (Channel Power Measurement) and spectrum analyzer measurement files. CPM files created by the Vision Port Scanner contain many RF sweep traces that include sweeps at multiple frequency bands and from multiple spectrum analyzers. Use File Viewer to review all of the traces in multiple views and explore the data as a set. See Chapter 9, "Scan Viewer".</p> <p>Trace Monitor: View traces stored in the database. Analyzes the database where measurements are collected to show date/time stamped trace information, spectrograms, and intuitive ways to monitor for interference signals. See Chapter 5, "Trace Monitor/Trace Viewer".</p> <p>Trace Viewer: Compare traces between channels. See "Trace Viewer" on page 5-11.</p>
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Figure 2-2. Applications Menu

Measurements Menu

The Measurements menu is described in [Figure 2-3](#).



PoA Locate: Locate sources using PoA. See [Chapter 6, "PoA Locate \(Option 401\)"](#).

TDoA Locate: Spectrum analyzers positioned in a triangular pattern perform TDoA to identify a stationary signal's longitude and Latitude coordinates. See [Chapter 7, "TDoA Locate \(Option 401\)"](#).

Occupancy: Provides tools to set power threshold levels to determine whether a given frequency channel is to be considered occupied. See [Chapter 11, "Occupancy"](#).

Cross Pol: Cross Polarization measurement monitors two antennas measuring the same signal, one turned 90 degrees relative to the other. See [Chapter 12, "Cross Polarization"](#).

Radio: The Radio Capture file contains the AM/FM Measurements for the spectrum analyzer with Option 400 installed. Displays AM/FM streaming audio. See [Chapter 10, "Radio \(Option 400\)"](#).

Figure 2-3. Measurements Menu

Utilities Menu

The Utilities menu is described in [Figure 2-4](#).

Utilities	
 DB Browser	<p>DB Browser: View details and load Vision databases for use in Vision Monitor, PoA Locate and Trace Viewer. See Chapter 3, "DB Creator".</p>
 Trace Acquire	<p>Trace Acquire: Stores traces at set intervals, stores results in user location, and provides email alerts when mask violation occur. See Chapter 4, "Trace Acquire".</p>
 DB Creator	<p>DB Creator: Create a database consisting of base stations, channel setup definitions, and mask definitions for use by Trace Monitor and Vision Acquire. See Chapter 3, "DB Creator".</p>
 Simulator	<p>Simulator: Used to practice and demonstrate using Vision. Simulate Anritsu remote monitors for testing and coverage evaluations. See Appendix A, "Simulator".</p>
 Settings	<p>Settings: Database maintenance and system utilities. The Settings and Control Panel provides the user interface tools for signal monitoring. See "Settings" on page 2-6.</p>

Figure 2-4. Utilities Menu

Favorites Menu

The Favorites folder is used as a preference location for users to access frequently used menus.

Copy Menus to Favorites

Vision menus offer a robust range of trace monitoring menus. Trace monitoring requires navigating through a few menus to create a database and a trace monitoring setup. Once setup, some menus may not require access often. As an alternative to repeatedly navigating through the menus listed, a user may store frequently used menus into a Favorite folder. The Favorites folder can be used as a repository for menus that are accessed frequently and repeatedly when perform signal trace monitoring.

To store a menu in the Favorites menu folder, right-click a frequently used menu to show the submenu shown in [Figure 2-5](#). Below, the Cross Pol (Cross Polarization) menu is copied and added to the Favorites folder. More menus can also be added and accessed through the Favorites folder.

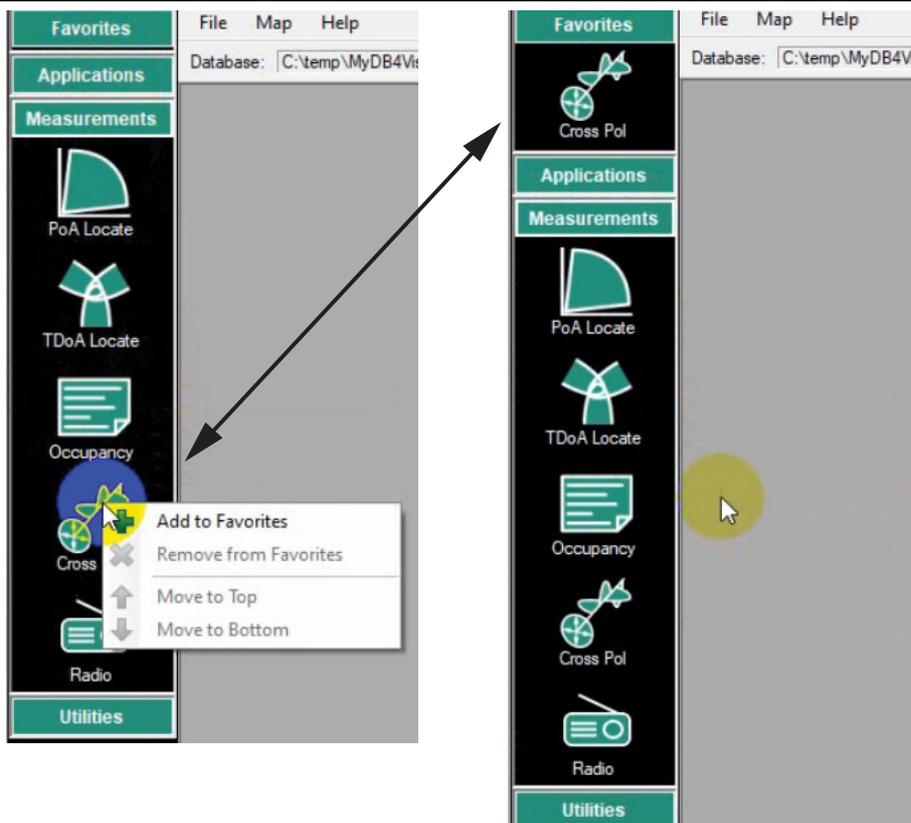


Figure 2-5. Add to Favorites

Add to Favorites: Right-click an application as shown above to add it to the Favorites Folder.

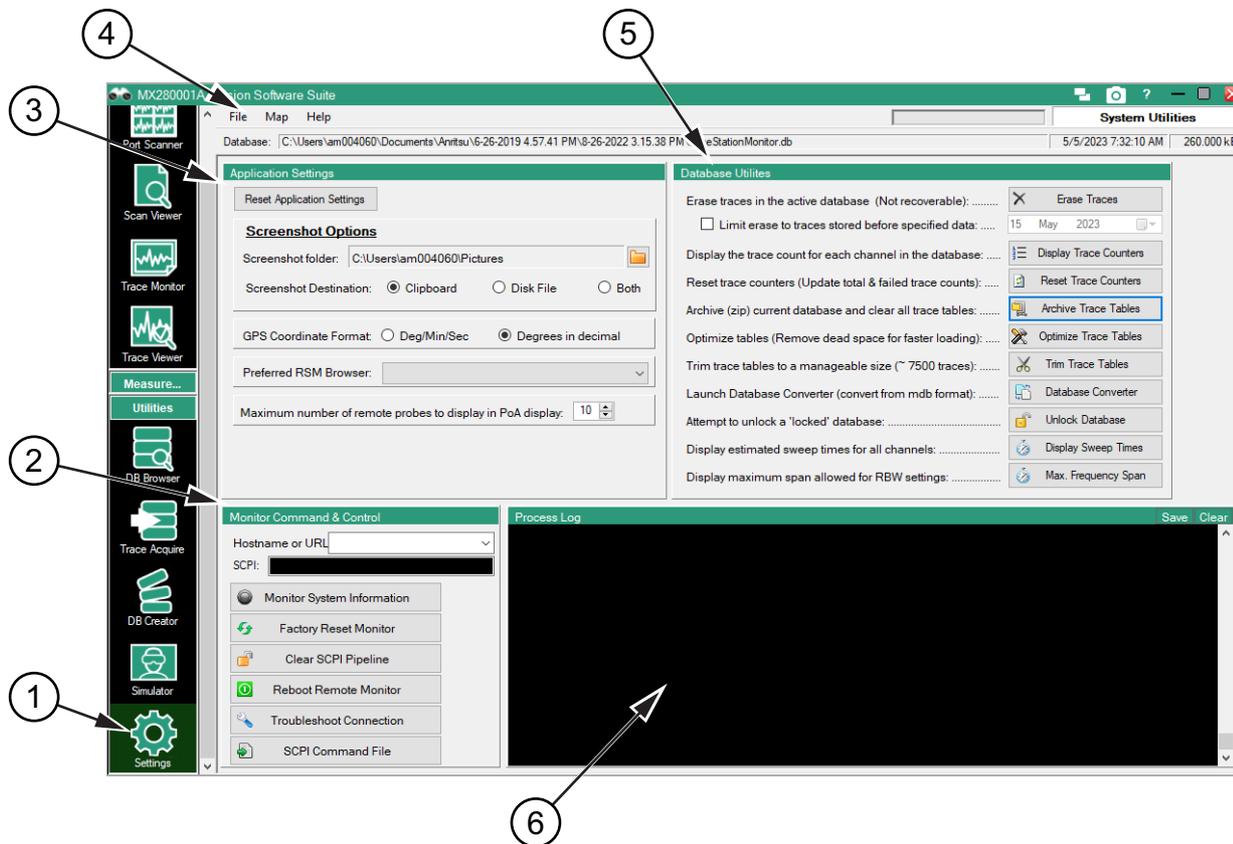
Remove from Favorites: Right-click a menu in the Favorites folder and click Remove from Favorites to remove it.

Move to Top: Right-click a menu in the Favorites folder and click Move to Top to move it to the top of the list.

Move to Bottom: Right-click a menu in the Favorites folder and click Move to Bottom to move it to the bottom of the list.

2-2 Settings

The Settings menu provides the Application Settings, Database Utilities, Monitor Command and Control and Process Log windows program controls. The Settings menu is shown in [Figure 2-6](#).



1. Settings Menu
2. Monitor Command and Control
3. Applications Settings
4. Menu Bar
5. Database Utilities
6. Process Log

Figure 2-6. Settings Menu

Settings Menu Bar

The Settings menu bar is shown below.

File Map Help

Figure 2-7. Settings Menu Bar

The Settings Menu bar is described in [Table 2-1](#).

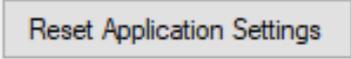
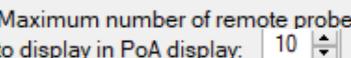
Table 2-1. Settings Menu Bar Description

Menu	Description
File	<p>Open Database: Opens the database folder that has been set from “Set Database Root Folder”.</p> <p>Set Database Root Folder: Sets the root folder of the database.</p> <p>Recent Databases: Click to display the most recent databases used.</p> <p>Exit: Exit the File menu.</p>
Map	<p>Load Map: Load a customer selected map to the screen.</p> <p>Existing Maps: Load a map from an existing map folder.</p>
Help	<p>Help: See “Help Menu” on page 5-3.</p>

Application Settings Window

The Application Settings are described in [Table 2-2](#).

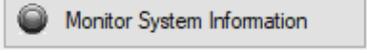
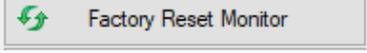
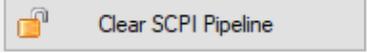
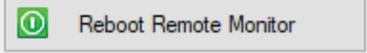
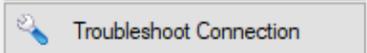
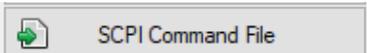
Table 2-2. Application Settings

Icon	Description
	<p>Reset Application Settings: Reset all program configuration and settings values to default values.</p>
	<p>Screenshot folder: Open the folder icon to browse and to set the screenshot folder. Default is the Pictures folder.</p> <p>Screenshot Destinations: Set the radio button to select the screenshot destination.</p> <ul style="list-style-type: none"> • Clipboard: Screenshots will be placed in the Windows clipboard. • Disk File: Screenshots are saved to a disk file (time stamped names are used). • Both: Screenshots will be saved to both the Windows clipboard and a disk file.
	<p>Deg/Min/Sec: Shows GPS coordinates in Deg/Min/Sec format.</p> <p>Degrees in Decimal: Shows GPS coordinates in Decimal format.</p>
	<p>Preferred RSM Browser: This setting refers to opening the RSM remote interface. Set as Google Chrome, Firefox, or Microsoft Edge and includes all web browsers installed on the user's PC. HTML content will ignore this setting and be opened with the user's default browser as set in Windows.</p>
	<p>Maximum Number of Probes: The number of probes set determines the number of probes available for the PoA menu.</p>

Monitor Command and Control

The Monitor Command and Control window is described in [Table 2-3](#).

Table 2-3. Monitor Command and Control Description

Icon	Description
	<p>Hostname or URL: Type the Hostname or URL.</p> <p>SCPI: Enter SCPI command for direct command and response.</p>
	<p>Monitor System Information: Display basic monitor information, including firmware version and installed options.</p>
	<p>Factory Reset Monitor: Factory reset the active spectrum analyzer.</p>
	<p>Clear SCPI Pipeline: If SCPI stops responding, this may restore communication by clearing the communication channel.</p>
	<p>Reboot Remote Monitor: Reboot the remote spectrum analyzer.</p>
	<p>Troubleshoot Connection: Click to test the monitor connection. The result is shown in Process Log.</p>
	<p>SCPI Command File: Load and process a SCPI command file</p>

Database Utilities

The Database Utilities window is described in [Table 2-4](#).

Table 2-4. Database utilities

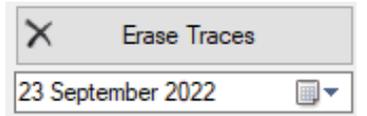
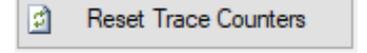
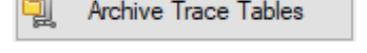
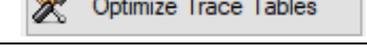
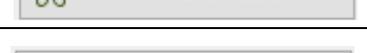
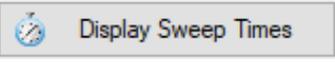
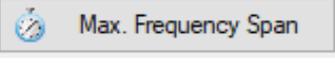
Icon	Description
	<p>Erase Traces: Erase traces in the database. This leaves the database empty as though newly created. Data is not recoverable.</p> <p>Before Date: Set a date to erase traces from the active database.</p>
	<p>Display Trace Counters: Display the trace counters for each monitor in the active database.</p>
	<p>Reset Trace Counters: Resets the trace counters of each monitor in the active database.</p>
	<p>Archive Trace Tables: Store active database in an archive (*.zip) file, erase all trace data, and reset.</p>
	<p>Optimize Trace Tables: Optimize the active database. This removes wasted space and compresses the database file.</p>
	<p>Trim Trace Tables: Remove old traces from the active database.</p>
	<p>Database Converter: Launch Database Converter to convert from older Vision Format.</p>

Table 2-4. Database utilities

Icon	Description
	Unlock Database: Attempt to unlock a 'locked' database.
	Display Sweep Times: Displays in the Process Log window the maximum frequency span for each normal value of RBW.
	Max. Frequency Span: Provides a Frequency-Span-Sweep Time conditions table in the Process Log window. See " Maximum Frequency Span ".

Maximum Frequency Span

Clicking the Max. Frequency Span button displays the maximum span and sweep time conditions for each standard RBW as shown in [Figure 2-8](#). The table shows the RBW and maximum frequency sweep span conditions allowed for the MS2710xA, MS2090A, and the MS27201A. Example using an MS2090A:

Start Frequency set to 4.0 GHz

Stop Frequency set to 5.0 GHz

Because the span is 1 GHz, the table shows that this span falls between 270 MHz and 1 GHz, therefore, the set RBW allowed must be set greater than 3 kHz.



RBW	Maximum span and sweep time at each standard RBW				The limits shown are in place to keep the sweep times down to manageable rates. The typical Span/RBW value is 100 to 1000, increasing as more display points are used. A lower RBW will increase the frequency resolution, but is slower. Nothing is gained if the Span/RBW value is above the display point count. Vision allows a wide enough span to get maximum resolution at the highest number of display points for each RBW.
	MS2710xA		MS2090A / MS27201A		
	Span	Sweep Time	Span	Sweep Time	
1 Hz	unsupported		10.00 kHz	37.5 sec.	
3 Hz	unsupported		30.00 kHz	13.7 sec.	
10 Hz	40 kHz	6.7 sec.	100.0 kHz	5.5 sec.	
30 Hz	379 kHz	4.9 sec.	1.20 MHz	4.7 sec.	
100 Hz	2.25 MHz	4.0 sec.	10.0 MHz	4.6 sec.	
300 Hz	28.50 MHz	3.8 sec.	45.5 MHz	3.9 sec.	
1 kHz	225.0 MHz	4.3 sec.	270.0 MHz	2.9 sec.	
3 kHz	2.854 GHz	4.5 sec.	1.000 GHz	3.8 sec.	
10 kHz	--	--	4.350 GHz	3.0 sec.	
30 kHz	--	--	17.450 GHz	3.0 sec.	

Higher RBWs support the maximum span for each instrument.
All values shown assume an RBW/VBW ratio of around 3.

Figure 2-8. Maximum Frequency Span Table

Note You can save the process log contents as a log file by clicking the Save button on the top right corner as shown in [Figure 2-8](#). To delete the log simply clicking Clear button next to the Save button.

Display Sweep Times

Clicking the Display Sweep Times button displays in the Process Log the estimated sweep times for each channel set in the Trace Monitor menu. The table shown in [Figure 2-9](#) provides a list of the active Monitors, Spectrum Analyzer Model type, estimate of the expected sweep times per channel. The sweep time parameters are set in the Trace Monitor measurement configuration window. The sweep times for Monitor 2 are the result of setting the averaging of several sweeps in the Measurement Configuration window of the Trace Monitor menu and displaying the results. For details, see [“Measurement Configuration” on page 5-33](#).

Monitor Name	Model	1	2	3	4	5	6	7	8	9	10	Total
Monitor 1	MS27101A	0.00	0.00	37.59	43.69	37.45	25.81	29.83	8.59	0.01	0.00	182.97
Monitor 2	MS2090A	150.2	62.50	20.83	28.34	31.07	4.42	4.55	3.46	28.26	23.37	356.95

* Sweep times are estimates only, and are shown in seconds. Listed times do not include network overhead.

Figure 2-9. Display Sweep Times Table

Chapter 3 — DB Creator

3-1 Introduction

The DB Creator (Database Creator) program provides the user interface to create a remote monitoring system database. This section will describe how to create a spectrum analyzers system using the Vision Database Creator program.

Base Station Database Creator Overview

The DB Creator program provides the tools to create a database consisting of base stations, channel setup definitions, and mask definitions for use by Vision Trace Monitor and Vision Acquire. The following lists the application modes that require a database and the application modes that do not.

Vision Database Required

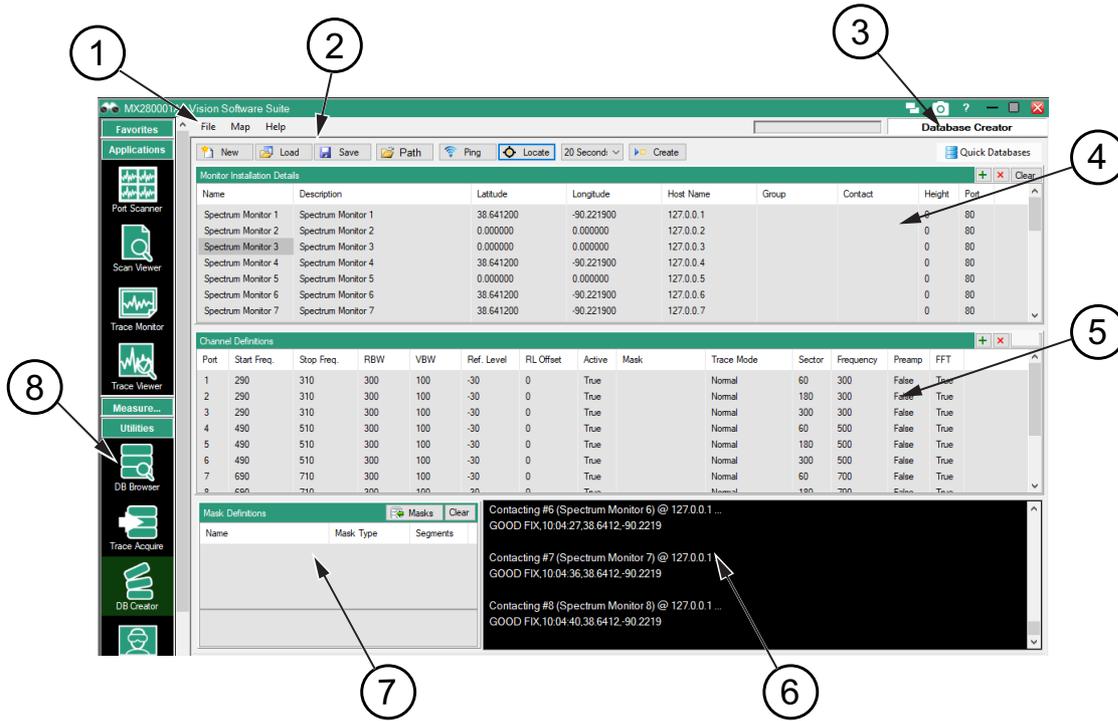
- Vision Acquire
- Trace Monitor
- Trace Viewer
- PoA Locate

Vision Database Not Required

- High-Speed Port Scanner
- Scanner File Viewer
- TDoA Locate
- Cross Polarization
- Radio Monitor
- RSM Simulator

3-2 Database Creator User Interface

Access DB Creator from the Utilities panel on the left side of the window as shown in [Figure 3-1](#). Database creator is used to create the remote monitoring system database.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Menu Bar 2. "Database Creator Toolbar" 3. "Quick Databases Button" on page 3-4 4. Monitor Installation Window | <ol style="list-style-type: none"> 5. "Channel Definitions" on page 3-5 6. "Process Log Window" on page 3-8 7. "Mask Definitions" on page 3-7 8. Database Creator Icon |
|---|--|

Figure 3-1. DB Creator Window

Database Creator Toolbar

The Vision Database Creator user interface includes a Toolbar, Monitor Installation Details List, Channel Definitions, Mask Definition, and a Response Data window. The Database Creator toolbar icons are described in [Table 3-1](#).

Table 3-1. DB Creator Toolbar

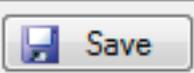
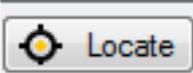
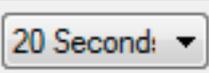
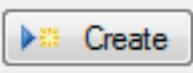
Icon	Description
	New: Creates a new database file in a specified path.
	Load: Loads an already saved database definitions file (.def).
	Save: Saves a database definition file (.def).

Table 3-1. DB Creator Toolbar

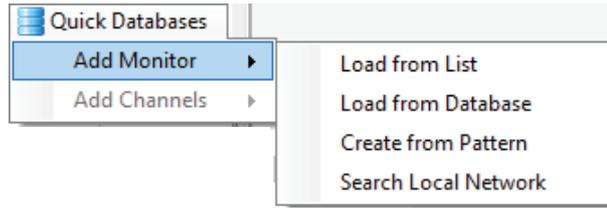
Icon	Description
	Path: Sets the location where the database will be created.
	Ping: Pings all monitors.
	Locate: Gets GPS coordinates for all monitors.
	Sweep Rate: Selects the monitor installation sweep rate.
	Create: Creates the database file using parameters set by Path and New icons.
	Create & Open: Creates the database and opens it in the trace monitor window.
	<p>Quick Databases: Adds spectrum analyzers and Channels. Submenus include:</p> <p>Add spectrum analyzers</p> <ul style="list-style-type: none"> • Load from List • Load from Database • Create From Pattern • Search Local Network <p>Add Channels submenu: Set the Channel Definitions</p> <ul style="list-style-type: none"> • Single Channel – Omni • Single Channel – Sectors • WiFi Bands • Capture from single analyzer • Capture from each analyzer <p>For details on the Quick Databases submenus, see “Quick Databases Button” on page 3-4.</p>

Quick Databases Button

Use the Quick Database button to add Spectrum Analyzers and channels to a database.

Add Spectrum Analyzers

Add spectrum analyzer as shown below.



Load from List

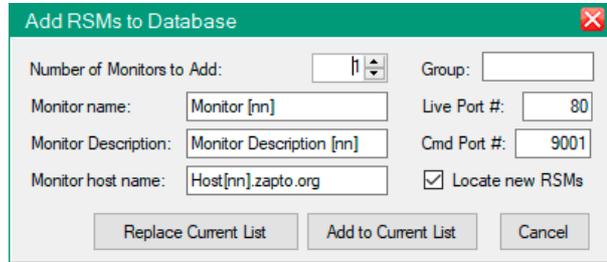
Load a Spectrum Analyzer list file (*.lst). For more information, see [“Import a List of Base Stations – Example” on page 3-10](#).

Load from Database

Browse to load a Vision Database File (BaseStationMonitor.db).

Create from Pattern

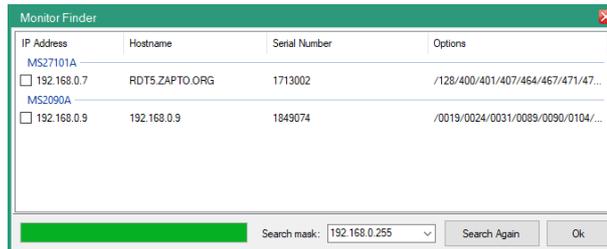
Displays a window to add RSMs to Database.



Search Local Network

Provides the window shown below. Enter the IP Address, Hostname, Serial Number, Search mask, and click OK, or search again.

When searching for units, you must specify the subnet to look in. Many PC's have multiple network interfaces installed, such as LAN, Wi-Fi, VPN, etc. If multiple interfaces are detected, the appropriate search mask is added to the drop-down list. Select the correct subnet search mask to locate your remote monitors. You can often determine which mask is correct by looking at the first two segments. As an example, in the figure above the selected mask begins with "192.168.". This is selected because it is known that the remote monitors are on the subnet with IP addresses that begin with "192.168.".

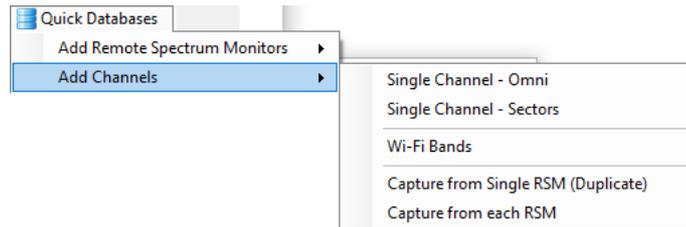


Channel Definitions

The Channel Definitions are the setup parameters for the spectrum analyzers.

Add Channels submenu

Set the Channel Definitions.



Single Channel – Omni

Displays the Add Channel to each monitor dialog as shown below. Enter the trace sweep parameters for the new channels you are adding.

Note

The maximum frequency setting Vision provides is the maximum allowed on the measuring instrument up to 54 GHz. Vision does not verify the maximum input frequency range of the measuring instrument.

Start Frequency: Type or enter the channel Start Frequency in MHz. Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

Stop Frequency: Type or enter the channel Stop Frequency in MHz. Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

RBW (kHz): Type of enter the resolution bandwidth in kHz. Range is 1 kHz to 3000 kHz.

VBW (kHz): Type or enter the video bandwidth in kHz. Range is 1 kHz to 3000 kHz.

Trace Points: Type or enter the number of trace points. Range is 10 points to 4001 points.

Antenna port number: Type or enter the amount of port number of this entry. Range is 1 to 24. (Set to 1 on single port remote monitors.)

Reference Level (dBm): Type or enter the reference level for sweep data. Range is 60 to –100 dBm.

Reference Level Offset (dB): Type or enter the reference level offset. Range is 0 dB to 80 dB.

Trace Mode: Click Trace Mode operation and then click: Normal, Rolling Min Hold, Rolling Max Hold, Average, Min Hold, and Max Hold.

Preamp: Click the Preamp check box to use a preamp for each sweep.

FFT: Click the FFT check box to use FFT (Fast Fourier Transfer) for each sweep (recommended).

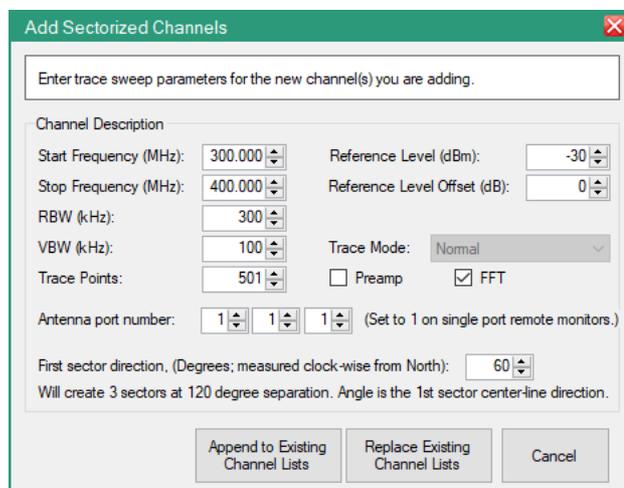
Append to Existing Channel Lists: Adds the channel created from this dialog to the existing channel list.

Replace Existing Channel Lists: Removes all current entries in the channel list and replaces with new channel created from this dialog.

Cancel: Click to cancel any entries or changes.

Single Channel – Sectors

Displays the Add Sectorized Channels dialog as shown below. Enter the trace sweep parameters for the new channels you are adding.



Note

The maximum frequency setting Vision provides is the maximum allowed on the measuring instrument up to 54 GHz. Vision does not verify the maximum input frequency range of the measuring instrument.

Start Frequency: Type or select the channel Start Frequency in MHz. Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

Stop Frequency: Type or select the channel Stop Frequency in MHz. Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

RBW (kHz): Type or select the resolution bandwidth in kHz. Range is 1 kHz to 3000 kHz.

VBW (kHz): Type or select the video bandwidth in kHz. Range is 1 kHz to 3000 kHz.

Trace Points: Type or select the number of trace points. Range is 10 points to 4001 points.

Antenna port number: Type or select the port number of this entry. Range is 1 to 24. (Set to 1 on single port remote monitors.)

Reference Level (dBm): Type or select the reference level for sweep data. Range is 60 to –100 dBm.

Reference Level Offset (dB): Type or select the reference level offset. Range is 0 dB to 80 dB.

Trace Mode: Click Trace Mode operation and then click: Normal, Rolling Min Hold, Rolling Max Hold, Average, Min Hold, and Max Hold.

Preamp: Click the Preamp check box to use a preamp for each sweep.

FFT: Click the FFT check box to use FFT (Fast Fourier Transfer) for each sweep (recommended).

Antenna port number: Type or select the port number of this entry. Range is 1 to 24. (Set to 1 on single port remote monitors.) The parameters set in the above section are the same for the three ports selected here. The first monitors angle (the first Antenna port number) is the first sector being adjusted and the other two will follow in 120 degree increments.

First Sector direction (Degrees measures clock-wise from the North): Range is 0 degrees to 359 degrees. This setting applies to the first antenna port on left from the above antenna port number selections. The middle antenna port and the antenna port on the right will follow in succession in 120 degree separation.

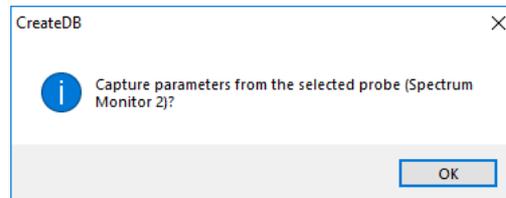
Append to Existing Channel Lists: Adds the channel created from this dialog to the existing channel list.

Replace Existing Channel Lists: Removes all current entries in the channel list and replaces with new channel created from this dialog.

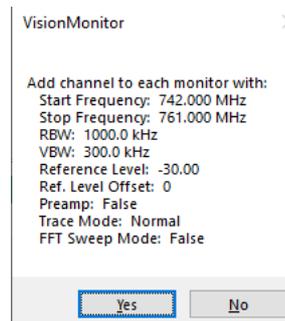
Cancel: Click to cancel any entries or changes.

WiFi Bands: Add WiFi Bands to the Channels Definitions section.

Capture from single monitor: Click a port from the list displays the dialog shown below. Click OK to confirm or click the close button.



Clicking OK will display the Spectrum Analyzer parameters below.



Capture from each spectrum analyzer: Click a port from the list displays the same dialog shown above. Click OK to confirm or click the close button. Clicking OK will display the Channel, Spectrum Analyzer, sweep parameters, and sweep response from each Spectrum Analyzer port in the test response data window as shown below.

```
Getting sweep parameters from: Spectrum Monitor 16 (16 of 24)
Getting sweep parameters from: Spectrum Monitor 17 (17 of 24)
Getting sweep parameters from: Spectrum Monitor 18 (18 of 24)
Getting sweep parameters from: Spectrum Monitor 19 (19 of 24)
Getting sweep parameters from: Spectrum Monitor 20 (20 of 24)
Getting sweep parameters from: Spectrum Monitor 21 (21 of 24)
Getting sweep parameters from: Spectrum Monitor 22 (22 of 24)
Getting sweep parameters from: Spectrum Monitor 23 (23 of 24)
Getting sweep parameters from: Spectrum Monitor 24 (24 of 24)
Channels created.
```

Monitor Installation Details List

The details list displays information regarding the spectrum analyzers in the field. Information includes a name, description, latitude and longitude positions, a host name or IP address, group and contact name, and the height position of the spectrum analyzers.

Mask Definitions

Mask Definitions contain the list of user created mask files that are used in determining the pass/fail limits of the measurements taken. The Mask Type and number of segments are displayed as part of the mask description in this list. See [“Add Masks” on page 3-19](#).

Process Log Window

The Process Log window provides data responses from the Spectrum Analyzer, such as after the spectrum analyzer is pinged, when **Locate** is clicked, and Spectrum Analyzer activity following a Database Creator setup has been initiated. Any error conditions encountered during database creation will be reported in this window. See [“Different Ways to Create Database” on page 3-11](#).

3-3 Create New Database

To create a new database, click **New** on the top left corner of the DB Creator user interface screen to display the New Database Description screen shown in [Figure 3-2](#). Here the user inputs the signal-monitoring setup parameters. Creating a new database example is provided in [Section 3-6 “Exercise – Manually Creating a Database”](#) on page 3-16.

Figure 3-2. New Database Description

Import a List of Base Stations – Example

In this example, you will create a list of Base Stations to import into Database Creator. The Import Base Stations results are shown in [Figure 3-4](#).

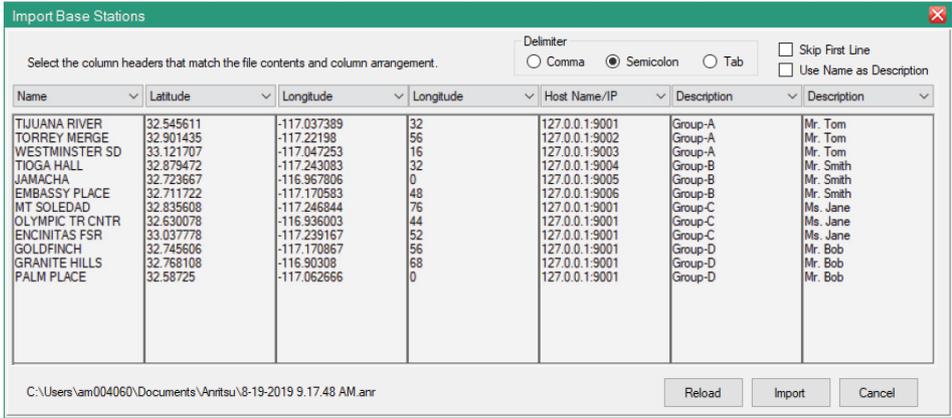


Figure 3-3. Import Base Stations

Create list

To create a list to import, use a text editor such as Notepad to enter the base station information. Refer to [Figure 3-4](#). Use a comma, colon, or a tab as the delimiter to separate the column entries. Store the list in a retrievable file location with the extension (.lst).

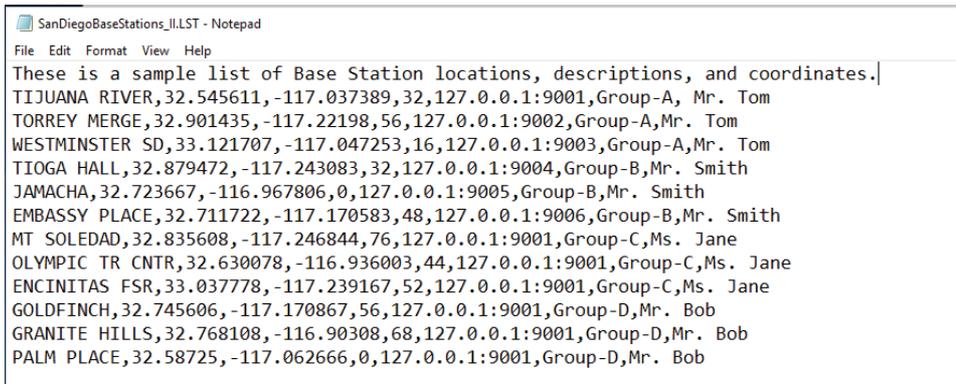


Figure 3-4. List Created of Base Station Details

Import List

From the Database Creator screen, click Quick Databases. From the drop-down menu click:

1. Add spectrum analyzers.
2. Load from List.

Find and open the list (.lst) file. You see the Import Base Stations screen populate as shown in [Figure 3-4](#). By clicking the “Skip First Line” check box will hide the first line of context, which in this case is “This is a sample list of Base Station locations, descriptions, and coordinates.” Click the delimiter chosen in the created list with one of the three radio buttons provided on the “Import Base Station” screen. In the example, each line is separated by a comma.

Column Headings

The column headings are pull-down selections as shown in [Figure 3-5](#). Click the heading that will best describe the column contents.

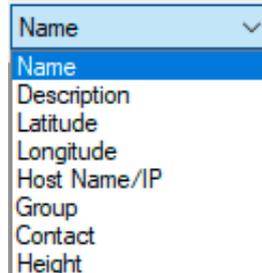


Figure 3-5. Column Heading Selections

The heading names provided and suggested definitions are:

- **Name:** The Base Station Name
- **Description:** The Base Station Identifier
- **Latitude:** The Latitude coordinate of the Spectrum Analyzer
- **Longitude:** The Longitude coordinate of the Spectrum Analyzer
- **Host Name/IP:** The Host Name and IP address for the Spectrum Analyzer
- **Group:** The Group of Spectrum Analyzers that are associated
- **Height:** The physical Height of the Spectrum Analyzer
- **Contact:** The name of the Contact person

3-4 Different Ways to Create Database

There are a few different types of databases that can be created using the Vision Database Creator and New Database Description user interfaces. Use the following procedures:

- Update a Base Station Definition File
- Using a Base Station Definition File
- Create a Definition File (.def) or Database File (.db) using a Database File
- Create a Definition File (.def) or Database File (.db) using a Base Station List File
- Create a Database Manually

Update a Base Station Definition File

Update a previously created base station definition file.

1. Refer to [“Database Creator Toolbar” on page 3-2](#).
2. Click **Load** on the Toolbar. The Open dialog is displayed.
3. Confirm or click **DB Definition Files (*.def)** as the file type to be used.
4. In the directory, locate and click the definition file.
5. Click **Open**. Data from the definition file for Monitor Installation Details, Channel Definitions, and Mask Definitions loads into the Database Creator program.
6. Edit the information as desired. Click once on an entry to edit. Click the **(+)** button to add a new item to the category. Highlight a line and click **(X)** to delete the line from a category.
7. Save the new data as a definition file.

8. Click **Save** on the Toolbar. The Save As dialog opens.
9. Navigate to the desired folder and type a file name and click **Save**. The file will save as a .def file.

Create a Database File Using a Base Station Definition File

Create a database using information from a previously created base station definition file.

1. Refer to [“Database Creator Toolbar” on page 3-2](#).
2. Click **Load** on the Toolbar. The Open dialog is displayed.
3. Confirm or click **DB Definition Files (*.def)** as the file type to be used.
4. In the directory, locate and click the definition.
5. Click **Open**. Data from the definition file for Monitor Installation Details, Channel Definitions, and Mask Definitions loads into the Database Creator program.
6. Edit the information as required.
7. Click once on an entry to edit.
8. Click **(+)** to add a new item to the category.
9. Highlight a line and click **(X)** to delete the line from a category.
10. Click **Create** to create a new database file. The database file is created in the directory previously set using the Path button.

Create a Definition File (.def) or Database File (.db) Using a Database File

Create a database file using information from a previously created database file .db.

1. Refer to “[Database Creator Toolbar](#)” on page 3-2.
2. Click **Load** on the Toolbar. The Open dialog is displayed.
3. Confirm or click **Vision Database files (BaseStationMonitor.db)** as the file type to be used.
4. In the directory, locate and click the database .db, file.
5. Click **Open**. Data from the database file for Monitor Installation Details, Channel Definitions, and Mask Definitions loads into the Database Creator program.
6. Edit the information as desired.
7. Click once on an entry to edit.
8. Click the (+) button to add a new item to the category.
9. Highlight a line and click (X) to delete the line from a category.
10. Click **Create** to create a new database file. Or, click **Save** to save the information as a definition file. A new database will be created in the directory set using the Path button.

Create a Definition File (.def) or Database File (.db) Using a Base Station List File

Create a definition file or database file using information from a previously created base station list file, (.lst, .txt, .csv).

1. Refer to “[Database Creator Toolbar](#)” on page 3-2.
2. Click **New** on the Toolbar. You see the New Database Description dialog open.
3. Click **Import Base Station list from file**.
4. Type the directory and filename of the Base Station List File or browse by clicking **Folder**.
5. Click **Open**. You can view the contents of the file by clicking the Search. Use the scroll bars to see the whole contents of the file.
6. Set the parameters for the base stations under Channel Description.
7. Click **OK**. The Import Base Stations window opens.
8. Set the column label names in accordance to the contents of the columns.
For example: If the column contents is the host name or IP address, click the pull down list for that column and click **Host Name/IP**. If the first line of the base station list file contained labels, click the **Skip First Line** check box. If you want to use the names of the base stations as descriptions click the **Use Name as Description** check box.
9. Click **Import**. Data from the definition file for Monitor Installation Details, Channel Definitions, and Mask Definitions loads into the Database Creator program.
10. Edit the information as desired.
11. Click once on the desired entry to edit. Click (+) to add a new item to the category. Highlight a line and click (X) to delete the line from a category.
12. Click **Create** to create a new database. A new database will be created in the directory set using the Path button. Or, click **Save** to save the information as a definition file.

Create a Database Manually

This is useful in creating a database for a small number of base stations.

1. Refer to “[Database Creator Toolbar](#)” on page 3-2.
2. Click **New** on the Toolbar. The New Database Description dialog opens.
3. Click **Manual entry of base station details**.
4. Enter the information for the number of base stations to create, base station name, base station host name. In the Monitor Name and Host Name fields, you can enter '[nn]' to add sequential numbering, or enter '[nn:m]' to add sequential numbering starting at number 'm'. For example, entering 'St. Louis [nn:5]' in the Monitor Name field will produce a series of monitors whose names are 'St. Louis 5', 'St. Louis 6', etc.
5. Set the parameters for the base stations under Channel Description.
6. Click **OK**. The New Database Description dialog closes and the information you entered is used to populate the Monitor Installation Details and Channel Details Definitions tables. You must have Latitude and Longitude coordinates in order to create the database. If you don't have Latitude and Longitude coordinates, use the **Locate** button to capture the GPS location from the monitors directly only if Host Names are valid.
7. Edit the information as desired.
8. Click once on the desired entry to edit.
9. Click the (+) to add a new item to the category.
10. Highlight a line and click the (X) to delete the line from a category.
11. Click **Create** to create a new database. The database file is placed into the directory previously set using the Path button.

3-5 Exercise – A Sample Database

In this exercise, you will create a database based on a sample database definition file. Before you begin, you will need to run the Vision Monitor Simulator. This will allow Vision Acquire to appear to capture and store trace data, even though no monitors are deployed.

Launching the Vision Monitor Simulator

1. Select Simulator icon from Utilities panel to open Monitor Simulator screen.
2. Click the **Vision Monitor Simulator** application icon. A window will open, ready to receive and respond to commands from Vision Acquire.

Creating Your First Database

1. Go to Utilities panel and select DB Creator icon to open Database Creator screen.
2. Click **Load** from the main toolbar. An Open File dialog is displayed.
3. In the **Open File** dialog, browse to and open the file named `St Louis.def`. The sample file is stored under the application folder in an **Example Files** sub-folder. The path will be something like:
C:\Program Files (x86)\Anritsu Company\Vision Trace Acquisition\Samples. The directory path is an example. The actual Vision installation path maybe different.
4. Click **Path**.
5. Designate a location to create the database. A suggested location might be in an Anritsu Databases sub-folder created under your Documents folder.
6. Click **Create**. You will see a process information appear in the process log portion of the screen. When this has run to completion, you have created the database.

3-6 Exercise – Manually Creating a Database

In this exercise, you will create a database for three simulated monitors located in St. Louis, MO. You need to run the Simulator program for this exercise.

New Database Description

Create a new database as described below.

1. Open the Simulator menu.
2. Open the DB Creator menu.
3. Click the “New” button on the Database Creator toolbar to open New Database Description dialog as shown in [Figure 3-6](#).
4. Select **Manual Entry of Monitor details** radio button.
5. Enter the settings as shown in [Figure 3-6](#).

New Database Description (MS2090A):

Import Monitor list from file
 Filename: _____

Manual entry of Monitor details

Number of Monitor entries to create: 24 Ant. Port #: [nn]
 Monitor name: Monitor [nn] Live Port #: 80
 Monitor host name: 127.0.0.1:9[nnn] Cmd Port #: 9001

Channel Description

Number of channels/Monitor: 12 Number of sectors: 3
 Sector center direction (Degrees): 60 180 300 315

Channel Frequency (MHz):	300.000	500.000	700.000	900.000
Channel Bandwidth (MHz):	200.000	20.0000	20.0000	20.0000
RBW (kHz):	0.100	300.000	300.000	300.000
VBW (kHz):	0.100	100.000	100.000	100.000
Reference Level (dBm):	-30.0	-30.0	-30.0	-30.0
Reference Level Offset (dB):	0.0	0.0	0.0	0.0
Sweep Time: (MS2090A)	1.2 min.	1.0 ms	1.0 ms	1.0 ms
Preamp:	<input type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On
FFT:	<input checked="" type="checkbox"/> On			

Help OK Cancel

Figure 3-6. New Database Description Dialog – Manual Base Station Entry

6. Set the **Number of Monitor entries to create** to 24.
7. **Monitor name** should read: **Monitor [nn]**. The [nn] will be replaced sequentially with 1, 2, 3, etc. This prevents two monitors from having the same name. Don't allow two monitors to have the same name.
8. **Monitor host name** should read: 127.0.0.1:9[nnn]
9. Set the **Number of channels/Monitor** to 12.
10. Set the **Channel Frequency (MHz)** to 751 and the **Channel Bandwidth (MHz)** to 20.
11. Set **RBW** to 30 kHz and **VBW** to 10 kHz.

12. Set **Reference Level** to -40 dBm and the **Reference Level Offset** to 0 dB.
13. Set **Preamp** to On.
14. Click **OK**. This will close the New Database Description dialog and populate the input tables as shown in [Figure 3-7](#).
15. Click **Ping** from the main Toolbar. You will see process information in the black status pane as communication with each monitor is verified. If there are any errors, correct them and Ping again. If it is successful, you will see a line stating each monitor is being 'pinged'. A number that indicates the time elapsed for a response in milliseconds. Since we are using the Vision Monitor Simulator for this exercise, the elapsed time for a response may be zero.
16. Click **Locate** from the main toolbar. This will capture the GPS coordinates of each monitor and add that information to the Monitor Definition input table. GPS coordinates are assigned randomly, your dBase may not exactly match the coordinates shown here.
17. You need to add a limit line mask. Click **Import Masks** from the Mask Definition table.
18. In the **Channel Definitions** table, double-click on the field under the **Mask** heading. This enters Edit mode for the table. Enter 751 MHz in the **Mask** field for that channel and click **Enter**.
19. Set the destination folder for the database. The current output destination folder is listed in the status bar. If you want to use the same location as in the last exercise, it should be remembered and listed here. Nothing is required to reuse the same location. If you want to enter a different location, click **Path** in the main Toolbar and then click a destination folder for this database.
20. Click **Create** and the database should be created with progress showing in the status pane.

The screenshot displays the Database Creator application window. At the top, there is a toolbar with buttons for 'New', 'Load', 'Save', 'Path', 'Ping', 'Locate', '20 Seconds', and 'Create'. Below the toolbar, the interface is divided into three main sections:

- Monitor Installation Details:** A table with columns: Name, Description, Latitude, Longitude, Host Name, Group, Contact, Height, Port. It lists seven 'Spectrum Monitor' entries with varying coordinates and host names.
- Channel Definitions:** A table with columns: Port, Start Freq., Stop Freq., RBW, VBW, Ref. Level, RL Offset, Active, Mask, Trace Mode, Sector, Frequency, Preamp, FFT. It lists eight channels with various parameters.
- Mask Definitions:** A table with columns: Name, Mask Type, Segments. It is currently empty.

At the bottom right, a black status pane displays the following text:

```

Contacting #6 (Spectrum Monitor 6) @ 127.0.0.1 ...
GOOD FIX,10.04.27,38.6412,-90.2219

Contacting #7 (Spectrum Monitor 7) @ 127.0.0.1 ...
GOOD FIX,10.04.36,38.6412,-90.2219

Contacting #8 (Spectrum Monitor 8) @ 127.0.0.1 ...
GOOD FIX,10.04.40,38.6412,-90.2219

```

Figure 3-7. Database Creator Screen – Manual Base Station Entry

3-7 Exercise – Creating a Real Database for Your Monitors

Creating your Custom Database

Previously we relied on a saved database definition in the first case, and a very small and simple database in the second case. When creating a database for a set of monitors installed at a determined location, some fields will have to be individually edited for each monitor.

Vision Database Creator (Figure 3-8) requires four fields in the **Monitor Definition** table for each monitor. These are: **Name**, **Latitude**, **Longitude** and **Host Name** (or IP Address). If you just have a monitor name and network host name, then you can use the Locate feature to capture the GPS coordinates of each monitor. That is enough information in the Monitor Definition table to create the database.

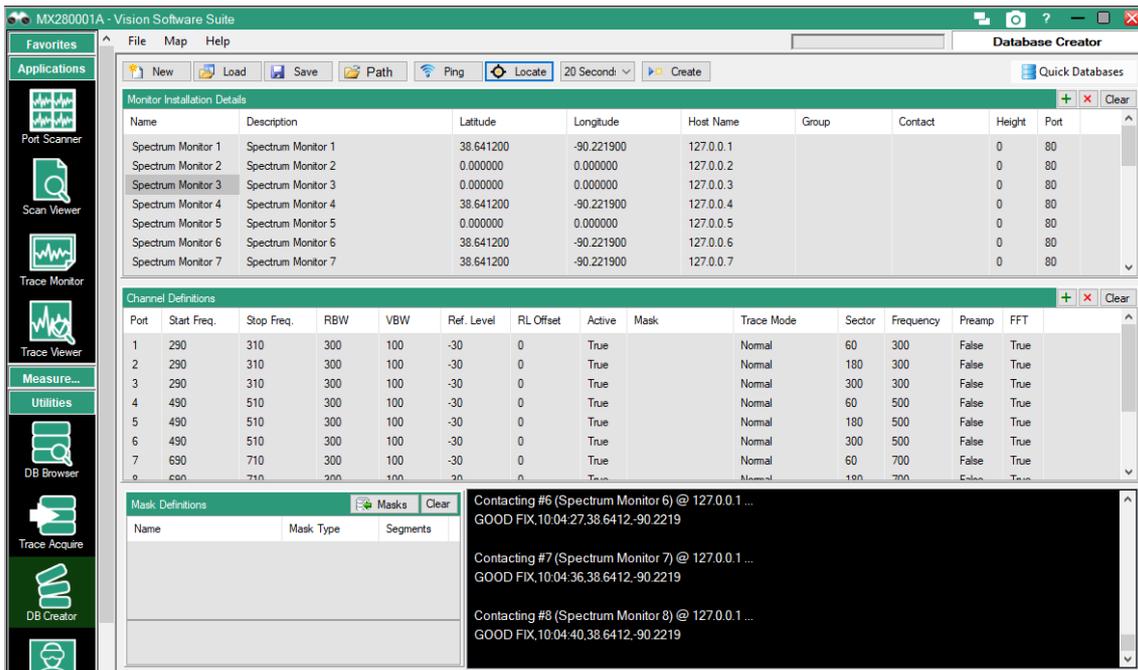


Figure 3-8. Vision Database Creator

The Group, Contact, and Height fields are often left blank. If an email address is entered in the Contact field for a particular monitor, then an email is sent to the contact email address each time that monitor has a failure.

Note

Before email notifications can be sent, email settings must be configured in Vision Acquire. Clicking Email Configuration opens a dialog where the user enters their email server and user identification. For more information Vision Acquire, see Chapter 4, "Trace Acquire".

The Height field is reserved for future use. Leaving this blank will generate Warning messages when creating a database, but it will not stop the database creation. Since the value is not used, you are not forced to enter anything.

The only field you can leave blank in the Channel Definitions table is the Mask field. The Mask is set of limit lines setup by the user that is used to capture signal limit violations. If no mask is specified, every trace passes. Also, if a mask is applied that does not match the frequency range of the sweep data, then the sweep will pass. If the range of the mask overlaps the sweep data, even if only slightly, the mask will be applied where possible and the trace marked as failed if it exceeds the mask where it can be tested.

Add Masks

The only way to enter Mask definitions into a database when it is created is to export masks from another database using the **Mask Editor** in Trace Monitor, then importing that mask definition into the Database Creator. If you do not have masks that can be imported, or you have no useful masks in another database, then you will need to create the database without masks defined. To learn more about setting up Masks, see [Section 5-10 “Setting up a Mask” on page 5-38](#). Once the database is created, collect some traces, then open the Mask editor and use the traces present as reference traces to generate and apply masks to the database.

Click **New** in the Vision Database Creator to begin the process of creating a custom database. Enter as much information as you can, then click **OK**. This will generate entries for the input tables. The tables will almost certainly need to be edited.

Importing a Monitor List – Example 1

1. Run the Vision Database Creator, starting with all of the input tables being clear.
2. Click **New** from the toolbar.
3. In the New Database Description dialog, click **Help** at the lower left. This slides out a description of the information that goes into each field.
4. Click **Import spectrum analyzer list from file**.
5. Click the folder icon to browse for file containing a monitor list.
6. Locate the file `St Louis Name_IP.lst` in the **Example Files** sub-folder of the Vision application folder under Program Files (x86).
7. Click the button next to the folder button to toggle a preview of the contents of the monitor import file as shown in [Figure 3-9](#).
8. Set number of **Channels/base station** to 1.
9. Click **OK**.

New Database Description (MS2090A)

Channel Description

Import Monitor list from file

Filename:

Manual entry of Monitor details

Number of Monitor entries to create: Ant. Port #:

Monitor name: Live Port #:

Monitor host name: Cmd Port #:

Channel Description

Number of channels/Monitor: Number of sectors:

Sector center direction (Degrees):

Channel Frequency (MHz):

Channel Bandwidth (MHz):

RBW (kHz):

VBW (kHz):

Reference Level (dBm):

Reference Level Offset (dB):

Sweep Time: (MS2090A)

Preamp: On On On On

FFT: On On On On

Buttons: Help, **OK**, Cancel

Figure 3-9. New Database Description Dialog – Example 1

You will now see the Import Base Stations dialog ([Figure 3-10 on page 3-21](#)). This dialog lets you specify what each field in the import file corresponds to in the Monitor list. The file we have selected has just two columns, Name and IP address. This is enough to create a database. The import dialog will try to determine the field separator (comma, semicolon or tab) and make a best guess at the fields the file contains. It will not always be right, so you can use the drop-down lists above each column to specify the role that column of data is to have in the database.

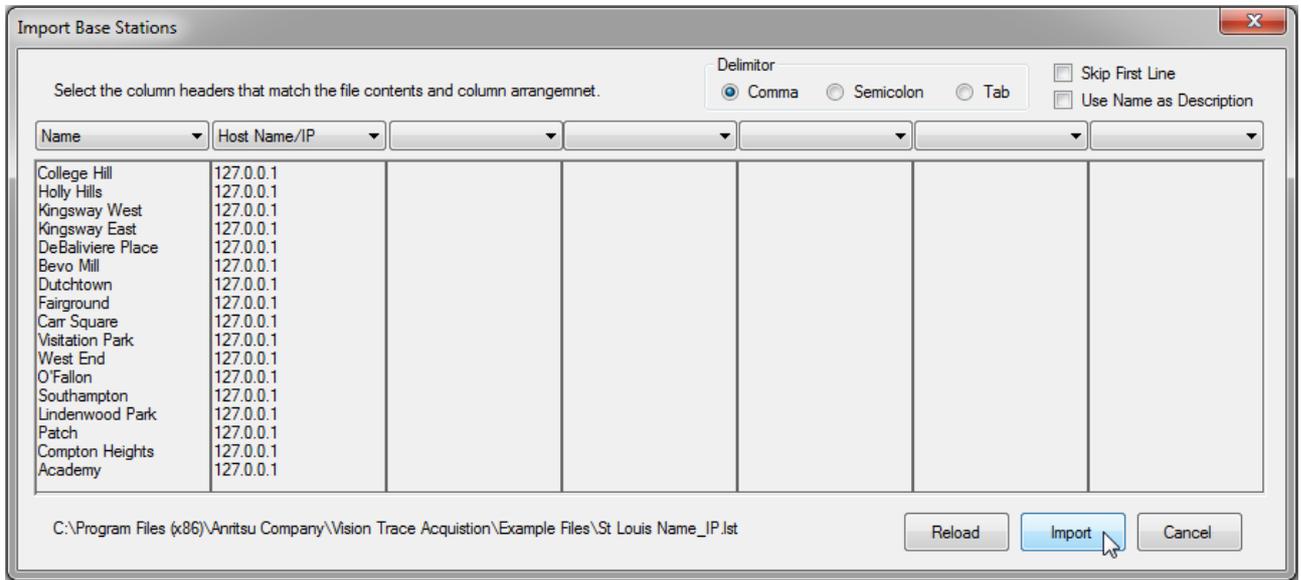


Figure 3-10. Import Base Stations Dialog – Example 1

- Click **Import** and the input tables in Database Creator will automatically compile. This import file did not contain GPS coordinates for the monitors, and click **Locate** (Figure 3-11) to get that from the monitors. If Vision Monitor Simulator is running, you can do that now to complete the Monitor Definition table.

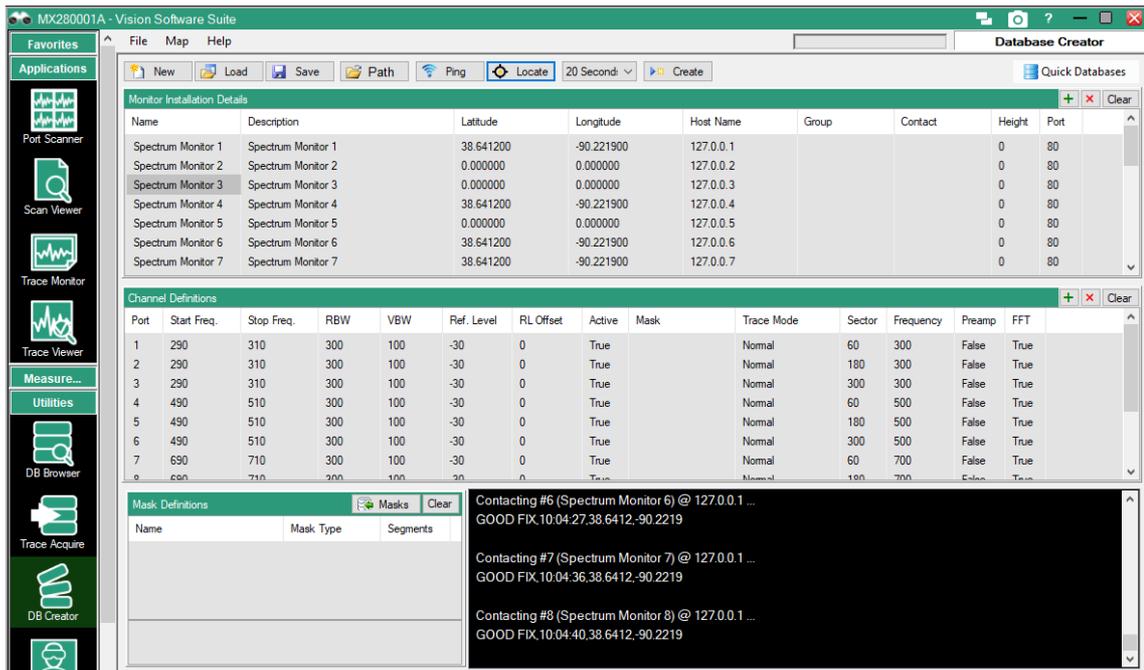


Figure 3-11. Database Creator Screen – Imported Monitor List – Example 1

Importing a Monitor List – Example 2

1. Clear all of the input tables in Vision Database Creator and click **New** from the toolbar.
2. With the Import spectrum analyzer list from file radio button checked, click the button with a folder icon to browse for a file containing a monitor list.
3. Locate the file `St Louis GPS_Group.lst` in the Example Files sub-folder of the Vision application folder under Program Files (x86).
4. As in the previous section, click the preview button to see that this file has more content than the last.
5. Set Number of channels/spectrum analyzer station to 1, as shown in [Figure 3-12](#).
6. Click **OK** to close the import dialog.

Figure 3-12. New Database Description Dialog - Example 2

You will now see the Import Base Stations dialog (Figure 3-13). This dialog lets you specify what each field in the import file corresponds to in the Monitor list. The file we have selected this time has five columns, Name, Latitude, Longitude, IP address, and Group name (under Description). The import dialog will try to determine the field separator (comma, semicolon or tab) and make a best guess at the fields the file contains. In this case it has identified the last column as Description, but that is not what is intended.

7. Click on the down-arrow in the header to the fifth column and change Description to Group.
8. Do not want to leave the Description field blank, so click the check box labeled: Use Name as Description. This will copy the Name field into the Description field in the next step.

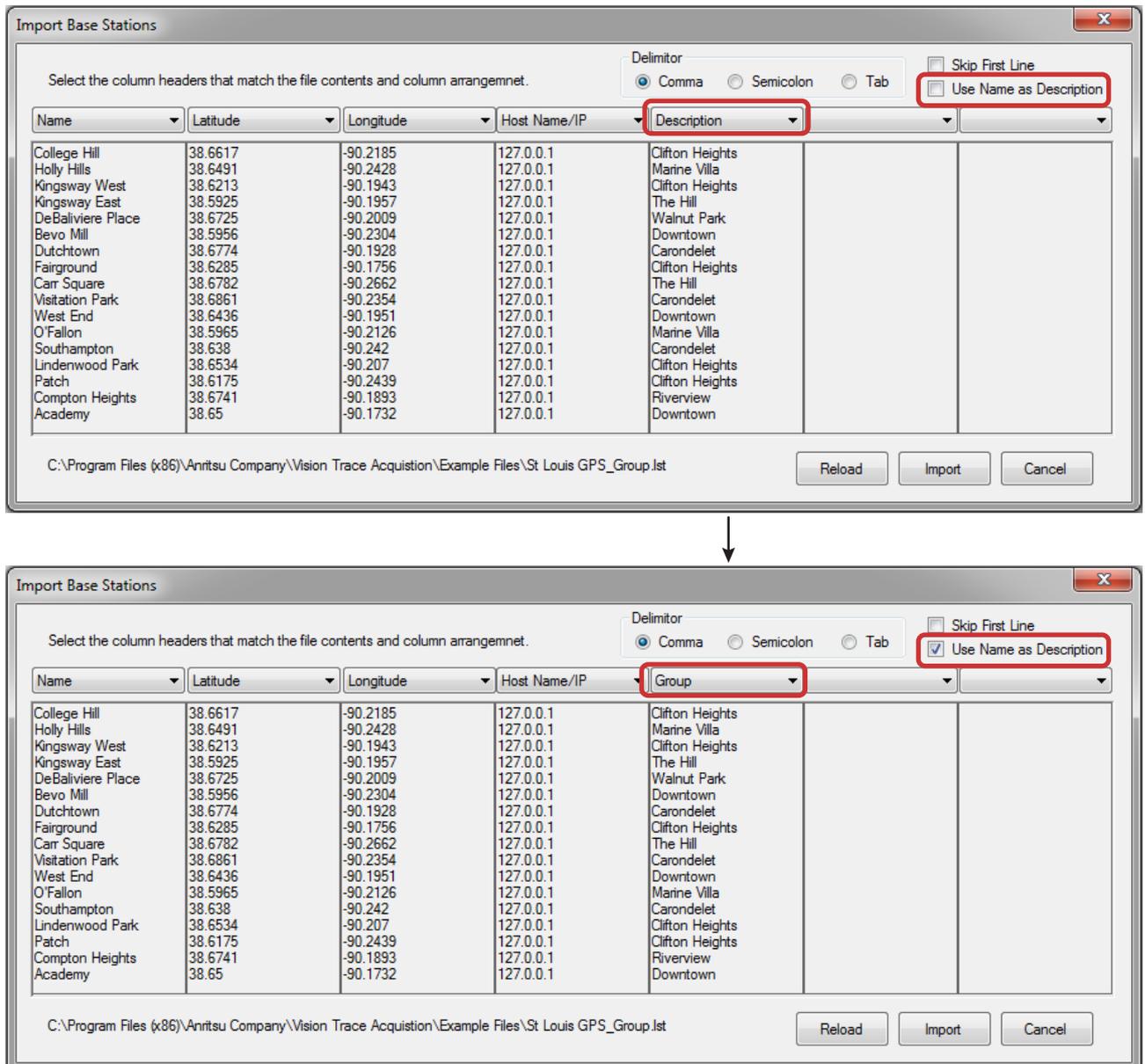


Figure 3-13. Import Base Stations Dialog - Example 2

9. Click **Import** and the input tables in Database Creator are compiled as shown in (Figure 3-14).
10. Set the output destination (click **Path**) so that you do not overwrite a database you want to keep, and then click **Create**. Run Vision Monitor to edit any further sweep parameters or Monitor specific parameters.

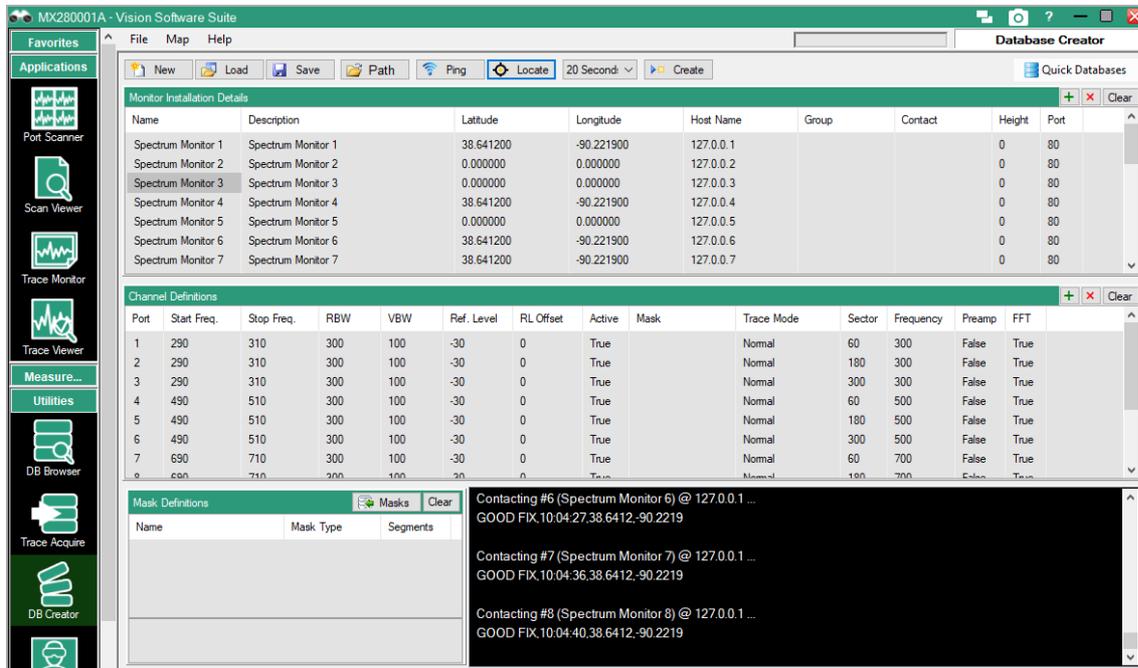


Figure 3-14. Database Creator Screen – Imported Monitor List – Example 2

11. In Vision Monitor, right-click any of the monitors names to open the monitor context menu. (see “Base Station Context Menu” on page 5-17). You can edit the name, description, location, height, group, contact, etc.
12. On the Monitor context menu you also have options to Add and Remove monitors from the list as well as Enable/Disable Sweep on all channels of a selected monitor.
13. When a new monitor is added, click **Enable Sweep on All Channels** to activate all channels on the new monitor.

Note

Removing a monitor is permanent. Traces are not deleted but there is no way to access them in Vision Monitor. The first item on the context menu will open a web browser with a live connection. This is the same as Live View in Vision Monitor, but uses an external browser window, so Vision Monitor is not tied-up with Live View.

Chapter 4 — Trace Acquire

4-1 Introduction

You will not be able to use Vision Acquire or Vision Monitor until you have created and attached a database. To create a database, see [Chapter 3, “DB Creator”](#). The database is used to configure each Spectrum Analyzer for sweeping and to store the resulting trace data. Trace Acquire collects traces from multiple Spectrum Analyzers located at base station sites. The trace collection is periodically configured by the user. Trace Acquire also maintains the database of traces by archiving them, removing old ones, compacting and compressing the database. Setup to receive email trace-monitoring status notifications.

4-2 Trace Acquire Program

From the Utilities menu, locate the Trace Acquire Menu button as shown in [Figure 4-1](#).

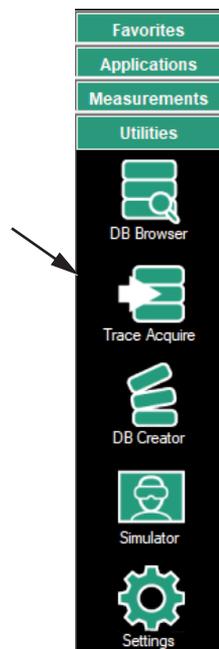
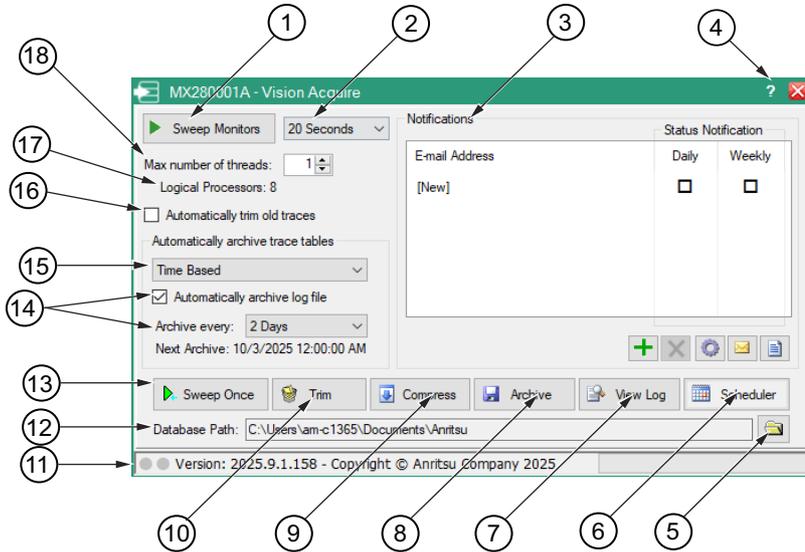


Figure 4-1. Trace Acquire Program

Open Trace Acquire

Click the Trace Acquire menu button to display the user interface shown below in [Figure 4-2](#).

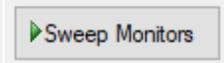


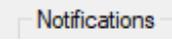
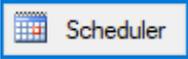
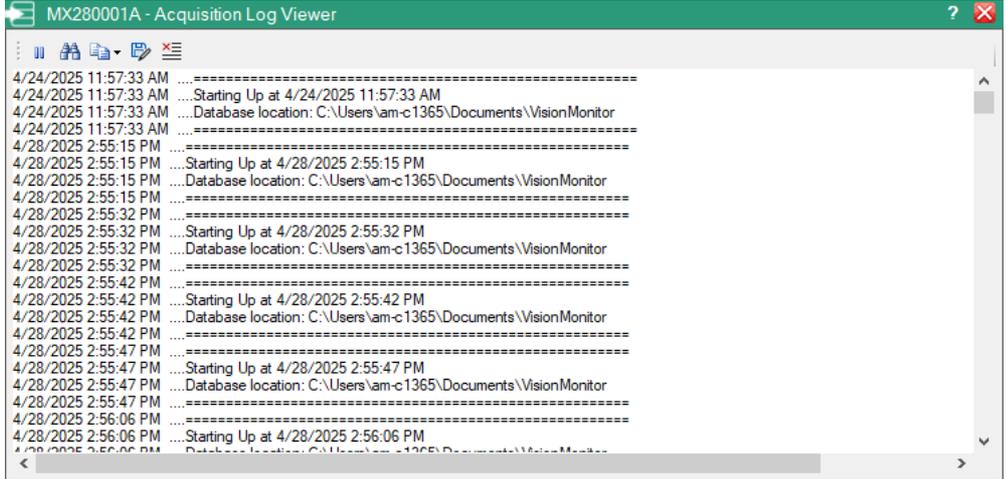
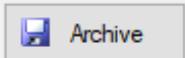
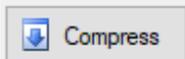
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Sweep Monitors/Stop Sweeping Button 2. Sweep Monitor Time Setting 3. Email Notification Window 4. Help 5. Open File Folder 6. Scheduler 7. View Log 8. Archive 9. Compress | <ol style="list-style-type: none"> 10. Trim 11. Monitor Process Status Indicator 12. Database Path 13. Sweep Once 14. Automatically archive log file check box, Archive every/ Next Archive date and time 15. Automatically archive trace tables (Time Based) 16. Automatically trim old traces check box 17. Logical Processors Readout 18. Max number of threads drop-down |
|---|---|

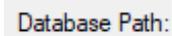
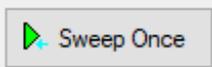
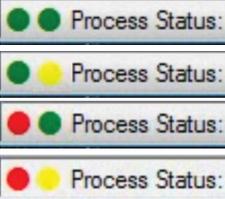
Figure 4-2. Trace Acquire User Interface

Trace Acquire Menu

The Trace Acquire menu is described below.

Icon	Description
	<p>Sweep Monitors: Start the collection of traces to the database. Data collection can be stopped from "Trace Acquire System Tray Menu". Go to system tray and right-click on the Trace Acquire icon, Trace Acquire menu pops up providing an option to stop data collection. A report titled Vision Monitor Failure and Status Report is generated and placed in the default browser. Note that the sweep count has been updated to reset based on the set Failure E-mail Rate. For example if the Failure E-mail Rate is set to 1 hour then sweep count will reset after every hour. See MX280001A - Acquisition Log Viewer below as an example.</p>

Icon	Description
	<p>Sweep Monitor Time Setting: Click this drop-down to set the data collection period from 1 hour to minutes, or seconds. Scroll down the list for the desired time or click the up/down arrow to the desired time. Click one of the timing options from the list. Alternative time intervals are not allowed. Note that based on the selected time interval, the Archive every drop-down options change. For example, if you select 1 second the only available option for Archive every drop-down is 3 Hours. If you select 1 minute more number of options appear in the Archive every drop-down.</p>
	<p>Email Notifications Window: To become active, the email configuration must be configured before it will become active. For details on setting up email notifications, refer to Section 4-3 “Setting Up Email Notifications” on page 4-6. Click on the + sign to add email address and check boxes to set notification period.</p>
	<p>Open File Folder: Browse and open a file.</p>
	<p>Scheduler: View the Advanced Database Scheduling window. See “View Scheduler” on page 4-12.</p>
	<p>Help: See “Help Menu” on page 5-3.</p>
	<p>View Log: Opens the Acquisition Log Viewer user interface screen that contains the activity between the Trace Acquire software and the remote Spectrum Analyzers. If opened when a sweep is occurring, real-time data can be viewed as shown below.</p> <p>For description of the Acquisition Log Viewer Icons, see “Acquisition Log Viewer” on page 4-5.</p> 
	<p>Archive: Save the current database to a different directory location. Click to open the Browse For Folder dialog. Click a folder or Make a New Folder to place the archive database. Click OK. This makes a copy of the active database, but new traces are still added to the old database.</p>
	<p>Compress: Compresses the data in the database file. It removes the unused space created by the deletion of old traces from the database. If Vision software seems to be running unusually slow, compacting the database may be necessary.</p>
	<p>Trim: Removes old traces from the database immediately. Does the same thing as the Automatically remove old traces check box, except without waiting. The “trimmed” database is also compressed.</p>

Icon	Description
	Database Path: Displays the directory location of the current database. Click the folder to enter a different database. This will not create a new database, but will point Trace Acquire to a different existing database for future data storage.
	Sweep Once: Sweep all Spectrum Analyzers immediately and store all traces.
	<p>Monitor Process Status Indicator: The Monitor Process Status Indicator bar provides a visual indicator of the Trace Acquire UI to indicate if a Spectrum Analyzer is off-line or in use. The Process Status indicator descriptions are as follows:</p> <ul style="list-style-type: none"> • Green, Green: All remote Spectrum Analyzers are on-line and available. • Green, Yellow: All Spectrum Analyzers are on-line, but one or more is occupied by another user. • Red, Green: One or more remote Spectrum Analyzers are currently off-line, but all the Spectrum Analyzers that are on-line are available. • Red, Yellow: At least one Spectrum Analyzer is off-line, and of the Spectrum Analyzers that are on-line, at least one of the remote Spectrum Analyzers is occupied by another user.

Automatically archive trace tables: The trace tables can be archived automatically by either choosing Time Based or Size Based. The option None disables automatic archiving of the trace tables. If Time based option is selected the log files are archived based on the selected option for Archive every time-interval drop-down. If Size Based option is selected enter the size of the file you want to archive and choose either MB or GB, refer to [Figure 4-3](#).

Automatically trim old traces: Check to remove old traces from the database. Old traces are removed once each day following the first data collection after 6:00 am.

Archive Every: Set a time interval to archive the trace data.

Logical Processors: The number of processors in the computer used to collect traces. Data collection is very processor intensive. The more processors used, the lighter the workload on the computer.

Max number of threads: The number of traces to be collected during the data collection period. The number of threads represents the number of Spectrum Analyzers under simultaneous communication. It cannot be more than the number of Spectrum Analyzers in the database.

Acquisition Log Viewer

The Acquisition Log Viewer Icons are described below.

Icon	Description
	Pause: Log Viewer Sweep Start/Stop
	Search: Log Viewer Find Text
	Copy: Log Viewer menu list to: <ul style="list-style-type: none"> • Copy selection • Copy current line • Copy current window block (400 lines) • Copy entire log
	Save Log: Saves the log viewer contents.
	Clear Log: Clears the log viewer contents.

Note

If you try to close Vision Acquire using the 'x' Close box in the upper right-hand corner of the application window title bar, Vision Acquire will not exit; it becomes hidden. To close the application, right-click the icon in the System Tray and click Exit.

4-3 Setting Up Email Notifications

The Trace Acquire Program provides a user interface screen to set up email notifications of the signal trace status. The settings in this example can be used to setup and Spectrum Analyzer the Vision Simulator Program.

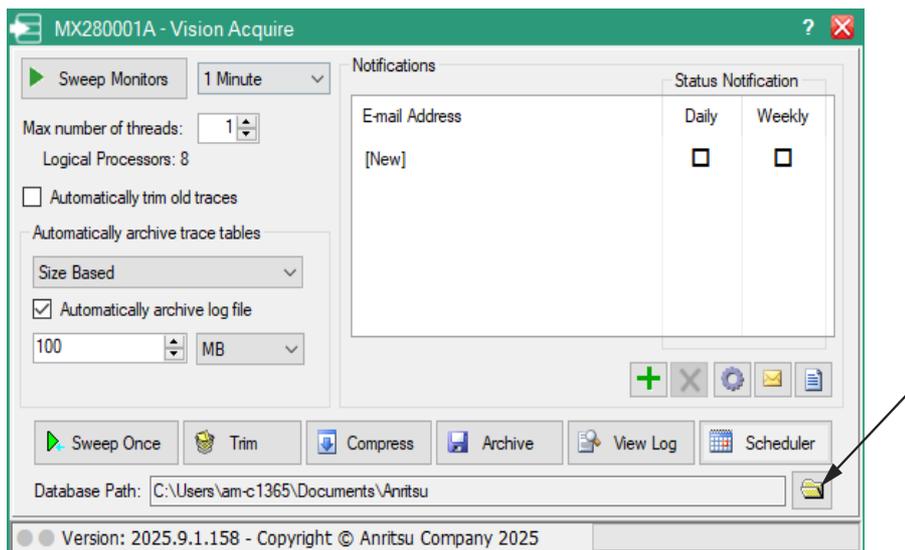
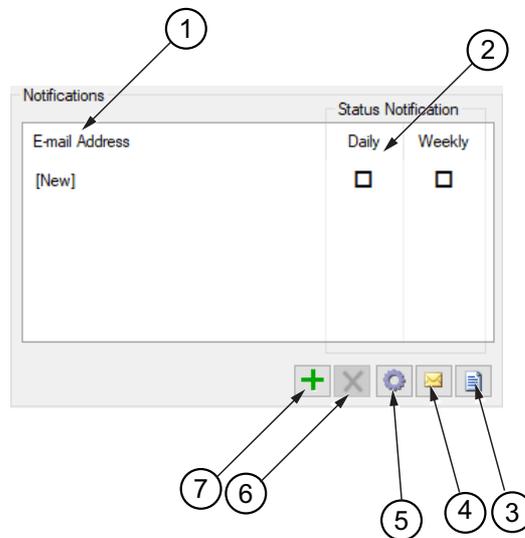


Figure 4-3. Email Notifications – File Folder Location

1. Click the folder icon at bottom-right as shown in [Figure 4-3](#). Browse to the database folder that has been created.
2. Set the sweep time to obtain sweep data.
3. Select Automatic archiving of trace tables:
 - None: Set to None if automatic archiving of log files is not required
 - Time Based: Set to Time Based if archiving is required based on the selected Sweep Monitors time-interval. Select an appropriate option to set archiving based on the available time-interval.
 - Size Based: Set to Size Based if archiving is required based on the size of the trace tables.
4. Check Daily and Weekly check boxes.
5. Click the Gear icon to configure the email service.
6. Check User Authentication box, and create user name and password.
7. Enter your email address and click Test button to test the email configuration.
8. Select 1 hour for Violation Email Rate.
9. Click OK.
10. Click Sweep Monitors. The Green progress bar should move across the bottom every 3 seconds.
11. Click 'View Log', scroll to the bottom of the log file.
12. Verify that there is activity, but no error reports. The log updates and auto-scrolls every few seconds.

To setup email notifications of Trace Status, refer to [Figure 4-4](#).



- | | |
|-----------------------------|--------------------|
| 1. Email Address Field | 5. Configure Email |
| 2. Email Reporting Duration | 6. Delete Email |
| 3. Generate Status Report | 7. Add New Email |
| 4. Send Email | |

Figure 4-4. Email Notifications Setup User Interface

The toolbar icons used for notifications settings are shown below in [Table 4-1](#).

Table 4-1. Email Notifications Icons

Icon	Description
	Generate Status Report: A report titled Vision Monitor Failure and Status Report is generated and placed in the default browser.
	Send Email to Selected Address: Click to immediately send an email to the listed email recipients with the list of traces in the database.

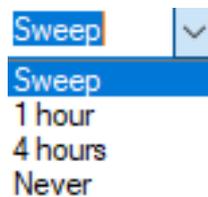
Table 4-1. Email Notifications Icons



Configure e-mail: Click to open the Email Configuration dialog as shown below. Enter the Host name and Port Number of the email server. If the User Authentication box is checked, enter the User name and Password for the email account listed. Enter the email address in the E-mail Addr field. Make sure to enter valid email address, otherwise no email will be sent. If needed, refer to your IT administrator for assistance and the necessary information.

Violation Notification Options: List provides the time interval the email notification will be sent.

Violation E-mail Rate: Send email violation notifications to recipients at the interval rate shown.



Sweep: Send email notification after every sweep.

1 hour: Send email notification after every 1 hour.

4 hours: Send email notification after every 4 hours.

Never: Email notifications are not sent.

Only report frequent Violations: Click the check box and set the Failure Threshold % value so that trace mask violations report can be sent when the threshold exceeds the set value.

Format: Check the radio button as:

Summary: Provides a summarized email list and reporting. See [Figure 4-5](#).

Detailed: Provides a detailed listing of the recipients and email reports. See [Figure 4-6](#).

Audible Alarms: Provides an audible alarm when a mask violation occurs.

Test: Click to display an Enter Recipient dialog as shown below. Adding an email and clicking OK will send a test email to verify email server configuration.

Table 4-1. Email Notifications Icons

	Delete an email address: Click to delete an email address from the Notifications list. A prompt will display to confirm you want to remove the email from the list. Click Yes and the email is deleted.
	Add new email address: Click to add a new email to the Notifications list. A box containing [New] will be listed under the Email Address column. Type the email address into that box.

4-4 Organize Trace Setup

For a typically large scale deployment of 1000 remote Spectrum Analyzers, it can take considerable time to collect all of the trace data. For the case of 1000 Spectrum Analyzers, each with 12 channels, the system needs to setup and acquire 12,000 unique traces in each collection run. It takes 2 seconds to switch the channel and set the desired frequency range, reference level and trace mode, wait for the sweep to complete, and then retrieve the data. With this setup, we need 24,000 seconds to complete the entire acquisition run. That is almost 7 hours if each is done sequentially.

Manage Processing Time

Trace Acquire uses multiple processor threads so it can simultaneously talk to multiple remote Spectrum Analyzers at once. For 24 threads, the total acquisition time is approximately 20 minutes. You can set up to 64 threads; however, the optimal number depends on the speed and processor count of the server running Trace Acquire. The time to collect from each channel may be different than the two seconds used in the example above. It will take longer if you are using Min Hold or some other form of trace math, and also longer if the network connection between the server and the remote Spectrum Analyzers has a lot of lag time.

Adjust Data Acquisition

You will need to adjust the acquisition interval and thread count to get optimal performance on your server and network setup. If the data collection run takes longer than the set time, then the next run starts approximately 3 seconds after the previous is completed. The next acquisition run will not launch in competition with one that has not completed.

Trace Limitations

When monitoring for activity, you will want to scan as often as possible. This means you will accumulate many traces over the course of a few days. Vision trace databases are limited in the number of traces they will hold. This limitation is in place so that Vision can be responsive to user interaction. Each time you click a different channel or Spectrum Analyzer in Vision, all of the traces for that channel are loaded, a spectrogram is generated and other work takes place behind the scenes. If the database is too large, it will become sluggish.

Number of Traces Stored

Vision limits the number of traces to 10,000 per channel in each database. If you are storing a trace every two seconds, then you reach the 10,000 trace limit in about 5 hours. If you want to collect for several days to thoroughly map out the usage, then you will need to store trace data in multiple databases.

Set Archive Trace Intervals

Choose either Time Based or Size Based option to set Trace Acquire to automatically archive trace tables. If Time Based archiving is selected choose an appropriate option for Archive every drop-down for doing the automatic archive, refer to [Figure 4-2](#). For example, if you set the interval to every 6 hours, the database will be copied to a sub-folder, and the active trace tables will be cleared for storage for the next 6 hour period. The periods have fixed start and stop times. If you set it for 6 hours, then the database will be archived at 6:00 am, noon, 6:00 pm and mid-night each day while it is running. If you start at 10:00 am, then the first archive will only have two hours of data. If Size Based option is selected the log files are archived based on the set size of the file as shown in the [Figure 4-3](#).

Trace Storage Violations

As each trace is collected, it is tested against a limit line mask. If the trace exceeds the mask, that trace is marked as having failed. At the end of each run, a report is generated listing each channel that failed. Depending on settings, the database may store weeks or months of trace data, so the report also includes sections for channels that have failed in the past hour, the past day, the past week, and the past month. Users who want to be notified can register to receive this report by email using the Email Notification system. See [“Setting Up Email Notifications”](#) on page 4-6.

Note

User must be aware that violation status email notices can be initially marked as SPAM and may need to setup a conditional check to Spectrum Analyzer the email notices.

Trace Violation Notifications

There is also a contact for each Spectrum Analyzer individually, and an email can be sent just for that Spectrum Analyzer when it has a channel failure. The user interface provides a table where contacts are registered and the level of reporting is indicated by checking a box. There is also a check box that enables sending emails. If this is not checked, no emails will go out.

Trim Old Traces

There are several database maintenance features available through the UI. If the check box is unchecked for removing old traces, then nothing will get automatically removed and the trace tables will continue to store old data and grow very large. Keep in mind that a typical installation with 1,000 Spectrum Analyzers will store 12,000 traces 4 times an hour. Using rough numbers, that is 50,000 traces per hour, or 1.2 million traces a day. If you store 30 days of data, that is almost 40 million traces in the database. Each trace takes around 4,000 bytes, so we have 160 Gigabytes of data. If you let that go several months without removing old traces, it can become quite large and unwieldy, potentially exceeding space available and certainly affecting system speed and responsiveness.

4-5 Trace Mask Violations

Trace mask violations are reported failure. The very first email-generated report that is issued will always show 1 violation count for each channel reported on in the notification. This violation report is generated shortly after starting trace capture in Trace Acquire regardless of the frequency specified in the notification settings.

Subsequent email reports reflect the actual violated trace totals. The first report counts 1 per channel is as shown in the Vision Monitor Summary and Detailed violation reports examples below in [Figure 4-5](#) and [Figure 4-6](#). See [Figure 4-7](#) which shows the set violation threshold percentage value on top of the trace mask violations table.

Vision Monitor Summary Violation Report

9/8/2025 3:21:23 PM

Violation Email Rate: Every Hour, on all failures

Database Host: ██████████

Database Path: C:\Users\████████\Documents\Anritsu\VisionMonitor

Available Disk Space: 715.800 GB

Trace Mask Violations

Base Station	Channel	Mask	Largest Violation		Report Violation Rate			Database Violation Rate		
			Frequency	Amount	Violation Count	Sweep Count	Percentage	Violation Count	Sweep Count	Percentage
allthethings1-4	4	-82 dBm	106.490 MHz	5.37 dB	18	20	90.0%	120	219	54.8%

Network Failures

No failures to report.

Figure 4-5. Vision Monitor Summary Violation Report

Vision Monitor Detailed Violation Report

9/8/2025 3:19:19 PM

Violation Email Rate: Every Hour, on all failures

Database Host: ██████████

Database Path: C:\Users\████████\Documents\Anritsu\VisionMonitor

Available Disk Space: 715.814 GB

Trace Mask Violations

Sweep Summary		Largest Violation Details		Sweep Image	Violation Rates	
Monitor name:	allthethings1-4	Time:	9/8/2025 3:18:46 PM		Report Violation Count:	35
Channel:	4	Mask name:	-82 dBm		Report Sweep Count:	36
Start Frequency:	104.000 MHz	Mask Level:	-82.00 dBm		Report Violation Rate:	97.2%
Stop Frequency:	109.000 MHz	Trace Frequency:	106.500 MHz		Database Violation Count:	66
Frequency Span:	5.000 MHz	Trace Power:	-76.33 dBm		Database Sweep Count:	162
Resolution BW:	10.0 kHz	Violation Amount:	5.67 dB		Database Violation Rate:	40.7%
Video BW:	10.0 kHz					
Reference Level:	-70.00 dBm					

Network Failures

No failures to report.

Figure 4-6. Vision Monitor Detailed Violation Report

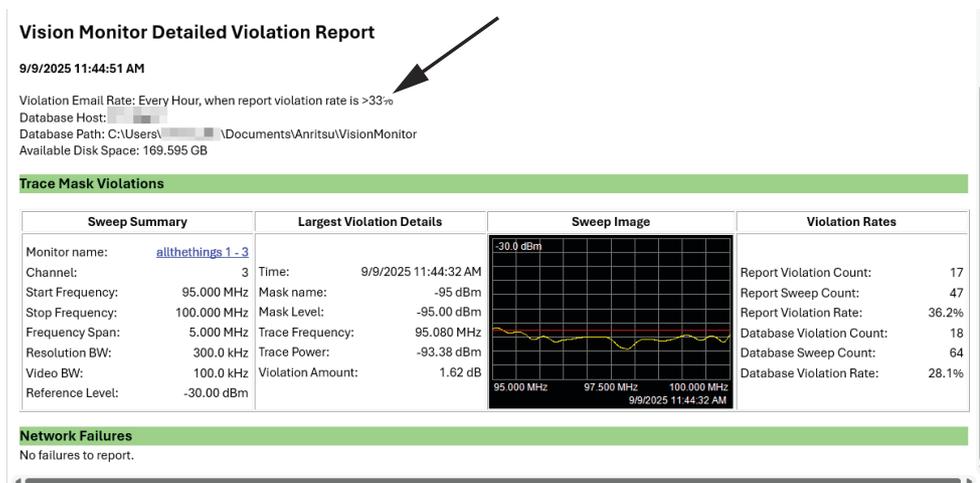


Figure 4-7. Vision Monitor Detailed Violation Report with Violation Threshold Percentage

View Scheduler

The Scheduler provides a weekly scheduling format to run up to four databases with different sweep parameters and Spectrum Analyzers to analyze the signal span at different times in the day or week. The scheduler menu can be opened by right-clicking the Vision Acquire icon in the system tray and locate View Scheduler as shown in Figure 4-8, or pressing the “Scheduler” button in the Trace Acquire. The start time and stop time is set by the user for each database as shown in Figure 4-9 on page 4-13.

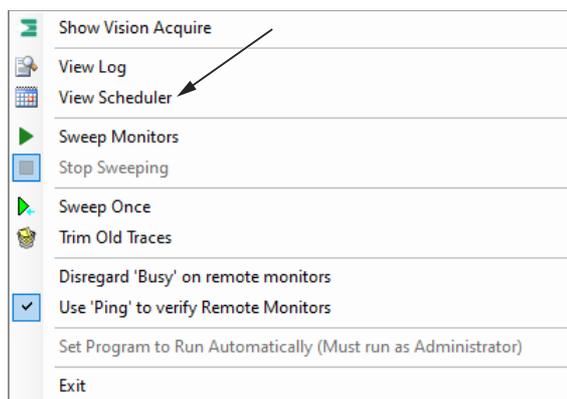


Figure 4-8. View Scheduler

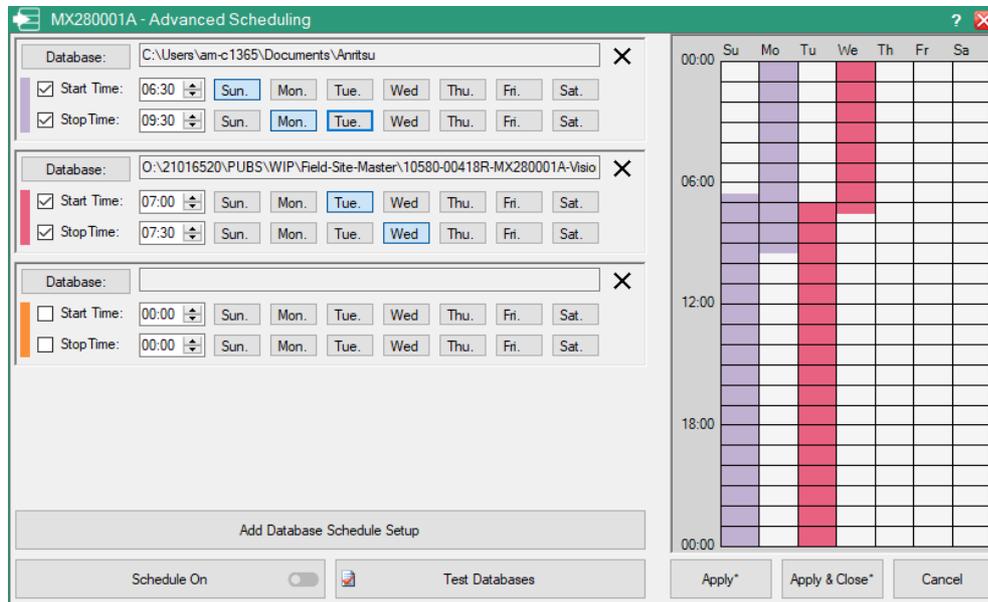


Figure 4-9. Advanced Scheduling Window

Advanced Scheduling Procedure

1. Click the Database to select a database file.
2. Set the time for data collection to begin using Start/Stop Time. You can choose the start and stop days which will displayed as color coded boxes as shown in [Figure 4-9](#).
3. Select a start and stop day of the week during which the data collection should take place. Notice the color-coded calendar on the right that showing the set start/stop time and day of the week. Note that an asterisk symbol is displayed both on Apply and Apply & Close buttons as shown in [Figure 4-9](#), to indicate that the changes are not applied yet. Once the Apply button is clicked the asterisk symbol disappears indicating the changes have been applied. Click Cancel to cancel the selections otherwise click either Apply or Apply and Close.
4. Click Add Database Schedule Setup button to add more databases. Click the X icon located at the right side of the database path to delete a specific database.
5. Clicking Schedule On button turns the Scheduler button green in Vision Acquire window. This indication keep the user informed of the setup database scheduling.
6. Click Test Databases button. This provides a sweep parameters pre-check to verify the RBW, frequency range, and RSM communication is valid so the scheduled database sweeps will perform properly. If an invalid setup is detected, an error message will display as shown [Figure 4-10](#). Corrections must be made as indicated to continue with the scheduled sweep.

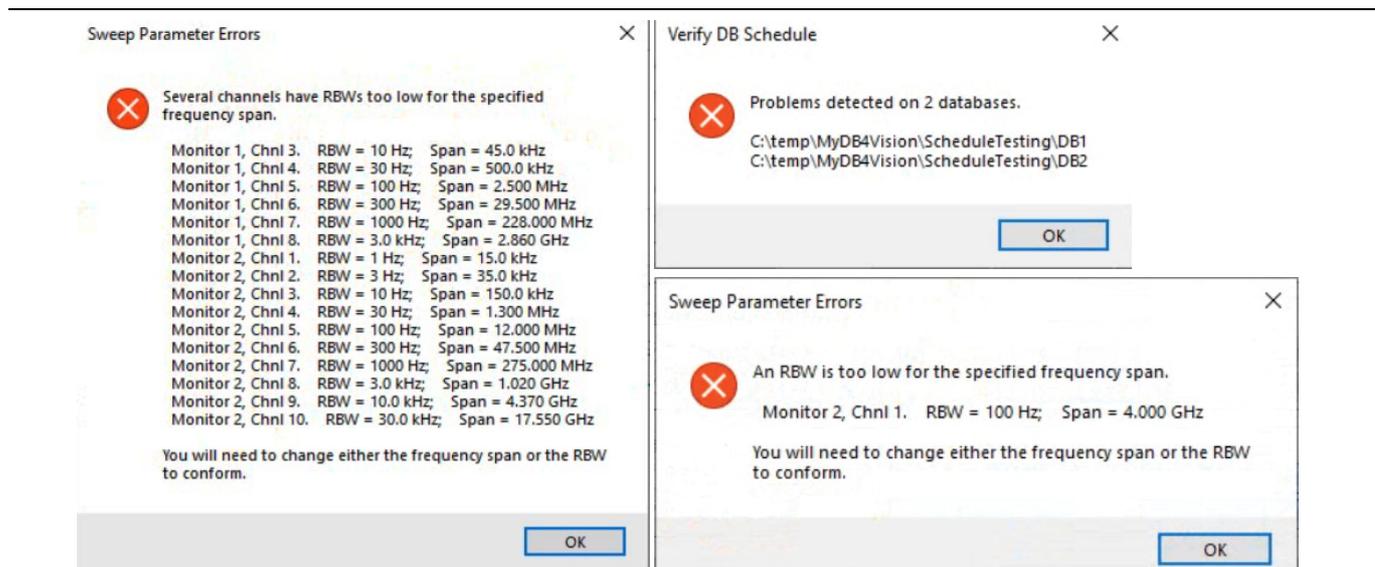


Figure 4-10. Scheduler Error Message Examples

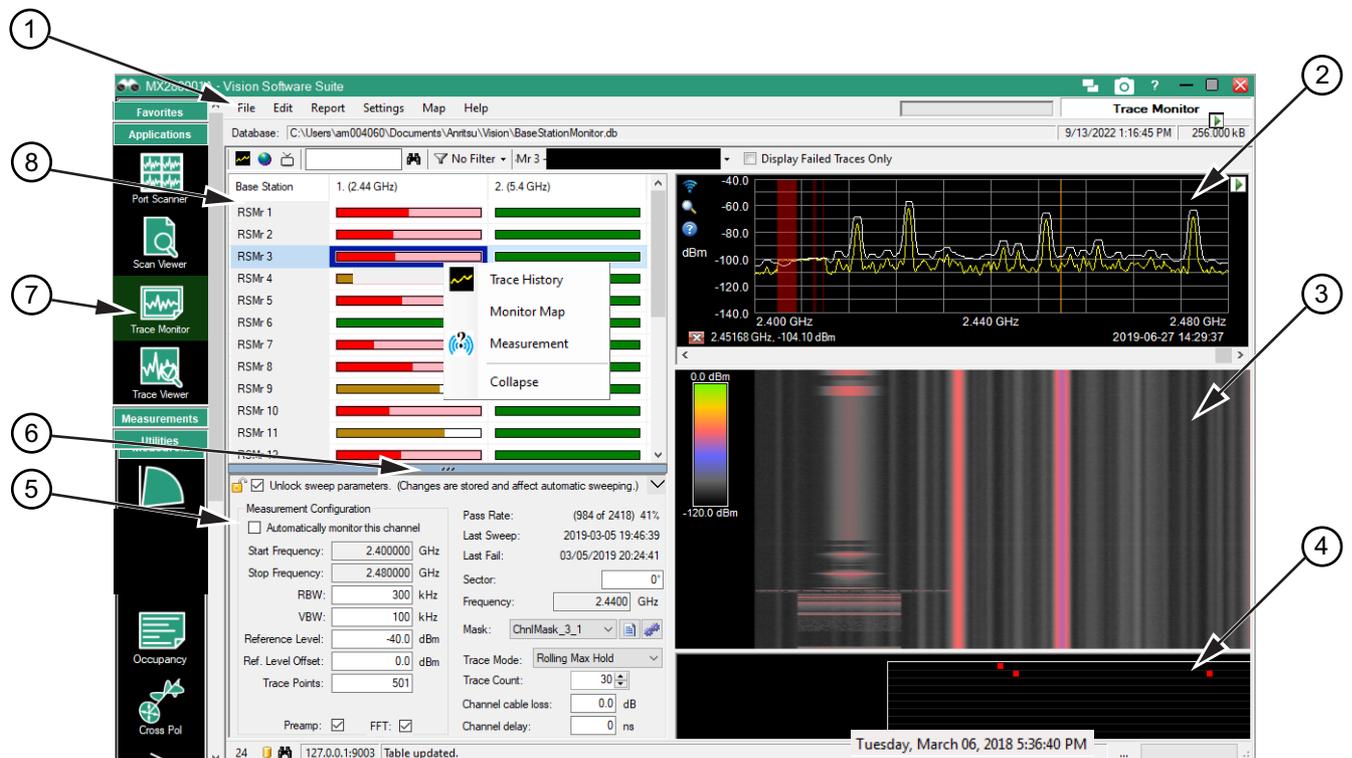
Chapter 5 — Trace Monitor/Trace Viewer

5-1 Introduction

The Trace Monitor program analyzes traces collected from Spectrum Analyzers and stores them in the Trace Monitor database. Trace Monitor can be used with spectrum analyzers with Option 400 installed. Trace Viewer compares traces between channels. See “Trace Viewer” on page 5-11.

5-2 Trace Monitor Program

The Vision Trace Monitor menu is shown below in Figure 5-1.



- | | |
|---|---|
| 1. “Trace Monitor Menu Bar” on page 5-2 | 6. “Three-Dot-Menu Window” on page 5-35 |
| 2. “Trace Panel” on page 5-23 | 7. Trace Monitor Button “Base Station and Channel Directory” on page 5-21 |
| 3. “Spectrogram” on page 5-27 | 8. Base Station status window |
| 4. “Trace Matrix” on page 5-28 | |
| 5. “Measurement Configuration” on page 5-33 | |

Figure 5-1. Trace Monitor User Interface

Trace Monitor Menu Bar

The Trace Monitor menu bar is shown in [Figure 5-2](#) and is described in [Table 5-1](#).

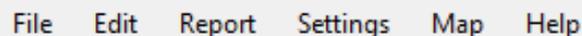


Figure 5-2. Trace Monitor Menu Bar

Table 5-1. Trace Monitor Menu Bar Description

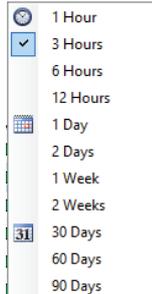
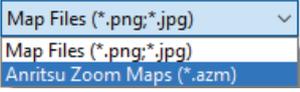
Menu	Description
File	<p>Open Database: Opens the database folder that has been set from “Set Database Root Folder”.</p> <p>Set Database Root Folder: Opens the database folder set the “Set Database Root Folder”.</p> <p>Recent Databases: Click to display the most recent databases used.</p> <p>Exit: Exit the File menu.</p>
Edit	See “ Copy and Paste Functions ” on page 5-49.
Report	<p>Generate Failure Report: Contains data sections of accumulated failures from the Last Pass, Past Hour, Past Day, Past Week, and Past Month. See “Generate Failure Report” on page 5-6.</p> <p>Export Failure Report: Export the failure report to a set file location.</p> <p>Network Health Check: Provides a Network Health Check Report. See “Network Health Check Report” on page 5-7.</p> <p>Browse Report Archive: Report Options. Opens the browser dialog.</p> <p>Report Options: Set the Failure Report, Occupancy Report and Export Field Delimiter Options. See “Trace Monitor Report Options” on page 5-8.</p>
Settings	<p>Set Time Frame: Set the total time contained for all rows and columns in the visible Time Chart as shown below. The selected time set provides the amount of time for each green, red or black square. Changing this setting does not affect the rate at which new traces are collected.</p>  <p>Show Location Estimate on Map: View a signal’s location in the map display.</p> <p>Preferred Web Browser: View a menu of a user’s preferred Web Browsers.</p> <p>Use High Contrast Colors: Show a color palate that is applied to the Trace Matrix block display for color identification of pass/fail traces.</p>

Table 5-1. (Continued)Trace Monitor Menu Bar Description

Menu	Description
Map	<p>Load Map: Click to locate a map file not in the suggested folder, or to import from an AZM file. The browser map file extensions are shown below.</p>  <p>Existing Map: Click to open a submenu that lists all of the map files located in the suggested map folder: “[user documents]\Anritsu Map Files”.</p>
Help	Help: See “ Help Menu ” below.

Help Menu

The Help menu shown in [Figure 5-3](#) is located in most menu bars of the Vision MX280001A Program.

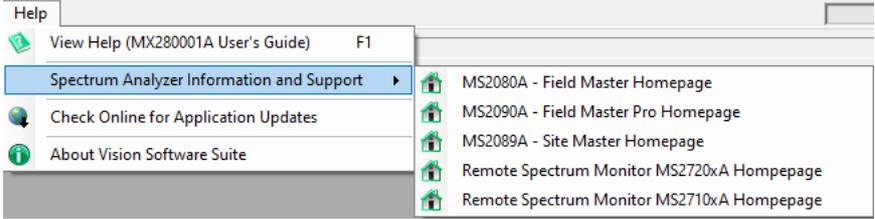
Help	<p>View Help (MX280001A User’s Guide): Provides the Online MX280001A Help File.</p> <p>Spectrum Analyzer Information and Support: Provides the information menu shown below for the MS2090A, MS2720xA, and MS2710xA.</p>  <p>Check Online for Application Updates: Provides the installed MX280001A version software and if a version update is suggested.</p> <p>About Vision Software Suite: Provides the MX280001A software details as shown below.</p> 
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Figure 5-3. Help Menu

Import Map from AZM File

To locate a map file not in the suggested folder or to import from an AZM file, chose the “Load Map” menu item from the “Map” file command. For all of the Vision applications that support a map display, import a map layer from any easyMap Tools map file (*.azm) Anritsu Zoom Maps by selecting as the file type in the Open Map dialog box as shown in Figure 5-4.

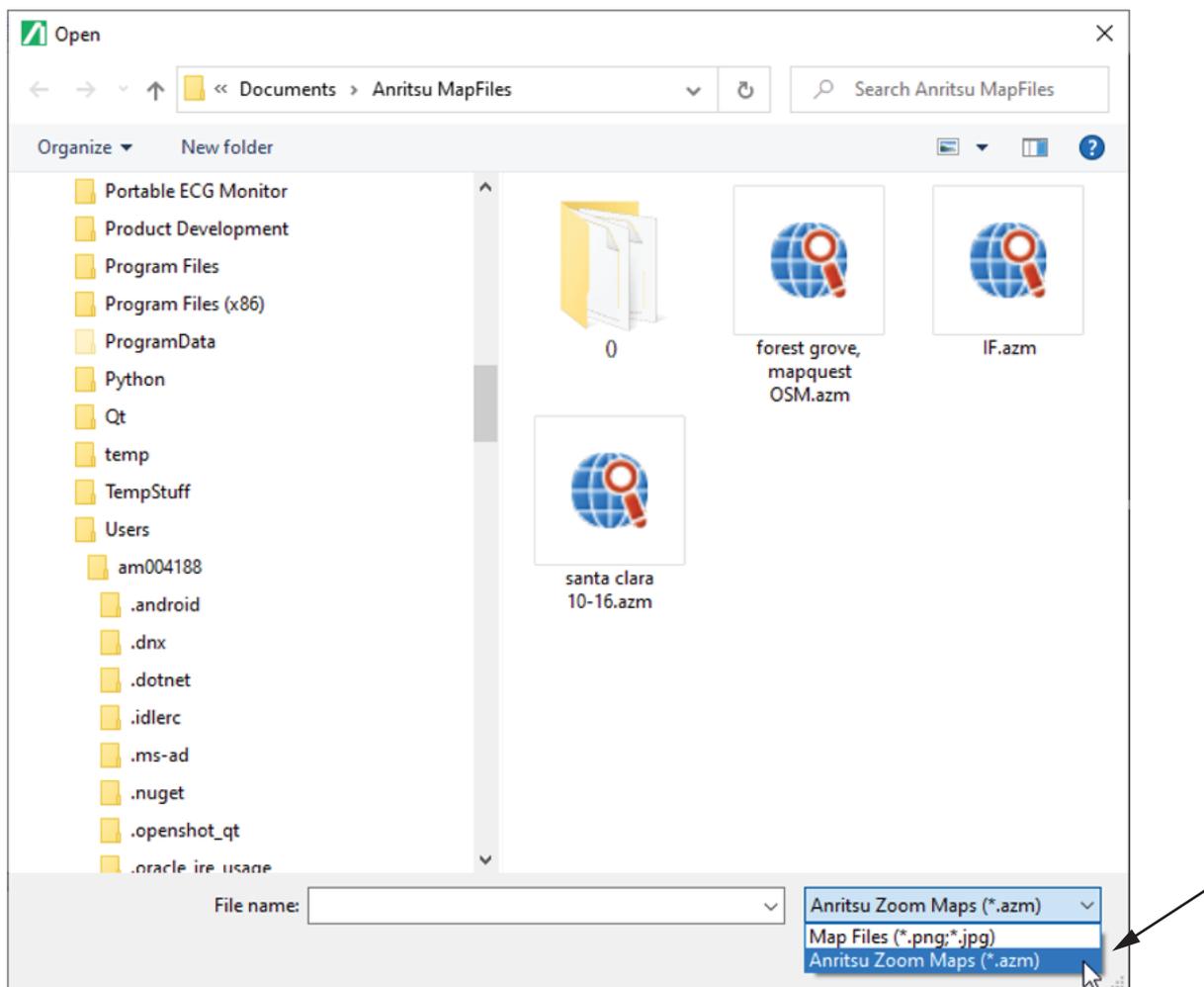


Figure 5-4. Anritsu Zoom Maps (*.azm) Dialog

Export Map

Select the Anritsu Zoom Maps file type displays the Export Map from AZM dialog as shown in [Figure 5-5](#).

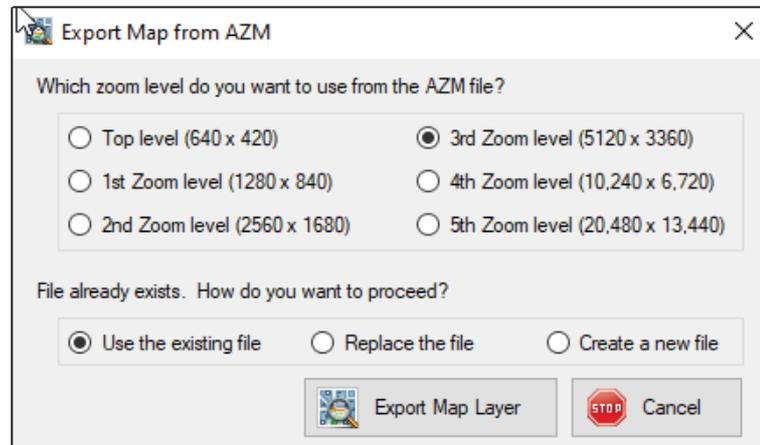


Figure 5-5. Export Map from AZM Dialog

The top section offers the user a number of map layers to choose from. Only the number of layers available in the file will be enabled. If only three layers are available, the other layers will be grayed-out.

The bottom section is only shown if a file already exists. The export file has the same name as the AZM file, but with a .png extension.

Export Map Layer Button: The layer is exported and automatically loaded as the new display map. The deep layers have a lot of map tiles that have to be extracted and stitched together (layer 5 has about 9000 individual images that have to be processed), so it can take several seconds. A progress bar is displayed during the tile stitching process.

Report Generator

When enough data has been collected to generate the report, open the Report menu. This is a separate window that opens, allows for some customization, and viewing of the report content as shown in [Figure 5-6](#).

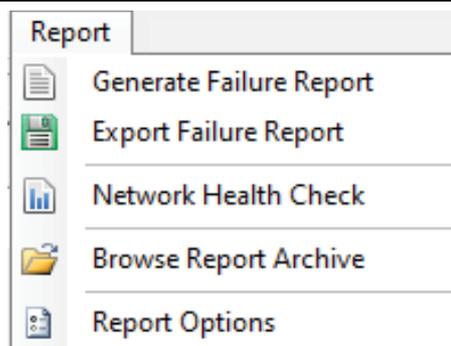


Figure 5-6. Report Generator

Generate Failure Report

From the Vision Trace Monitor menu bar, press Report and then Generate Failure Report. The “Vision Monitor Failure & Status Report” is displayed as shown in [Figure 5-7](#). This report contains data sections of accumulated failures from the Last Pass, Past Hour, Past Day, Past Week, and Past Month. Each section provides:

- Monitor Name
- Description
- Channel
- Carrier Frequency
- Failure Rate (percentage)
- Fail Time

A Vision Monitor Failure and Status Report is shown in [Figure 5-7](#).

Vision Monitor Status Report / Database Breakdown

6/9/2025 4:50:26 PM

Database Host: ██████████
 Database Path: C:\Users\am005085\Documents\Anritsu\VisionMonitor
 Available Disk Space: 718.394 GB

Past Hour Failures

Base Station	Description	Channel	Mask	Fail Count	Sweep Count	Fail Rate
Monitor 1	Monitor 1	1		0	49	0.0%
Monitor 1	Monitor 1	2	c1	31	49	63.3%
Monitor 1	Monitor 1	3		0	48	0.0%
Monitor 1	Monitor 1	4		0	48	0.0%
Monitor 1	Monitor 1	5		0	48	0.0%
Monitor 1	Monitor 1	6		0	48	0.0%
Monitor 1	Monitor 1	7		0	48	0.0%

Past Day Failures

Base Station	Description	Channel	Mask	Fail Count	Sweep Count	Fail Rate
Monitor 1	Monitor 1	1		0	52	0.0%
Monitor 1	Monitor 1	2	c1	33	52	63.5%
Monitor 1	Monitor 1	3		0	51	0.0%
Monitor 1	Monitor 1	4		0	51	0.0%
Monitor 1	Monitor 1	5		0	51	0.0%
Monitor 1	Monitor 1	6		0	51	0.0%
Monitor 1	Monitor 1	7		0	51	0.0%

Figure 5-7. Generate Failure Report

Network Health Check Report

The Vision Health Check Report provides a spectrum analyzer identification and operational status report. From the “[Report](#)” menu, click the “[Network Health Check Report](#)”. The Network Health Check Report appears as shown in [Figure 5-8](#).

Vision Health Check Report - 08/24/2022 15:35:48

Monitor Name	Model/Options	Serial #	Firmware Version	GPS	Response Time	Busy
RSMr 8	MS2710xA Simulator/400/401/407/479/482/485	VSIM9008	2022.9.1.1	GOOD FIX	0 ms	Open
RSMr 2	MS2710xA Simulator/400/401/407/479/482/485	VSIM9002	2022.9.1.1	GOOD FIX	0 ms	Open
RSMr 19	MS2710xA Simulator/400/401/407/479/482/485	VSIM9019	2022.9.1.1	GOOD FIX	0 ms	Open
RSMr 7	MS2710xA Simulator/400/401/407/479/482/485	VSIM9007	2022.9.1.1	GOOD FIX	0 ms	Open
RSMr 3	MS2710xA Simulator/400/401/407/479/482/485	VSIM9003	2022.9.1.1	GOOD FIX	0 ms	Open
RSMr 15	MS2710xA Simulator/400/401/407/479/482/485	VSIM9015	2022.9.1.1	GOOD FIX	0 ms	Open

Figure 5-8. Network Health Check Report

The Vision Health Check Report columns are described in [Table 5-2](#).

Table 5-2. Vision Health Check Report Description

Column Name	Description
Monitor Name	A list of the active Spectrum Analyzer names from the Remote Monitor List. The order of the Spectrum Analyzers listed appear in the order they respond to the Health Check ping.
Model/Options	A list of the spectrum analyzer model number and the options installed in each Spectrum Analyzer.
Serial Number	A list of the Serial Numbers that identify each Spectrum Analyzer.
Firmware Version	A list of firmware versions of each Spectrum Analyzer.
GPS	A list that displays the GPS connection status. Good Fix indicates the Spectrum Analyzer is connected to GPS. NO Fix indicates the GPS connection is poor or none.
Response Time	A list of the Monitors Response Time. Typically in the 10s to 100 ms.
Busy	A list indicating if Monitor is available for remote control: Open: indicates available, Busy: indicates someone else is using the spectrum analyzer, Error: indicates the spectrum analyzer did not respond, likely it is off-line.

Trace Monitor Report Options

The Vision Report Options dialog box is shown below in [Figure 5-9](#).

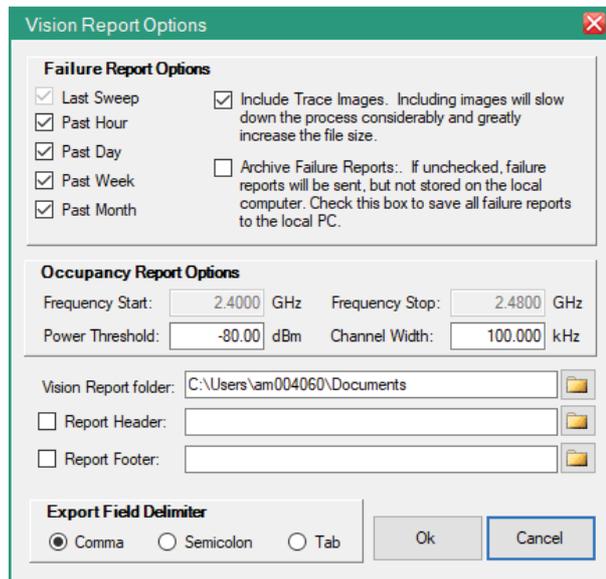


Figure 5-9. Vision Report Options Dialog

Report Options

Last Sweep: Not available for this release. All other failure report options will include the last sweep failure.

Past Hour: Report is generated for the failures that have occurred in the past hour.

Past day: Report is generated for the failures that have occurred in the past day.

Past Week: Report is generated for the failures that have occurred in the past week.

Past Month: Report is generated for the failures that have occurred in the past month.

Include Trace Images: Check to include the trace images in the report.

Archive Failure Reports: Check to automatically save reports in an archive folder.

Trace Monitor Span Warning Messages

The Trace Monitor screen will provide an error message if the frequency span is too large for the selected RBW as shown in [Figure 5-10](#). The error message warns that the sweep will be blocked when the sweep is initiated in Trace Acquire. For specific sweep conditions, see “[Maximum Frequency Span](#)” on page 2-9. Once the error condition is corrected, the message will no longer be displayed.

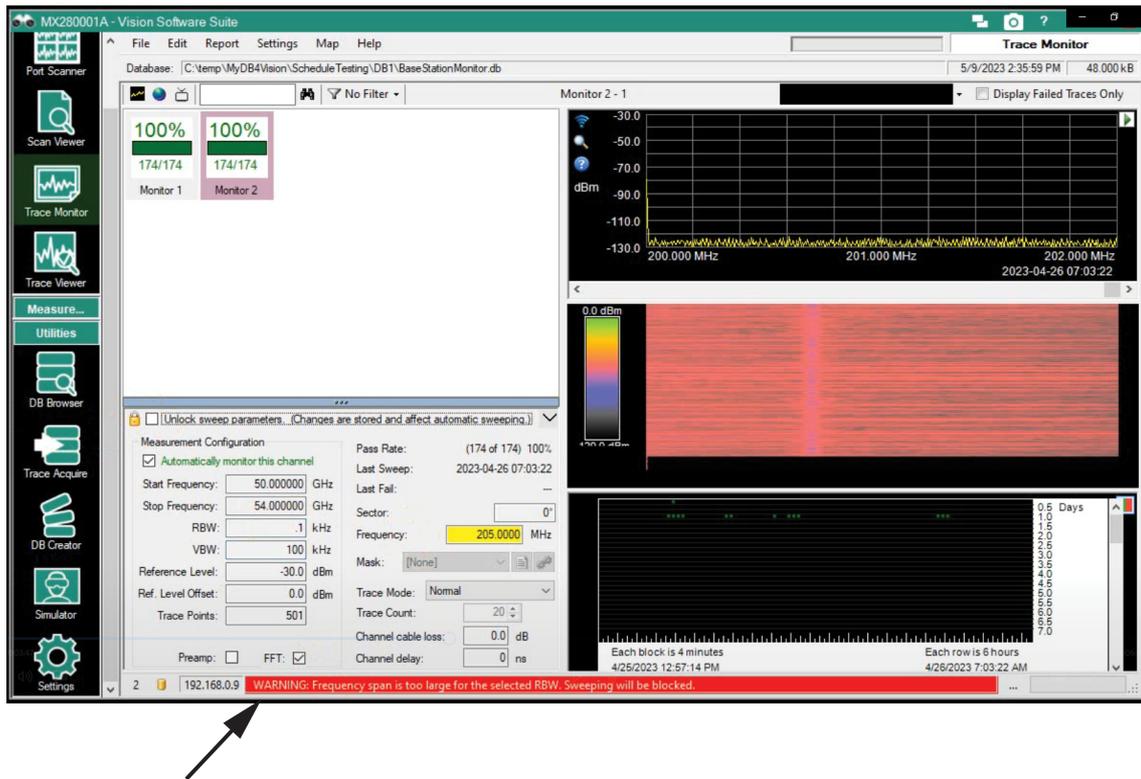


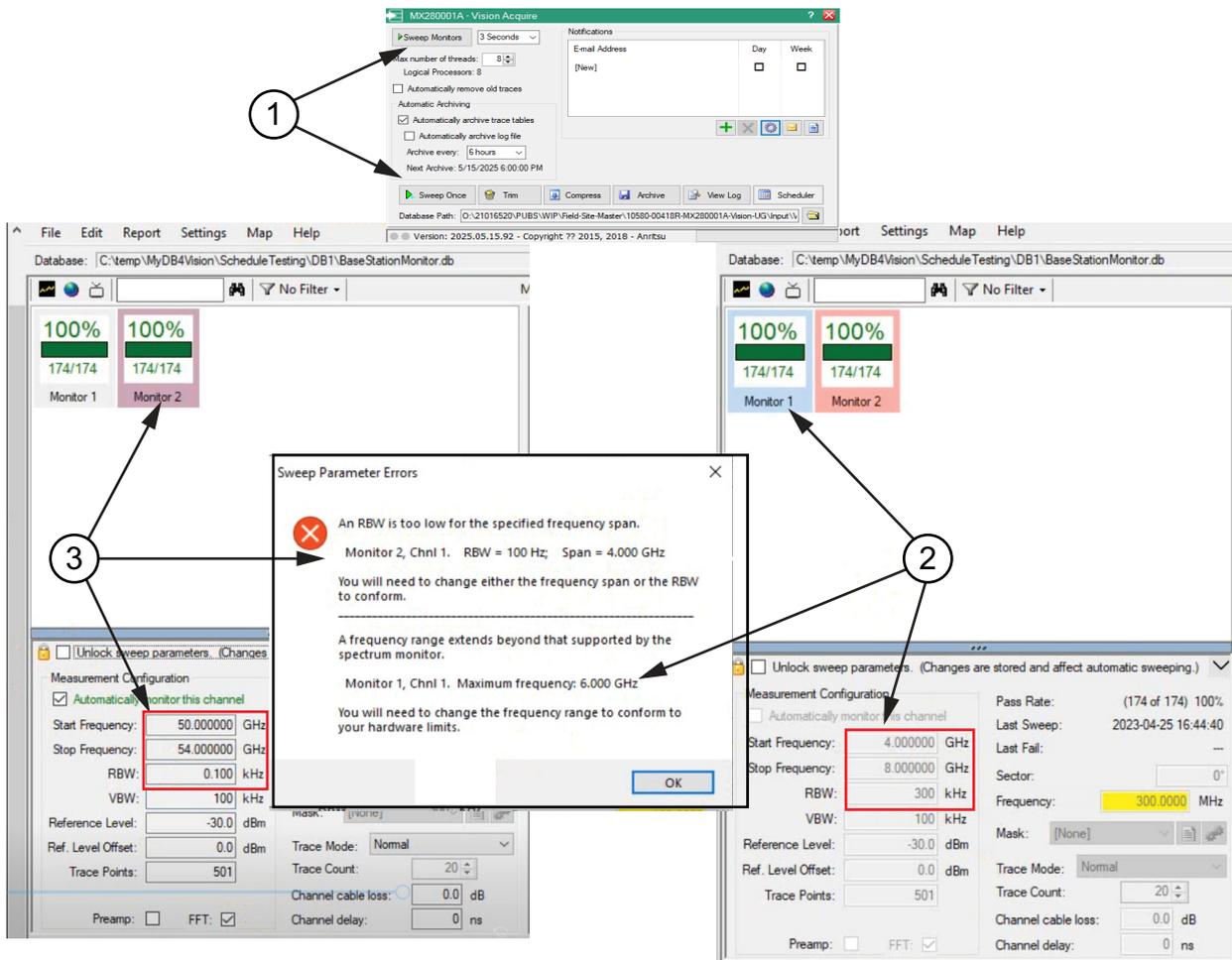
Figure 5-10. Trace Monitor Span Warning Message

Data Sweep Blocked

When the sweep parameters are set up in Trace Monitor, initiating a sweep with Trace Acquire will sweep only when the sweep parameters set in Trace Monitor are valid.

Figure 5-11 shows an example with two Spectrum Analyzers. Each Spectrum Analyzer has its own sweep criteria limitations:

- Monitor 1 is an MS27102A. The stop frequency is set to 8 GHz in Trace Monitor. The limitation for this MS27102A is a stop frequency of 6 GHz. In this example, the sweep will not start due to an invalid stop frequency.
- Monitor 2 is an MS2090A. The Start Frequency is set at 50 GHz and a Stop Frequency of 54 GHz. In this example, the sweep will not start due to an invalid span. Refer to [“Maximum Frequency Span” on page 2-9](#). The Frequency span of 4 GHz is too large and must be reduced to less than 100 Hz or the RBW must be increased to 3 kHz.



1. Open Trace Acquire: Click Sweep Monitors or Sweep once to initiate sweep
2. Error Message: Captures sweep span parameter errors when Monitor 1 sweep is initiated.
3. Error Message: Captures sweep frequency parameter errors when Monitor 2 sweep is initiated.

Figure 5-11. Error Message Example for Invalid Frequency and Span Entries

5-3 Trace Viewer

Trace Viewer provides a view of the selected Spectrum Analyzer traces from the Trace Monitor menu (Figure 5-1 on page 5-1). Figure 5-12 shows a typical single trace view.



1. DB Trace View Icon
2. Menu Toolbar
3. Trace View

Figure 5-12. Vision Trace Viewer

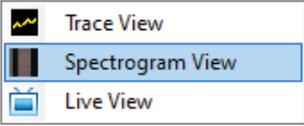
Trace View Menu Bar

The Trace View menu bar is shown in [Figure 5-13](#) and described in [Table 5-3](#).

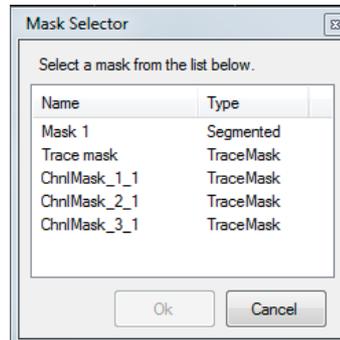


Figure 5-13. Trace View Menu Bar

Table 5-3. Trace View Menu Bar Description

Menu	Description
File	<p>Open Database: Opens the database folder that has been set from “Set Database Root Folder”.</p> <p>Set Database Root Folder: Opens the database folder set the “Set Database Root Folder”.</p> <p>Open Windows List: Open the recently viewed windows list.</p> <p>Save Windows List: Save and close the recent windows list.</p> <p>Recent Databases: Click to display the most recent databases used.</p> <p>Exit: Exit the File menu.</p>
View	<p>View Mode: Opens the context menu shown below.</p>  <p>Trace View: Set all windows to Trace View mode. Toggle individual windows to spectrogram view by clicking on their displayed graph.</p> <p>Spectrogram View: Set all windows to spectrogram view mode. Toggle individual windows to trace view by clicking on the graph.</p> <p>Live View: Set all displayed channels to Live View.</p> <p>Synchronize Traces: Synchronize all displayed channels. Scrolling through one channel will scroll through all displayed channels in time.</p> <p>Arrange Windows: Arrange and resize all displayed channel windows to fit to the main Trace Viewer window.</p>
Report	<p>Generate Failure Report: Contains data sections of accumulated failures from the Last Pass, Past Hour, Past Day, Past Week, and Past Month. See Figure 5-7 on page 5-6.</p> <p>Export Failure Report: Export the failure report to a set file location. Network Health Check</p> <p>Network Health Check: Provides a Network Health Check Report. See “Network Health Check Report” on page 5-7.</p> <p>Browse Report Archive: Report Options. Opens the browser dialog.</p> <p>Report Options: Set the Failure Report, Occupancy Report and Export Field Delimiter Options. See “Trace Monitor Report Options” on page 5-8.</p>
Map	<p>Load Map: Load a customer selected map to the screen.</p> <p>Existing Maps: Load a map from an existing map folder.</p>
Help	<p>Help: See “Help Menu” on page 5-3.</p>

Set Limit Line: Displays the Mask Selector menu as shown below. See “Setting up a Mask” on page 5-38 for setting up a Mask.



Clear Limit Line: Removes selected limit line.

Copy to Clipboard: Copy Trace View data to clipboard.

Live Trace View: Displays the Live Trace View.

Live Data Stream

Live Data Stream provides a user interface screen to view a live stream of trace data. Refer to Figure 5-14. You can view multiple traces from the Trace Monitor user interface by shift-clicking the Base Station RSMs to view in the Trace View screen. Below Base Station RSM 2 through RSM 4 have been highlighted in the Trace Monitor user interface. Click the Trace View to display the four traces.

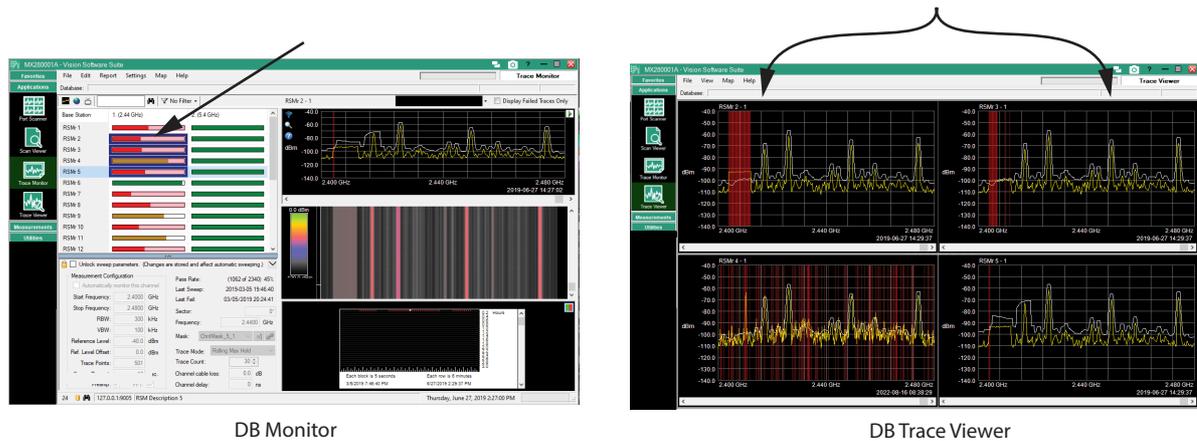
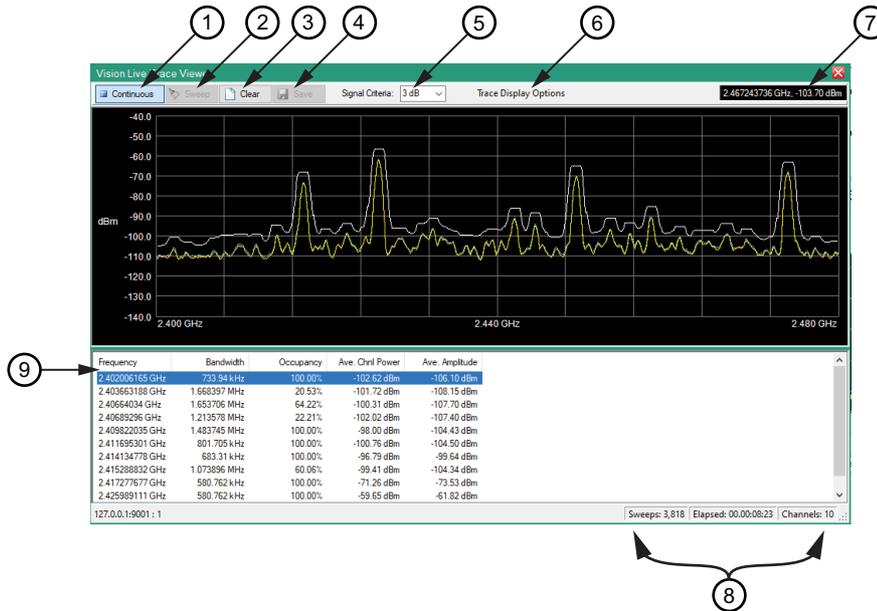


Figure 5-14. View Multiple Traces

Live Data Stream

Live Data Stream provides a user interface screen to view a live stream of trace data. The live trace parameters are displayed also.



- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Continuous 2. Sweep 3. Clear 4. Save 5. Signal Criteria | <ul style="list-style-type: none"> 6. Trace Display Option Pull-Down Button 7. Mouse Marker Readout Field 8. Metrics Log (Sweeps, Elapsed, Channels) 9. Traces Parameters Field |
|--|---|

Figure 5-15. Live Trace Viewer

Click to continually collect trace data. Click again will stop trace data collection.

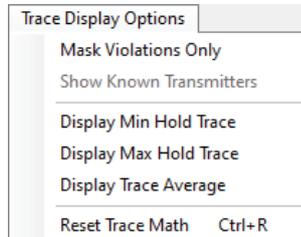
Sweep: Click to generate and capture a single sweep.

Clear: Click to clear all results.

Save: Click to save the resulting sweep data in either HTML or Tab delimited format.

Signal Criteria: Click to set the criteria for determining peak thresholds in the trace data.

Trace Signal Display Pull-Down Button: Click to open menu list below.



Mask Violations Only: Click to check the box to include only the traces that violate a mask in the results table.

Show Known Transmitters: Click the box to display the known transmitters within the bandwidth of the displayed trace. This box will remain grayed until known transmitter files have been loaded. A user created list of known transmitters is required to be loaded first before they will be available to display. This is achieved from within the Trace Monitor trace display window via the Transmitter Menu Button menu. For more information on loading a known transmitter file, See [Section “Loading the Known Transmitter \(.lst\) File” on page 5-30](#).

Once the user created list of known transmitters has been loaded and then selected, any known transmitters will appear as white vertical lines above the trace. Selecting one of these lines will display a dialog box with the transmitter details. See [Figure 5-16](#).

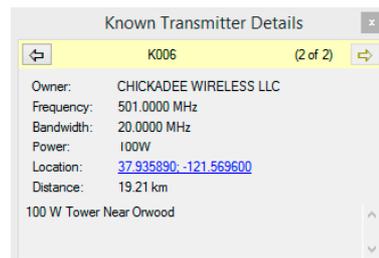


Figure 5-16. Known Transmitter Details

Display Min Hold Trace: Shows the cumulative minimum value of each display point over many trace sweeps. Can be applied to only one channel Spectrum Analyzer in the database.

Display Max Hold Trace: Shows the cumulative maximum value of each display point over many trace sweeps. Can be applied to only one channel Spectrum Analyzer in the database.

Display Trace Average: Shows an exponential average of a number of traces, determined by the number of Averages. Can be applied to only one channel Spectrum Analyzer in the database.

Reset Trace Math: Clears the three options – Min Hold, Max Hold and Trace Average. It turns these three off, if they are turned on.

Mouse Marker Readout Field: The signal’s frequency and amplitude correlating to the mouse location on the display.

Metrics Log: When either in continuous sweep or paused, selecting the Clear button will reset the Sweeps and Channel count to zero.

Sweeps: Records the number of continuous sweeps. The sweep count stops when the sweep is stopped and continues from when a sweep is restarted.

Elapsed Time: Records the elapsed time that starts when the Continuous button is pressed. The elapsed time restarts at zero seconds when restarted.

Channels: The number of channels displayed in the trace parameters field. These signals displayed are filtered per the Signal Criteria set.

Trace Parameters Field: The Trace Parameter Field displays each signal parameter.

Frequency: Signal Frequency

Bandwidth: Signal Bandwidth

Occupancy: Percent of Occupancy

Ave. Chnl Power: Average Channel Power

Ave. Amplitude: Average Channel Amplitude

To view a frequency and its associated bandwidth on the sweep spectrum, click Continuous a second time to pause the sweep. Click a readout in the Trace Parameters Field to view the marker frequency and bandwidth on the user interface screen. See [Figure 5-17](#).

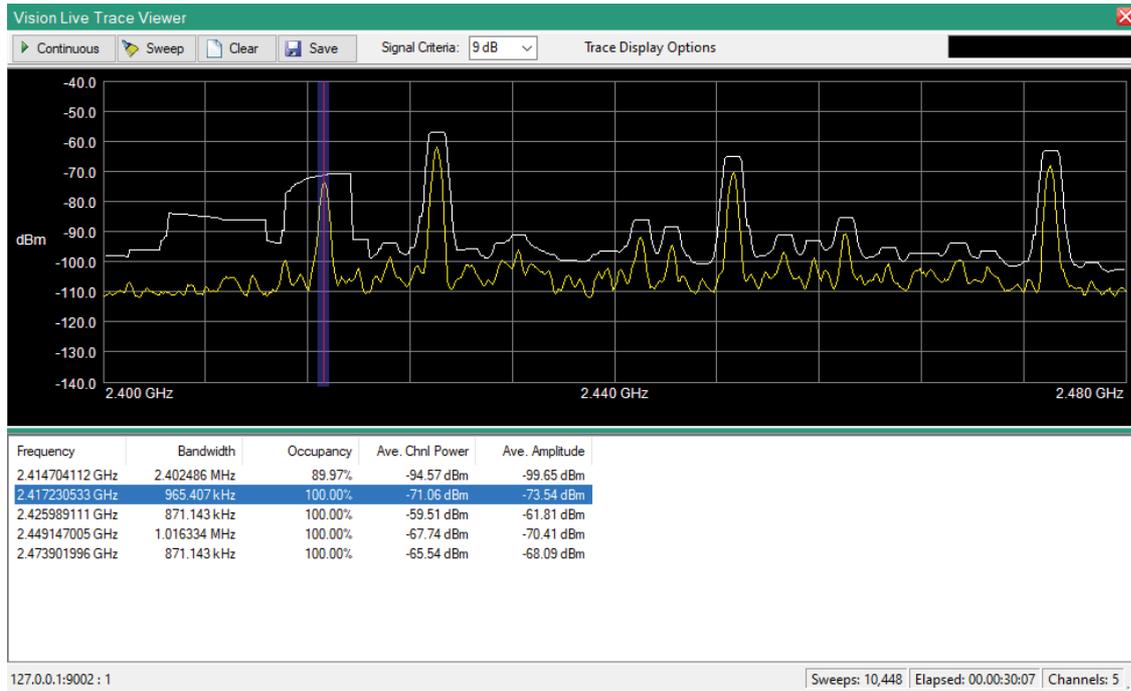


Figure 5-17. View Selected Sweep

Base Station Context Menu

You can also configure a specific Spectrum Analyzer through the use of its context menu. Highlight the desired Spectrum Analyzer and click the right mouse button. The context menu is shown in [Figure 5-18](#).

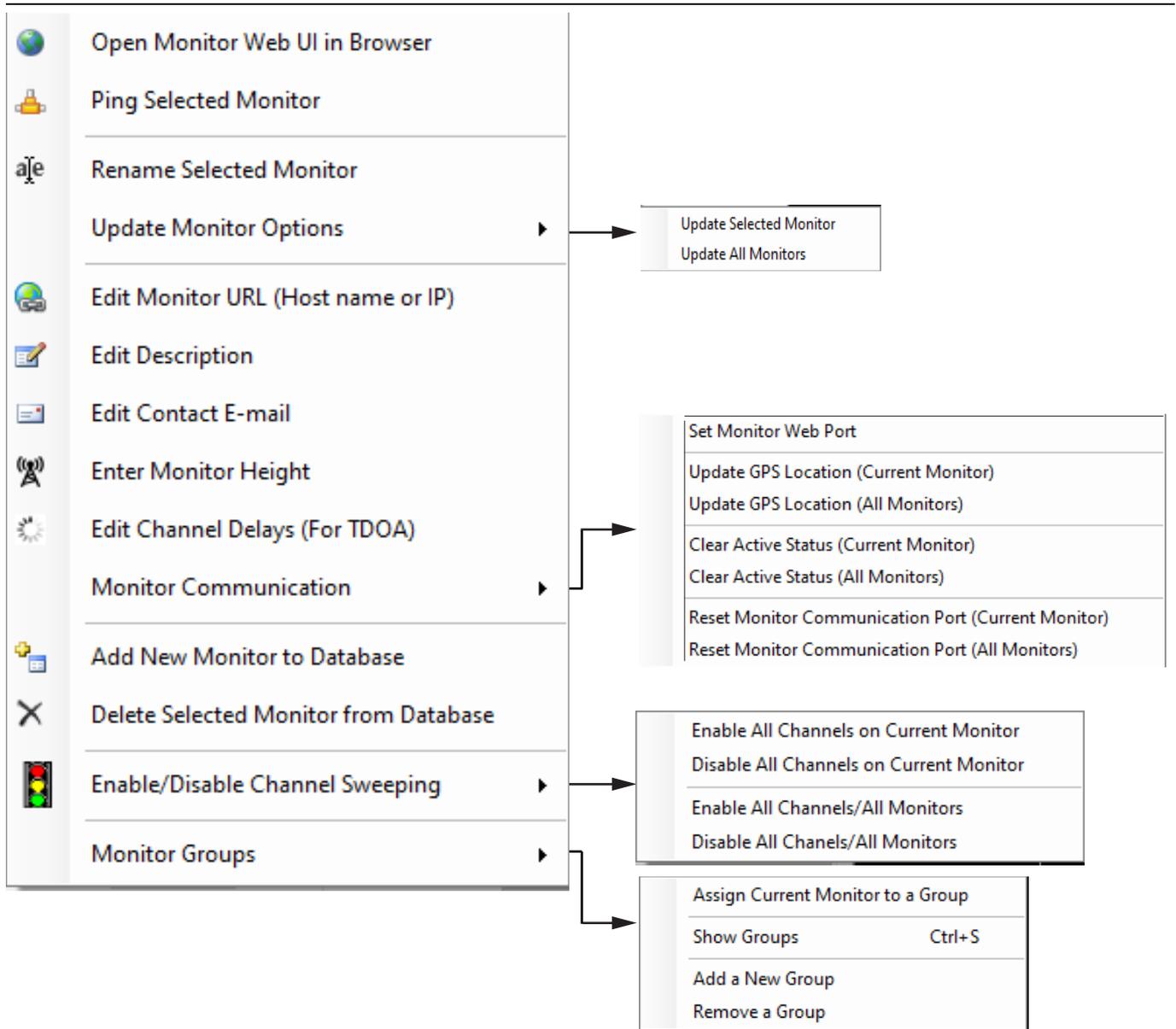


Figure 5-18. Base Station (Spectrum Analyzer) Context Menu

The base Station Context menu Icons are described in [Table 5-4](#).

Table 5-4. Base Station Context Menu Icons

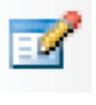
ICON	Description
	Open Monitor Web UI in Browser: Opens the Installed Web Browsers dialog to choose either Chrome or IEXPLORE.EXE.
	Ping Selected Monitor: Establishes communication with the Spectrum Analyzer. The Vision Ping dialog opens displaying the reply information from the Spectrum Analyzer.
	Rename Selected Monitor: Opens the Edit Base Station dialog to change the label of the selected Spectrum Analyzer. Enter a new name in the entry box.
	Retrieve and Update GPS Location: Does an immediate query to the Spectrum Analyzer for updated GPS location.
	Update Monitor Options: Click to update any changes in options. A dialog will pop up stating: <ul style="list-style-type: none"> • Update Monitor – Updates and lists the active Spectrum Analyzer. • Update All Monitors – Displays dialog describing which Spectrum Analyzers have been successfully updated or will list which Spectrum Analyzers have not been updated.
	Edit Monitor URL (Host name or IP): Opens the Edit Base Station URL dialog to change the URL of the selected remote Spectrum Analyzer. Enter a new URL in the entry box.
	Edit Description: Opens the Edit Base Station Description dialog to change the description of the selected remote Spectrum Analyzer. Enter a new description in the entry box.
	Edit Contact E-mail: Opens Edit Base Station Contact dialog to add or change the e-mail address to those monitoring this base station. Add or change the e-mail address in the entry box.
	Enter Monitor Height: Opens the Monitor Height dialog to add or to change the height location of the selected remote Spectrum Analyzer. Enter the new height in the entry box. Units are in meters.

Table 5-4. Base Station Context Menu Icons

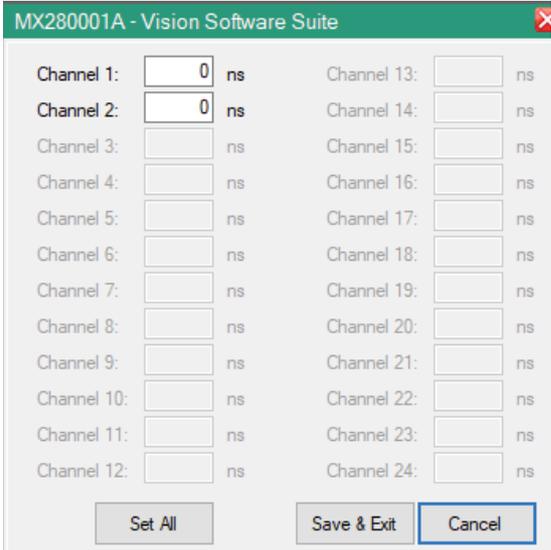
ICON	Description
	<p>Edit Channel Delays (For TDoA): Opens a User Interface for entering channel delays.</p> 
	<p>Monitor Communication:</p> <p>Click a menu:</p> <ul style="list-style-type: none"> • Set Monitor Web Port: Opens the HTTP port # dialog. Enter the HTTP port number for this remote Spectrum Analyzer. If assistance is needed in obtaining this port number, contact the person setting up the network for remote spectrum monitoring. • Update GPS Location (Current Monitor) • Update GPS Location (All Monitors) • Clear Active Status (Current Monitor) • Clear Active Status (All Monitors) • Reset Monitor Communication Port (Current Monitor) • Reset Monitor Communication Port (All Monitors)
	<p>Clear Active Status: A spectrum analyzer in use sets an internal flag that marks the spectrum analyzer as busy and is cleared when not in use. Users should not attempt to use the spectrum analyzer for measurements until the flag is cleared. There may be times when a process fails to clear the Active flag and the spectrum analyzer will report as busy until the flag is cleared. When no users are accessing that spectrum analyzer, use this menu option to clear the Active flag so that the spectrum analyzer can be accessed freely.</p>
	<p>Reset Monitor Communication Port: Reset the Ethernet port using this menu option.</p> <p>Note: If someone is using the spectrum analyzer to perform a long term measurement, the SCPI port will appear blocked; therefore this function can corrupt someone else's measurement.</p> <p>A symptom of a blocked SCPI port: The spectrum analyzer interface is displayed in browser view, but no measurements/sweeps are shown.</p>

Table 5-4. Base Station Context Menu Icons

ICON	Description
	<p>Add New Monitor to Database: The Create New Base Station dialog opens to enter information for the new database. Fill in the entries and click OK. The new Spectrum Analyzer is listed on the Base Station and Channel Directory.</p>
	<p>Delete Selected Monitor from Database: Allows you to delete a base station from the directory.</p>
	<p>Enable Sweep on All Channels / Disable Sweep on All Channels:</p> <p>Click a menu:</p> <ul style="list-style-type: none"> • Enable All Channels on Current Monitor • Disable All Channels on Current Monitor • Enable All Channels/All Monitors • Disable All Channels/All Monitors <p>Enables data collection for each channel on a Spectrum Analyzer. This can be done one at a time by clicking on the 'Unlock sweep parameters' check box, then checking the check box for 'Automatically Spectrum Analyzer this channel'. Enable Sweep on All Channels is a quick way to do all channels on a Spectrum Analyzer at once, rather than the tedious process of enabling each separately.</p> <p>Disables data collection for all channels on a Spectrum Analyzer. This can be done one at a time by clicking on the 'Unlock sweep parameters' check box, then clearing the check box for 'Automatically Spectrum Analyzer this channel'. Disable Sweep on All Channels is a quick way to do all channels on a Spectrum Analyzer at once, rather than the tedious process of disabling each separately.</p>
<p>Monitor Groups</p>	<p>Monitor Groups: Click to open the groups submenu. Click the appropriate command shown below:</p> <ul style="list-style-type: none"> • Assign Current Monitor to a Group: Add a Spectrum Analyzer to a group. • Show Groups: Display the list of groups. • Add a New Group: Add a new group to a current list or start a new group. • Remove a Group: Remove a group of Spectrum Analyzers from the list. <p>Monitors can be assigned into groups. Groups are used only to visually arrange the Spectrum Analyzers so that associated Spectrum Analyzers are together in the Spectrum Analyzer list. By default, the Spectrum Analyzers are listed in the order they are entered into the database. To place the Spectrum Analyzers in groups, use the Spectrum Analyzer context menu to add and assign groups. You also must toggle the Show Groups setting on to see the grouped Spectrum Analyzer list. Individual groups can be collapsed or expanded to easier view just the Spectrum Analyzers that are of interest at a particular time.</p> <p>For more on Spectrum Analyzer groups, see "Base Station and Channel Directory" on page 5-21.</p>

5-4 Base Station and Channel Directory

The Spectrum Analyzers can be organized into groups as shown in [Figure 5-19](#). The list on the left contains the names of the Base Station Spectrum Analyzer groups. Columns numbered one through twelve are the Spectrum Analyzer channels.

Base Station	1	2	3	4
College Hill				
Holly Hills				
Kingsway West				
Kingsway East				
DeBaliviere Place				
Bevo Mill				
Dutchtown				
Fairground				
Carr Square				
Visitation Park				
West End				
O'Fallon				
Southampton				
Lindenwood Park				
Patch				
Compton Heights				
Academy				
Clayton Tamm				
Cheltenham				
Ellendale				
Boulevard Heights				
Mark Twain				

Figure 5-19. Base Station and Channel Directory

Monitor Groups

Organize the spectrum analyzer channel directory as described below. Refer to [Figure 5-20](#).

1. Right-click on any Spectrum Analyzer in the Monitor list.
2. Point to the Monitor Groups submenu.
3. Click Show Groups.

This will cause the Monitor list to be displayed differently. You can collapse and expand groups. Groups are logical sets of Spectrum Analyzers, arranged any way that is convenient, whether geographically, by modulation type, or by the person or organization in charge of maintenance.

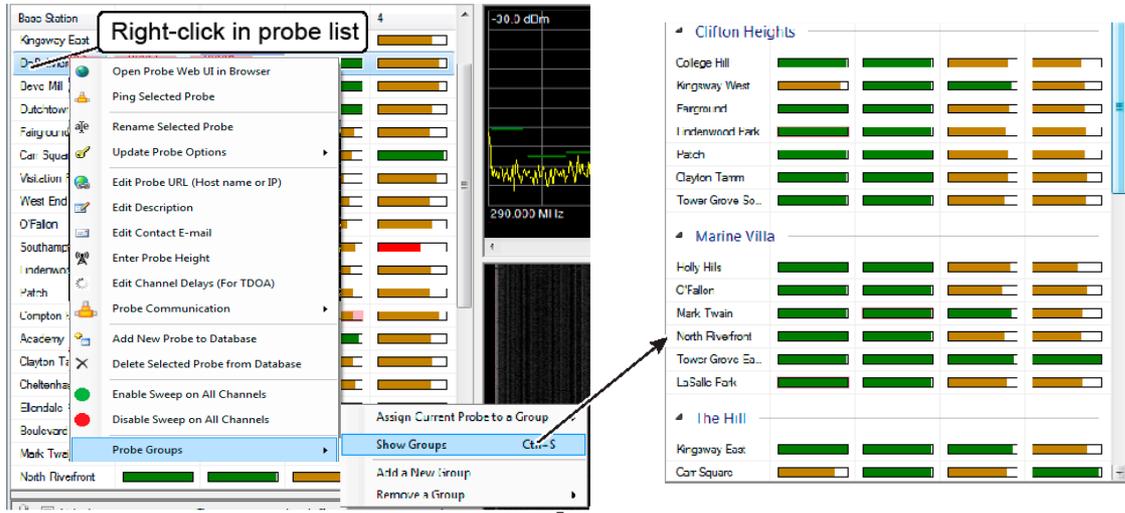


Figure 5-20. Monitor Groups Configurations

Base Station Status Indicators

The Base Station status indicators are described in [Table 5-5](#).

Table 5-5. Base Station Status Indicators

Icon	Description
	<p>These bars represent channels and indicates the varying passing percentages of traces within the channel.</p> <p>Three foreground colors Green: 90 % or more passing Tan: 65 % or more passing Red: Less than 65 % passing</p> <p>Two background colors White: Most recent trace passed Pink: Most recent trace failed</p>
	<p>The light blue outline indicates the current channel selected. The last trace collected from the Spectrum Analyzer will be displayed in the Trace Preview Panel, highlighted as a yellow line in the Spectrogram Pane, and outlined as a white square box in the Trace Matrix panel. In the Monitor Map view, the Spectrum Analyzer and channel will be indicated as a bouncing pin.</p>
	<p>The bars outlined in red indicate the last trace collected for that channel failed.</p>

Table 5-5. Base Station Status Indicators

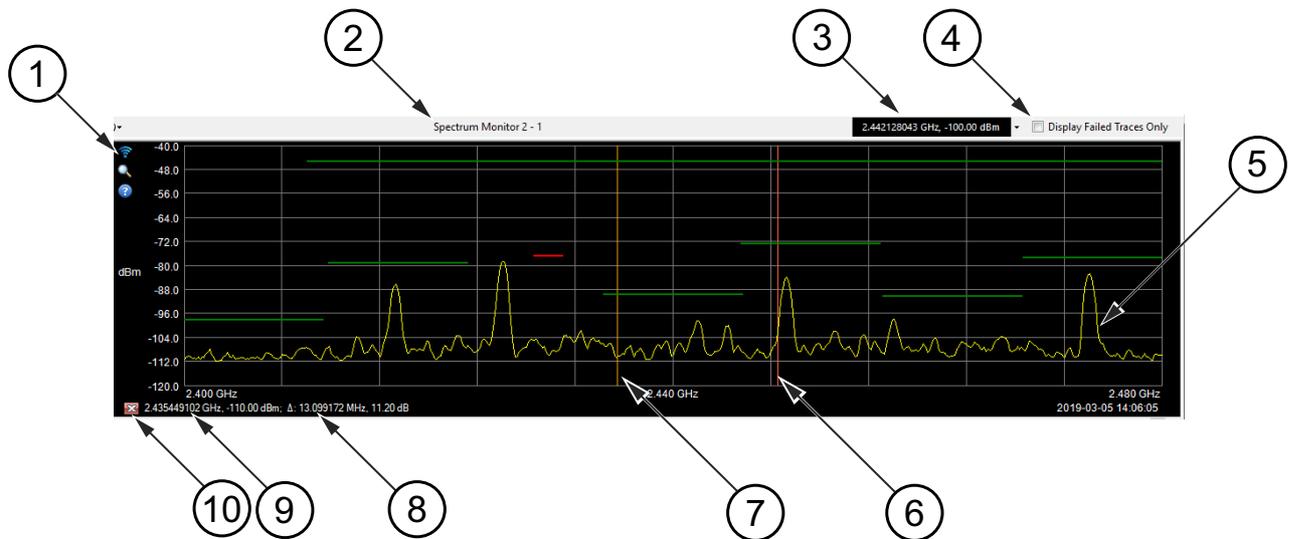
Icon	Description
	<p>Multiple channels that have been selected are outlined in dark blue. These channels are used with the Open Trace Viewer Window feature or with the Location Finder feature.</p>

Trace Panel

When a channel is selected, the last trace collected in the database is displayed. Use the Scroll bar at the bottom of the display to view all of the other traces for the selected channel and base station. The Trace Panel shown in Figure 5-21 is an example of a Trace Matrix block that contains only one trace. The bar above the trace display will display the Spectrum Analyzer and channel, frequency and amplitude at the cursor location, and a selection box to display only failed traces. The power displayed is the power at that frequency and not at the location of the cursor.

Display Failed Traces Only

If the Display Failed Traces Only box is checked, only traces that failed the limit line mask are shown in the trace display, spectrogram, and trace-matrix. Markers can be set by placing the cursor at a desired location and clicking the left mouse button. An orange horizontal marker appears indicating frequency and amplitude of that location. A second red delta marker, can be displayed by holding down shift key and clicking at any other location on the trace display. Frequency and power delta information will display right of the main marker information under the x-axis. See also Figure 5-26, “Trace Matrix with One Trace Per Block”.



1. Trace Display Icons	6. Delta Cursor
2. Spectrum Analyzer Identification	7. Frequency Cursor
3. Cursor Measurement Readout	8. Delta Marker Measurement
4. Display Failed Traces	9. Marker Measurement Position
5. Frequency Spectrum	10. Markers Off

Figure 5-21. Trace Panel

Trace Display Icons

Three Trace display icons are available. See [Table 5-4](#).

Table 5-6. Base Station Menu Icons

ICON	Description
	Transmitter Menu: Opens the menu for displaying known transmitters. See “Transmitter Menu Button” .
	Zoom: Zoom on current trace at marker frequency. See “Zoom” on page 5-25 .
	Marker Help: Provides Keyboard and Mouse Control instructions for Scaling and Marker Placement. See “Marker Help” on page 5-26 .

Transmitter Menu Button

Click to show the transmitter location menu. See [Figure 5-22](#).

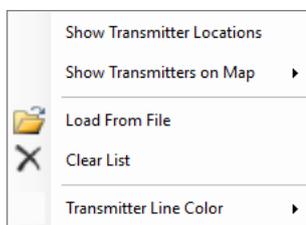


Figure 5-22. Transmitter Icon Menu

The Transmitter menu commands are described in [Table 5-7](#).

Table 5-7. Base Station Menu Icons

ICON	Description
Show Transmitter Locations	Show Transmitter Locations: Click to locate the Transmitter locations on the Monitor map.
Show Transmitters on Map ▶	<p>Show Transmitters on Map: Click to display three methods of viewing a transmission as shown below.</p> <div data-bbox="778 520 1193 615" style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <input checked="" type="checkbox"/> Show Selected Transmitter On Map <input type="checkbox"/> Show Transmitters in Active Frequency Span <input type="checkbox"/> Show All Loaded Transmitter Locations </div> <p>Show Selected Transmitter on Map: Displays a single spectrum analyzer marker on the map, corresponding to the selected transmitter in the trace display. Click a vertical line representing the frequency of a known transmitter and see the location on the map.</p> <p>Show Transmitters in Active Frequency Span: Displays the spectrum analyzer markers for each known transmitter listed in the loaded file that transmits in the frequency range of the currently selected spectrum analyzer/channel, as displayed in the trace window.</p> <p>Show All loaded Transmitter Locations: Displays a spectrum analyzer marker on the map for all of the transmitters in the loaded file of known transmitters.</p>
Load From File	Load From File: Click to load file to view transmitter coordinate information.
Clear List	Clear List: Click will remove all listed Transmitter information.
Transmitter Line Color ▶	<p>Transmitter Line Color: Opens a sub-menu with color choices to change the Transmitter line color as shown below. Click White, Blue, Green, Red, Orange, or Brown.</p> <div data-bbox="906 1239 1062 1419" style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <input checked="" type="checkbox"/> White <input type="checkbox"/> Blue <input type="checkbox"/> Green <input type="checkbox"/> Red <input type="checkbox"/> Orange <input type="checkbox"/> Brown </div>

Zoom

Zoom function allows the user to see the trace at full resolution - 1 data point per pixel column on the display. If a set marker is active, the zoom will focus a 200 pixel bandwidth around the set marker. If both the set marker and delta marker are active, the zoom will center on the set marker only. For example, trace data at 2000 trace points, but the trace window is only 500 pixels wide, the data points are crunched together. Zoom opens up the data points around the marker, and then crunches distant points more.

Marker Help

Provides the following dialog that contains marker and scaling instructions.

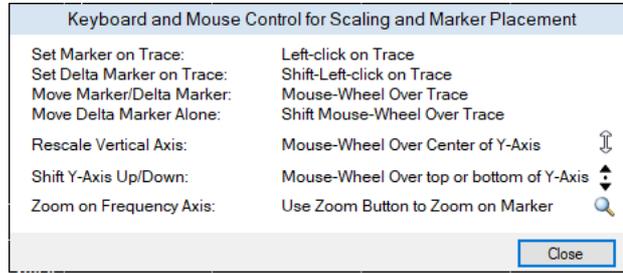
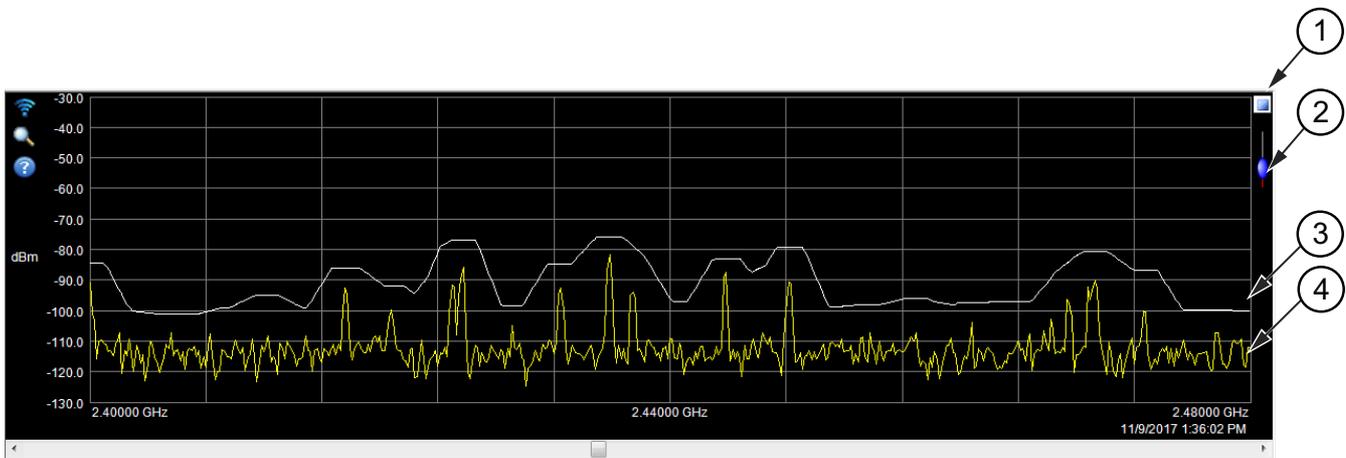


Figure 5-23. Marker and Scaling Instruction Dialog

If you click a block in the Trace Matrix that contains more than one trace, all the traces for that block are drawn simultaneously in the trace panel. See [Figure 5-27, “Trace Matrix with Multiple Traces per Block”](#).



- | | |
|--------------------------------|------------------------------------|
| 1. Sweep Control On/Off Button | 3. Trace Mask |
| 2. Speed Control Scroll Bar | 4. Spectrum Analyzer Trace Display |

Figure 5-24. Trace Mask Panel

Sweep Speed Control On/Off Button

Initiates an active sweeping trace displayed on the Spectrum Analyzer Screen.

Sweep Speed Control Scroll Bar

The speed control scroll bar becomes available when the “sweep control on/off button” is selected. The speed control scroll bar provides a sweep speed control of the trace. Click and slide the bar up to increase the trace sweep speed or slide the bar down to reduce the sweep speed.

5-5 Spectrogram

Displays all of the traces collected from the 12 channels of the selected base station. The trace displayed in the Current Trace Panel is indicated by the short white line at the left edge of the display panel. See [Figure 5-25](#). To view the short white line indicator:

1. Click Alt while the mouse is over the spectrogram displays a line across the spectrogram at the position of the currently selected trace.
2. Click Ctrl while the mouse is over the spectrogram displays a line across the spectrogram at the position of the mouse cursor, therefore illustrating the trace that would be selected when clicking. If the number of traces exceed the display, a scroll bar will appear on the right that will allow you to view all of the traces.

A power range color indicator resides left of the spectrogram which defines the trace colors in the spectrogram. A day, date, and time stamp will display under the power range color indicator for a trace that the cursor points to in the spectrogram.

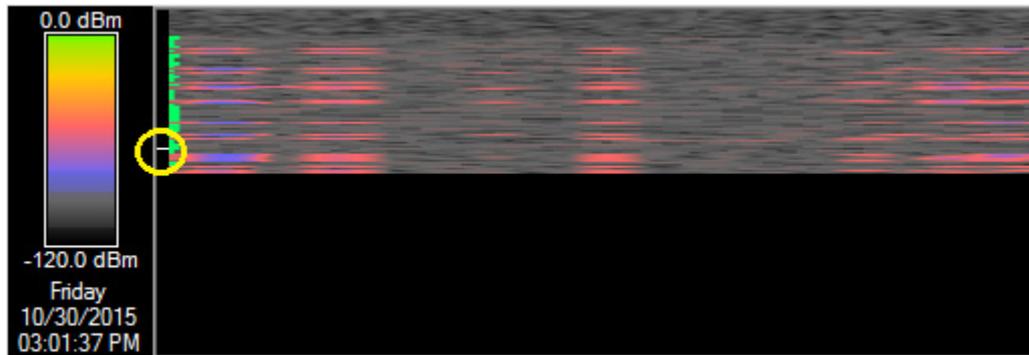


Figure 5-25. Spectrogram

5-6 Trace Matrix

The user can observe interference signal patterns that are occurring based on time and day. In [Figure 5-26](#), each block is 5 seconds and a row a tenth of an hour. Depending on the length of time measurements are taken, the amount of traces can fill the matrix display. If that occurs, use the vertical scroll bar of the display to view the other blocks of measurements.

Color Bars

The Color Bars button allows you to change the color scheme of the data blocks in the matrix from green, red, and yellow to blue, yellow, and green.

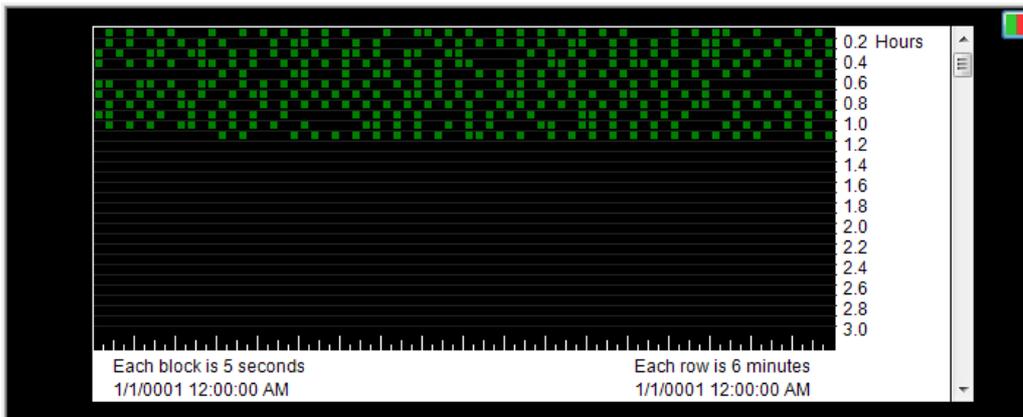


Figure 5-26. Trace Matrix with One Trace Per Block

For example, data collection is set to 10 seconds and the time frame in Vision Monitor is set to 6 hours making a data block 20 seconds long. This results in acquiring two traces for each data block and the color coding shown in [Figure 5-27](#), “Trace Matrix with Multiple Traces per Block”.

Click on a colored square to view the associated trace in the Trace Panel or Spectrogram. Depending on how you set up data collection, multiple traces can be collected during one data block. The color definitions are:

- **Green:** All traces pass in that defined block.
- **Red:** All traces fail in that defined block.
- **Yellow:** Some traces pass and some fail in the defined block.
- **Blank:** Occurs during tracking events when Trace Acquire is not collecting traces and is determining the tracking candidate status.

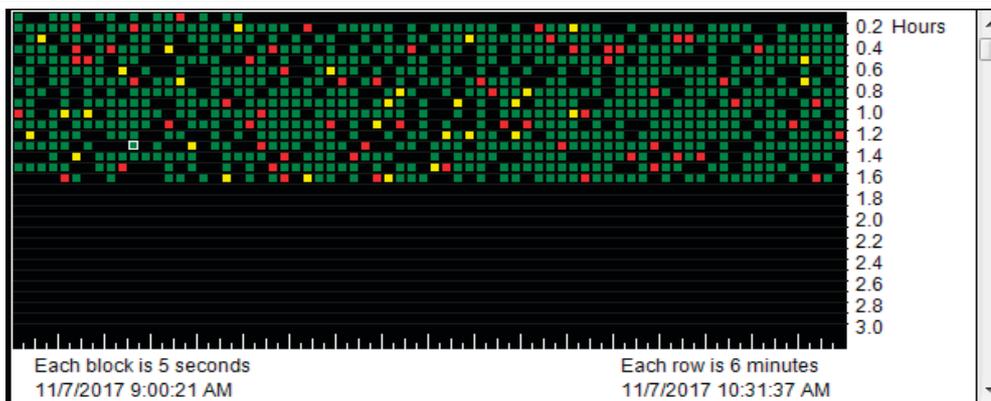
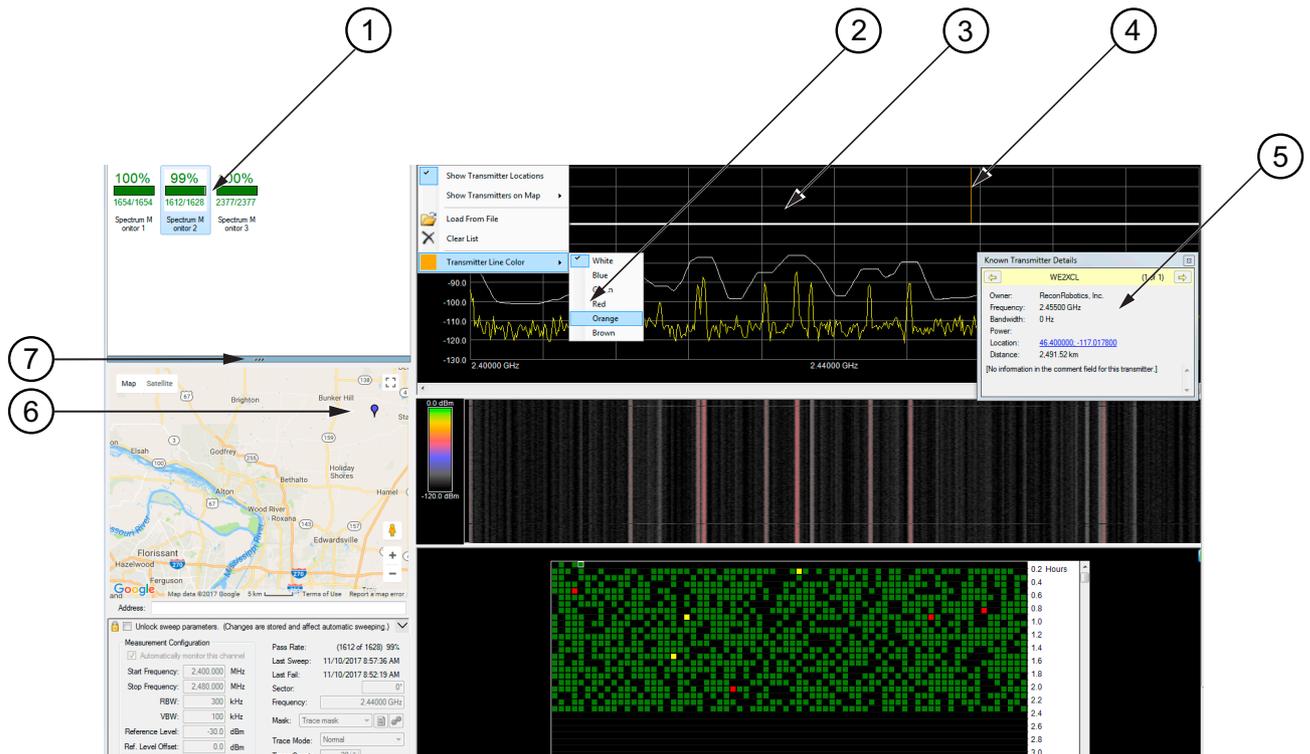


Figure 5-27. Trace Matrix with Multiple Traces per Block

5-7 Finding Known Transmitter Details

Known transmitter details can be identified by selecting the signal spectrum on the Spectrum Analyzer Screen. From the Trace Monitor screen, click the **“Transmitter Menu”** to display the Known Transmitter menu. Refer to [Figure 5-29 on page 5-30](#) to locate the Transmitter Menu button.



- | | |
|---|---|
| 1. Highlighted Spectrum Analyzer | 5. Known Transmitter Details Pop Up |
| 2. Transmitter Line Color Selected (Orange) | 6. Blue Balloon – Transmitter Signal Frequency Map Location |
| 3. Show Transmission Location Horizontal Line | 7. Three-Dot-Menu |
| 4. Orange Transmitter Signal Frequency Location on Spectrum | |

Figure 5-28. Vision Trace Monitor User Interface

Loading the Known Transmitter (.lst) File

A list of known transmitters is required to be loaded first before they will be available to display. To load the file of the known transmitter signal:

1. Click the Spectrum Analyzer from the top left side of the Spectrum Analyzer screen.
2. Click the Transmitter Menu Button from the Spectrum Analyzer display. See [Figure 5-29](#).

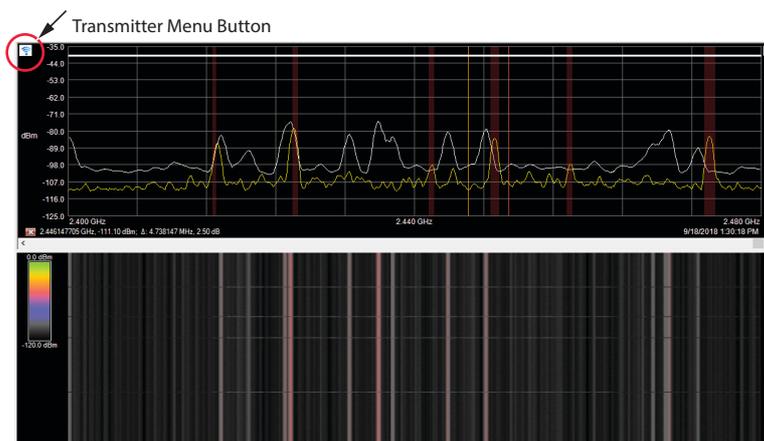


Figure 5-29. Transmitter Menu Button

Once selected, you see a drop-down menu as shown in [Figure 5-30](#).



Figure 5-30. Load From File

3. Click the Load From File menu.
4. Click the list file (.lst) from your stored location.

Show Transmitter Locations

1. Click Show Transmitter Locations from the pull down menu shown in [Figure 5-30](#), This will show a horizontal white bar across the Spectrum Analyzer screen. The distance the white bar is pulled down will determine the length of the transmitter signal-identifier.
2. Click to open the Load From File menu and locate the transmission file that you want to locate.
3. Click the .lst file and you will see the Transmitter Signal Frequency appear as a vertical line in the Spectrum Display Screen as shown in item (4) of [Figure 5-28](#). The color of the Transmitter Signal Frequency is determined by the color selection chosen from the Transmission Line Color menu. This example shows that Orange has been previously selected.

Finding the Known Transmitter Location

Once the signal appears on the Spectrum Analyzer screen, the known transmitter details can be determined.

1. Move the pointer over the known transmitter signal on the screen.
2. Click over the signal. A Known Transmitter Details pop-up is displayed.
3. View the details displayed on the Known Transmission pop-up. Refer to [Figure 5-31](#).

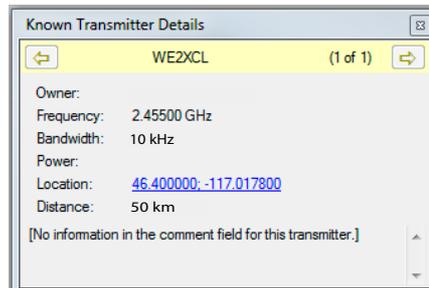


Figure 5-31. Known Transmitter Details

The information in the Known Transmission Details pop-up window includes:

- Owner
- Frequency
- Bandwidth
- Power
- Location
- Distance

Viewing the Known Transmitter Location

To view the Known Transmitter location on the Geo-Map:

1. Click the three-dot-menu on the Task Bar: See [“Three-Dot-Menu Window”](#) on page 5-35.
2. Click Monitor Map: A user set Geo Map will open in the center of the left-side column. A balloon locator will appear on the map identifying the location of the transmitting signal. See [Step 6](#) of [Figure 5-28](#).

The coordinates identified in the Known Transmitter Details dialog therefore locate the Transmitting signal on the Geo map.

5-8 Monitor Map

Clicking the “Map” button, the right side panel changes to Monitor Map view. See [Figure 5-32](#). The blue pins displayed represent the active on-line base stations in the Base Station and Channel Directory window. The red background for the Spectrum Analyzer name indicates the Spectrum Analyzer is off-line. On the map, its corresponding marker icon is red. The yellow background indicates the Spectrum Analyzer is on-line, but in use by another user. On the map, its corresponding marker icon is yellow.

The highlighted base station in the Base Station and Channel Directory is represented by a bouncing blue pin. The map can be viewed in street map, terrain, and satellite modes. Use the + and – buttons to zoom in and out of the map. Use the drag mode of the cursor to adjust the location view of the map. Drag the person icon to the location of the pin to get a ground level view of that location. Use the Filter on the Toolbar to view base stations based on specific setup criteria.

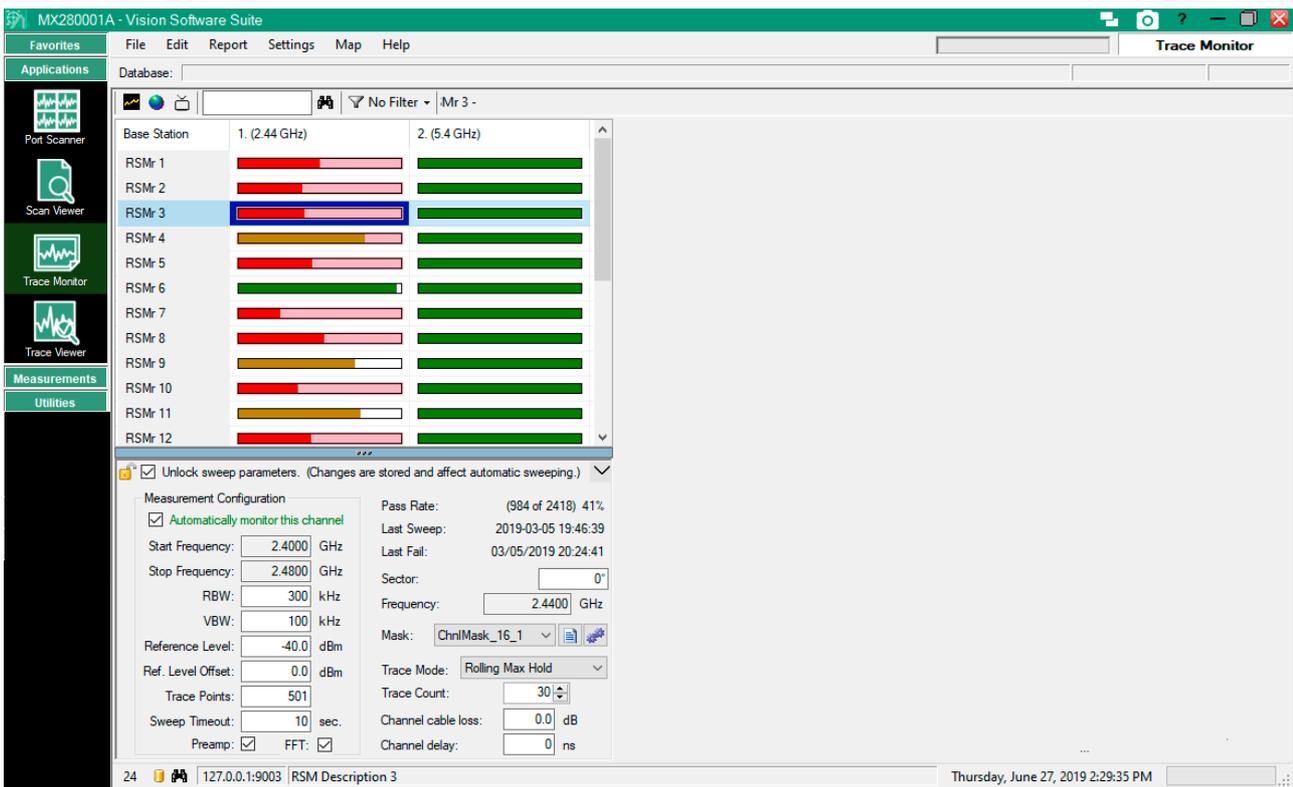
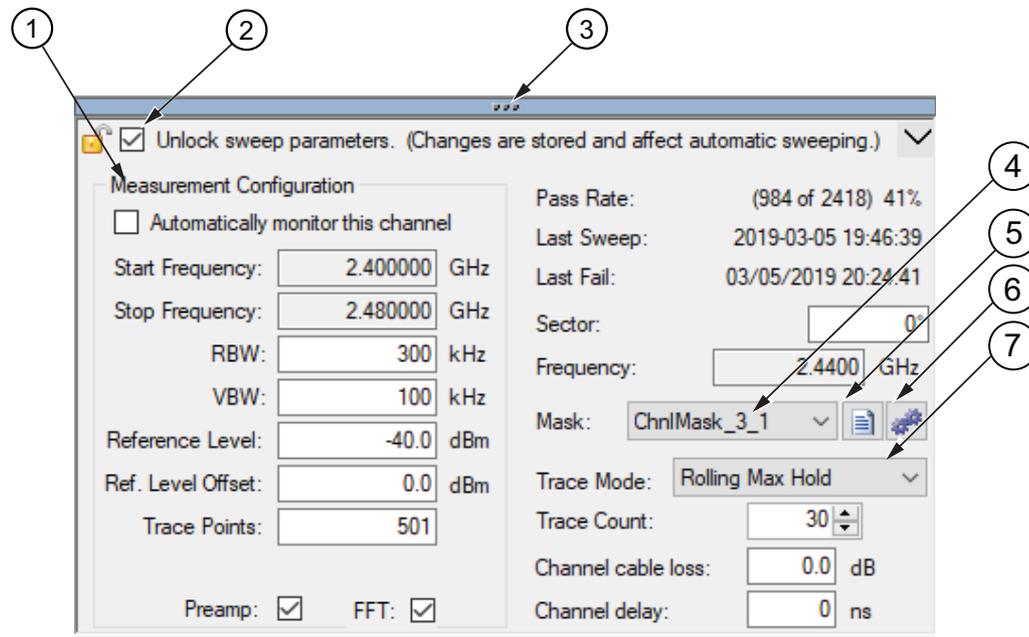


Figure 5-32. Monitor Map

5-9 Measurement Configuration

The Measurement Configuration Panel provides trace channel setup and status fields. Refer to [Figure 5-33](#).



- | | |
|------------------------------------|--|
| 1. Measurement Configuration Field | 5. Mask Editor Button |
| 2. Unlock sweep parameters | 6. Apply Mask to Selected Channel Button |
| 3. Three-Dot-Menu | 7. Trace Mode Sub-menu Button |
| 4. Active Limit Line Mask Button | |

Figure 5-33. Configuration Panel

The data trace monitoring parameters are set here and are active using the sweep buttons (Sweep Monitors and Sweep Once) in the Trace Acquire menu. See [Chapter 4, “Trace Acquire”](#) for trace channel setup details.

Unlock Sweep Parameters

When checked, the Measurement Configuration parameters can be edited. When unchecked, the fields are secured and can not be edited.

Measurement Configuration

Measurement Configuration contains the setup parameters of the Spectrum Analyzer in the field. To change the parameters of the Status Panel, check the Unlock sweep parameters check box. If desired, they can be changed in their respective edit boxes.

Note

The maximum frequency setting Vision provides is the maximum allowed on the measuring instrument up to 54 GHz. Vision does not verify the maximum input frequency range of the measuring instrument.

Start Frequency: The active trace start frequency. Enter Channel start frequency. Press “k” (kHz), “M” (MHz) or “G” (GHz). Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

Stop Frequency: The active trace stop frequency. Enter Channel stop frequency. Press “k” (kHz), “M” (MHz) or “G” (GHz). Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

RBW: Set the active trace resolution bandwidth.

VBW: Set the active trace video bandwidth.

Reference Level: The active trace reference level.

Ref. Level Offset: The active trace reference level offset.

Trace Points: The active trace points setting.

Preamp: Check to toggle Preamp to active status for current channel.

FFT: Check to toggle FFT (Fast Fourier Transform) to active status for current channel.

Pass Rate: Provides the total number of traces in the channels, number of traces that passed, and the pass percentage.

Last Sweep: Date and time of the last sweep.

Last Fail: Date and time of the last trace that failed.

Sector: The direction of the antennae in relation to north.

Frequency: The center frequency of the transmission band. This Frequency window highlights yellow when the frequency is not set within the Start and Stop frequency range as shown in [Figure 5-34](#).

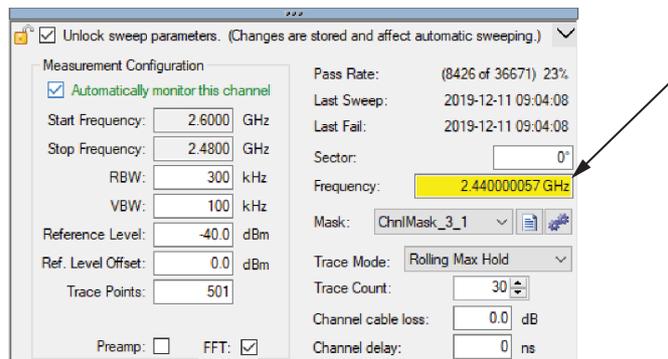


Figure 5-34. Highlighted Frequency Window

Mask: From the Mask list, click a limit line mask. Includes “Limit Line Editor” and “Apply Mask to Selected Channel” icons. For a more detailed description of these Mask features, see [Section 5-10 “Setting up a Mask” on page 5-38](#).

Trace Mode: From the Mask list, click active limit line mask. See [Section “Trace Mode” on page 5-47](#).

Trace Count: Enter the trace count when Rolling Min Hold or Rolling Max Hold is selected.

When Averaging is set, the trace displayed is the result of the trace count multiplied by each Rolling Min Hold or Rolling Max Hold. Example: Trace count set to 5 will return a trace that is a result of the Rolling Min Hold signal swept 5 times and the resulting average of the 5 sweeps is displayed.

Channel cable loss: Type the channel cable loss. This value sets the cable loss (in dB) for this channel. This value will be subtracted from the measured values.

Channel delay: Type the channel delay. This value sets the wait time for this channel before Trace Acquire determines the Spectrum Analyzer non-responsive.

Three-Dot-Menu Window

Clicking the three-dot-menu provides a menu as shown in [Figure 5-35](#).

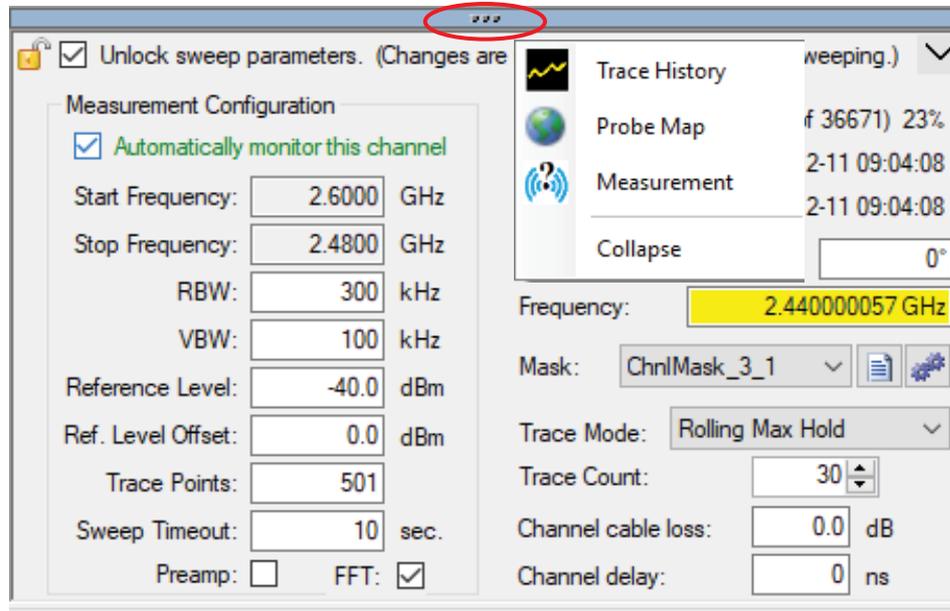


Figure 5-35. Three-Dot-Menu

Three-Dot-Menu

Trace History: Toggles the main GUI screen to display the GEO Map and the trace display is reduced and positioned above the status bar.

Monitor Map: Toggles the main GUI screen to display the Trace History screen and the GEO Map is reduced and positioned above the Status Bar.

Measurement: Provides a file tab selection as shown in [Figure 5-36](#). Measurement menu tabs are described below in “[Measurement Menu Catalog](#)” on page 5-35.

Collapse: Hides the three-dot-menu.

Measurement Menu Catalog

The Measurement menu provides signal detection and control from the following file tabs:

- “[Channel Info Tab](#)”
- “[Channel List Tab](#)”

Channel Info Tab

Clicking the Channel Info tab provides the following fields as shown in [Figure 5-36](#). PoA on the Channel Info tab page will use the time of the current trace if the user has scrolled back. If the user has not scrolled back, it will look for the maximum power at the set frequency over the most recent 30 traces in order to get the best results. The PoA under the Channel Info tab page in Vision Monitor assumes omni-directional antennas and does not do a search to optimize sectors. The Channel Info PoA has no setup and provides a search result estimate only. For a more sophisticated method for obtaining optimum search results, refer to [“PoA Settings and Control Panel”](#) on page 6-3.

The screenshot shows a software window titled "Channel Info" with two tabs: "Channel Info" (selected) and "Channel List". The interface contains several input fields and labels:

- Frequency:** A text input field followed by a dropdown menu set to "MHz".
- Bandwidth:** A text input field followed by a dropdown menu set to "MHz".
- Chnl Power:** A text input field followed by a dropdown menu set to "dBm".
- AM Modulation:** A text input field.
- FM Deviation:** A text input field.
- Frequency & Bandwidth:** A large text input field with a blue hyperlink label above it.

Figure 5-36. Channel Info Tab

Frequency, Bandwidth, and Chnl Power (Channel Power): Displays the selected signal parameters.

AM Modulation and FM deviation: Click for AM Modulation measurement on Live signal. (Requires Option 400)

FM Deviation: Click for FM Deviation measurement on Live signal. (Requires Option 400)

Frequency and Bandwidth: Click to load a known transmitter list. A list must be previously loaded in order to display a known transmitter location in this field. For more detail on loading a “Known Transmitter” file, see the [“Loading the Known Transmitter \(.lst\) File”](#) on page 5-30.

Channel List Tab

The Channel List tab provides the active channel signal parameter details as shown in [Table 5-37](#).

Frequency	Bandwidth	Occupancy	Ave. Chnl Power	Ave. Amplitude
2.426027944 ...	958.084 kHz	100.0%	-60.41 dBm	-62.70 dBm
2.473932136 ...	958.084 kHz	100.0%	-66.70 dBm	-68.60 dBm
2.449181637 ...	958.084 kHz	100.0%	-69.21 dBm	-69.90 dBm
2.417245509 ...	958.084 kHz	100.0%	-72.57 dBm	-72.50 dBm
2.457964072 ...	958.084 kHz	100.0%	-89.22 dBm	-90.60 dBm
2.441836327 ...	1.277445 MHz	100.0%	-89.26 dBm	-91.80 dBm
2.444231537 ...	1.277445 MHz	100.0%	-91.70 dBm	-96.50 dBm

Channels: 11 Show All Traces Channel Threshold: 6 dB

Figure 5-37. Channel List Tab

The signal details include:

Frequency: Displays the Frequency.

Bandwidth Occupancy: As a percentage.

Average Channel Power: In dBm.

Average Amplitude: In dBm.

You can click from the list to change the Channel Threshold power. The “Show All Traces” check box can be checked to show all active traces that are available when the Channel Threshold has been selected. A scrollbar will become available when more trace channels populate the channel field.

5-10 Setting up a Mask

Create a Mask to Spectrum Analyzer a signal’s limit line violations. To locate and create the Mask limits, refer to the red boxed area shown in [Figure 5-38](#). The create a mask section consists of the elements in [Table 5-8](#).

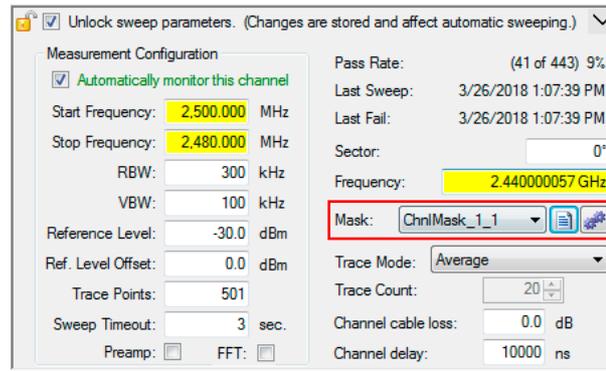
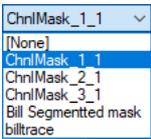


Figure 5-38. Create Mask Block

Table 5-8. Create a Mask

Icon	Description
	<p>Mask Library List: Click from the list which mask format to view. The list of masks are created from the Mask Editor icon described below.</p>
	<p>Mask Editor: Click opens the Mask Limit Line Editor screen. See Section “Mask Limit Line Editor” on page 5-39.</p>
	<p>Apply Mask: Click to apply the created mask. The Apply Mask To: dialog appears as shown below.</p> <div data-bbox="703 1255 1166 1493" style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p>Apply Mask To:</p> <p><input checked="" type="radio"/> Current channel: 1 in Spectrum Monitor 1</p> <p><input type="radio"/> Current basestation: Spectrum Monitor 1</p> <p><input type="radio"/> All of channel 1 in group:</p> <p><input type="radio"/> All basestations in group:</p> <p><input type="radio"/> All of channel 1</p> <p><input type="radio"/> All basestations</p> <p style="text-align: right;"><input type="button" value="OK"/> <input type="button" value="Cancel"/></p> </div> <p>Depending on the limit line and trace type selected, some selections will be unavailable if a mask does not apply:</p> <ul style="list-style-type: none"> • Current channel: 1 in Spectrum Monitor 2 • Current basestation: Spectrum Monitor 2 • All of channel 1 in group • All basestations in group • All of channel 1 • All basestations

Click the Mask Editor Button: Refer to [Section “Mask Limit Line Editor” on page 5-39](#).

Trace Mode Sub-menu

See “Trace Mode” on page 5-47.

Mask Limit Line Editor

From the Status Panel, use the Mask Limit Line Editor to create a mask that will determine the pass/fail limits of the traces collected. Apply the mask to an individual channel or to the entire database. Refer to “Trace Mask” on page 5-44 to access the Vision Limit Line Editor. A panel titled How to Edit Limit Lines contains instructions for developing a mask.

Click a limit line either on the table or the graph. You can drag a limit line with the mouse to reposition anywhere on the graph. To adjust the segment size, hold down the Control key and use the mouse wheel.

- For precise placement, use the segment editor accessed from the toolbar.
- For crude adjustments, the keyboard arrow keys are very useful.
- For finer adjustment hold the Shift or Control keys while adjusting a segment.

A Limit Line Editor user interface is shown in [Figure 5-39](#).

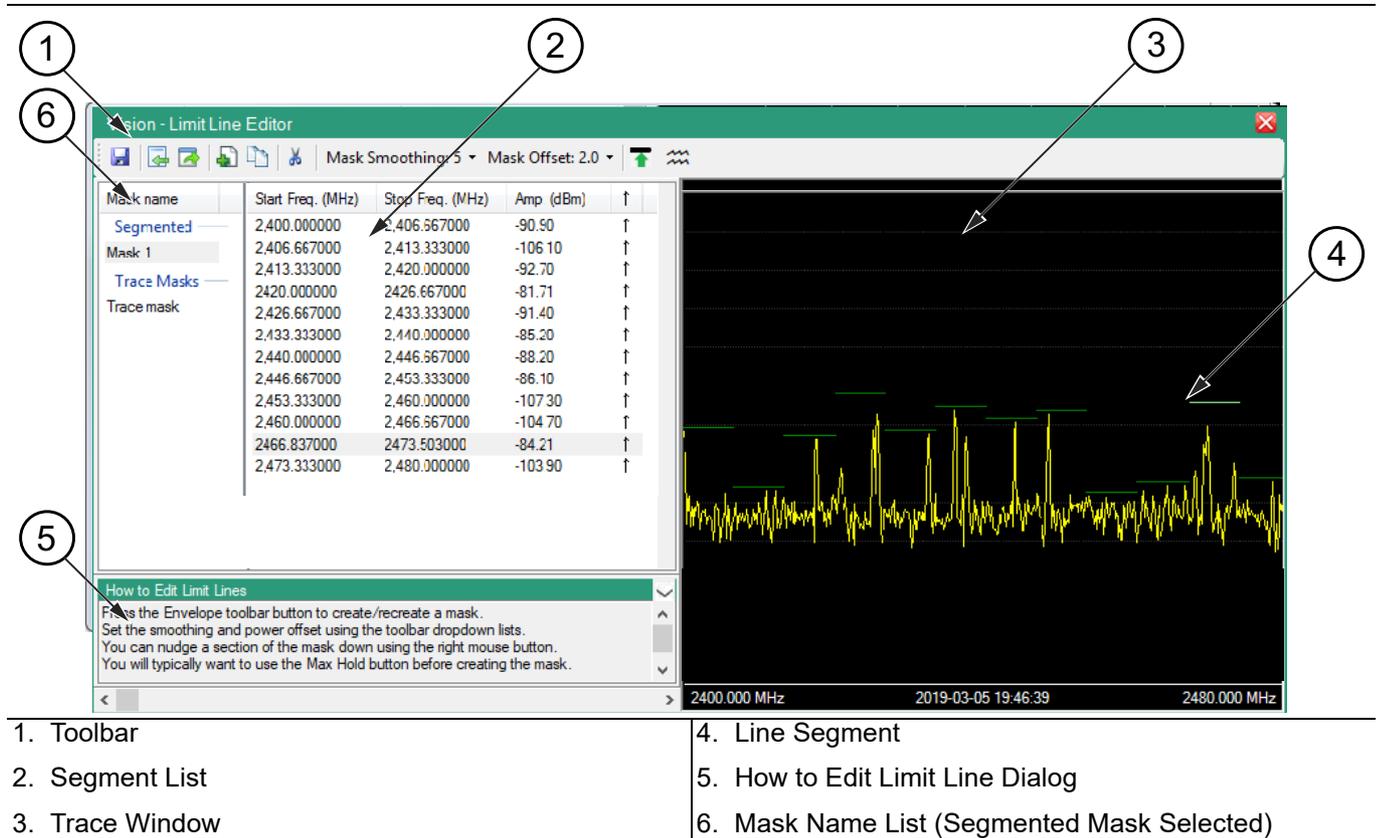


Figure 5-39. Vision - Limit Line Editor (Segmented)

Types of Limit Lines

There are two types of limit lines:

- “Segmented Mask” on page 5-40
- “Trace Mask” on page 5-44

The Segmented toolbar and Trace toolbar have different icons. This description describes using the limit line editor for segmented masks. The toolbar changes when editing trace masks. See [Section 5-13 “Trace Mask” on page 5-44](#) to create trace mask limit lines.

5-11 Segmented Mask

The Limit Line Editor Toolbar for segmented masks is shown in [Figure 5-40](#).



Figure 5-40. Segmented Masks Toolbar

The Limit Line Editor Segmented Mask toolbar icons are described in [Table 5-9](#).

Table 5-9. Segmented Toolbar Icons

Icon	Description
	<p>Save: Click to save.</p>
	<p>Import Masks: Click to imports a mask from another database into the Limit Line Editor. The Open window displays the Documents Library. Navigate to the desired folder and enter or type a mask file (.msk). Click Open. Import and Export Masks are used for moving the list of masks between databases, and are not required to load or save masks in the current database.</p>
	<p>Export Masks: Click to save the current mask to another database. The Save As window displays the Documents Library. Navigate to the desired folder to save the mask file (.msk). Click Save.</p>
	<p>Add New Mask: Click opens the dialog Create New Mask. Enter a mask name in the entry window. Click OK. It will be added to the list of masks under Mask name and its Segment Mask parameters or Trace Mask parameters listed in the same row with its respective values. Click Import From File button directs the user to the PC directories to locate and import a pre-configured Mask file.</p> <div data-bbox="742 1188 1114 1388" style="border: 1px solid gray; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center; background-color: #008000; color: white; padding: 2px;">Create a New Mask ✖</p> <p>Mask Name: <input style="width: 150px;" type="text"/></p> <p> <input checked="" type="radio"/> Segmented Mask <input type="button" value="OK"/> </p> <p> <input type="radio"/> Trace Mask </p> <p> <input type="radio"/> Import From File <input type="button" value="Cancel"/> </p> </div>
	<p>Duplicate Masks: Click opens the Duplicate Mask dialog box. Enter a name of the duplicated mask. Click OK.</p> <div data-bbox="742 1497 1120 1661" style="border: 1px solid gray; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center; background-color: #d3d3d3; padding: 2px;">Duplicate Mask ☒</p> <p>Enter the name for the new mask:</p> <p><input style="width: 150px;" type="text"/></p> <p style="text-align: right;"> <input type="button" value="OK"/> <input type="button" value="Cancel"/> </p> </div>
	<p>Cut (Delete) Masks: Highlight Mask and click delete to remove from list.</p>

Table 5-9. Segmented Toolbar Icons

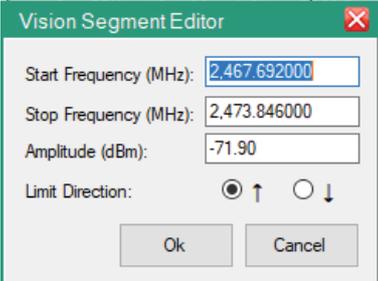
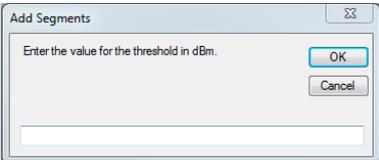
Icon	Description
	<p>Add new segment to current limit line: Click opens Vision Segment Editor. Type a new Start Frequency, Stop Frequency and Amplitude in their respective entry boxes. Click the desired Limit Direction; Arrow up indicates above the RF spectrum or arrow down indicates below the RF Spectrum. Then click Ok. Clicking a line segment from the list will also provide the Vision Segment Editor.</p> 
	<p>Delete the selected segment: Highlight the segment on the segment list or in the mask editor. Click to delete.</p>
	<p>Split selected segment: Highlight the segment on the segment list or in the mask editor to be split. Click to split segment into two halves.</p>
	<p>Join selected segments: Hold the down Ctrl button on the keyboard. Click the two or more segments to be joined together. The segments become one.</p>
	<p>Fill all gaps with new segments at set amplitude: Click to open a dialog box as shown below. Type the value for the new threshold in dBm. Click OK and the added segment line(s) will fill all gaps in the trace window at selected dBm. Each added segment will also appear in the segment list.</p> 
	<p>Draw a new segment: Click on the editor panel and the pencil becomes activated. Draw a segment at the desired location.</p>
	<p>Edit selected segment: Click on a segment in the segment list or in the editor panel. The Vision Segment Editor dialog opens. Change the desired parameter in the dialog. Then click Ok.</p>
	<p>Max Hold on all traces in reference set: Click to activate the Max Hold function. Displays the cumulative maximum value of each point over multiple trace sweeps. A typical application for employing Max Hold is to first set up your Envelope segment lines (see feature immediately below). Then activate the Max Hold feature. You can then scroll through the trace measurements and observe that all traces under consideration would pass. Note that changing the offset of an existing mask does not save the offset. On save, the mask offset returns to it's previously saved state.</p>
	<p>Create mask over current trace data: Click repositions segments to trace peaks.</p>

Table 5-9. Segmented Toolbar Icons

Icon	Description
	Envelope segments: Uses the number of segments determined by moving the scroll bar. The number of segments will display in the box at the right of the scroll bar.

5-12 Lower Limit Lines

Another feature in Vision is to have both upper and lower limit lines in Pass/Fail masks. Only segmented limit lines can be set as a 'lower' limits. Trace masks form upper limits only.

Set up the Lower Limit lines from the limit line editor as before. There is a fourth column now in the segment table. This column shows an arrow, pointed either up or down, indicating the direction of that segments' limit as shown in [Figure 5-41](#).

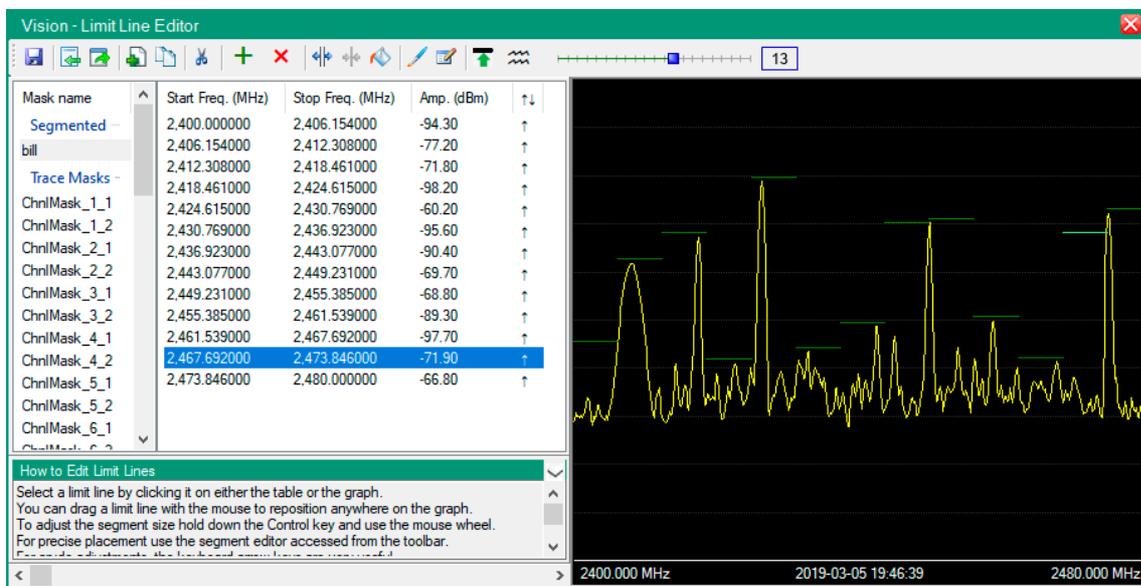


Figure 5-41. Vision - Limit Line Editor

Vision Segment Editor

In Vision Segment Editor, all segments start as upper limit lines. Use the dialog box shown in [Figure 5-42](#) to edit the limit line. There are two methods available to show the Vision Segment Editor.

1. Double click an entire line from the “[Segment List](#)”.
2. Click a line from the segments list and click the “edit selected segment” icon from the Segmented Toolbar. See [Table 5-9](#) on page 5-40.

This action will flip the arrow and change the color of the line: green for upper and blue for lower.

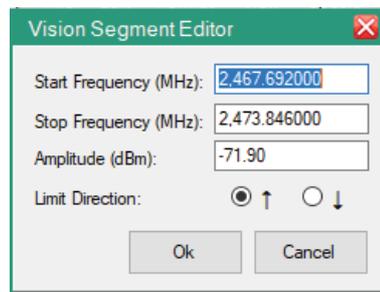
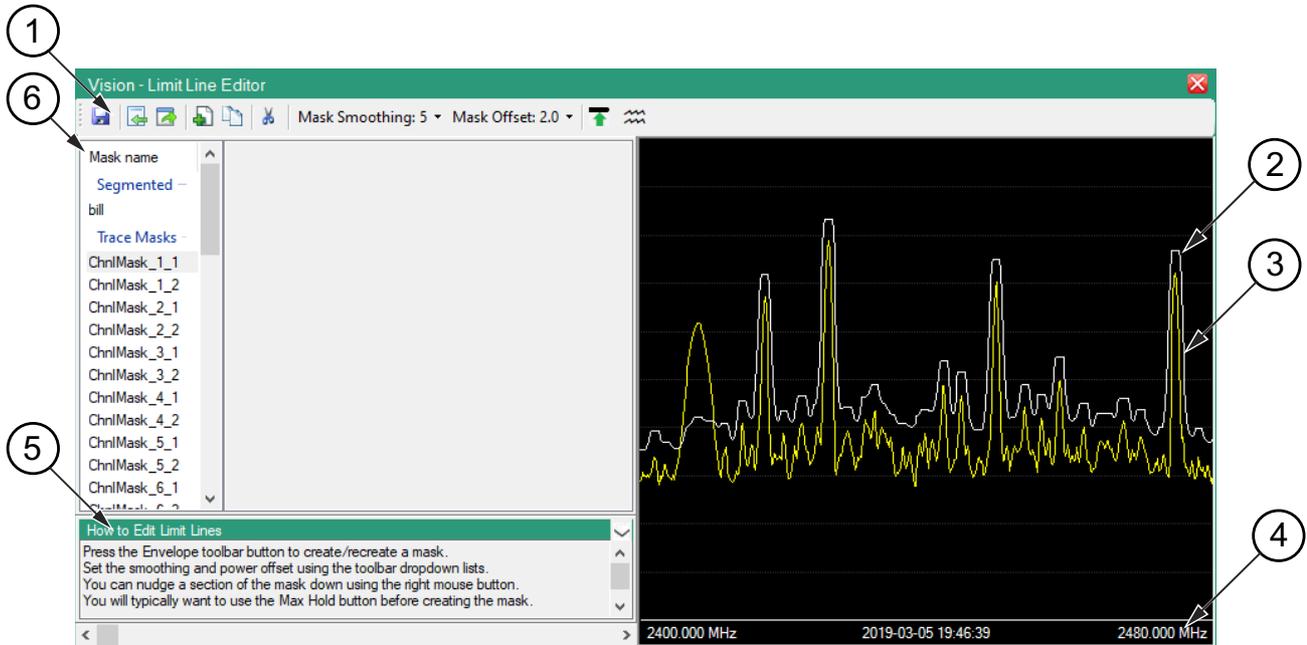


Figure 5-42. Vision - Segment Editor

5-13 Trace Mask

The Limit Line Editor Trace Mask user interface is shown in [Figure 5-43](#).



- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Toolbar 2. Mask Limit Line 3. RF Signal | <ul style="list-style-type: none"> 4. Trace Scrollbar 5. How to Edit Limit Line Dialog 6. Masks List |
|--|---|

Figure 5-43. Vision - Limit Line Editor (Segmented)

Trace Mask Toolbar

The Limit Line Editor Trace Mask Toolbar is shown and described in [Table 5-10](#).

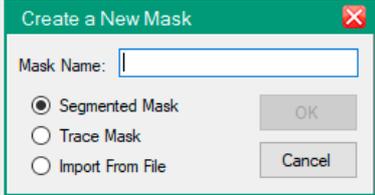
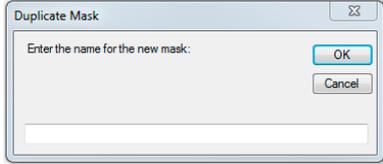
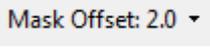


Figure 5-44. Segmented Masks Toolbar

Table 5-10. Segmented Toolbar Icons

Icon	Description
	Save: Click to save.
	Import Mask: Imports a mask from another database into the Limit Line Editor. The Open window displays the Documents Library. Navigate to the desired folder and type or enter a mask file (.msk). Click Open . Import and Export Masks are used for moving the list of masks between databases, and are not required to load or save masks in the current database.

Table 5-10. Segmented Toolbar Icons

Icon	Description
	Export Masks: Saves the current mask to another database. The Save As window displays the Documents Library. Navigate to the desired folder to save the mask file (.msk). Click Save.
	Add new limit line: Opens the dialog Create New Mask as shown below. Enter a mask name in the entry window. Click OK . It will be added to the list of masks under Mask name and its segment parameters listed in the same row with its respective values. 
	Duplicate Masks: Click to show Duplicate Mask dialog box as shown below. Type a name of the duplicated mask and then click OK. 
	Cut (Delete) Masks: Highlight Mask and click delete to remove from list.
	Mask Smoothing: Determines how jagged or how smooth the mask is over the trace. Click the list arrow. Enter the desired smoothing number. The higher the number results in a smoother mask.
	Mask Offset: Place the mask closer or further away from the trace by changing the offset distance. The lower the value, the closer the mask is to the trace.
	Max Hold on all traces in reference set: Click to activate the Max Hold function. Displays the cumulative maximum value of each point over multiple trace sweeps. A typical application for employing Max Hold is to first set up your Envelope segment lines (see feature immediately below). Then activate the Max Hold feature. You can then scroll through the trace measurements and observe that all traces under consideration would pass. Note that changing the offset of an existing mask does not save the offset. On save, the mask offset returns to it's previously saved state.
	Create mask over current trace data: Click to immediately create an envelope of segments around the trace. You may have to use the other editing tools to create the correct mask. You can also use the mouse drag feature to move a segment around.

Trace Scrollbar

The Limit Line Editor trace scrollbar, see [Figure 5-43 on page 5-44](#), is a user tool for scrolling through the stored traces in the database of the selected spectrum analyzer Channel. Scrolling the trace view window sequences the time stamp readout that in turn provides a snapshot of the trace image at the date and time displayed. A typical use would be to click the Max Hold button from the toolbar. See the Max Hold description in [Table 5-10](#). Click Max Hold will hold on all the traces available to scroll through.

Edit Trace Masks

To edit trace masks:

1. Click the **Create mask over current trace data** toolbar button to create/recreate a mask.
2. Set the smoothing and power offset using the toolbar drop-down lists.
3. Nudge a section of the mask down using the left mouse button.
4. Use the Max Hold button before creating the mask.

Changing the mask in the list affects future traces acquired, but not the status of traces already stored in the database.

New Mask Setup

Create a Mask to set up limit lines.

1. Check the Unlock sweep parameters box. This allows parameter changes and editing.
2. Click Mask Editor to open the Limit Line Editor.
3. Use the tools in the toolbar to create a mask.

Existing Mask Setup

Edit masks to add or change existing masks.

1. Click the down arrow for the Mask to display the list of masks.
2. Highlight and click on the desired mask.
3. Use the tools in the toolbar to edit a mask.

Next to the Mask Editor button is the **Apply Mask To** button. Click to open the **Apply Mask To** dialog. You can apply the selected mask in the limit line list to historical trace data in the database. You can choose to apply the mask to the selected channel, the current base station, all channels in the column or all channels in the table. Masks can also be applied to channels within a group or base stations within a groups. When a mask is applied to trace history, the status of previously collected traces is updated as are pass/fail statistics for the channels affected. Changing the mask in the list affects future traces acquired, but not the status of traces already stored in the database. To summarize:

- To change the mask only for future traces, change the mask without clicking on **Apply**.
- To change the mask for both past traces and for future traces, click on **Apply**.

Refer to [Section “Mask Limit Line Editor”](#) for more mask editing information.

Trace Mode

The Trace Mode box shows a list as shown in [Figure 5-45](#).

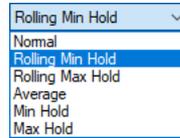


Figure 5-45. Trace Mode Menu

Select the Trace Mode Setting:

Normal: Displays data for the current trace sweep. Can be applied to several channel Spectrum Analyzers in the database.

Rolling Min Hold: Minimum value at each frequency point over the last trace sweeps. Can be applied to several channel Spectrum Analyzers in the database.

Rolling Max Hold: Maximum value at each frequency point over the last trace sweeps. Can be applied to several channel Spectrum Analyzers in the database.

Average: Average value at each frequency point over the last trace sweeps. Can be applied to several channels in the database. When set, the Spectrum Analyzer sweeps and averages the set number of sweeps before it returns a trace.

Min Hold: Minimum value at each frequency point over the last trace sweep. Applied to only one channel Spectrum Analyzer in the database. This returns what is in the Min Hold buffer on the spectrum analyzer. The time allocated to sweep takes the same time as a single trace sweep.

Max Hold: Maximum value at each frequency point over the last trace sweep. Applied to only one channel Spectrum Analyzer in the database. This returns what is in the Max Hold buffer on the spectrum analyzer. The time allocated to sweep takes the same time as a single trace sweep.

5-14 Status Bar

The Status Bar located at the lower left of the screen displays information relating to the number of Spectrum Analyzers, the URL or IP address of a Spectrum Analyzer, installed options, database location and loading of database information.

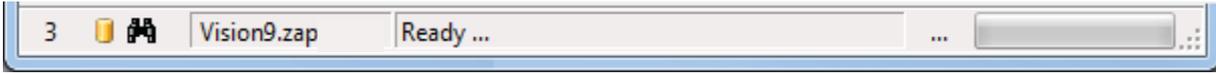
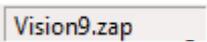
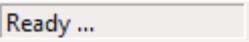


Figure 5-46. Status Bar

Status Bar Icons

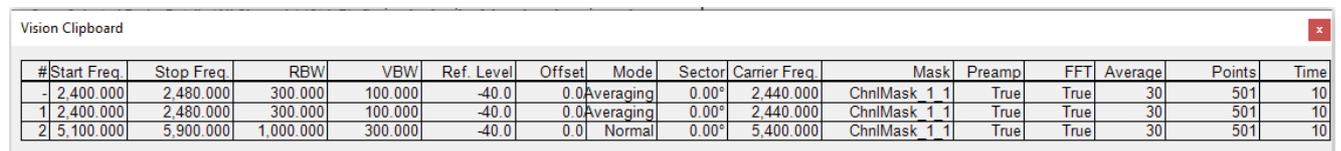
Table 5-11. Status Bar Icons

Icon	Description
3	Displays the number of Spectrum Analyzers found in the database. Also, a refresh of new data stored in the database by Trace Acquire occurs approximately every 15 to 20 seconds. During the refresh this field with count up from 1 % to 100 % indicating the progress of the update process.
	Indicates Vision software Option 400 is installed.
	Indicates Vision Source Locater software Option 401 is installed.
	Displays the URL or IP address of the Spectrum Analyzer.
	When setting the database location, the folder and file destination is displayed. When selecting a channel, the Spectrum Analyzer (Spectrum Analyzer) and channel number are displayed. During the refresh of the selected channel's database the date and time will be displayed.

5-15 Copy and Paste Functions

The Copy and Paste Function allows you to copy Measurement Configuration information, Sector, Frequency, Mask, and Trace Mode information to the Vision Clipboard.

Click the **Copy and Paste** list arrow button to display the various copy and paste functions. Setups can be done efficiently by copying the setup of one channel to another or to multiple channels. Click on the desired Copy/Paste function. To view the information that was copied in the Vision Clipboard, click View Vision Clipboard.



#	Start Freq.	Stop Freq.	RBW	VBW	Ref. Level	Offset	Mode	Sector	Carrier Freq.	Mask	Preamp	FFT	Average	Points	Time
-	2,400,000	2,480,000	300,000	100,000	-40.0	0.0	Averaging	0.00°	2,440,000	ChnlMask 1 1	True	True	30	501	10
1	2,400,000	2,480,000	300,000	100,000	-40.0	0.0	Averaging	0.00°	2,440,000	ChnlMask 1 1	True	True	30	501	10
2	5,100,000	5,900,000	1,000,000	300,000	-40.0	0.0	Normal	0.00°	5,400,000	ChnlMask 1 1	True	True	30	501	10

Figure 5-47. Example of the Vision Clipboard Contents

Copy Selected Channel Details (Ctrl+C): Copies the details of one channel, the selected channel, to be copied to other channels using the Paste Channels Details, Paste Channel Details to Entire Column, or Paste Channel Details to Entire Column in Group functions.

Copy Selected Monitor Details (All Channels) (Ctrl+B): Copies the details of the selected Spectrum Analyzer to be copied to other Spectrum Analyzers using the Paste Monitor Details to Select Monitor, Paste Monitor Details to All Monitors in Group, or Paste Monitor Details to all Monitors functions.

Paste Channel Details (Ctrl+V): Paste the information onto the desired channel.

Paste Channel Details to Entire Column in Group: Paste the information you obtained using the Copy Selected Channel Details function onto the desired channel column in the selected channel group. Select the desired column from one Spectrum Analyzer in the group to accomplish this task.

Paste Channel Details to Entire Column: Paste the information you obtained using the Copy Selected Channel Details function onto the desired channel column.

Paste Monitor Details to Select Monitor (Ctrl+G): Paste the information you obtained using the Copy Selected Monitor Details function onto the desired Spectrum Analyzer.

Paste Monitor Details to All Monitors in Group: Select one Spectrum Analyzer in the group and paste the information you obtained using the Copy Selected Monitor Details function onto all Spectrum Analyzers in the selected group.

Paste Monitor Details to All Monitors: Paste the information you obtained using the Copy Selected Monitor Details function onto all Spectrum Analyzers in the Spectrum Analyzer directory.

View Vision Clipboard: Displays the information copied using either the Copy selected Channel Details or Copy Selected Monitor Details (All Channels) functions.

Copy Base Station List: (Ctrl+A) Copies the list of base stations and their channels' passing percentage. Channels with failing percentages will be colored yellow and red. The list is placed in the Windows Clipboard in two formats - a formatted version that can be pasted into a word processor or a plain text version that can be pasted into a spreadsheet or other text based programs.

Copy Trace Image: Copies the active trace image displayed in the Trace Preview Panel to the clipboard.

Copy Spectrogram Image: Copies the all of the traces for the selected channel including those not displayed in the Spectrogram Preview Panel.

Copy Time Chart Image: Copies the full time chart regardless of the size of the Time Chart Preview Panel. The image size will match the current size of the Time Chart on screen. To capture a larger image, increase the size of the window in Vision Monitor by maximizing the window or dragging up the separator bar between the Spectrogram display and the Time Chart.

Copy Trace Data: Copies the raw numbers of the trace into the windows clipboard.

Export Trace Data: Save the current trace to a .spa file compatible with Master Software Tools.

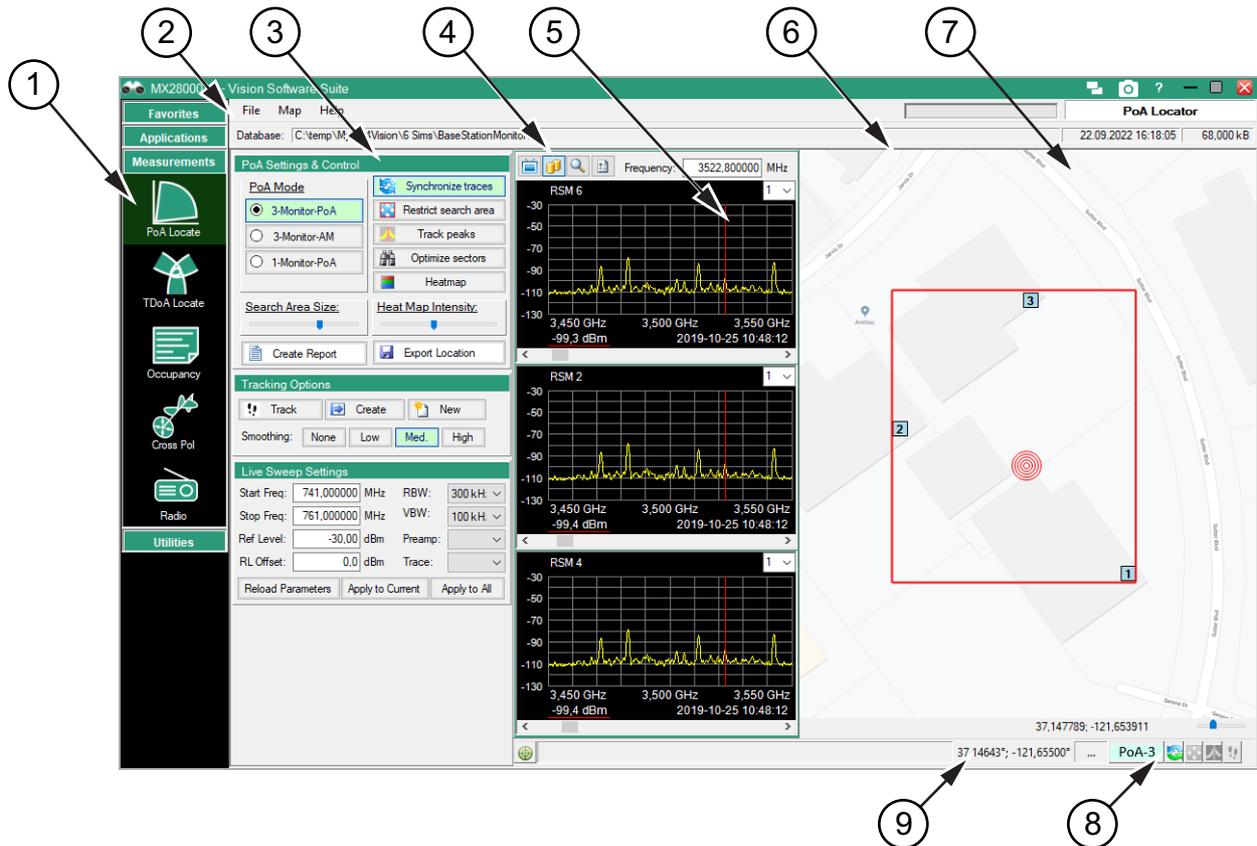
Chapter 6 — PoA Locate (Option 401)

6-1 Introduction

PoA Locate opens the Locator window, displays the Spectrum Analyzers on the map, and loads the trace history. PoA Locate can be used with the spectrum analyzer with Option 401 installed to provide the settings and control panel for PoA, Source Tracking, and Live Sweep Settings.

6-2 PoA Menu

The PoA Locate window appears on the screen as shown in [Figure 6-1](#).



- | | |
|---|---|
| 1. PoA Finder Menu Button | 6. Locator Map |
| 2. "PoA Toolbar" on page 6-3 | 7. "Monitor Coordinate Area" on page 6-2 |
| 3. "PoA Settings and Control Panel" on page 6-3 | 8. "Active Settings and Control View" on page 6-7 |
| 4. "PoA Locate Toolbar" on page 6-2 | 9. GPS Coordinates |
| 5. Monitor Display Area | |

Figure 6-1. PoA Locate Menu

PoA Locate Toolbar

File Map Help

Figure 6-2. PoA Locate Toolbar

Table 6-1. PoA Locate Toolbar Description

Menu	Description
File	<p>Open Database: Opens the database folder that has been set from “Set Database Root Folder”.</p> <p>Set Database Root Folder: Opens the database folder set the “Set Database Root Folder”.</p> <p>Recent Databases: Click to display the most recent databases used.</p> <p>Exit: Exit the File menu.</p>
Map	<p>Load Map: Load a customer selected map to the screen.</p> <p>Existing Maps: Load a map from an existing map folder.</p>
Help	<p>Help: See “Help Menu” on page 5-3.</p>

Monitor Coordinate Area

The Spectrum Analyzer coordinate area provides the algorithmic region of the suspect signal. The algorithmic region is derived mathematically from the coordinates of the monitoring Spectrum Analyzers selected. The number of Spectrum Analyzers available is set in the Utilities menu - “Maximum number of remote Spectrum Analyzers to display in PoA display”.

The Spectrum Analyzer coordinate markers are described in [Table 6-2](#).

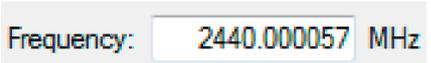
Table 6-2. Monitor Coordinate Markers

Icon	Description
	<p>Spectrum Monitor: Spectrum Analyzers selected on the Base Station and Channel Directory to locate the interfering signal. The short lines that extend out from the square depict the direction of the antenna used. For a view of the interfering signal's bearing using a single Spectrum Analyzer, click the desired Spectrum Analyzer represented by a number or star then click 1Monitor from the Monitor pull-down list above the top trace display.</p>
	<p>Base Station: Base Stations that are close by that can be used to locate the interfering signal. Click on this base station icon to make it one of the three base stations locating the interfering signal. At the same time, the last active number icon base station will turn into a star icon. The trace for the base station will change accordingly in the trace panel.</p>
	<p>Interfering Signal: The approximate location of the interfering signal based on the information from the selected base stations.</p>

PoA Toolbar

The PoA toolbar is described in [Table 6-3](#).

Table 6-3. PoA Icons

Icon	Description
	Capture Live Traces From Remote Monitors: Initially when the Source Locator opens, the last sweep taken is displayed in the trace panels for each of the selected Spectrum Analyzers. Click Live to view the trace measurements in real-time. Click again will stop the sweep of the displays.
 	Show Traces from Database: This allows you to scroll through both live and database data while looking at location estimates. Live traces in the Locator window do not get stored to the database. This icon button changes state to indicate the active selection: Live Data: The two cylinder icon shows that the trace graphs are pulling from the database. Stored Data: The TV icon shows the three trace graphs displayed are from live data.
	Toggle: Toggle the display between database view and live capture view
	Hide/Show: Hide/Show locate options and settings
	Frequency Field: Type a marker frequency. “Capture Live Traces From Remote Monitors” must be selected to stop the sweeping, then type a Frequency entry. The display marker will move to selected location. Click Capture Live Traces From Remote Monitors to restart the sweep.

6-3 PoA Settings and Control Panel

The Settings and Control Panel provides the user interface tools for signal monitoring. The tools from the panel include:

- PoA Settings & Control
- TDoA Settings and Control
- Source Tracking
- Spectrum Analyzer Sweep Settings

The Power of Arrival (PoA) settings and control panel displays the menu selections shown in [Figure 6-3](#). Power of Arrival and Control panel provides the means of loading the trace data and lets the user scroll through the traces on that screen. Note that the PoA settings and Control panel setup does not automatically synchronize with the time stamp of the current trace in Vision Monitor; therefore, the sophistication of PoA Settings and Control panel measurements provide the optimum search results.

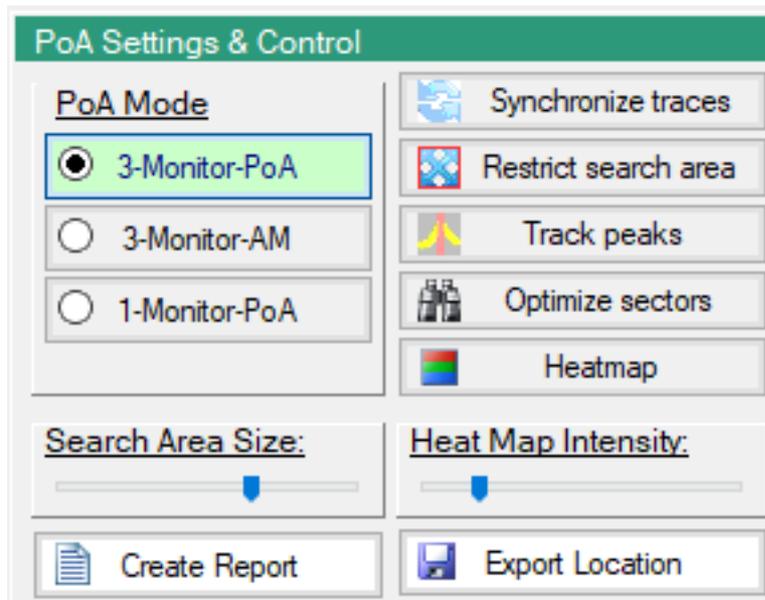


Figure 6-3. PoA Settings and Control

The PoA Settings and Control selection tabs are described in [Table 6-4](#).

Table 6-4. PoA Settings and Control Buttons

Icon	Description
	3-Monitors-PoA: Triangulate the interferer position when the signal of interest can be seen on three near by Spectrum Analyzers. This is normal mode.
	3 Monitors-AM: Triangulate the interferer position in AM-mode when the signal of interest can be seen on three near-by Spectrum Analyzers.
	1-Monitors-PoA: View signals at a single Spectrum Analyzer, from the Monitor pull-down list above the top trace display. 1 Monitor detection is only useful if the interferer can be seen in the sweep data on two more channels on the same Spectrum Analyzer. Save PoA mode to 1-Spectrum Analyzer (Angle of Arrival).
	Synchronize Traces in Time: Toggles time synchronization between the three Spectrum Analyzers used in the location algorithm. Each trace graph has a horizontal scroll bar that allows the user to scroll through the trace history and look for a particular trace that exhibits the interference most strongly.
	Restrict Search Area: Used Toggle Clipping mode: Only looks for sources in the overlap region of sectors.
	Peak Tracking: Tracks signal peaks.
	Optimize Sectors: Find Sectors with maximum Power at Source Frequency. Click to locate base station(s) that transmit the most power at the source frequency.

Table 6-4. PoA Settings and Control Buttons

Icon	Description
	Show Heat Map: Isolates the interferer signal by displaying a heat sense map over the suspected region.
	Search Area Size: Use the slider to set the line lengths on the map.
	Heat Map Intensity: Use the slider to set the line lengths on the map.
	Create Report: Generate a report for the current location estimate. See “PoA Report” on page 6-10.
	Export Location: Save/Export the location estimate results.

Source Tracking

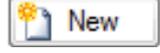
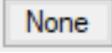
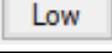
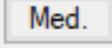
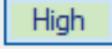
The Vision Locator Source Tracking settings and control panel provides the menu selection shown in Figure 6-4.



Figure 6-4. Source Tracking Control and Settings

The Source Tracking selection tabs are described in Table 6-5.

Table 6-5. Source Tracking Settings and Control Buttons

Icon	Description
	Track: Toggle tracking mode (Breadcrumbs on map to track source location).
	Create: Create tracks based on traces in the database.
	New Tracks: Remove existing tracks and prepare for a new tracking measurement.
	Smoothing None: Set track averaging off.
	Smoothing Low: Set track averaging to Low. May increase resolution, but also increases path noise.
	Smoothing Medium: Set track averaging to Medium. Best setting under normal conditions. Gives a fairly smooth path, but some corners may be rounded.
	Smoothing High: Set tracking averaging to High. Very smooth path, will round corners and turns. Small detours will be lost.

Live Sweep Settings

Live Sweep Settings provides the menu shown in [Figure 6-5](#).

Live Sweep Settings			
Start Freq:	2400.000000	MHz	RBW: 300 kHz
Stop Freq:	2480.000000	MHz	VBW: 100 kHz
Ref Level:	-40.00	dBm	Preamp: (dropdown)
RL Offset:	0.0	dBm	Trace: (dropdown)
Reload Parameters		Apply to Current	
Apply to All			

Figure 6-5. Live Sweep Settings

Frequency Start: Type in the Start Frequency for live sweeps. Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

Frequency Stop: Type or enter the Stop Frequency for live sweeps. Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

Ref Level: Reference level for live sweeps.

RL Offset: Reference level offset for live sweeps.

RBW: Set Resolution Bandwidth (RBW) for live sweeps. Pull-down provides RBW of 1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, and 3 MHz.

VBW: Set Video Bandwidth (VBW) for live sweeps. Pull-down provides RBW of 1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, and 3 MHz.

Preamp: Toggle Preamp state (On/Off).

Trace: Select the desired Trace Mode Setting.

- Normal: Displays data for the current trace sweep. Can be applied to several channel Spectrum Analyzers in the database.
- Rolling Min Hold: Minimum value at each frequency point over the last trace sweeps. Can be applied to several channel Spectrum Analyzers in the database.
- Rolling Max Hold: Maximum value at each frequency point over the last trace sweeps. Can be applied to one channel Spectrum Analyzer in the database.
- Average: Average value at each frequency point over the last trace sweeps. Can be applied to only one channel Spectrum Analyzer in the database.
- Min Hold: Minimum value at each frequency point over the last trace sweep. Can be applied to only one channel Spectrum Analyzer in the database.
- Max Hold: Maximum value at each frequency point over the last trace sweep. Can be applied to only one channel Spectrum Analyzer in the database.

Reload Parameters: Reset spectrum analyzer Sweep Parameters from database.

Apply to Current: Apply the current settings above to the selected spectrum analyzer.

Apply to All: Apply the current settings above to all spectrum analyzers.

Active Settings and Control View

The “Active Settings and Control View” on page 6-7” on page 6-1 displays the corresponding active buttons from the Settings and Control panels. Inactive Icons will be grayed. These active icons provide a visual tool of the settings and control buttons that are in use. Note that the icons in this panel are not activated from this location, but must be selected via the Settings and Control panel buttons to execute.

6-4 Set Up a PoA

To set up a PoA locate measurement, select a channel from the Trace Monitor window as shown in Figure 6-6.

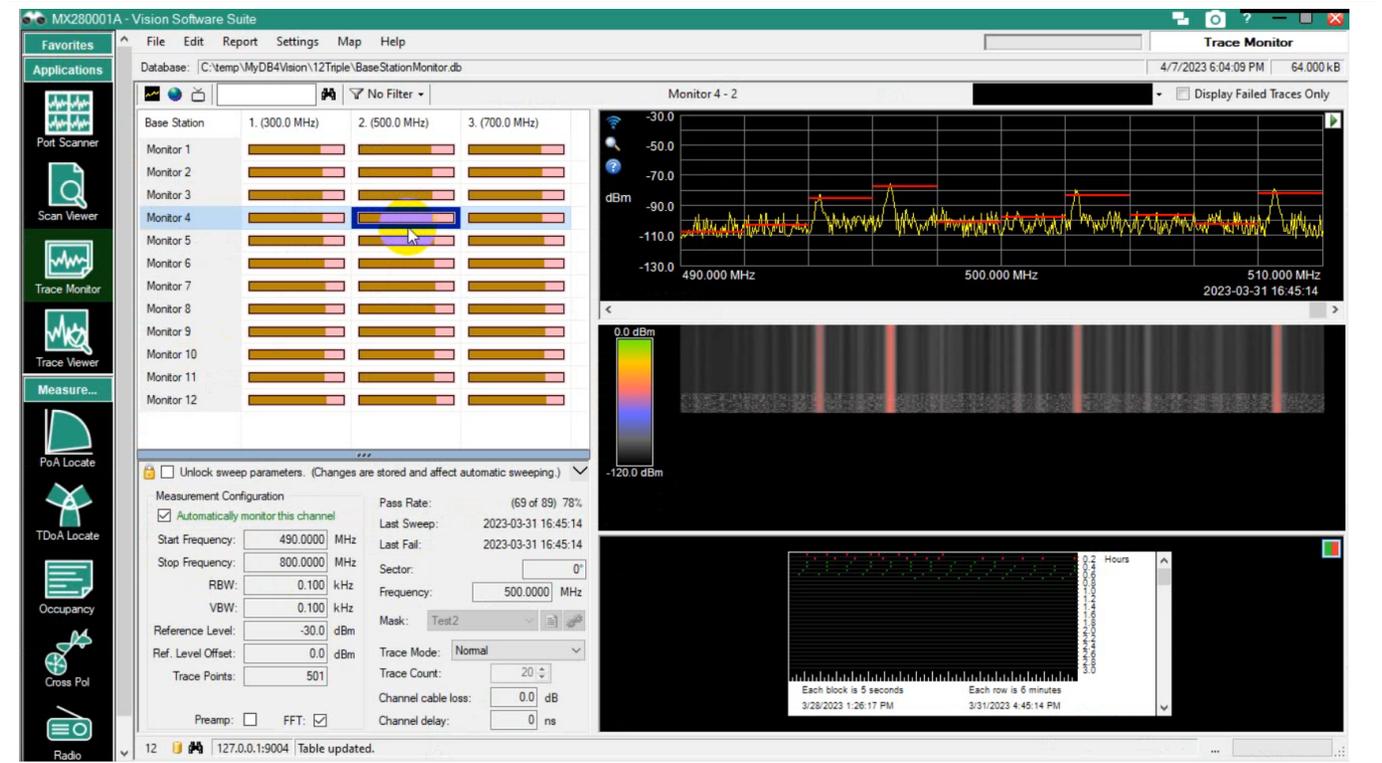


Figure 6-6. Monitor #4 Selected

Monitored Area

Refer to [Figure 6-7](#). The selected Spectrum Analyzer from Trace Monitor is displayed on the screen as Spectrum Analyzer “1” on the PoA map. As default, the closest two Spectrum Analyzers are shown and labeled as Spectrum Analyzer “2” and Spectrum Analyzer “3”. These are the three Spectrum Analyzers initially set to measure the interferer signal. The three Spectrum Analyzers are enclosed in a red-boundary capture range rectangle used to calculate the interferer location.

Up to three Spectrum Analyzers can be selected in the Trace Monitor menu. The red-boundary measurement window encloses the three Spectrum Analyzers selected.

Change Measurement Monitors on PoA Map

Click another probe on the PoA map or click a trace display repositions the red-boundary to include the selected Spectrum Analyzer. The number of probes displayed on the PoA map can be changed using “[Application Settings Window](#)” on [page 2-7](#) and then add Spectrum Analyzers using the set the “[Maximum Number of Probes](#)”, Note that only three can be set to make interferer measurements.



Figure 6-7. Change PoA Monitor

1. Initial PoA Measurement
 2. Clicked Monitor / Changed Boundary
-

Figure 6-7. Change PoA Monitor

PoA Report

The report generated is shown in [Figure 6-8](#). The report includes a screenshot of the PoA screen, Report Date, and the Interferer Coordinates. The report can be printed and saved in a user designated folder.

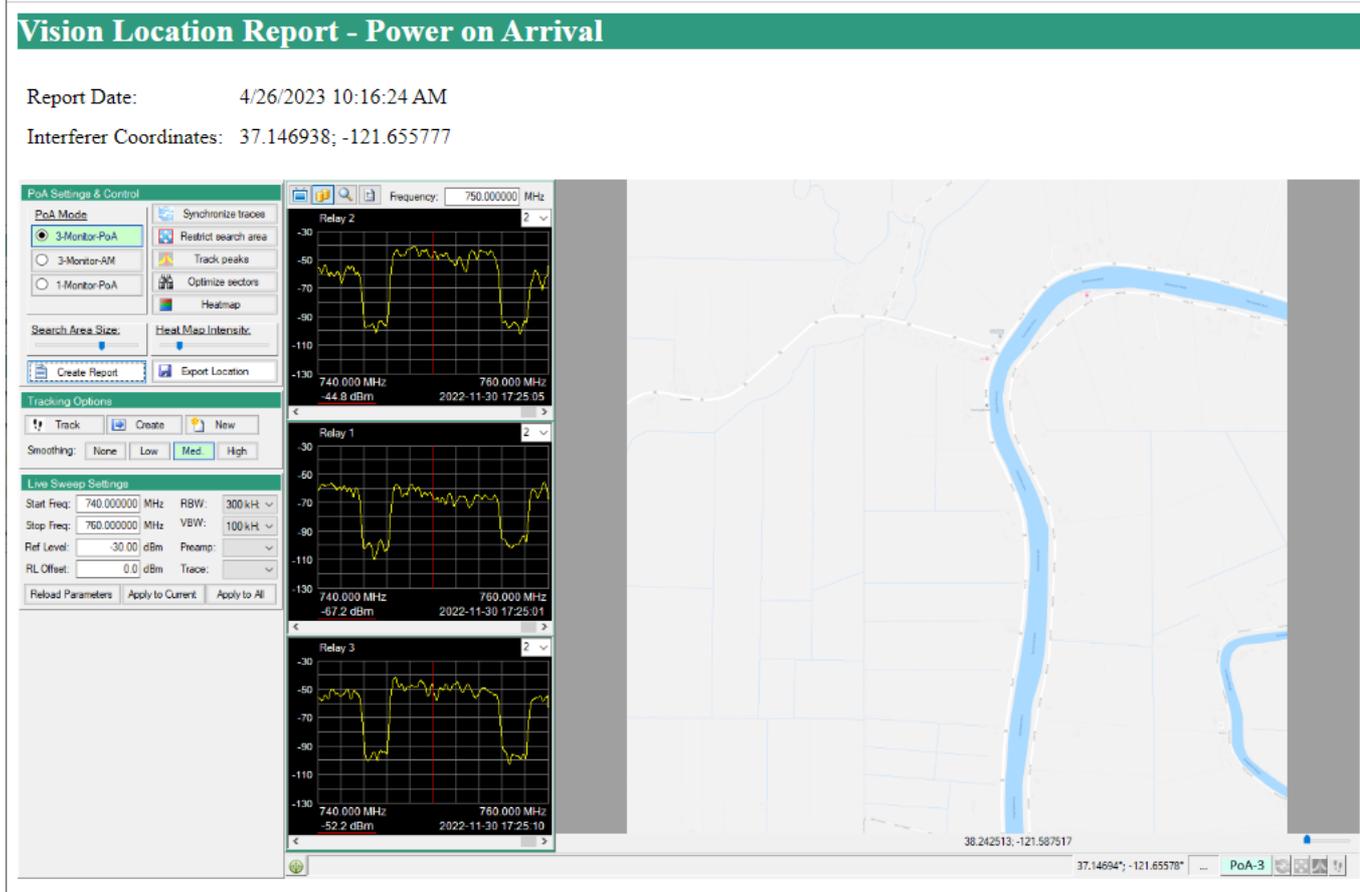


Figure 6-8. PoA Report

Chapter 7 — TDoA Locate (Option 401)

7-1 Introduction

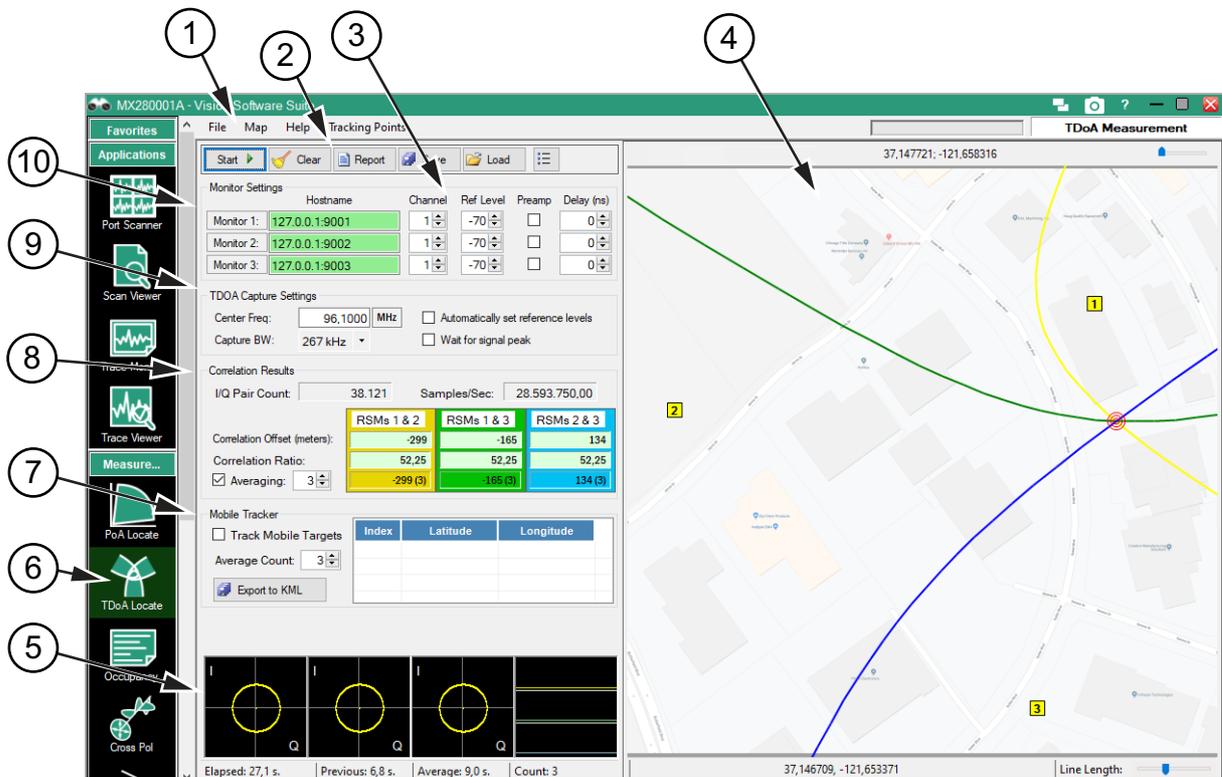
The TDoA Locate (Option 401) is built using the Vision API. Spectrum analyzers positioned in a triangular pattern perform TDoA to identify a stationary signal's longitude and Latitude coordinates. Use either a user selected map, or a bit map to identify and geo-locate the interferer's signal source.

7-2 Using TDoA

For clarification of the TDoA functionality, we use the Vision Simulator program ([Appendix A](#)) to develop the single screen interface as shown in [Figure 7-1](#). Although the simulator does not understand and respond to all Monitor SCPI commands, it does respond to the complete sub-set of commands that Vision uses.

Typically, a map is loaded from an existing user file. The TDoA Application Graphical User Interface provides the approximate location of the simulated Spectrum Analyzers along with a series of locations that are used to simulate RF sources. These RF source locations can represent:

- Interference sources when working with Power of Arrival (PoA) or Time Difference of Arrival (TDoA).
- A series of locations when tracking a moving RF emitter.



1. "TDoA Menu Bar" on page 7-2

2. "TDoA Toolbar" on page 7-3

3. "Monitor Settings" on page 7-3

4. "TDoA Map Display" on page 7-10

5. "TDoA and IQ Results" on page 7-8

6. TDoA Locate Measurement

7. "Mobile Tracker" on page 7-7

8. "Correlation Results" on page 7-6

9. "TDOA Capture Settings" on page 7-5

10. "Monitor Settings" on page 7-3

Figure 7-1. TDoA Graphical User Interface

TDoA Menu Bar

The TDoA menu bar is shown in [Figure 7-2](#) and described in [Table 7-1](#).

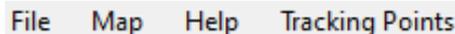
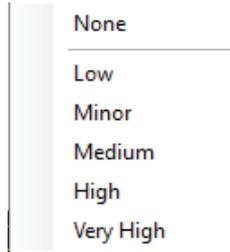


Figure 7-2. TDoA Menu Bar

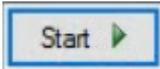
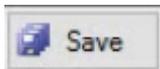
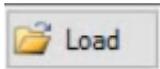
Table 7-1. TDoA Menu Bar Description

Menu	Description
File	<p>Open Database: Opens the database folder that has been set from “Set Database Root Folder”.</p> <p>Set Database Root Folder: Opens the database folder set the “Set Database Root Folder”.</p> <p>Recent Databases: Click to display the most recent databases used.</p> <p>Exit: Exit the File menu.</p>
Map	<p>Load Map: Load a user selected map to the screen.</p> <p>Existing Maps: Load a map from an existing map folder.</p>
Help	<p>Help: See “Help Menu” on page 5-3.</p>
Tracking Points	<p>Show Tracking Points: Show tracking points on the map.</p> <p>Highlight Last Track Point: The last tracking point is highlighted as it scans.</p> <p>Tracking Smoothing: Smoothing does a running average over the track points to make the line through them smoother. Set smoothing as:</p> <div style="text-align: center;">  </div> <p>Track Thickness: Set as thick, medium, or heavy.</p> <p>Combine Points: Combine points as Track 1 or Track 2.</p> <p>Export tracks: Export tracks to a user selected file.</p> <p>Open Export Folder: Opens the user selected TDoA export folder.</p>

TDoA Toolbar

The TDoA Application's toolbar descriptions are listed in [Table 7-2](#).

Table 7-2. TDoA Toolbar

Icon	Description
	Start: Starts the TDoA tracking.
	Clear: Removes all measurement and map tracking results.
	Report: Generates a TDoA report that includes the Spectrum Analyzer information, search parameters and the current displayed map results.
	Save: Opens a dialog box to enter the name of a file to save everything shown as a configuration file (*.cfg). Save does not save the results that appear in the Mobile Tracker Index-Latitude-Longitude box. Can also save the most recent IQ captures data as Binary IQ Data (*.IQ).
	Load: Search and load a saved configuration file.
	TDoA Settings: Displays a dialog box that provides the TDoA display view options. Section "TDoA Settings" on page 7-9.

Monitor Settings

The Monitor Settings section provides text boxes to type or enter the Spectrum Analyzer setting parameters. The Monitor 1, Monitor 2, and Monitor 3 identify the communication setting parameters for each Spectrum Analyzer as shown in [Figure 7-3](#).

Monitor Settings					
	Hostname	Channel	Ref Level	Preamp	Delay (ns)
Monitor 1:	127.0.0.1:9002	1	-70	<input checked="" type="checkbox"/>	0
Monitor 2:	127.0.0.1:9003	1	-70	<input checked="" type="checkbox"/>	0
Monitor 3:	127.0.0.1:9004	1	-70	<input checked="" type="checkbox"/>	0

Figure 7-3. Monitor Settings

The Monitor Settings section is described in [Table 7-3](#).

Table 7-3. Monitor Settings and Control Buttons

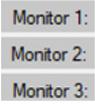
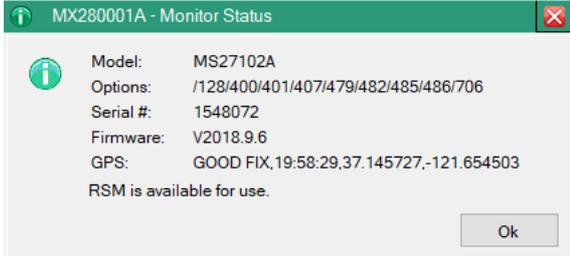
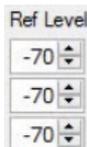
Icon	Description
	<p>Monitor 1,2,3: Identifies each Spectrum Analyzer. Each Spectrum Analyzer label is a button. Click each Spectrum Analyzer label to display its RMS Status dialog as shown below. The Spectrum Analyzer Status dialog provides details of each Spectrum Analyzer as shown:</p> <p>Model: The model of the Spectrum Analyzer.</p> <p>Options: The Spectrum Analyzer options installed.</p> <p>Serial #: The serial number of the Spectrum Analyzer.</p> <p>Firmware: The firmware installed.</p> <p>GPS: Indicates the GPS as GOOD FIX (Strong GPS signal connected). NO FIX (GPS signal is too weak or none found). The Spectrum Analyzer coordinates are displayed.</p> <p>Spectrum Analyzer in use: Flag indicating the Spectrum Analyzer is in use and also displays the end-user. In this case the end user is the Simulator. If the Spectrum Analyzer is not in use, the flag will indicate – Spectrum Analyzer is available for use.</p> 
	<p>Hostname: Type in the Host name settings. The URL Hostname is the communication link to the spectrum analyzers.</p>
	<p>Channel: Type or select the Spectrum Analyzer channel.</p>
	<p>Ref Level: Type or select the Spectrum Analyzer Reference Level.</p>
	<p>Preamp: Select the Preamp check box to activate the Preamp for each Spectrum Analyzer.</p>

Table 7-3. Monitor Settings and Control Buttons

Icon	Description
	Delay (ns): Type or select a delay time. The delay time selections are in nano seconds.

TDoA Capture Settings

Enter the TDoA Capture Settings section is shown below in [Figure 7-4](#).

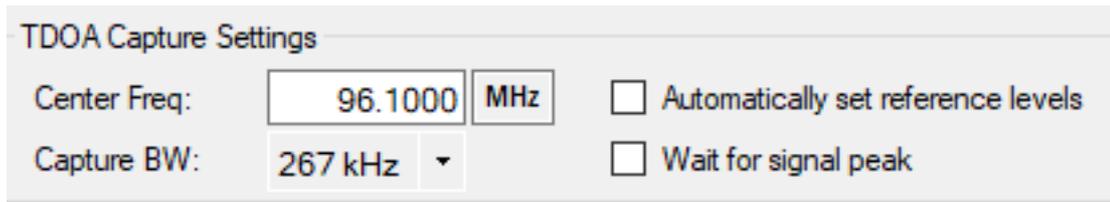


Figure 7-4. TDoA Capture Settings

The TDoA Capture Settings section is described in [Table 7-4](#).

Table 7-4. Capture Settings

Icon	Description
	Center Freq: Type the center frequency and then select the frequency terminator.
	Capture BW: Click to open the Capture BW frequency list and select the frequency.
	Automatically set reference level: Click the check box to set reference levels automatically.
	Wait for signal peak: Click to enter a check-mark to set - Wait for signal peak.

Correlation Results

View the correlation results, the I/Q pair count, samples per second data, as well as correlation data for each Spectrum Analyzer. The correlation ratio is a number that relates to how strongly the algorithm was able to find the correct time alignment and offsets (expressed in meters). The correlation peaks at the position where the two sets of IQ data are aligned in time. If this peak is very pronounced, then you can have confidence in the time alignment. If it is not so pronounced, then the data is suspect. Basically, the correlation ratio is the peak amplitude divided by the average value of the correlation function. A value less than 20 means you should not trust the results at all while a value above 100 is usually a strong indication that the correlation is good. This area provides you the option of selecting Averaging and setting the averaging count used in the calculation above. The Correlation Results section is shown in [Figure 7-5](#).

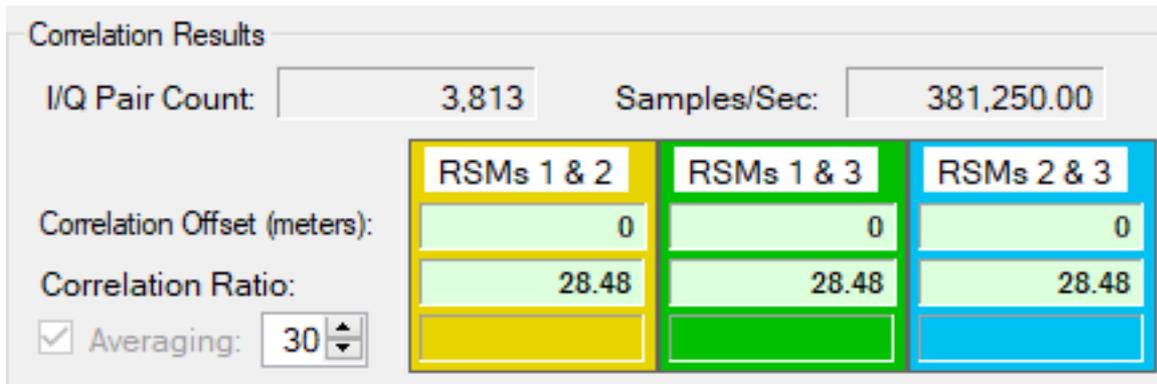


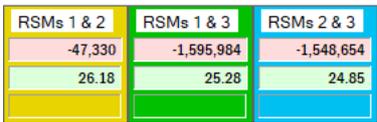
Figure 7-5. Correlation Results

The TDoA Correlation Results section are described in [Table 7-5](#)

Table 7-5. Correlation Results

Icon	Description
	I/Q Pair Count: Displays the I/Q Pair Count.
	Samples/Sec: Displays the number of samples per second.
	Correlation Offset (meters): The values shown in the Averages look different. For example: The yellow box averaging display of -236 (3). The first number is the averaged value taken from the Correlation Offset (meters) field above. The number in parenthesis is the count of values used in the average. This can be a different number for each Spectrum Analyzer pair, depending on the Correlation Ratios from each measurement.
	Correlation Ratio: The Correlation Ratio is the peak amplitude divided by the average value of the correlation function. A value less than 20 means you should not trust the results at all, while a value above 100 is usually a strong indication that the correlation is good.
	Averaging: Click the Averaging check box to initiate averaging for each time a TDoA I/Q capture is done. Type or select the amount of averages. The measured distance is averaged with previous measurements. The average values are used when drawing the arcs on the map and locating the RF source. If the check box is clear, then the most recent measurement values will be used on the map, rather than the average values.

Table 7-5. Correlation Results

Icon	Description
	<p>Monitor Block: The Spectrum Analyzer combinations blocks and the numeric boxes are colored for quick visual separation.</p> <ul style="list-style-type: none"> • Yellow, dark green, blue for each Spectrum Analyzer combination corresponds to the hyperbolic lines drawn on the map. • Lighter green background in the numeric boxes indicate the measurement is good. • Lighter red in the numeric boxes indicate the correlation ratio is too low (<5) or if the Spectrum Analyzer correlation is greater than the Spectrum Analyzer separation. • Any number of the numeric boxes can be either green background or red background, depending on the value it displays.

Mobile Tracker

The Mobile Tracker shows a location table for a mobile interferer with locations at a number of index points. You can also export this data to a KML for use in a mapping program or to upload a user selected map. The Mobile Tracker section is shown in [Figure 7-6](#).

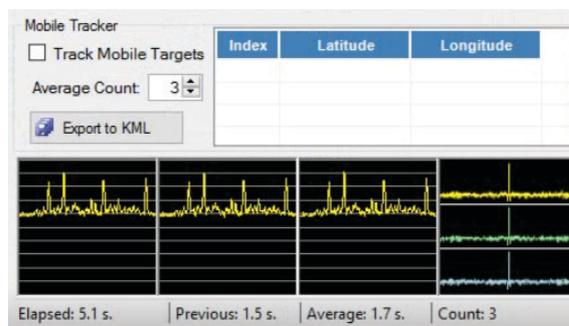
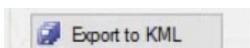


Figure 7-6. Mobile Tracker

The TDoA Mobile Tracker section is described in [Table 7-6](#).

Table 7-6. Mobile Tracker

Icon	Description
	<p>Track Mobile Targets: Click the check box to track mobile targets. This will put a marker on the map indicating a moving source position and will continue to track it when within the Spectrum Analyzer range.</p>
	<p>Average Count: Type or enter the number of completed sweeps before the Mobile Tracker identifies a moving object and tracks the target on the map.</p>
	<p>Export to KML: Export to a KML file.</p>
	<p>Index-Latitude-Longitude Box: Click the “Track Mobile Targets” check box initiates tracking when a source is identified and assigns an index number. The signals latitude and longitude is recorded. The event is sequenced with a new index number for each occurrence per the amount of count averaging selected until the source is no longer within the Spectrum Analyzer range or the flight has terminated.</p>

TDoA and IQ Results

The TDoA and IQ windows are shown in [Figure 7-6](#).



1. RF Sweep

2. IQ Signal Correlation

3. Averaging Count

4. Average Time

5. Previous Time-to-Measurement.

6. Total Time

Figure 7-7. TDoA and IQ Windows

RF Sweep: The RF sweep trace from each Spectrum Analyzer.

IQ Signal Correlation: IQ signal correlation for each set of spectrum analyzers. The prominence of the peak above the baseline is a good indication of the quality of a particular measurement. Top chart is a graph of the correlation between Spectrum Analyzers 1 and 2. Middle chart is for Spectrum Analyzers 1 and 3. Bottom chart is for Spectrum Analyzers 2 and 3.

Average Count: Due to the uncertainty in each position estimate, several sequential measurements and average the results are performed. This is the number of measurements in the current result.

Average Time: The average time for each IQ capture and position calculation.

Previous Time-to-Measurement: The time the most recent measurement took. If this number gets very large, one of the spectrum analyzers might be off-line.

Total Time: The total time taken for the set of measurements in the current result.

Maps

To view the spectrum analyzer, TDoA coordinates, and IQ activity over a specific geographical area, it is essential to load a geo-map into the TDoA application map window. The map is loaded from an existing user file location. To load a map, go to the TDoA toolbar and click “Load” to view the TDoA Settings dialog as shown in [Figure 7-8](#).

TDoA Settings

The “TDoA Settings” is available from the TDoA toolbar. Most of the TDoA Settings windows can be hidden where only the Monitor Settings and TDoA Capture settings are available to view. The Monitor Settings and TDoA Capture Settings are the minimal view settings and can not be hidden. The user’s interface viewing selections are shown below in [Figure 7-8](#).

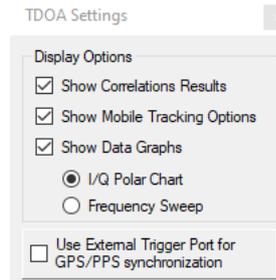


Figure 7-8. TDoA Settings

The TDoA Settings section is described in [Table 7-7](#).

Table 7-7. TDoA Settings Dialog

Check box	Description
<input type="checkbox"/> Show Correlations Results	Show Correlation Results: Click the Show Correlations Results check box to show the Correlation Results window, or click to hide the Correlation Results window.
<input type="checkbox"/> Show Mobile Tracking Options	Show Mobile Tracking Options: Click the Mobile Tracking Options check box or click to hide the Mobile Tracker window.
<input checked="" type="checkbox"/> Show Data Graphs <input type="radio"/> I/Q Polar Chart <input checked="" type="radio"/> Frequency Sweep	Show Data Graphs: Click the Show Data Graphs check box to show the TDoA and IQ window, or click to hide the TDoA and IQ window. I/Q Polar Chart: Click to toggle display view to an IQ Polar Chart. Frequency Sweep: Click to toggle display view to a Frequency Sweep Chart.
<input type="checkbox"/> Use External Trigger Port for GPS/PPS synchronization	Use External Trigger Port for GPS/PPS synchronization: Check this box to use External Trigger Port for GPS/PPS synchronization.

TDoA Map Display

Selecting “Start” will initiate the program to communicate to the three Spectrum Analyzers and perform the TDoA measurement. The red bullseye indicates the identified target by the intersecting lines of the spectrum analyzer 1, 2, and 3 as shown in [Figure 7-9](#). The TDoA map display is described in “[TDoA Application](#)” on page 7-11.

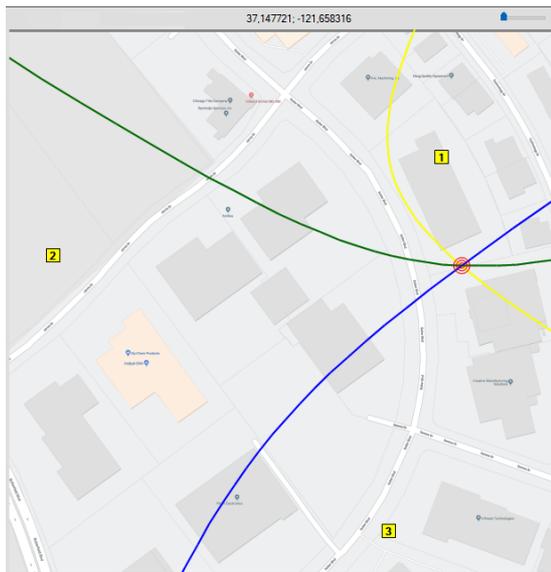
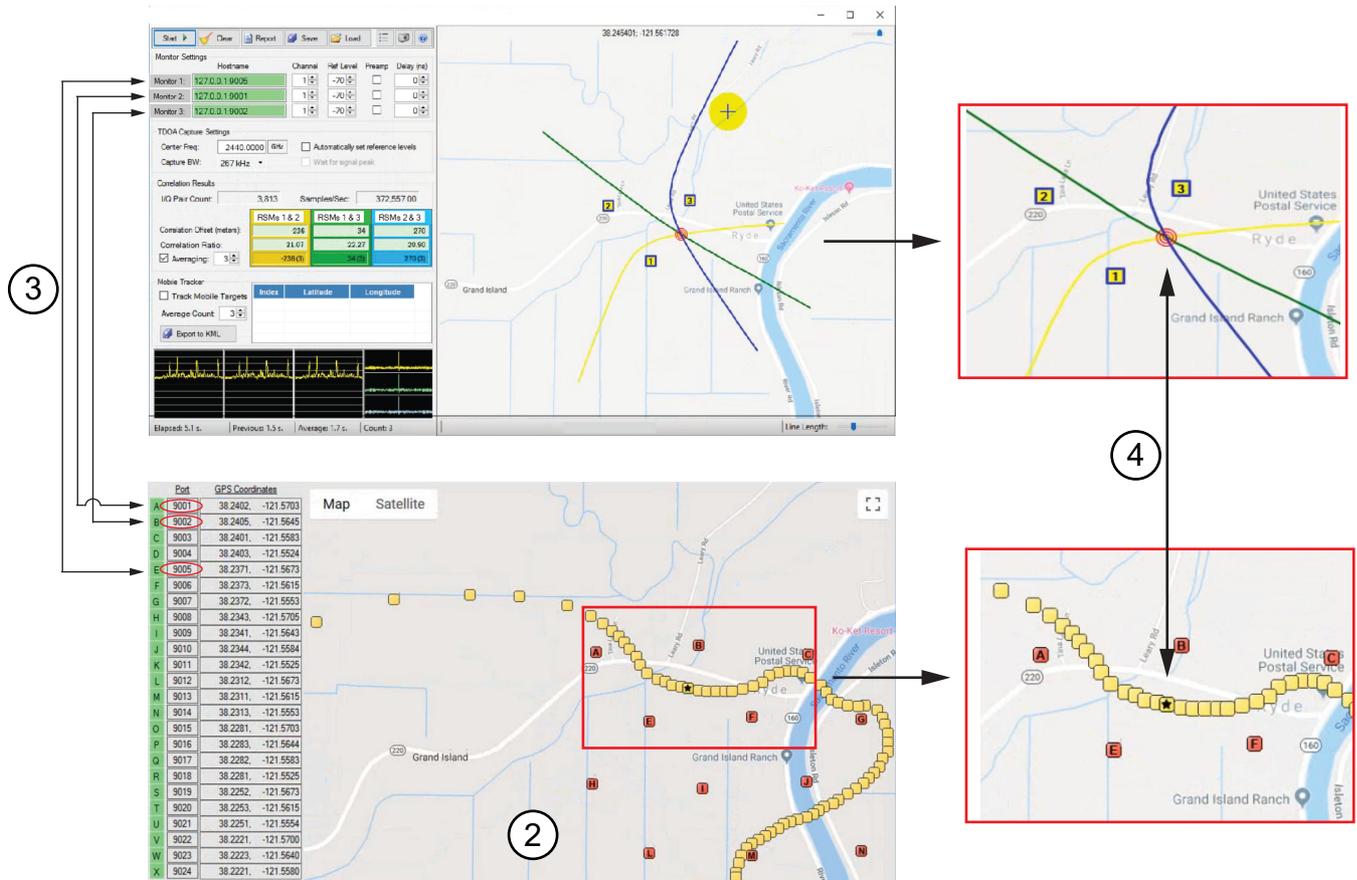


Figure 7-9. TDoA Map Measurement Display

7-3 TDoA Application

The TDoA Application used with the Vision Simulator Program provides a user screen with the tools to simulate a tracked stationary or a mobile interferer signal as shown in Figure 7-10.



1. TDoA Application Graphic User Interface
2. Vision Simulator Program Graphic User Interface
3. Corresponding Monitors
4. Emitter Tracking

Figure 7-10. TDoA Application With Simulator Program

Callout (4) shows the Simulator’s emitter position between the A, B, and E Spectrum Analyzers in the lower image and the TDoA Application’s triangulated TDoA measurement of the signal in the upper image. The URL “**Hostname**” is the communication link between the TDoA Application and the Simulator. In this example, to make this measurement, set up the TDoA Application as follows:

- TDoA Monitor 2 with the URL Hostname **127.0.0.1.9001** links Simulator port **9001** – map position A.
- TDoA Monitor 3 with the URL Hostname **127.0.0.1.9002** links Simulator port **9002** – map position B.
- TDoA Monitor 1 with the URL Hostname **127.0.0.1.9005** links Simulator port **9005** – map position E.

With the Simulator loaded with Spectrum Analyzers 9001, 9002, 9005, click “**Start**” and the TDoA Application communicates to the three Simulator Spectrum Analyzers and performs TDoA measurements.

In the Simulator example, any set of Spectrum Analyzers can be Spectrum Analyzed, but the Spectrum Analyzed Spectrum Analyzers need to be positioned in a triangular pattern in order to perform a TDoA measurement.

If the target is mobile and moves past Spectrum Analyzer A, B, and E, the next set of Spectrum Analyzers that would capture the signal would be B, C and F. To make this measurement, enter the following Hostnames.

- TDoA Monitor 2 with the URL Hostname **127.0.0.1.9003** links to Simulator port **9003** – map position C
- TDoA Monitor 3 with the URL Hostname **127.0.0.1.9002** links to Simulator port **9002** – map position B
- TDoA Monitor 1 with the URL Hostname **127.0.0.1.9006** links to Simulator port **9006** – map position F

From the TDoA toolbar, click **“Report”** to generate the TDoA report as shown in **Figure 7-11**.

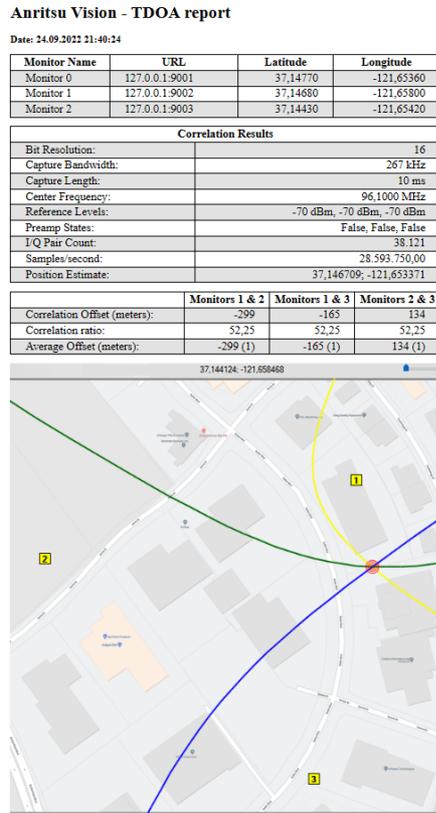


Figure 7-11. TDoA Report

TDoA Report Results

The TDoA generated report results corresponds to the Simulator setup shown in **Figure 7-10** on page 7-11.

Monitor 1, Monitor 2, Monitor 3 Latitude and Longitude settings in the TDoA report are in Degrees, Minutes and Seconds (D.M.S) and the corresponding settings in the Simulator are in Decimal.

The TDoA report’s Bit Resolution is set at 16 bits and the Capture Length is set to 10 ms. These are preset and are not adjustable settings from the TDoA Application or the Simulator Program.

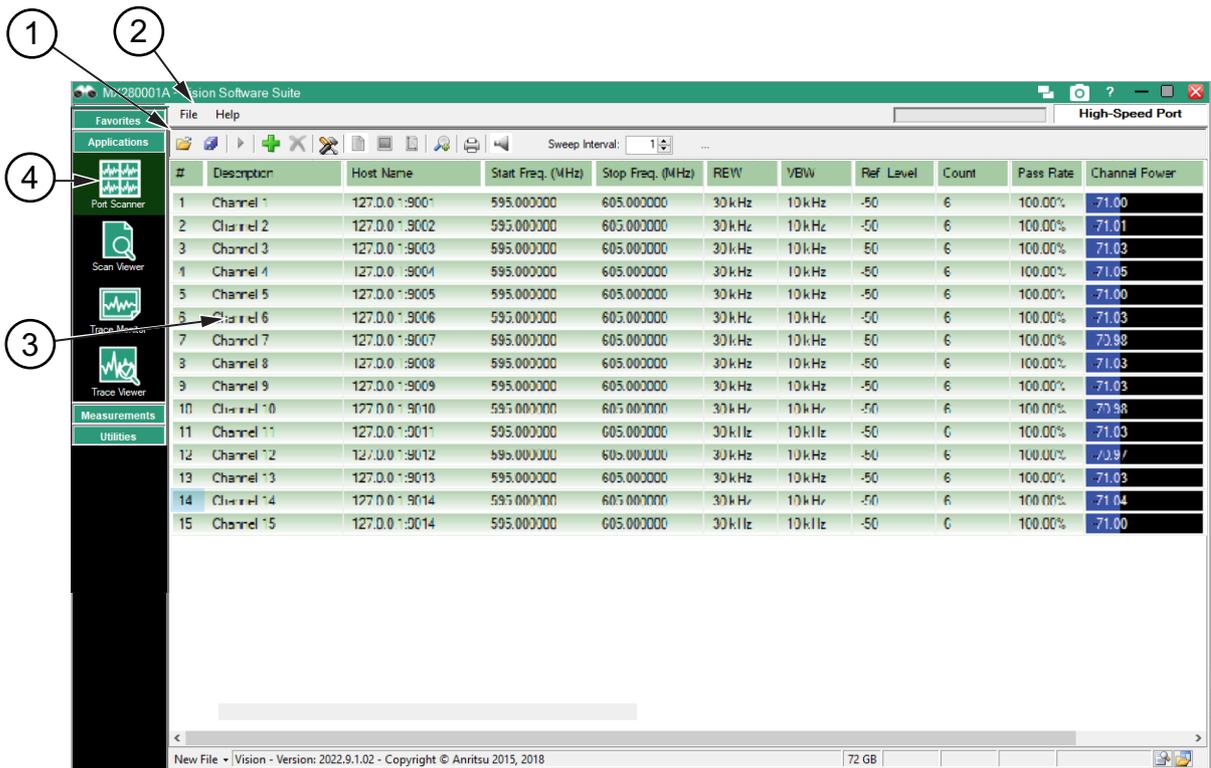
Chapter 8 — Port Scanner (Option 407)

8-1 Introduction

Port Scanner allows you to quickly monitor the channel power on any number of channels using Anritsu's spectrum analyzer with Option 407 installed.

8-2 Port Scanner Menu

Open the Port Scanner Program to display the user interface shown below in [Figure 8-1](#).



- | | |
|-------------|------------------------|
| 1. Toolbar | 3. Table List |
| 2. Menu Bar | 4. Port Scanner Button |

Figure 8-1. Port Scanner Menu

Port Scanner Menu Bar

The Port Scanner menu bar is shown in [Figure 8-2](#) and described in [Table 8-1](#).



Figure 8-2. Port Scanner Menu Bar

Table 8-1. Port Scanner Menu Bar Description

Menu	Description
File	Open Configuration File: Open the configuration dialog folder. Save Configuration: Open Save Dialog folder. Exit: Exit the File menu.
Help	Help: See “Help Menu” on page 5-3.

Port Scanner Toolbar

The Port Scanner Toolbar is described in [Table 8-2.](#)

Table 8-2. Port Scanner Toolbar

Icon	Description
	Open Saved Configuration File: Displays the Open window to load a previously saved configuration file.
	Save Configuration File: Opens the Save window to save a configuration file. File type extension is CPC.
	Run/Stop: Activates channel monitoring. Button symbol changes to a square. Click to stop channel monitoring.
	Add Channel: Opens the Add Channels dialog. See “Add Channels Dialog” on page 8-4.
	Remove Channel: Removes a channel on the Table List.
	Options and Settings: Opens the Options and Settings dialog. See “Options and Settings” on page 8-7.
	Table List View: Displays the High Speed Port Scanner User Interface as shown in Figure 8-1 on page 8-1. The column listings in the heading row is user selectable through the Options and Settings dialog. See “Display Table List Columns” on page 8-8.
	Trace View: Displays all the active channels on the screen. Each channel is displayed in a x-y graticule of frequency vs. power.
	RSSI (P vs T) View: Display the RSSI (Received Signal Strength Indication) in power vs. time graphs. PvT graphs plot the Channel Power from each trace sweep.
	Expand View: Opens the window with the enlarged or expanded view of up to three user selected traces.
	Print: Sends output to the printer of the Table List, Trace, and RSSI view.
	Audible Alarm: Toggles audible alarm. A two-state button that toggles the Audible Alarm state - When depressed, the limit line violations produce an audible alarm. If it is out (off) then the program is quiet.

Table 8-2. Port Scanner Toolbar

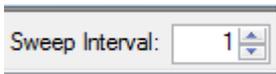
Icon	Description
	<p>Sweep Interval: Sets how often each channel in the channel table will be swept. If the sweep interval is too short to complete all channels, then each sweep will follow immediately after the previous.</p> <p>While multiple monitors will be swept simultaneously, each channel on a monitor will be swept sequentially. If the channels on one monitor take longer than the sweep interval to accomplish, then that monitor will accumulate fewer total sweeps per channel than other monitors.</p>

Table List

The Table List is the main body of the program window. It lists the channels to be monitored, the sweep parameters for each channel, along with a summary of sweep results. Parameter columns and entries can be added, removed, or edited. For information on how to edit columns and parameters, see [Section 8-4 “Options and Settings”](#) on page 8-7.

#	Description	Ant.	Start Freq. (MHz)	Stop Freq. (MHz)	RBW	VBW	Ref. Level	Points	Trace Mode	Trace Count	Upper Li.	Lower Li.	Count	Pass Rate	Channel Power
1	Spectrum Monitor 1	1	2400.000000	2480.000000	400.0 kHz	100.0 kHz	-30.0	501	Normal	20	None	None	2403	100.00%	-73.21
2	Spectrum Monitor 2	1	2400.000000	2480.000000	400.0 kHz	100.0 kHz	-30.0	501	Normal	20	None	None	2403	100.00%	-73.17
3	Spectrum Monitor 3	1	2400.000000	2480.000000	300.0 kHz	100.0 kHz	-30.0	501	Normal	20	None	None	2403	100.00%	-71.76
4	Channel 4	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Normal	20	None	None	2403	100.00%	-70.99
5	Channel 5	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Normal	20	None	None	2403	100.00%	-71.01
6	Channel 6	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Normal	20	None	None	2403	100.00%	-71.02
7	Channel 7	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Normal	20	None	Segment...	2403	100.00%	-71.01
8	Channel 8	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Rolling Max	20	None	None	2403	100.00%	-70.80
9	Channel 9	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Normal	20	None	None	2403	100.00%	-71.01
10	Channel 10	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Normal	20	None	None	2403	100.00%	-71.02
11	Channel 11	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Normal	20	None	None	2403	100.00%	-71.01
12	Channel 12	1	595.000000	605.000000	30 kHz	10 kHz	-50	501	Normal	20	None	None	2403	100.00%	-71.00

Figure 8-3. Table List

Once the parameter measure criteria is set and the program is started, the individual channel signal-monitoring traces can be viewed. See [“Trace View”](#) on page 8-12 and [Section “RSSI PvT View”](#) on page 8-15 for more information on viewing the Table List channel traces.

Run the Port Scanner

The Port Scanner can be operated with the monitor simulator as described in [Chapter A, “Simulator”](#). All tools described while using the Simulator program are available and used the same when using real-time monitoring.

Add Channels Dialog

The Add Channel Dialog is used to add, replace, or insert a channel with selected parameter criteria from the dialog. From the toolbar, click **“Add Channel”**. The Add Channels dialog box opens as shown in [Figure 8-4](#).

To edit channels parameters that are already active in the Table List, see [Section 8-4 “Options and Settings” on page 8-7](#).

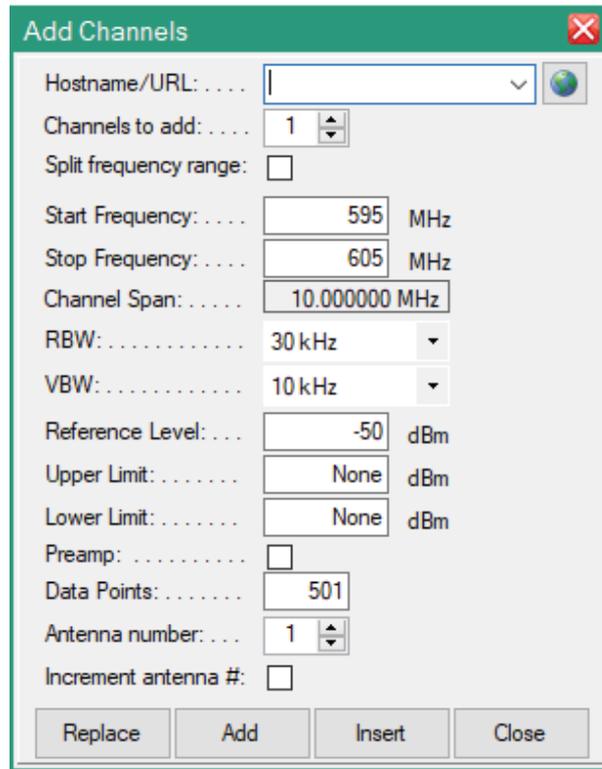


Figure 8-4. Add Channels Dialog

A description of the Add Channel entries are described below.

Table 8-3. Add Channels Parameter Description

Parameter	Description
Host name/URL	Enter a host name or URL address for the instrument taking measurements. If using the simulator program, enter 127.0.0.1 for the Hostname.
Channels to add	Will add to the Table List the number of channels designated in the entry box. Type in a value using the number keypad or the up/down arrow buttons to increment/decrement the number of desired channels.

Table 8-3. Add Channels Parameter Description (Continued)

Parameter	Description
Split frequency range	The frequency span is split into the sub-channels. For example: Start Frequency is set at 600 MHz and Stop Frequency set at 700 MHz with 10 channels to add. <ul style="list-style-type: none"> • If Split Frequency Range is not checked, 10 channels set at 600 MHz to 700 MHz. • If Split Frequency Range is checked, 10 channels each with a 10 MHz span. 600 MHz to 610 MHz, 610 MHz-620 MHz, etc.
Start Frequency	Type in the desired start frequency using the number keypad. The maximum frequency setting Vision provides is the maximum allowed on the measuring instruments up to 54 GHz.
Stop Frequency	Type in the desired stop frequency using the number keypad. The maximum frequency setting Vision provides is the maximum allowed on the measuring instruments up to 54 GHz.
Channel Span	Channel Span displays the individual channel spans when Split Frequency Range is checked. So in the Split frequency range example above, it will be blank if Split Frequencies is not checked, and show 10 MHz if Split Frequencies is checked.
RBW	Type or enter a RBW value from the list. The selectable range is 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz.
VBW	Type or enter a VBW value from the list. The selectable range is 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz.
Reference Level	Type in the desired start power range using the number keypad. The entry range is –120 to 20 dBm.
Upper Limit	Type in the desired upper limit using the number keypad. The entry range is –120 to 20 dBm.
Lower Limit	Type in the desired lower limit using the number keypad. The entry range is –120 to 20 dBm.
Preamp	Select this box to use the preamp. Checked will activate the preamp to reduce noise.
Data Points	Type in the desired data points using the number keypad.
Antenna number	Type in a value using the number keypad or the up/down arrow buttons to increment/decrement the number of antennas. The selectable range is 1 to 24.
Increment Antenna #	If checked, the antenna number starts at 1 and will increment for each channel added. For example, if five channels are added, the antenna number will start at 1 and increment to 5. If not checked, the antenna number will always be 1.
Replace	Replace entire Table List with current Add Channel configuration.
Add	Include the Add Channel configuration to the bottom of Table List.
Insert	Click a channel number before opening the Add Channel dialog. Click Insert to add the Add Channel configuration above the selected channel number. This allows the user to insert at the top of the Table List.
Close	Close the Add Channels dialog.

Adding Channel Parameters

Add parameters to build the High Speed Port Scanner Table List. Refer to [Figure 8-4 on page 8-4](#) and [Table 8-3 on page 8-4](#). Once the Add Channel Dialog is open:

1. Type a host name or URL address for the instrument taking measurements. If using simulator program, enter 127.0.0.1 for the Host name.
2. Type or enter the number of channels to add. (For this demonstration, add 12)
3. Click the Split frequency range check box.
4. Click the Increment antenna # check box.
5. Click Add. You can add up to 500 channels.
6. Click Close.
7. Type in the sweep interval.
8. Click the Run/Stop to start button (Green “Play” button). You should see the channel power column continuously updating in 1 second intervals.

If you have a multi-port monitors (i.e. MS27103A) you can add channels for all antenna ports at once, if each antenna is going to sweep a single frequency range.

If you want to scan multiple frequency ranges (channels) on individual antenna ports, add channels as sets for each antenna port.

8-3 Monitoring Channels

Press the Start button, The Port Scanner channel window will begin to show activity as the channels are sequentially scanned.

If you have set limit values to distinguish pass/fail sweeps, then the channel power will be shown with a red bar when a channel fails a limit test as shown in [Figure 8-5](#).

#	Description	Host Name	Start Freq. (MHz)	Stop Freq. (MHz)	RBW	VBW	Ref. Level	Upper L.L.	Lower L.L.	Count	Pass Rate	Channel Power
1	Spectrum Monitor 1	127.0.0.1:9001	2400.000000	2480.000000	400.0 kHz	100.0 kHz	-30.0	-30	-50	8	0.00%	-72.04
2	Spectrum Monitor 2	127.0.0.1:9002	2400.000000	2480.000000	400.0 kHz	100.0 kHz	-30.0	None	None	8	100.00%	-72.60
3	Spectrum Monitor 3	127.0.0.1:9003	2400.000000	2480.000000	300.0 kHz	100.0 kHz	-30.0	None	None	8	100.00%	-71.85
4	Channel 4	127.0.0.1:9004	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.00
5	Channel 5	127.0.0.1:9005	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.03
6	Channel 6	127.0.0.1:9006	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.03
7	Channel 7	127.0.0.1:9007	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.03
8	Channel 8	127.0.0.1:9008	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.03
9	Channel 9	127.0.0.1:9009	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.03
10	Channel 10	127.0.0.1:9010	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.03
11	Channel 11	127.0.0.1:9011	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.02
12	Channel 12	127.0.0.1:9012	595.000000	605.000000	30 kHz	10 kHz	-50	None	None	8	100.00%	-71.03

Figure 8-5. Table List with Failed Channel Power

As channel power measurements are completed, results are written to a file. The output file and directory are shown in the status bar at the bottom of the window. This file will be in a sub-folder in the current users My Documents folder. The filename contains the date on which the scan started. Each time a scanning stops and is restarted, a new file is created. The output file is a simple CSV file that can be read by many other programs, such as spreadsheet application. See [Figure 8-3 on page 8-3](#).

8-4 Options and Settings

The Options and Settings dialog provides the tools to organize, operate, edit, and view the Port Scanner parameters in the display. Once opened, the Options and Settings dialog appears as shown in [Figure 8-6](#).

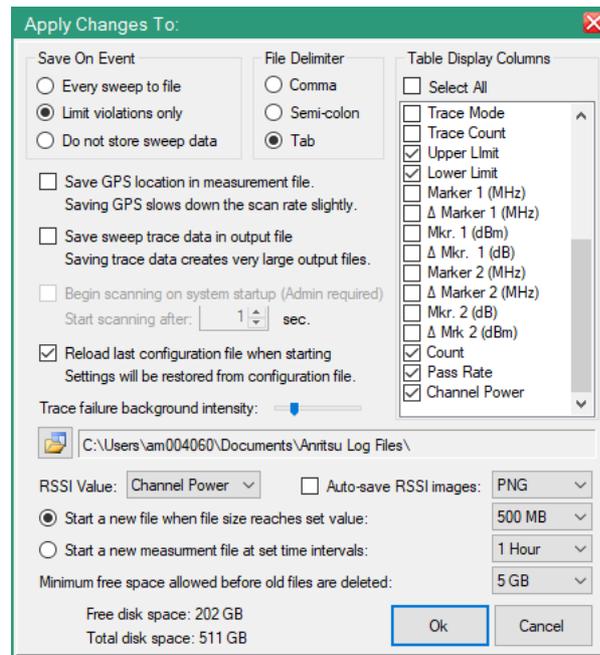


Figure 8-6. Options and Settings Dialog

Save On Event

Save On Event controls when data is written to the output file. Click the desired event check box.

Every sweep to file: Saves measurement after every sweep. Note that files get very large very quickly if you are sweeping often and saving all of the measurement data.

Limit violations only: Saves measurement data when a limit line is violated.

Do not store sweep data: Visually monitor the scan results. No data is stored.

File Delimiter

File Delimiter controls the character used in the output file to separate fields in each record. Separations are Comma, Semi-colon, and Tab.

Save GPS location in measurement file check box: Saves the GPS location in the data file.

Save Sweep Trace data in output file check box: The Save Sweep Trace option will write out the trace data each time a measurement is saved to the output file. This causes the output file to grow very rapidly, but it is nice to have when you go back to look at the measurements.

Begin Scanning On System Startup check box: This requires running the Port Scanner application to be run as administrator. The check box will be unavailable otherwise and this feature will not be enabled.

Will place a Windows short-cut in the Startup folder of the PC. This will cause Port Scanner to run automatically every time the computer is started.

Start scanning after: Type or enter the delay time in seconds after startup to start scanning the channels.

Note

Begin Scanning on System Startup and click Reload Last Configuration. You cannot begin scanning automatically if you do not reload a configuration file. Therefore, changing either of these settings may also change the other. (You can reload without restarting the scan, but you cannot restart the scan without reloading the configuration).

Reload Last Configuration File: This will cause Port Scanner to reload the last used configuration file whenever the program restarts.

Trace failure background intensity: Controls the red color intensity level of the monitor's background as a limit line violation occurs. When a signal crosses a limit line so that an error occurs, Trace View displays the failed signal sweep as shown in [Figure 8-10 on page 8-11](#).

Display Table List Columns

Click the parameters from the Table Display Columns menu to be displayed in the **“Trace View”** window as shown in [Figure 8-3, “Table List” on page 8-3](#). Each data collection item checked from the scroll-bar menu becomes available to view as a column in the Trace View table. Each column displays the data for each active channel. Click the Select All check box to select all the items in the Trace View table.

RSSI Value: Select from the pull-down Channel Power or Peak Power. Click the **“RSSI (P vs T) View”** icon in the toolbar to display the sweeping PvT plots as selected.

Auto-save RSSI images: Select from the pull-down: JPG, PNG, GIF or BMP. The images are saved at a user defined rate as determined by the sweep time interval and the RSSI collection rate. For example, start scanning at a 3600 second rate with a sweep interval set to 1 will save an image after 1 hour.

Start a new file when file size reaches set value: Click and type or enter 10 MB, 20 MB, 50 MB, 100 MB, 200 MB, or 500 MB file size.

Start a new measurement file at set time intervals: Type or enter 1 Hour, 2 Hours, 4 Hours, 6 Hours, 8 Hours, 12 Hours, 24 Hours.

Set the minimum free space allowed before old files are deleted: Type or enter 1 GB, 2 GB, 5 GB, 10 GB, 20 GB, 50 GB, or 100 GB file size.

Minimum free space allowed before old files are deleted: Set to 1GB, 2GB, 5GB, 10GB, 20GB, 50GB, 100GB.

8-5 Table List Columns and Parameters

In order to change or add to the Table List columns and parameters, pause the program by clicking the “Run/Stop” button.

Once the channels have been added as described in “Adding Channel Parameters” on page 8-6, additional parameters can then be added and existing parameters can be changed using the “Options and Settings” on page 8-7.

Add or Remove Parameters Columns,

Parameters columns can be added or removed from the Table List. In the Options and Setting dialog, scroll the Table Display Columns list of parameters. Click the checkbox of the column to appear or clear the checkbox to remove the column from the Table List. Click the Run/Stop button to restart the active display and the parameters columns will reappear in the channel Table List as they were chosen to appear from the Table Display Columns list.

#	Description	Host Name	Ant.	Start Freq. (MHz)	Stop Freq. (MHz)	RBW	VBW	Ref. Level	dB/Div	Prea...	Points	Trace M.	Trace C.	Δ Mark...	Pass Rate	Channel Power
1	Spectrum Monitor 1	127.0.0.1:9001	1	2400.000000	2480.000000	400.0 k...	100.0 k...	-30.0	10	Off	501	Normal	20		100.00%	-73.21
2	Spectrum Monitor 2	127.0.0.1:9002	1	2400.000000	2480.000000	400.0 k...	100.0 k...	-30.0	10	Off	501	Normal	20		100.00%	-73.26
3	Spectrum Monitor 3	127.0.0.1:9003	1	2400.000000	2480.000000	300.0 k...	100.0 k...	-30.0	10	Off	501	Normal	20		100.00%	-71.95
4	Channel 4	127.0.0.1:9004	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.01
5	Channel 5	127.0.0.1:9005	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.05
6	Channel 6	127.0.0.1:9006	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.05
7	Channel 7	127.0.0.1:9007	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.01
8	Channel 8	127.0.0.1:9008	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.05
9	Channel 9	127.0.0.1:9009	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.02
10	Channel 10	127.0.0.1:9010	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.02
11	Channel 11	127.0.0.1:9011	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.01
12	Channel 12	127.0.0.1:9012	1	595.000000	605.000000	30 kHz	10 kHz	-50	10	Off	501	Normal	20		100.00%	-71.01

Figure 8-7. Table List

Edit Table List Parameters

Most parameters listed in the Table List can be changed within the Table List window. Each parameter resides in a cell that can be edited. Stop the sweep and click the parameter cell to be changed. The changes will then also appear in the Trace View and the PvT view. The following is a list of parameters and what can be changed.

#: Cannot change this parameter from this view. This is a fixed value.

Description: Click and type to change the description title.

Host Name: Click and type to change the Host Name.

Ant: Click and then click again from list box to enter values 1 to 24.

Start Freq: Click and type to change the Start Frequency. The maximum frequency setting Vision provides is the maximum allowed on the measuring instruments up to 54 GHz.

Stop Freq: Click and type to change the Stop Frequency. The maximum frequency setting Vision provides is the maximum allowed on the measuring instruments up to 54 GHz.

RBW: Click to type and change a RBW value from the list. The selectable range is 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz.

VBW: Click to type and change a VBW value from the list. The selectable range is 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz.

Reference Level: Click to type and change Reference Level using the number keypad. The entry range is –120 to 20 dBm.

dB/Div: Click to type and change from the list. The selectable range is 1 through 20.

Preamp: Click to toggle On or Off.

Points: Click to type the points. The maximum value depends on the instrument. If the value exceeds the supported number of points on the instrument, the input value is ignored.

Trace Mode: Click to select from the mode box: Normal, Average, Rolling Max, or Rolling Min.

Normal: Displays data for the current trace sweep.

Rolling Min Hold: Minimum value at each frequency point over the last trace sweeps.

Rolling Max Hold: Maximum value at each frequency point over the last trace sweeps.

Average: Average value at each frequency point over the last trace sweeps.

Trace Count: Click to change Count. Range is 10, 20, 30, 40, 50, 60, 80, 100, 120, 150, 200, or 300.

Upper Limit: Click and type and change the Upper Limit using the number keypad.

Lower Limit: Click and type and change the Lower Limit using the number keypad.

Marker 1 (MHz): Click to type a value.

Delta Marker 1 (MHz): Click to type a value.

Marker 1 (dBm): Click to type a value.

Marker 2 (MHz): Click to type a value.

Delta Marker 2 (MHz): Click to type a value.

Marker 2 (dBm): Click to type a value.

Count: Cannot change the parameter. This counts the sweeps per active session. Each start and stop will start the count over again.

Pass Rate: Cannot change the parameter. Pass rate is a measurement pass/fail result of the channel sweep.

Channel Power: Displays the power measured for the channel.

Limit Lines

To edit an upper or lower limit line, click the **“Run/Stop”** button to stop the sweep. Click a limit line entry to open the field for editing. The field will open for editing. Enter a limit and click to close. To change an entry to None, click to highlight the parameter and press Enter on the keyboard as shown [Figure 8-8](#).

Upper Limit	Lower Limit	Upper Limit	Lower Limit
-78	-80	None	-80
Segmented	Segmented	Segmented	Segmented

Figure 8-8. Edit Limit Field

Edit a Segmented Entry

To edit a segmented parameter, press F2 on the keyboard while the parameter field is open for editing. An Segmented edit screen will open as shown in Figure 8-9. Click a Start Freq. Stop Freq., and Level (dBm) field to create a segment limit line.

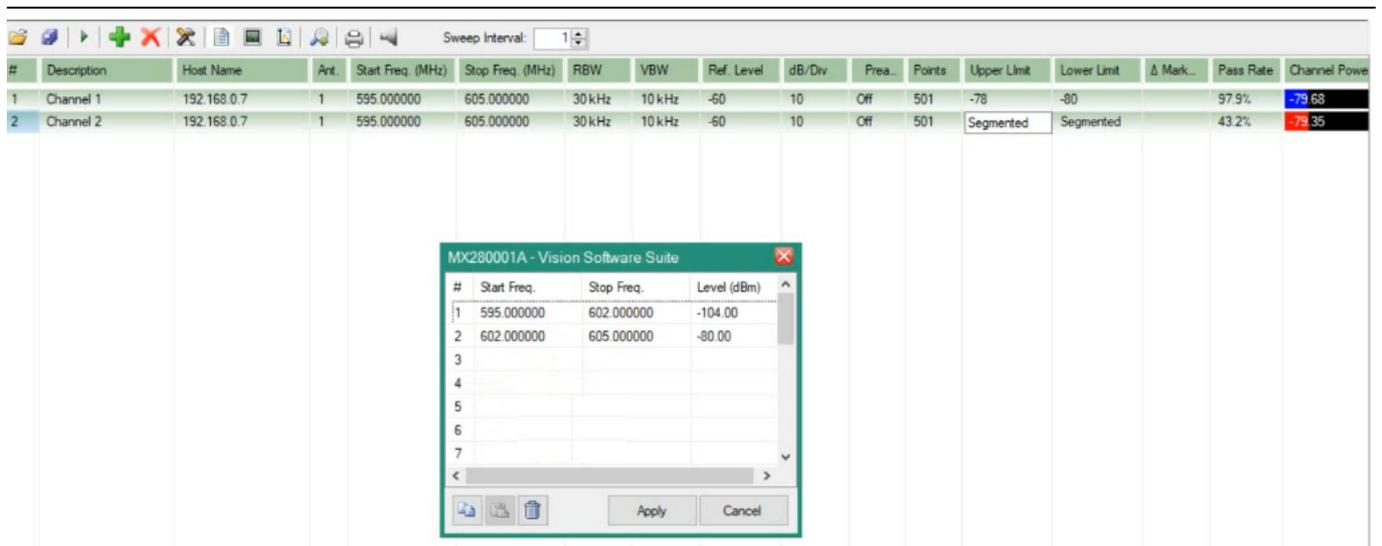


Figure 8-9. Segmented Edit Screen

Mask Limit Line Trace Display

Press “Trace View” to show the active channels and the set limit lines as shown in Figure 8-10. The limit lines entered in the Port Scanner table are displayed for each channel. A limit line violation turns the background color red. The monitors background intensity level of the limit line violation can be controlled by the “Trace failure background intensity” slider.

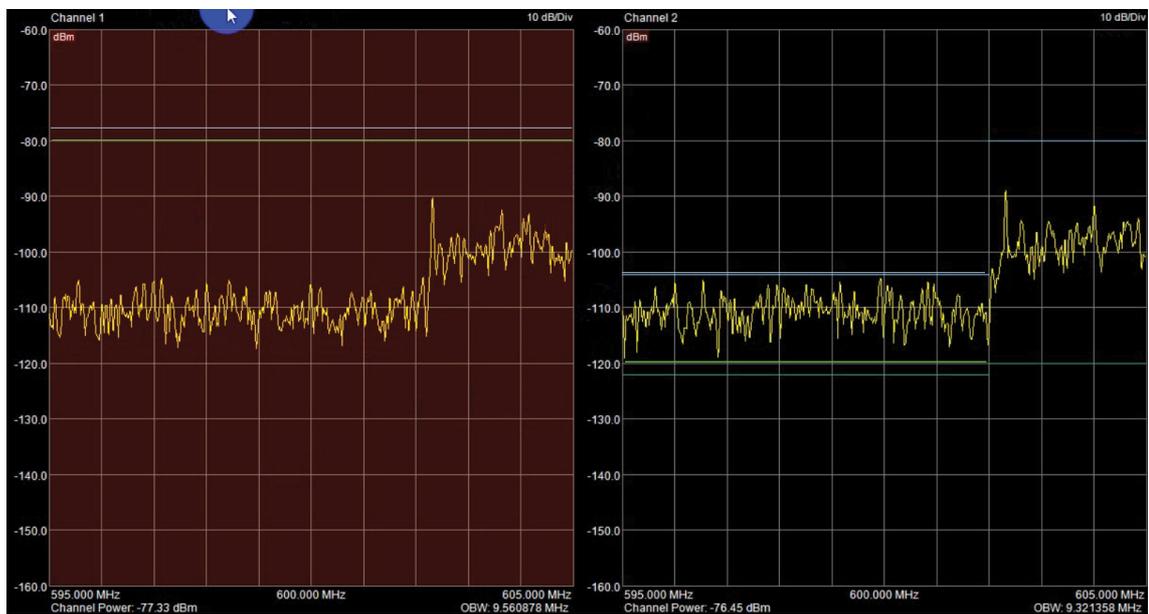


Figure 8-10. Trace View Limit Lines

Trace View

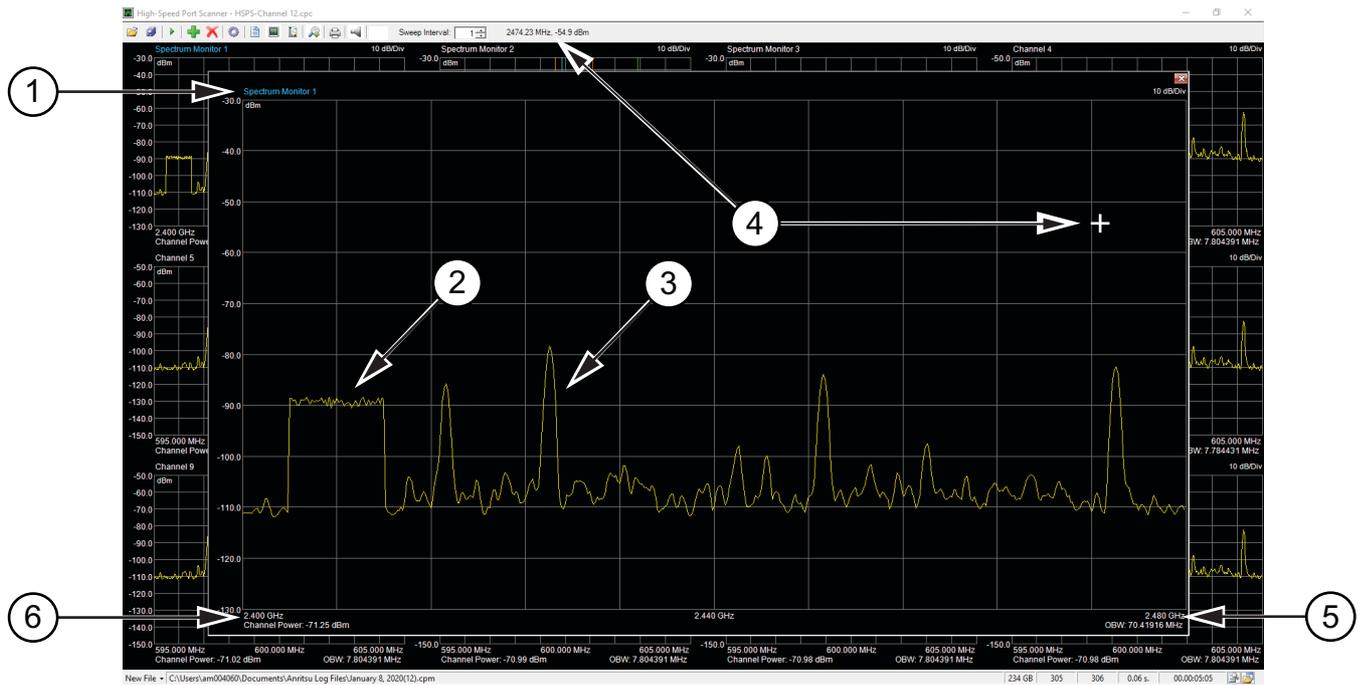
Once the Table List is complete, view the resulting trace responses in “Trace View”. Trace view provides an active swept view of the traces being monitored as set up in the Table List. Twelve traces from the Table List example above are being monitored as shown in Figure 8-11.



Figure 8-11. Twelve Trace Displays

Expand Individual Traces

Expand to view individual traces. Double-click on any trace to provide an expanded view of the trace. If the selected trace has markers active, the expanded view will also display markers as shown in [Figure 8-12](#). For more information on how to set up markers, see “[Markers](#)” on page 8-16.



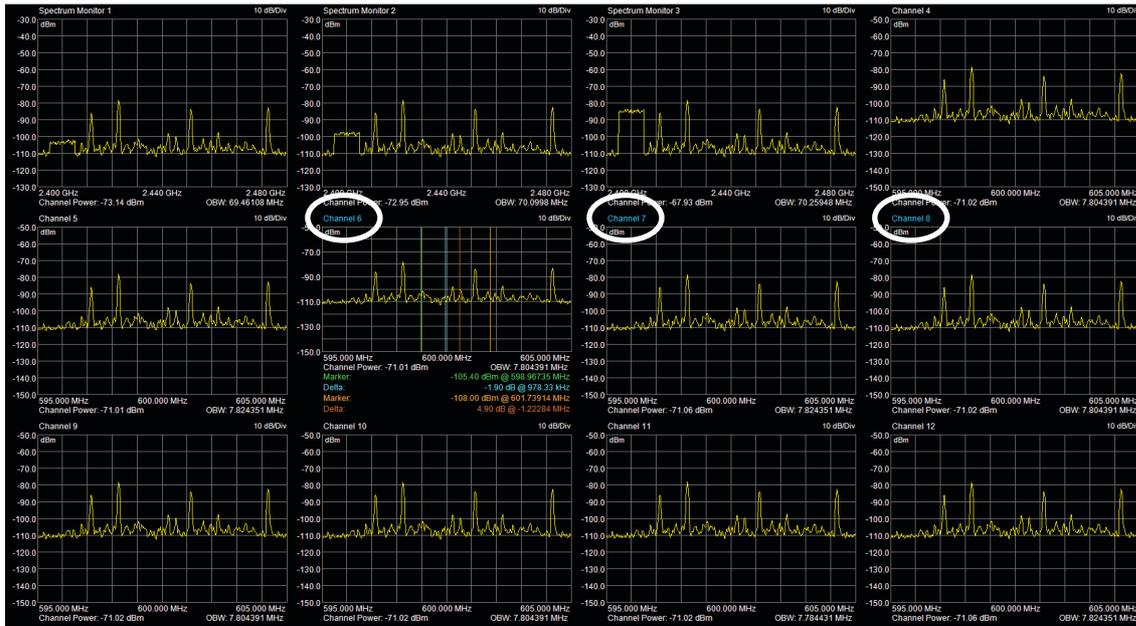
1. Channel Title
2. Moving Signal Identified
3. Stationary Signal
4. Cursor and Cursor Location Readout
5. End Frequency and OBW Readout
6. Start Frequency and Channel Power Readout

Figure 8-12. Expand Trace

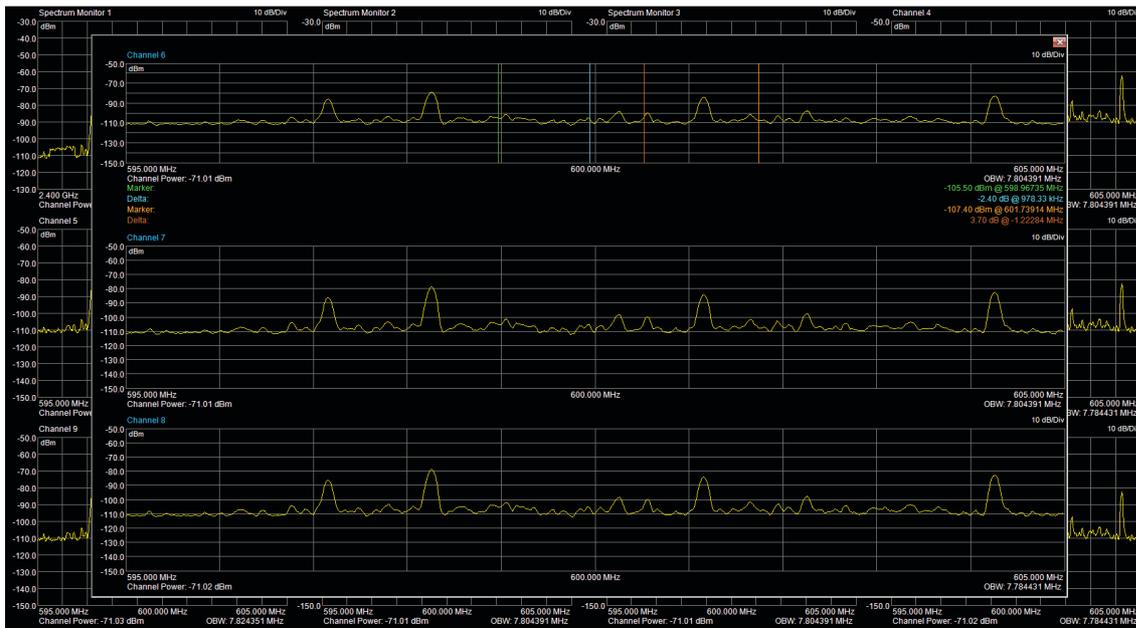
The expanded trace in [Figure 8-12](#) provides the same details of the trace as is shown in the Trace View.

Expand Three Traces

Click up to three channels from Trace View by clicking on the Channel # of the trace as shown in [Figure 8-13](#). Click **“Expand View”** on the toolbar to display the three selected traces as expanded views also shown in [Figure 8-13](#).



Select Three Channels

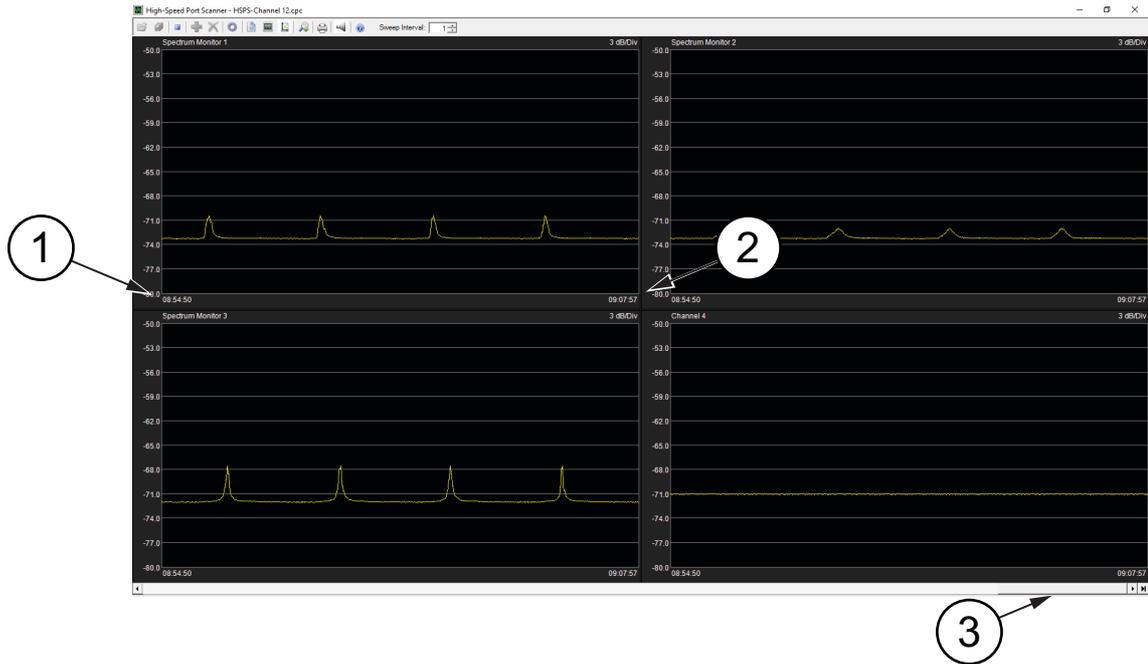


Expand Selected Plots

Figure 8-13. Expand Three Traces

RSSI PvT View

The RSSI PvT (Power vs. Time) graphs plot the Channel Power from each trace. Figure 8-14 shows four traces in PvT mode display. As the traces sweep, the graph fills slowly from the left to right as each trace sweep data is captured.



1. Time-of-Day Readout
2. Time-of-Day Current Readout
3. Scrollbar

Figure 8-14. PvT Plots

“RSSI (P vs T) View”

The PvT graph will accumulate up to 3600 points per plot. The time-of-day readouts continuously track the trace as it scrolls from left to right. The PvT will continue to collect points, replacing the oldest points as new ones come in – always adding values to the right. It is likely that some spectrum analyzers will be slower, or be used to scan more channels than others, so the number of points do not necessarily match.

There is a scrollbar at the bottom of the PvT plot screen. Moving this allows the user to see values that have scrolled off of the screen.

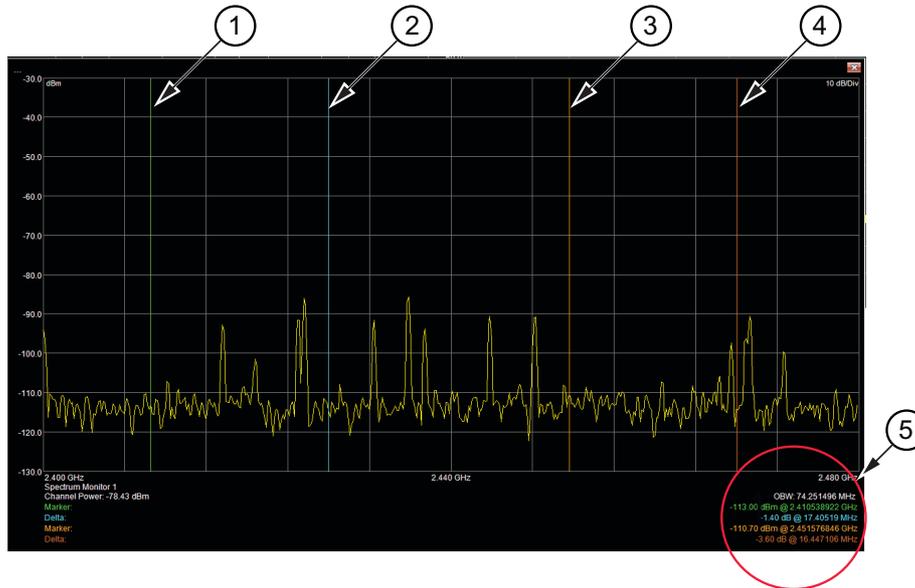
The scrollbar position indicates a time for the center of each graph. Because graphs may have different numbers of points, the time markers may not match. The goal when scrolling is to look at a common time, so each will be centered as near as possible to a common point in time.

8-6 Markers

Marker readouts track the marker's frequency and power level when positioned on the trace display. Two markers and their delta marker (4 markers total) can be displayed and positioned for each trace displayed when running High Speed Port Scanner.

Set-up Markers

Figure 8-15 shows two positioned markers and their delta marker. Frequency and power readouts as displayed in the bottom right corner of each display. If many traces are displayed, all the trace marker setups can be displayed independently for each trace view.



- | | |
|-------------|--------------------|
| 1. Marker 1 | 4. Delta 2 |
| 2. Delta 1 | 5. Marker Readouts |
| 3. Marker 2 | |

Figure 8-15. Markers/Delta Markers Displayed

Markers Control

Marker 1 and Marker 2 can be displayed independent of each other. To activate marker 1 and marker 2 on a trace:

Marker 1: Control-click makes marker 1 active. Hold the control key and scroll the mouse wheel to move marker 1.

Marker 2: Shift-click makes marker 2 active. Hold the shift key and scroll the mouse wheel to move marker 2.

Peak Search

To peak search, right-click over the trace displays the dialog as shown in [Figure 8-16](#). The markers do not have to be already active to use this feature.

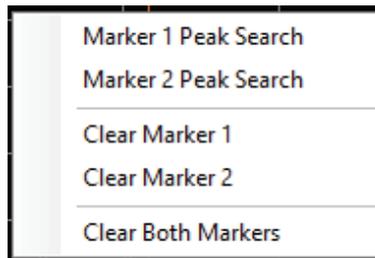


Figure 8-16. Marker Search Dialog

Marker 1 Peak Search: Positions the active Marker 1 over the peak signal. If there is no active Marker 1 active on the trace display, click the Marker 1 Peak Search and an active Marker 1 will become available. The Marker measurement readouts will monitor and display at the bottom of the display screen. If Delta 1 is active, it will track the Marker 1 when Marker 1 Peak Search is selected.

Marker 2 Peak Search: Positions the active Marker 2 over the peak signal. If there is no active Marker 2 active on the trace display, click the Marker 2 Peak Search and an active Marker 2 will become available. The Marker measurement readouts will monitor and display at the bottom of the display screen. If Delta 2 is active, it will track the Marker 2 when Marker 2 Peak Search is selected.

Clear Marker 1: Clears Marker 1 and the Delta 1 Marker.

Clear Marker 2: Clears Marker 2 and the Delta 2 Marker.

Clear Both Markers: Clears all Markers in the display.

Marker Readout

When markers are activated and positioned within a trace display, a markers real-time measurement readout is available below each trace. The readout provides the frequency and power level of the markers position.

Marker Control and Add Delta Markers

Marker activation and control is performed by using the keyboard and mouse. Click and drag the mouse wheel over the Port Scanner screen to display the “To adjust marker position” dialog as shown in [Figure 8-17](#).

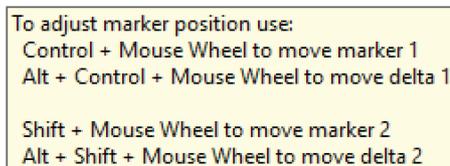


Figure 8-17. Adjust Marker Dialog

Click and drag the mouse pointer over the trace display to bring up the red cross position-finder. Continue to move the red cross position-finder to the desired marker location. This can be done for each marker/delta marker when positioning each marker sequence. Once the desired marker position is confirmed, release the mouse “left-click” and then click the following as needed:

Ctrl + Click to add Marker 1: Ctrl + Scroll Mouse Wheel to move Marker 1.

Alt + Control + Click to add Delta 1: (Marker 1 must already be active). Alt + Control + Scroll Mouse Wheel to move Delta 1 Marker.

Shift + Click to add Marker 2: Shift + Scroll Mouse Wheel to move Marker 2.

Shift + Alt + Click to add Delta 2: (Marker 2 must already be active). Shift + Alt + Scroll Mouse Wheel to move Delta 2 Marker.

When moving marker 1 or marker 2, its delta marker will track. The delta marker can be moved independent of the marker and the delta marker readout will provide the delta markers position as it is being moved. Clearing a marker as described from [Figure 8-16 on page 8-17](#) will remove its corresponding delta marker also.

Print Output

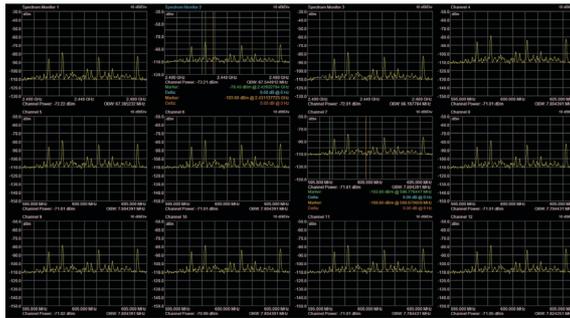
Click Print on the Port Scanner toolbar to print the three views, Table List, Trace view, and PvT view can be printed with inverted color scheme to save toner as shown in **Figure 8-18**. The print output prints the active view.

#	Description	Host Name	Start Freq. (MHz)	Stop Freq. (MHz)	Ref. Level	dBmV	Preamp	Points	Trace M.	Trace C.	Δ Mark.	Pass Rate	Channel Power
11	Spectrum Monitor 1	127.0.0.19001	2400.000000	2480.000000	-30.0	10	Off	501	Normal	20		100.00%	73.15 dBm
12	Spectrum Monitor 2	127.0.0.19002	2400.000000	2480.000000	-30.0	10	Off	501	Normal	20		100.00%	73.15 dBm
3	Spectrum Monitor 3	127.0.0.19003	2400.000000	2480.000000	-30.0	10	Off	501	Normal	20		100.00%	73.15 dBm
4	Channel 4	127.0.0.19004	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
5	Channel 5	127.0.0.19005	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
6	Channel 6	127.0.0.19006	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
7	Channel 7	127.0.0.19007	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
8	Channel 8	127.0.0.19008	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
9	Channel 9	127.0.0.19009	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
10	Channel 10	127.0.0.19010	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
11	Channel 11	127.0.0.19011	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
12	Channel 12	127.0.0.19012	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm

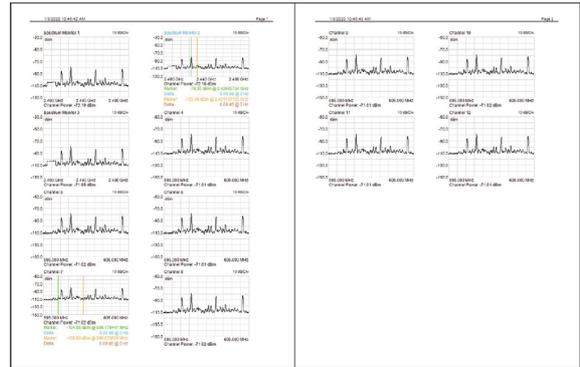
List View

#	Description	Host Name	Start Freq. (MHz)	Stop Freq. (MHz)	Ref. Level	dBmV	Preamp	Points	Trace Mode	Trace Count	Marker 2	Power	Channel Power
1	Spectrum Monitor 1	127.0.0.19001	2400.000000	2480.000000	-30.0	10	Off	501	Normal	20		100.00%	73.15 dBm
2	Spectrum Monitor 2	127.0.0.19002	2400.000000	2480.000000	-30.0	10	Off	501	Normal	20		100.00%	73.15 dBm
3	Spectrum Monitor 3	127.0.0.19003	2400.000000	2480.000000	-30.0	10	Off	501	Normal	20		100.00%	73.15 dBm
4	Channel 4	127.0.0.19004	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
5	Channel 5	127.0.0.19005	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
6	Channel 6	127.0.0.19006	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
7	Channel 7	127.0.0.19007	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
8	Channel 8	127.0.0.19008	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
9	Channel 9	127.0.0.19009	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
10	Channel 10	127.0.0.19010	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
11	Channel 11	127.0.0.19011	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm
12	Channel 12	127.0.0.19012	595.000000	605.000000	-50	10	Off	501	Normal	20		100.00%	73.15 dBm

List View Print



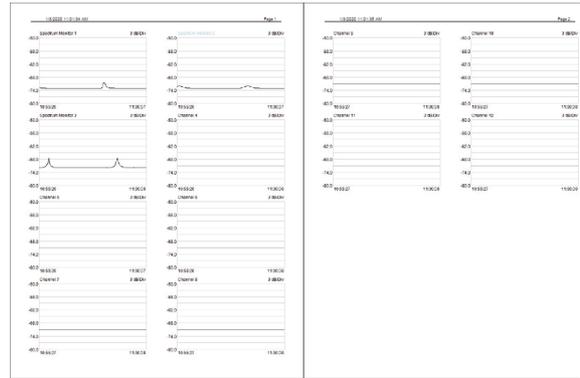
Trace View



Trace View Print



PvT View



PvT View Print

Figure 8-18. Table List, Trace, PvT Print Views

All graphs are printed eight graphs per page. When more graphs are printed, eight will be on the first page and the next graphs will appear on subsequent pages, up to eight per page. All the same data, such as markers and readout information will be visible on the print job.

Table List View Print

If the Table List view size is too wide due to many “[Display Table List Columns](#)” being active, the dialog shown in [Figure 8-19](#) will appear.

Click Yes: The Table List view print will be reduced in size to include all the columns in the print job.

Click No: To reduce the amount of columns displayed that have been set through the Options and Settings “[Display Table List Columns](#)” and reprint, or allow the print to continue and the print job will remove the right-most columns.

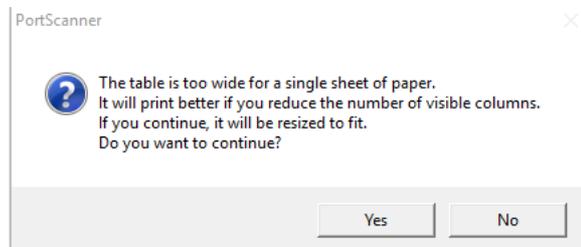


Figure 8-19. Table List View Too Wide Dialog

8-7 Adding Limit Lines

To add limit lines to the swept signal.

1. Click the **“Run/Stop”** button to stop the sweep.
2. Click on the Options and Settings button on the Toolbar to open the Options and Settings dialog.
3. Click on either the Upper or Lower Limit line options in Table Display Columns. These fields will be added to the Table List.
4. Click Upper Limit or Lower Limit.
5. Click the Table List view from the toolbar.
6. Click a “limit” cell in the Table List.
7. Press F2 on the keypad to open the Sweep Monitor Mask Editor dialog as shown in [Figure 8-20](#).
8. Click the cell in the dialog to type in the desired frequency and power level.
9. Click Apply when complete.

The Limit cell will display “Segmented” indicating the limit segment entered is now active. The channel power cell will display red if the segment mask is tracking a power level violation.

#	Start Freq.	Stop Freq.	Level (dBm)
1	596.000000	600.000000	-70
2	597.000000	599.000000	-90
3	598.000000	602.000000	-90
4	599.000000	600.000000	-95
5			
6			
7			

Figure 8-20. Sweep Monitor Mask Editor

Limit functions

None: Default setting. Do not change if you do not want a limit for this channel.

Channel Power: Click to set a simple limit on the channel power. Type or enter a numeric value into the field. A Channel Power limit does not correspond with a max or min power level in the data, but for the integrated channel power.

Segmented: Click to create a limit line mask. This will open the Sweep Monitor Mask Editor. A segment definition contains a Start Frequency, Stop Frequency, and a Power Level. You may enter up to 21 segment definitions. At the bottom left of the dialog are three buttons - Copy, Paste, and Delete. Copy and Paste allows you to copy the defined segments in the editor and paste those segments into another channel’s Upper or Lower Limit segment definition. Delete clears the Sweep Monitor Mask Editor. Click **Apply** after completing the segmented mask definition.

Mask Editor

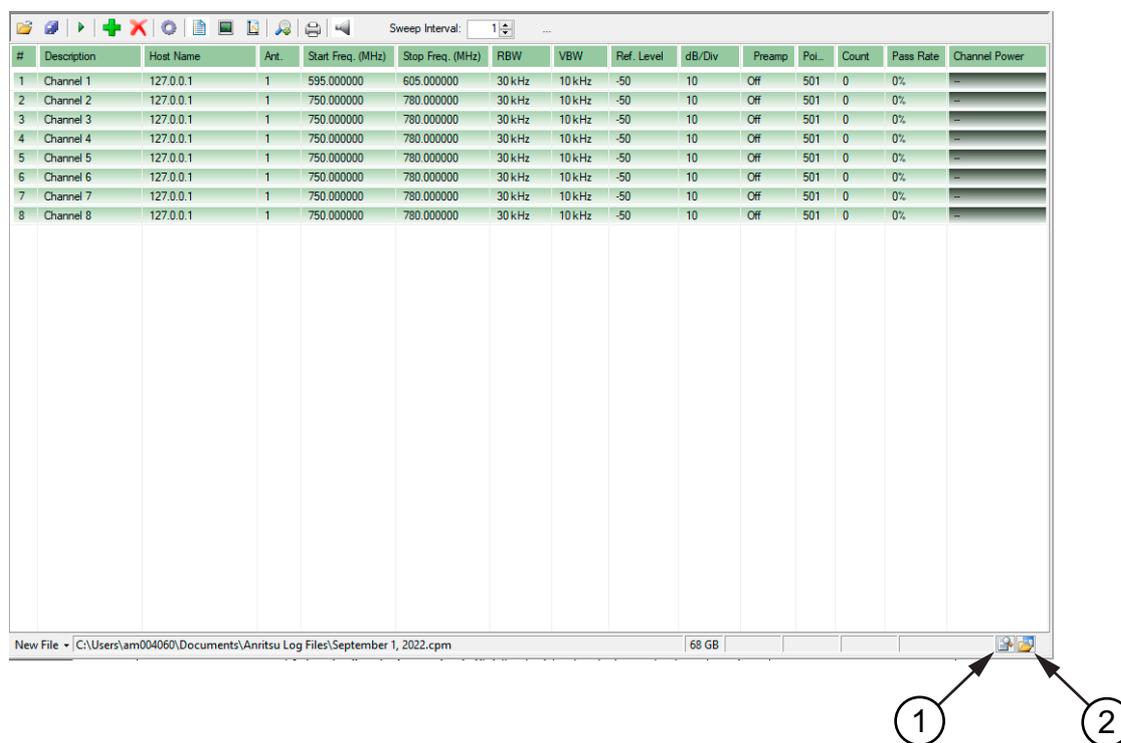
The Mask editor icons are described in [Table 8-4](#).

Table 8-4. Mask Editor Icon

Icon	Description
	Copy: Copy mask definitions to clipboard.
	Paste: Paste mask definitions from clipboard.
	Delete: Delete the mask definition.
	Apply or Cancel: Press Apply to apply the set mask definitions. Press cancel the mask definition and close the mask editor.

Viewing the Log File

At the bottom right of the Port Scanner window are two buttons. See [Figure 8-21](#).



1. See [“File Viewer Button”](#) on page 8-23
2. See [“Log Folder Viewer”](#) on page 8-23

Figure 8-21. Port Scanner access File Buttons

File Viewer Button: File Viewer opens the current CPM Scan Viewer as shown in [Figure 8-22](#).

Log Folder Viewer: Directs you to the Anritsu Log Files folder which lists all of the CPM files.

The screenshot shows a window titled "CPM Scan Viewer" with a green header bar and a close button. Below the header are "Open" and "Refresh" buttons. The main area contains a table with the following data:

Description	Hostname	Ant...	TimeStamp	Chnl Pwr	Pass/Fail	Latitude	Longitude	C
bCpmzg2z+QwXCcO...								
Channel 1	172.26.208.72	1	2022-09-07 10:4...	-76.69	Fail			9
Channel 2	172.26.208.72	1	2022-09-07 10:4...	-76.84	Fail			9
Channel 3	172.26.208.72	1	2022-09-07 10:4...	-81.66	Fail			4
Channel 4	172.26.208.72	1	2022-09-07 10:4...	-77.47	Fail			1

Figure 8-22. CPM Scan Viewer

Chapter 9 — Scan Viewer

9-1 Introduction

Scan Viewer provides tools for viewing saved .cpm (channel power measurement) files and spectrum analyzer measurement files. CPM files created by Port Scanner contain many RF sweep traces that include sweeps at multiple frequency bands and from multiple spectrum analyzers. Use Scan Viewer to review all of the traces in multiple views and explore the data as a set.

Spectrum analyzers can be programmed to save traces at regular intervals as each sweep is saved in a separate spectrum analyzer file. Using Scan Viewer, download a large set of spectrum analyzer files and convert them into a .cpm file so that the full data visualization utility of Scan Viewer can be used for analysis.

9-2 Scan Viewer Program

Open the Scan Viewer as shown [Figure 9-1](#) to view saved spectrum analyzer and CPM files.

- Spectrum Analyzer files are retrieved and viewed from a spectrum analyzer or as a saved file.
- CPM files are viewed from a saved file.

There are three user interface types:

Hardware Monitor: View a current spectrum analyzer file. See [“Remote Monitor”](#) on page 9-4.

Local Measurement Folder: View spectrum analyzer files from a folder on a local drive. See [“Local Measurement Folder”](#) on page 9-8.

CPM Measurement File: View CPM files from a folder on a local drive. See [“CPM Measurement File”](#) on page 9-9.

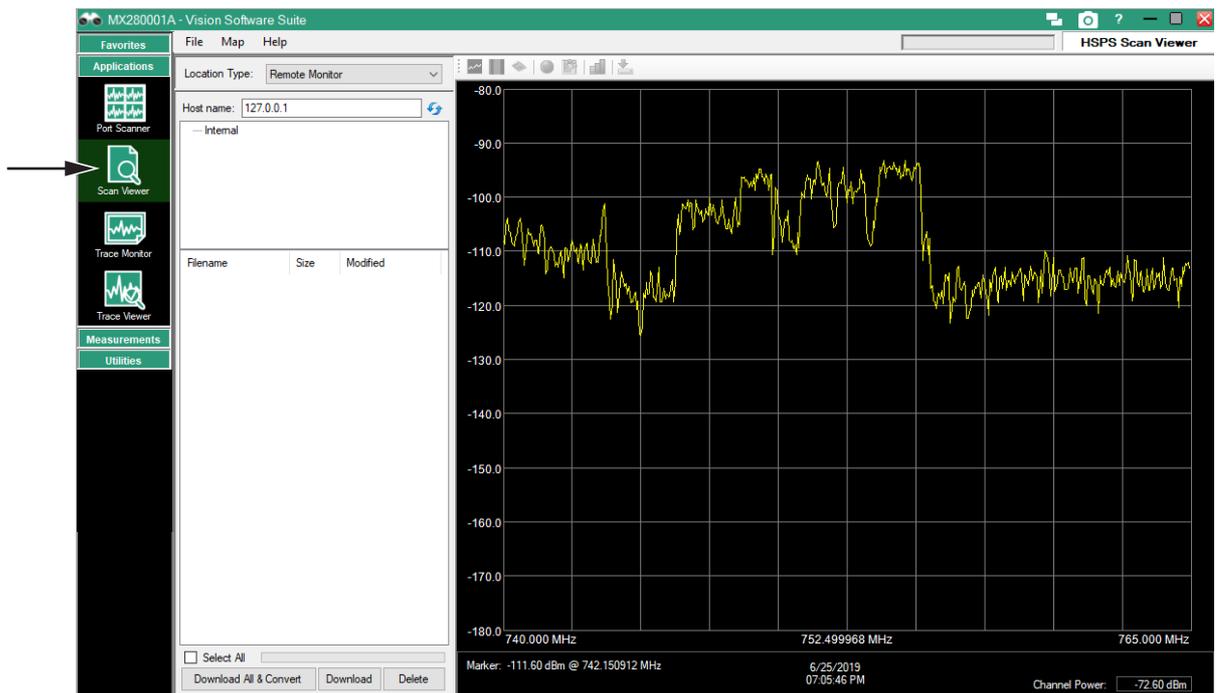


Figure 9-1. Scan Viewer

Scan Viewer Menu Bar

The Scan Viewer menu bar is shown in [Figure 9-2](#) and described in [Table 9-1](#).

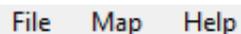


Figure 9-2. Scan Viewer Menu Bar

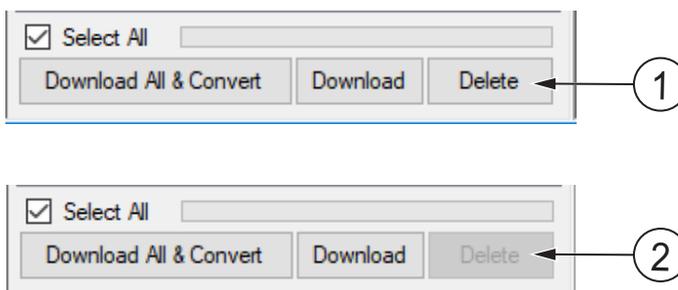
The Scan Viewer Toolbar is described in [Table 9-1](#).

Table 9-1. Scan Viewer Toolbar Description

Menu	Description
File	<p>Open CPM Measurement File: Opens the Channel Power Scanner (.cpm) file folder that has been created by the user. Once created, the Scan Viewer program will continue to open this folder location until the path is changed by the user.</p> <p>Refresh File List: Click to refresh the “Monitor File List”.</p> <p>Lock Remote File Delete: Provide Password Protection. See “Password Protection” below.</p> <p>Exit: Exit the File menu.</p>
Map	<p>Load Map: Load a customer selected map to the screen.</p> <p>Existing Maps: Load a map from an existing map folder.</p>
Help	<p>Help: See “Help Menu” on page 5-3.</p>

9-3 Password Protection

Password protection is available in the Scan Viewer File menu. In cases where multiple users are viewing a file set, only the administrator retains the rights to delete the remote files when they are downloaded. When the delete button is inactive, it is grayed and not available to users. Therefore, protected spectrum analyzer files can be archived for future reference.



1. Delete Active
2. Delete Inactive

Figure 9-3. Delete Button

To make the Delete button inactive and unavailable, select the “[Lock Remote File Delete](#)” command from the File menu. The first time this command is selected, the Enter Password dialog is displayed as shown in [Figure 9-4](#). Type a password and click OK. The Delete button becomes unavailable to other users.

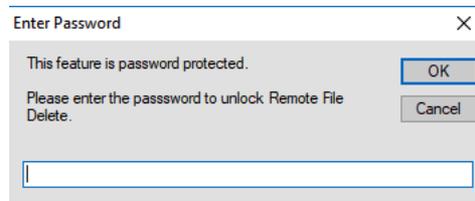


Figure 9-4. Enter Password

To unlock the Delete button, click [Unlock Remote File Delete](#).

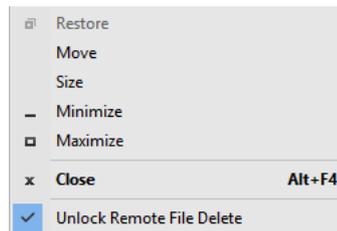


Figure 9-5. Unlock Delete

The Delete button becomes active as shown in [Figure 9-6](#). Files can be selected and deleted by all users.

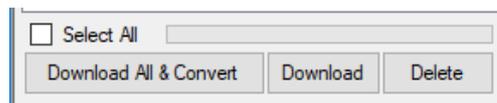


Figure 9-6. Delete Unlocked

9-4 Location Type

The Location Type provides a dropdown list of trace monitoring types as shown in [Figure 9-7](#).

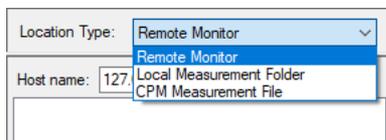


Figure 9-7. Location Type

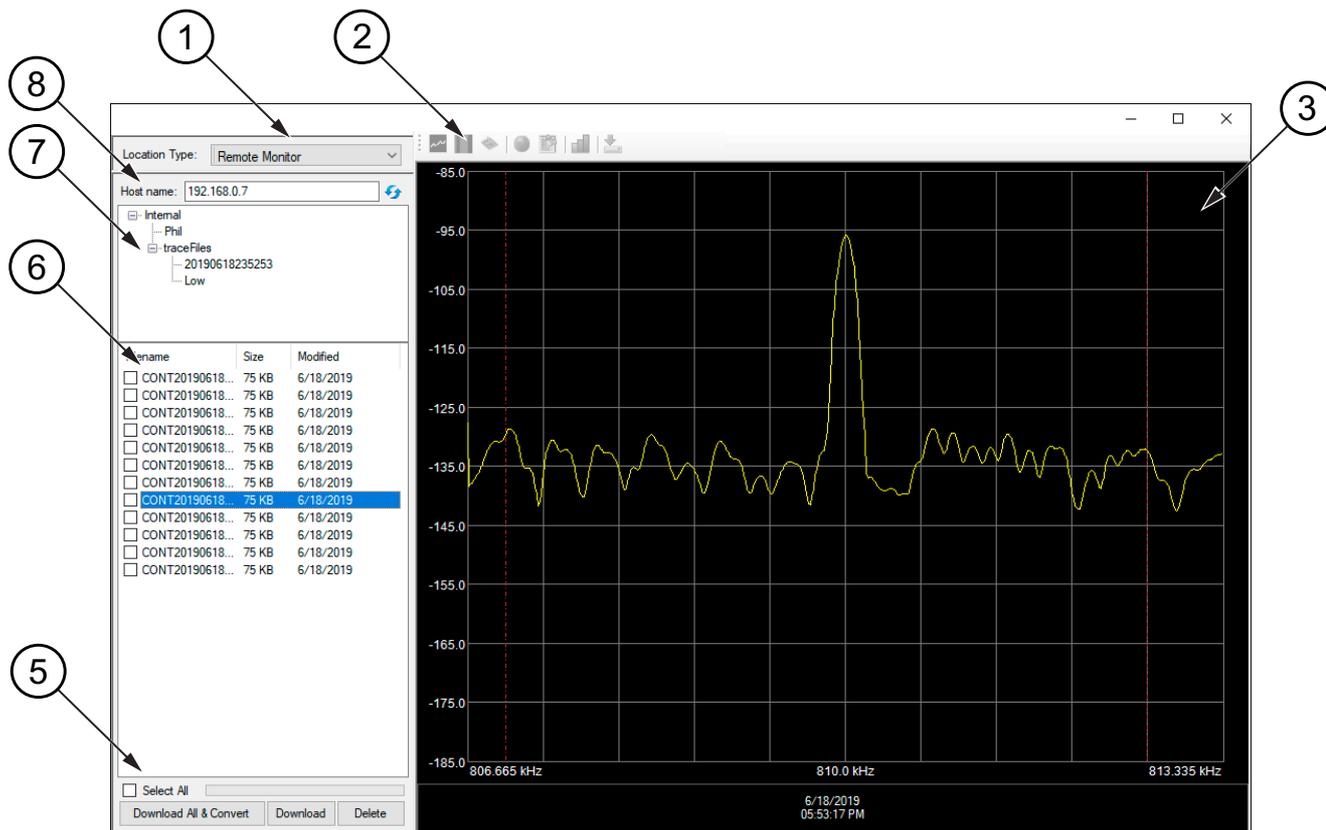
Remote Monitor: See “[Remote Monitor](#)” below.

Local Measurement Folder: See “[Local Measurement Folder](#)” on page 9-8.

CPM Measurement File: See “[CPM Measurement File](#)” on page 9-9.

Remote Monitor

The Remote Monitor view is shown in [Figure 9-8](#).



- | | |
|--|-----------------------------------|
| 1. Remote Monitor Mode | 5. File Management |
| 2. Toolbar -Unavailable in this Remote Monitor Mode. | 6. Monitor File List |
| 3. RF Sweep Screen | 7. Hardware Monitor Folder Window |
| 4. Status | 8. Host Name Field |

Figure 9-8. Remote Monitor View

Remote Monitor View: Click the Location Type button and select from the list.

-
1. Recent Folders and Files
 2. Spectrum Analyzer Measurement List
 3. File Management
-

Figure 9-10. Spectrum Analyzer Folder Panel

Recent Folders and Files: The file window shows the user created file folder (Remote) and the spectrum analyzer time-stamp folder. The folder name and placement is user selectable. When a new time-stamp folder is program created, if another user created location is used, the program selected file will be deleted.

Remote Measurement File: Displays the spectrum analyzer measurement files list. Click on the desired spectrum analyzer file to view.

File Management: Contains the folder control commands.

- **Select All:** Click the check box of a specific spectrum analyzer file or the **Select All** check box to download files to a local drive.
- **Delete:** When active, the file folder will be deleted from the Remote Folder when opened and a new time-stamped folder will be created. When not active (grayed) the folder will be added to the Remote folder list when the files are loaded.
- **Download:** Opens the Browse For Folder box as shown in [Figure 9-11](#). The program will highlight a suggested folder to store the files into. If the Make New Folder button is pressed, the suggested file that is highlighted will be removed.
- **Download All & Convert:** Performs the same function as Download, but also converts the files and displays a CPM view. This button does the following, in sequence:
 1. Downloads the spectrum analyzer files from the designated spectrum analyzer.
 2. Deletes (optional) the spectrum analyzer files from the spectrum analyzer, and cleans up the containing folder.
 3. Combines all spectrum analyzer files downloaded into a single .cpm measurement file.
 4. Switches views and opens the .cpm file, automatically displaying the most recent sweep trace.
 5. Turns on Max Hold and Min Hold in the current trace view. The progress bar shows the file conversion status. The download time depends on the number of files to be downloaded, and on the network bandwidth available between the PC and the spectrum analyzer.

When the process is complete, you will see a CPM view displaying a spectrogram and the last sweep trace in the file set. The CPM view is described in [“CPM Measurement File”](#) on page 9-9.

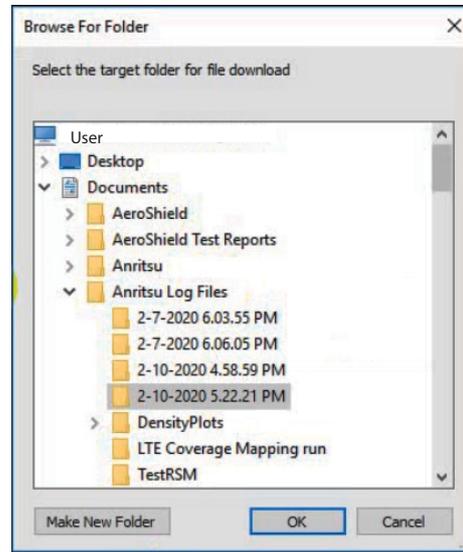
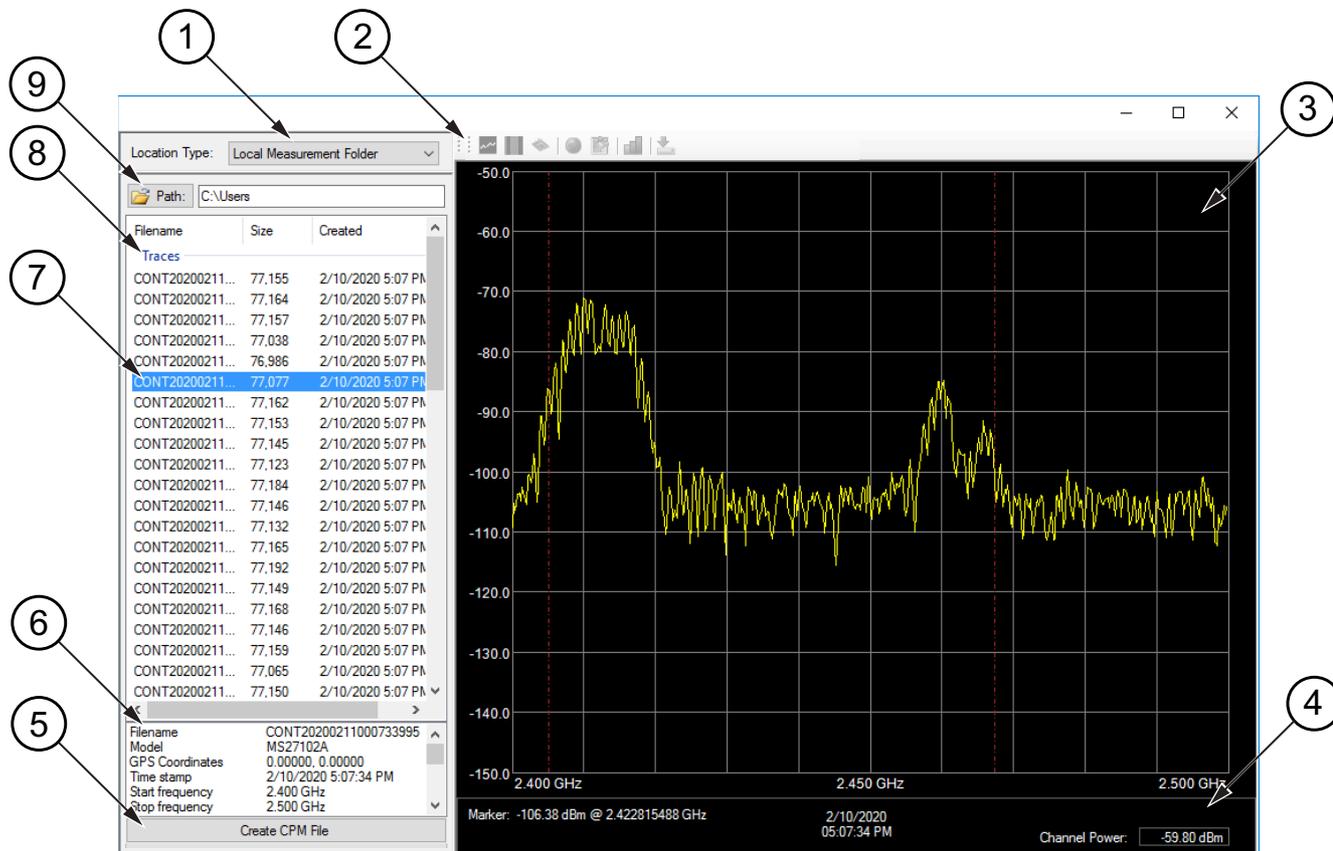


Figure 9-11. Browse for Folder Box

Local Measurement Folder

The Log Measurement Folder view is shown in [Figure 9-12](#).



- | | |
|--|------------------------------|
| 1. Local Measurement Folder | 6. Spectrum Analyzer Details |
| 2. Toolbar - all buttons are unavailable in this mode. | 7. User Selected File |
| 3. RF Sweep Screen | 8. File Folder Window |
| 4. Status | 9. File Browse |
| 5. Create CPM File Button | |

Figure 9-12. Log Measurement Folder View

Local Measurement Folder: User selected view. Click or type a path to navigate to the folder that contains spectrum analyzer files.

Toolbar: Not active in Local Measurement view.

RF Sweep Screen: Shows the selected spectrum analyzer file RF sweep view.

Status: Shows the RF sweep date and time collected, Channel Power, Marker and Delta Marker details when the markers are active.

Create CPM File Button: Converts the spectrum analyzer file to a CPM file.

Spectrum Analyzer Details: Displays the spectrum analyzer details of the selected file.

User Selected File: Click highlights the spectrum analyzer file to view.

File Folder Window: Displays the files of the opened spectrum analyzer folder.

File Browse: Click to browse or type a path to locate the folder which contains supported measurement files.

CPM Measurement File

The CPU Measurement File view is shown in [Figure 9-8](#).

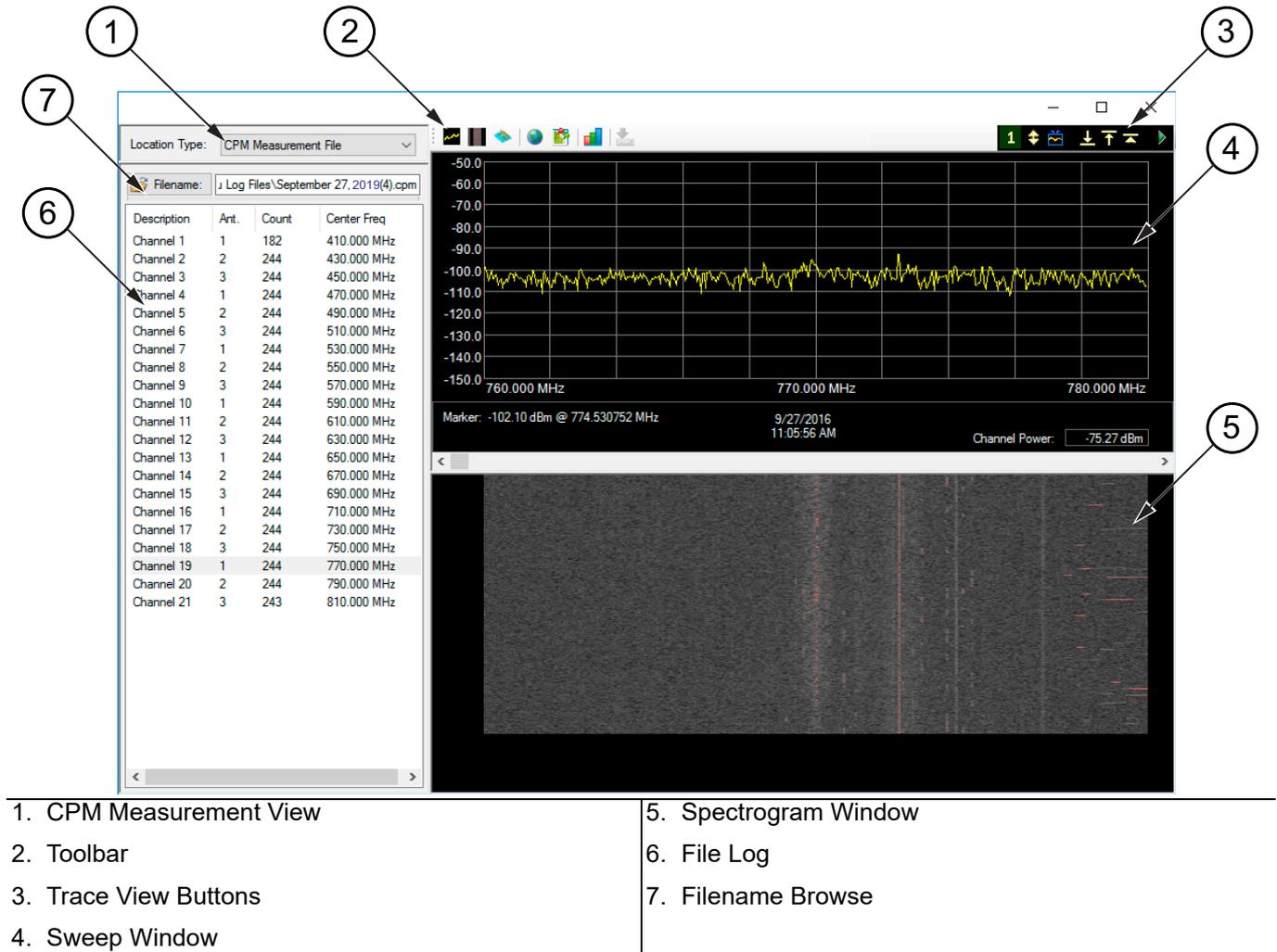


Figure 9-13. CPM Measurement View

CPM Measurement View: User selected view. Two windows will be displayed to view the CPM file – trace view and spectrogram view.

Toolbar: Active in CPM Measurement File view.

For toolbar button details, see [“Scan Viewer Toolbar” on page 9-10](#),

Trace View Buttons: Usable in CPM Measurement File mode.

For description of each, see [Table 9-3 on page 9-11](#).

Sweep Window: Shows the RF sweep view of the selected CPM file.

Spectrogram Window: Shows the Spectrogram view of the selected CPM file.

File Log: Shows the files staged in the opened folder.

Filename Browse: Browse to locate the CPM files catalog.

Scan Viewer Toolbar

The Scan Viewer toolbar provides measurement viewing preferences. The toolbar shown in [Figure 9-14](#) is only available for the Location Type – CPM Measurement File.



Figure 9-14. Scan Viewer Toolbar

The Scan Viewer icon buttons and their description is listed in [Table 9-2](#).

Table 9-2. Email Status Icons

Icon	Description
	Trace View: Click provides Trace View only display.
	View Trace and Spectrogram: Splits the Viewing display into Trace View and Spectrogram View.
	3-D Spectrogram: Click provides 3-D Spectrogram display.
	Monitor map: Click provides a map overview and a Locator of the trace Spectrum Analyzer. Floating the mouse over the indicator provides the host name of the Spectrum Analyzer.
	Breadcrumbs Map: Click provides a breadcrumb global map representation of the path traveled when monitoring signal strength. See Section “Marker” on page 9-14 .
	Power vs Time: Click provides a bar graph representation of the power vs. time of the selected traces. To set markers and view time stamp, see Section “Power vs Time Markers” on page 9-13 .
	Export: Click to Export coverage mapping details to KML file.

Trace View Buttons

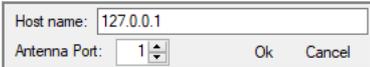
The Scan Viewer Trace View toolbar is located at the top right corner of the trace display. The trace view buttons shown in [Figure 9-15](#) provide trace sweep viewing options.



Figure 9-15. Trace View Toolbar

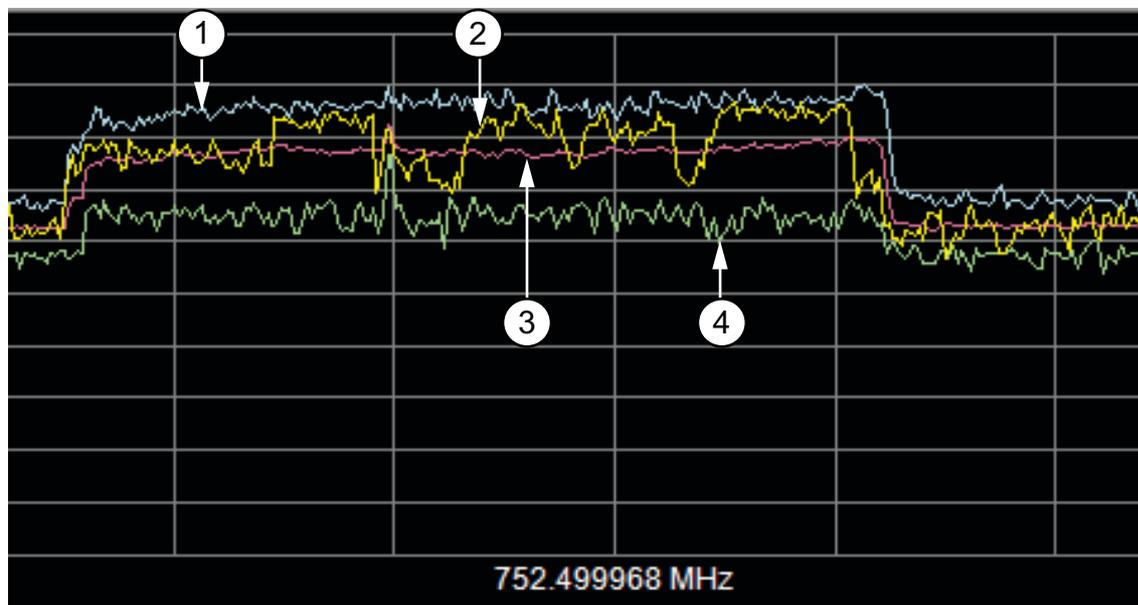
The Trace View buttons are described in [Table 9-3](#).

Table 9-3. Trace View Buttons

Icon	Description
	Single Trace: Default view showing only one trace, the last measurement trace taken. See “Trace Views” on page 9-12 .
	Density Plot: Shows all of the traces taken during a set period for the channel. Superimposes all the traces onto the Trace View display as shown in Figure 9-17, “Density Plot” on page 9-12 .
	Live Trace View: A live trace view of a spectrum analyzer. Click displays the dialog below. Type the host name of the spectrum analyzer to view, enter many Antenna Ports, and click Ok. The antenna port number may not be relevant for the spectrum analyzer in use, however, the option is available for users with multi-port spectrum analyzers. Scan Viewer updates the sweep trace once per second. 
	Min Hold Trace: Shows the cumulative minimum value of each display point over many trace sweeps. Can be applied to only one channel Spectrum Analyzer in the database. See “Trace Views” on page 9-12 .
	Max Hold Trace: Shows the cumulative maximum value of each display point over many trace sweeps. Can be applied to only one channel Spectrum Analyzer in the database. See “Trace Views” on page 9-12 .
	Average Hold Trace: Shows an exponential average of a number of traces, determined by the number of Averages. Can be applied to only one channel Spectrum Analyzer in the database. See “Trace Views” on page 9-12 .
	Start / Stop: Click starts or stops play through all the traces sequentially.

Trace Views

Figure 9-16 shows a Single Trace view with Max Trace, Min Trace, and Average Trace active.



1. Max Hold Trace (Light Blue)
2. Single Trace (Yellow)
3. Average Trace (Magenta)
4. Min Hold Trace (Light Green)

Figure 9-16. All Traces View

Figure 9-17 shows the density plot of the Single Trace shown in Figure 9-16. The plot displays all the single spectrum analyzer sweep traces saved and then superimposed in one display.

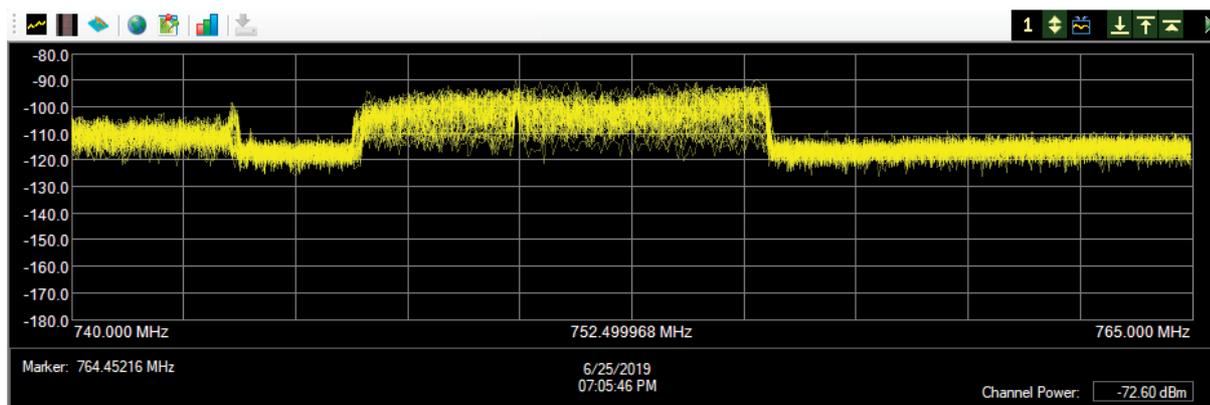


Figure 9-17. Density Plot

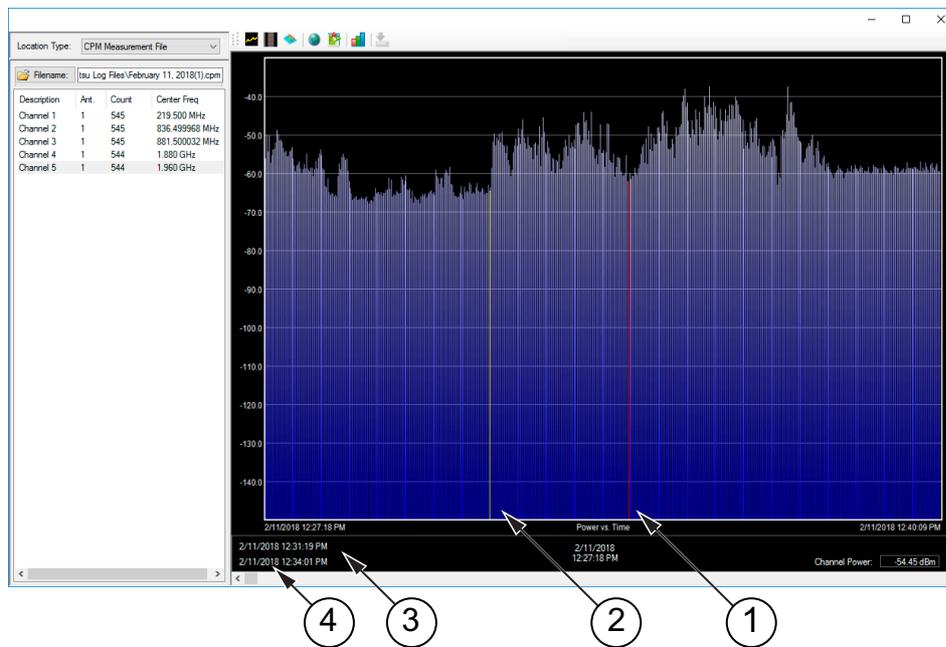
Power vs Time Markers

The Power vs Time chart provides a date/time occurrence readout of a selected power level within a swept spectrum. In the example shown in [Figure 9-18](#), two markers are positioned with the date/time occurrence for each marker displayed at the lower left corner of the display.

To mark and display the date and time of a power level occurrence, move the mouse cursor over the Power vs. Time plot to track the power level date/time occurrence in the lower left corner of the window. Clicking on the plot sets a persistent first marker, colored yellow on the bar chart. The date/time value of this positioned marker is displayed in the marker text. With one marker set, continue to move the cursor over the plot and click again to set a second (red) marker. The marker date/time occurrence at the second line reflects the second persistent marker. This allows the user to see the date/time when events occur in the data set and to see a time span between power events, such as a signal turning on or off.

Clear the Power vs Time Markers

The markers can be cleared in one of two ways. Clicking on the marker text clears the persistent nature of that marker. Click Escape clears the 2nd marker, if set, or the first if the 2nd is not set. Double-click Escape twice clears both markers.



- | | |
|----------------------|------------------------|
| 1. Marker 2 (Red) | 3. Marker 1 Time Stamp |
| 2. Marker 1 (Yellow) | 4. Marker 2 Time Stamp |

Figure 9-18. Power vs. Time Markers

Marker

To add a marker on the channel trace, move the mouse over a point on the sweep and click to display a marker.

Delta Marker

To add a delta marker on the channel trace, move the mouse over a point and click. You will see a blue Marker appear. Note that a Delta Marker can be selected “After” a marker has been placed in the Trace. The Delta Marker refers to the relationship with the next selected spot and the green marker that has been placed.

Channel Power

An occupied bandwidth is determined as the region that contains 99 % of the power. The Channel Power is the power in that bandwidth.

Delta Marker check box

Removes the Delta Marker from the trace display.

Marker check box

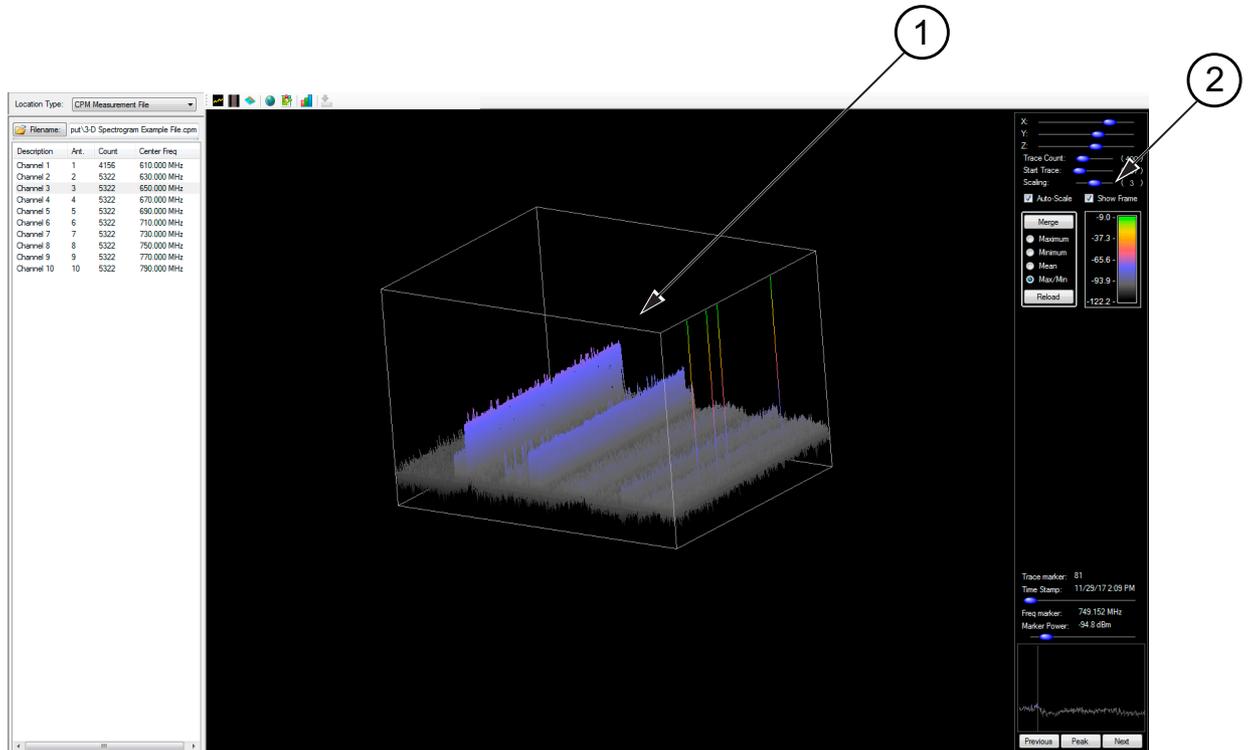
Removes the Marker and Delta Marker from the trace display.

Add and Remove Markers

1. Add a marker and/or delta marker by pointing on the desired frequency and click.
2. Remove the markers by clicking at the left bottom corner of the display. The values of the Occupied Bandwidth (OBW) and Channel Power are displayed at the bottom right corner.

3-D Spectrogram View

3-D Spectrogram view provides a 3-D Spectrogram view of the selected trace(s) as shown in [Figure 9-19](#).



1. Spectrogram Display
2. Spectrogram View Control Panel

Figure 9-19. Spectrogram View

The Spectrogram View Control Panel provides the tools analyze the Spectrogram display. The control panel consists of:

- XYZ control
- Trace Count
- Start Trace
- Scaling
- Auto-Scale check box
- Show Frame check box
- Trace Merge Components of Maximum, Minimum, Mean, Max/Min, and Reload
- Spectrogram power level legend
- Trace marker indicator
- Trace Time Stamp
- Frequency marker readout
- Marker Power readout
- Spectrogram peak search with choices of: Previous, Peak, and Next

9-5 Coverage Mapping

Coverage Mapping requires the High Speed Scanner (Option 407). Signal information gathered while using the High Speed Port Scanner can be stored and opened with Scan Viewer.

View a CPM File

Press the Location Type button and open a CPM file to view. Refer to (“[Scan Viewer Toolbar](#)” on page 9-10),

Once opened, a map appears that provides the captured Breadcrumbs path traveled when monitoring the signal. See [Figure 9-20](#). The map displays colored signal power levels that provide signal strength information while monitoring the area.

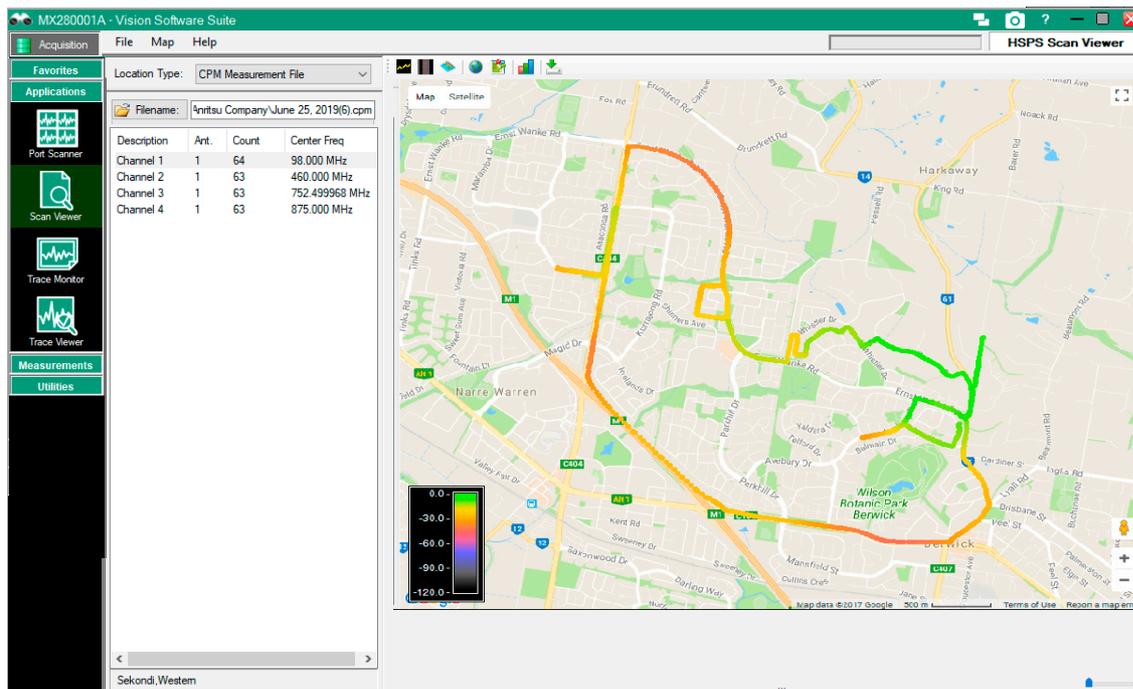


Figure 9-20. Breadcrumbs Map

The Coverage Mapping tool provides the following features:

- Ability to scan over multiple frequency channels.
- Measurements can be taken based on RSSI, Channel Power or Occupied Bandwidth.
- User selected and Offline maps are supported.
- The color scale used for mapping can be changed to match the dynamic range of signals measured.
- Measurements can be imported to a user selected map for further display and analysis.

9-6 Outdoor Frequency Coverage Mapping Example

Use the following steps to configure a typical measurement setup for an outdoor GPS-assisted, multi-frequency coverage mapping. Option 407 (Port Scanner) and 486 (Coverage Mapping) are required.

1. Connect the spectrum analyzer to a 12V DC power supply, such as a car's 12V accessory plug.
2. Connect the GPS antenna.
3. Establish an IP connection between the spectrum analyzer unit and your laptop.
4. Start the Vision Option 407 Port Scanner software on your laptop.
5. Configure the measurement setup. See [Chapter 8, "Port Scanner \(Option 407\)"](#).
6. Start driving and use the multi-screen capability to display all measured frequencies at the same time.
7. Display the measurement results afterwards and create your report.

[Figure 9-21](#) shows a typical setup for a measurement of the down-link channels of several LTE 800 MHz cellular systems and several TETRA systems. Adapt the settings to your needs and save your setup.

Figure 9-21. Port Scanner Setup

Options and Settings

Vision software Option 486 enables coverage mapping. Option 407 allows you to view live data, record data related to given limit lines, or record GPS-assisted measurement results. Use the Port Scanner menu to insure that the correct boxes are checked. [Figure 9-22](#) shows a typical setup. Once you have verified your settings, start monitoring, recording and driving the route. All data is saved on the laptop's hard drive. Because the data is gathered continuously, stop the measurement when you are finished.

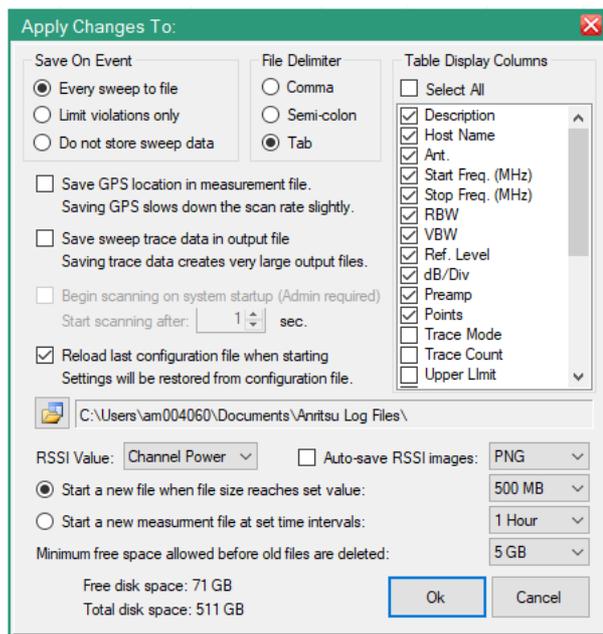


Figure 9-22. Port Scanner Options and Settings Configuration

Display Results

Use Vision Scan Viewer to display your results.

- Start the Vision Scan Viewer: All Program > Anritsu > Vision Tools > Scan Viewer.
- Load the previously saved Channel Power Measurement File (*.CPM). The file is usually available in the following file directory: C:\Users\.....\Documents\Anritsu Log Files*.cpm.

Note: All Vision software options must also be enabled in the spectrum analyzer hardware device.

Figure 9-23 shows an example of the displayed measurement results. On the left side are the recorded frequencies, the used spectrum analyzer antenna port, and the number of successfully saved data files. The split screen shows the spectrum trace in the top view and the corresponding spectrogram in the bottom view.

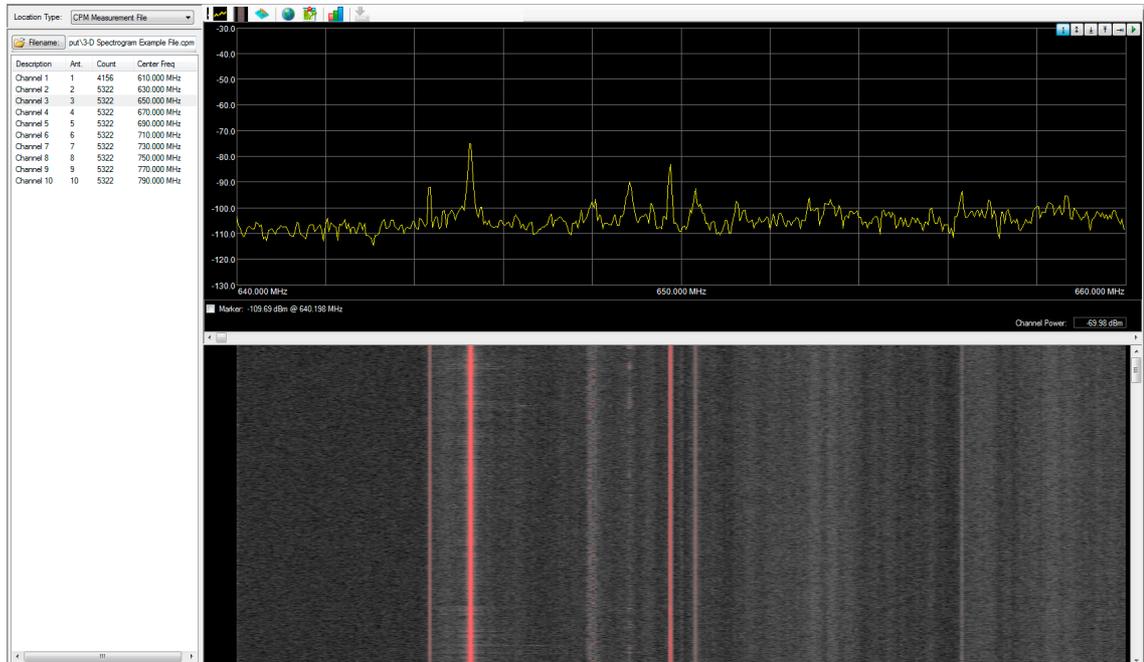


Figure 9-23. Example of Recorded Results

Click the “Breadcrumbs Map” from the menu bar to view the mapped results path. See Figure 9-24.

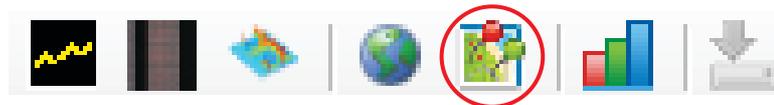


Figure 9-24. Breadcrumbs Icon

Each time you select a frequency, the corresponding trace will appear and the Breadcrumb Map will display the coverage mapping results in different colors as shown in Figure 9-25. The corresponding power levels are given on the right side of the map.

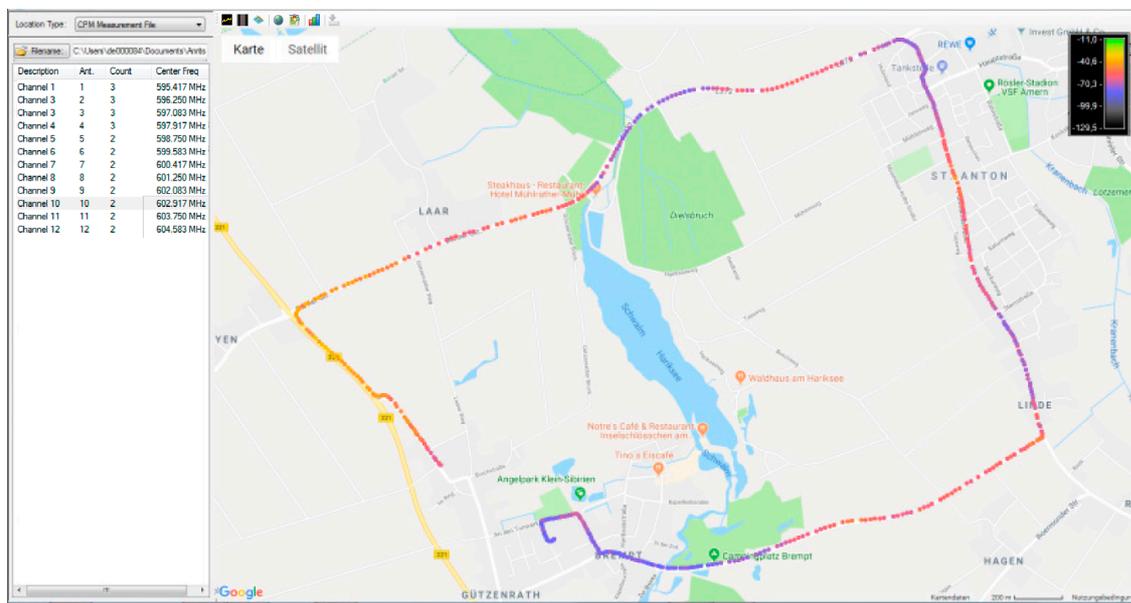


Figure 9-25. Mapped Measurement Results

Chapter 10 — Radio (Option 400)

10-1 Introduction

The Radio Capture file contains the AM/FM Measurements for the spectrum analyzer with Option 400 installed. The function “Streaming Audio” is option controlled. It is accessed via the Vision API. The Radio Capture file uses the Vision API to stream audio from spectrum analyzer. If accessing a spectrum analyzer without Option 400, it will not function. The AM/FM option provides analysis information included AM modulation quality and FM deviation metrics.

10-2 Radio Capture Program

Click the Radio measurement icon to display the user interface shown below in [Figure 10-1](#).

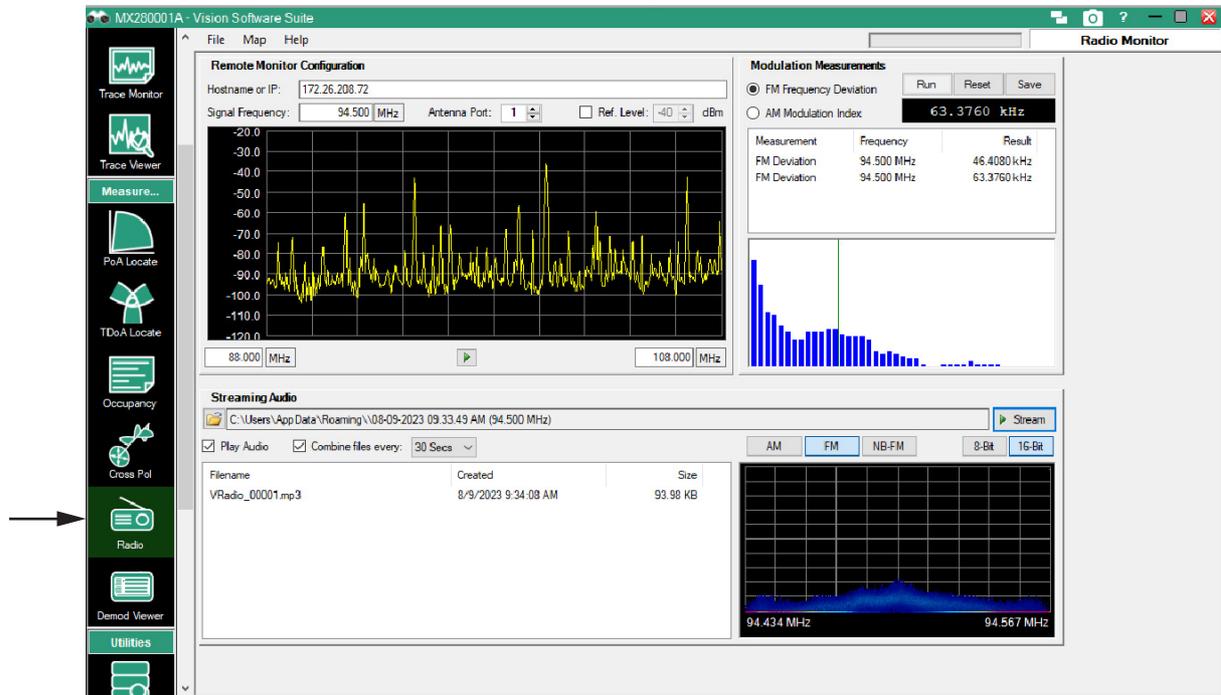


Figure 10-1. Radio Menu

Radio Menu Bar

The Radio menu bar is shown in [Figure 10-2](#) and described in [Table 10-1](#).

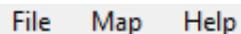


Figure 10-2. Radio Menu Bar

Table 10-1. Radio Menu Bar Description

Menu	Description
File	<p>Open Database: Opens the database folder that has been set from “Set Database Root Folder”.</p> <p>Set Database Root Folder: Opens the database folder set the “Set Database Root Folder”.</p> <p>Recent Databases: Click to display the most recent databases used.</p> <p>Exit: Exit the File menu.</p>
Map	<p>Load Map: Load a customer selected map to the screen.</p> <p>Existing Maps: Load a map from an existing map folder.</p>
Help	<p>Help: See “Help Menu” on page 5-3.</p>

The AM/FM Measurements menu provides a way to:

- Sweep a range
- See the sweep trace
- See a peak in the trace
- Click on the peak to select the frequency for the audio streaming
- Set Reference Level (dBm) using the scroll reference level selector

You select a start and stop frequency for the trace graph. Click the 'Play' button starts sweeping that range and you see the traces in the graph. When you see a peak you are interested in, you stop sweeping and float your mouse over the graph display, which scrolls the graph as a green marker, and click on the peak that sets the frequency (box above the graph) to the peak position. The bandwidth (span) for the IQ capture and audio streaming are automatically set by the type of audio signal (AM, FM, or NBFM).

If the user knows the frequency of the signal they are interested in, they can skip this step altogether and just type the frequency in the box provided. The graph is used to select a peak (frequency) to test (either FM deviation, AM modulation, or Streaming audio). However, the user can enter it from the keyboard and not use the graph. The graph will typically have a much wider span than the bandwidth of the signal you want to test, and the signal is unlikely to be at the center frequency of the graph.

Example

If you are interested in streaming a radio station from the US FM broadcast band, set the Start and Stop frequencies to 88 MHz and 108 MHz. That is the FM band. Then you can sweep and see that there are quite a few peaks in the trace data, each representing a particular radio station. If you want to listen to one of them, you click on the peak, 106.5, for instance. That frequency is then set as the test frequency. Doing the measurements or streaming will use the bandwidth of the signal type selected, not the full span of the trace graph.

Remote Monitor Configuration

The AM/FM Measurements – Remote Monitor Configuration section provides the menu shown in [Figure 10-3](#).

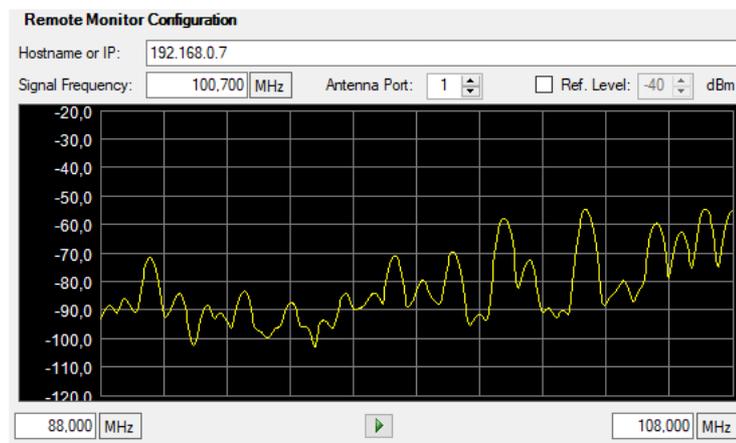
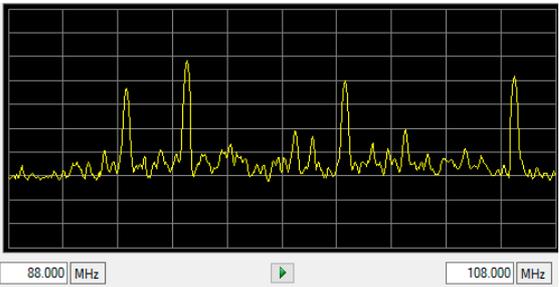


Figure 10-3. Remote Monitor Configuration

The Remote Monitor Configuration buttons are described in [Table 10-2](#).

Table 10-2. Remote Monitor Configuration

Icon	Description
	<p>Host name: Type the host name of IP address of the remote monitor you want to use.</p>
	<p>Signal Frequency: Type the carrier frequency to capture data.</p>
	<p>Antenna Port: Type the antenna port on the remote monitor. Range is 1 to 24.</p>
	<p>Ref. Level: Check and set reference level (dBm) to selected value from the list. If the Reference Level is unchecked, the reference level is audio-adjusted.</p>
	<p>Stream Audio: Stream audio from a selected source.</p>
	<p>Sweep Trace: Provides a sweep display graph of the audio streaming.</p> 

Modulation Measurements

The AM/FM Measurements – Modulation Measurements section provides the menu shown in [Figure 10-4](#).

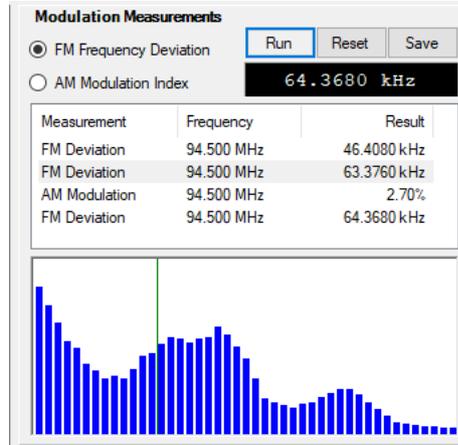
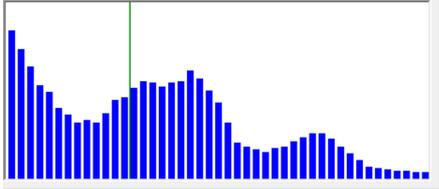


Figure 10-4. Modulation Measurements

The Modulation Measurements section is described in [Table 10-3](#).

Table 10-3. Modulation Measurements

Icon	Description
<input checked="" type="radio"/> FM Frequency Deviation	FM Deviation: Provides a FM Deviation.
<input checked="" type="radio"/> AM Modulation Index	AM Modulation Index: Provides AM Modulation Index.
Run Reset Save	Run: Run the measurement selected. Reset: Reset the measurement result display. Save: Save the measurement result display.
64.3680 kHz	Measurement Readout: Displays the marker frequency readout from the measurement graph display as shown below. 

Streaming Audio

The AM/FM Measurements – Streaming Audio provides the menu shown in [Figure 10-5](#).

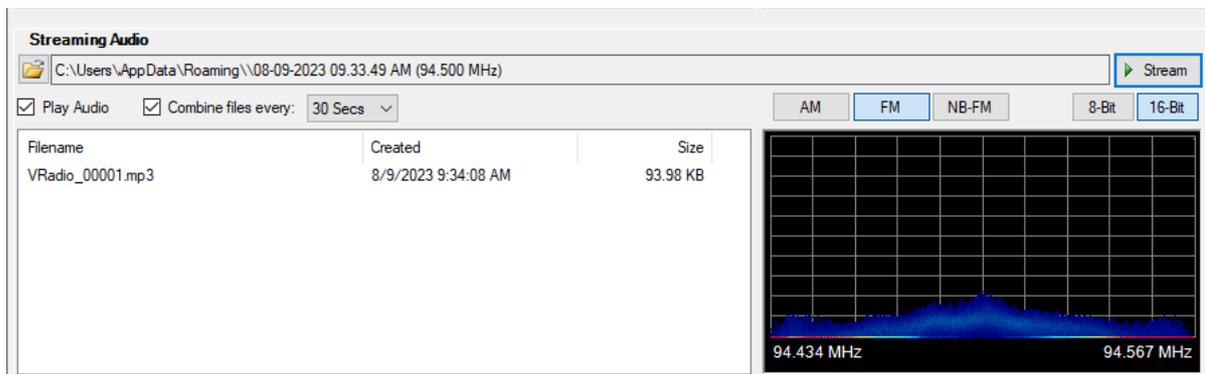


Figure 10-5. Streaming Audio

The Streaming Audio icons are described in [Table 10-4](#).

Table 10-4. Streaming Audio

Icon	Description
	Load: Loads an audio file.
<input checked="" type="checkbox"/> Play Audio	Play Audio: Click to play audio when collecting data.
<input checked="" type="checkbox"/> Combine files every:	Combine Files: Click to capture short files and combined into longer files. Select from the time interval list how often to combine files.
<input type="button" value="AM"/> <input type="button" value="FM"/> <input type="button" value="NB-FM"/>	AM: Stream as AM. Demodulate the captured signal as AM. FM: Stream as FM. Demodulate the captured signal as FM. NB-FM: Demodulate the captured signal as narrow-band FM.
<input type="button" value="Stream"/>	Stream: Stream audio from selected source.
<input type="button" value="8-Bit"/> <input type="button" value="16-Bit"/>	8-Bit data transfer: Smaller transfer for shorter gaps, but provides more noise. 16 bit data transfer: Use for larger transfer size. Longer gaps if network throughput is limited.

The URL of the spectrum analyzer is entered along with the center frequency of the FM signal. The bin width of the FM deviation measurement can also be adjusted as needed.

The AM/FM demodulation option also enables the user to remotely capture AM/FM signals and listen to the signals via their PC/laptop. The AM/FM signals can also be saved as WAV files to be played at a later date.

Play AM or FM Demodulated Signals

These buttons demodulate the I/Q data and create an audio sound file. Playing a demodulated signal is useful if the demodulated signal is known. By listening to a demodulated signal, you can pin point the location of the interferer signal.

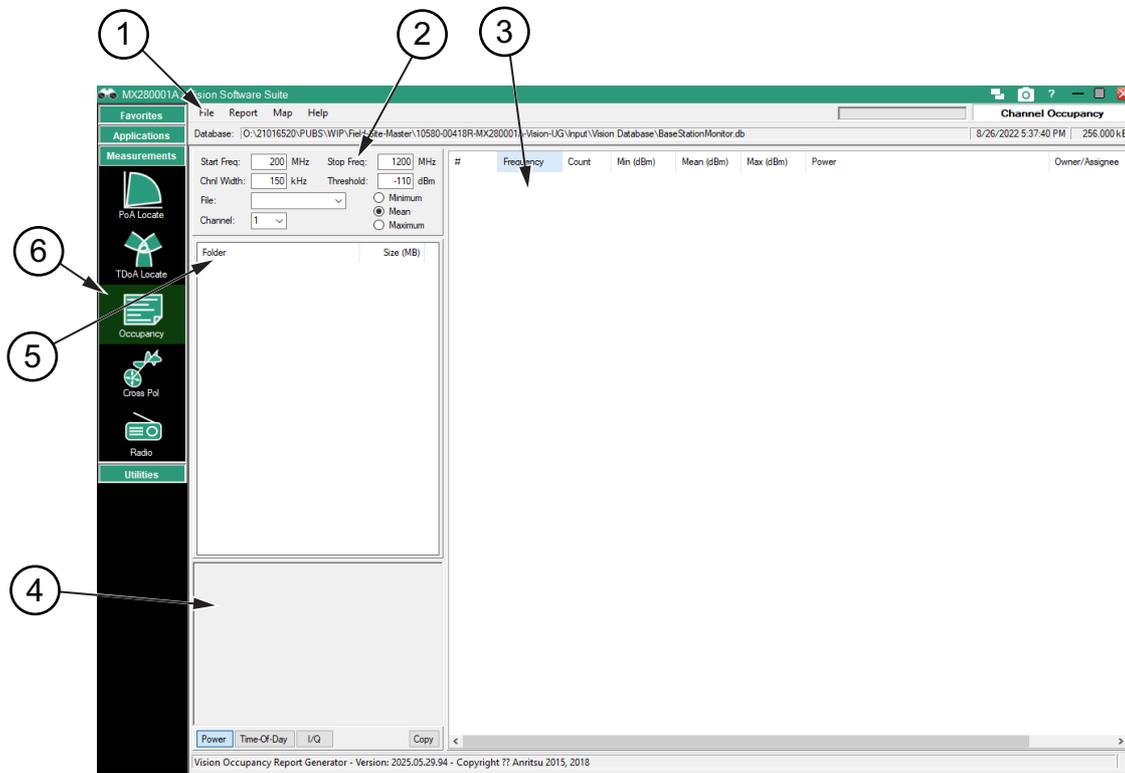
Chapter 11 — Occupancy

11-1 Introduction

Occupancy measurement of Vision Software Suite provides power threshold levels to determine whether a given frequency channel is to be considered occupied. In this way, noise and very low-level signals can be eliminated from the analysis.

11-2 Occupancy GUI

Occupancy measurement GUI consists of channel setup parameters, Folder section, Power/Time-Of-Day/I/Q histograms and a table of sub-channels indicated with frequency, count, Minimum, Mean, Maximum, Power and Owner/Assignee columns, as shown in [Figure 11-1](#).



- | | |
|-------------------------------------|--------------------------|
| 1. Occupancy Menu Bar | 4. Power Histogram |
| 2. Channel Setup Parameters Section | 5. Folder Section |
| 3. Occupancy Sub-channels Table | 6. Occupancy Measurement |

Figure 11-1. Occupancy GUI

Occupancy Menu Bar

The Occupancy menu bar is shown in [Figure 11-2](#) and described in [Table 11-1](#).

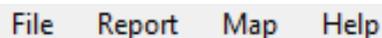

 A horizontal menu bar with four items: 'File', 'Report', 'Map', and 'Help', each in a light gray button-like box.

Figure 11-2. Occupancy Menu Bar

Table 11-1. Occupancy Menu Bar Description

Menu	Description
File	<p>Open Folder Location: Open to the set Occupancy folder location.</p> <p>Load Owner/Assignee List: Load the occupancy owner or assignee list to view in the occupancy window.</p> <p>Save Owner/Assignee List: save the owner/assignee list to a user selected folder location.</p> <p>Recent Databases: Click to display the most recent databases used.</p> <p>Exit: Exit the File menu.</p>
Report	<p>Generate: Click to generate the Occupancy report. See “Generating Occupancy Report” on page 11-3.</p> <p>Export to Browser: See “Include Detail Graphs in Web Report” on page 11-12.</p> <p>Export to CSV: See “Export to CSV” on page 11-2.</p> <p>Show by Pass/Fail Status: See “Owner/Assignee” on page 11-4.</p> <p>Include Detail Graphs in Web Report: See “Include Detail Graphs in Web Report” on page 11-12.</p>
Map	<p>Load Map: Load a customer selected map to the screen.</p> <p>Existing Maps: Load a map from an existing map folder.</p>
Help	<p>Help: See “Help Menu” on page 5-3.</p>

Generating Occupancy Report

An occupancy report divides up a frequency range into sub-channels and shows the typical traffic at each sub-channel frequency. Occupancy reports are:

- Typically used to investigate the availability of bandwidth within a particular frequency space or to locate unexpected signals in the frequency space.
- Generated from several hours, days, or weeks of continuous spectrum monitoring data.
- May span multiple databases.

Determine the frequency range of interest and then collect trace data in that frequency space. The spectrum analyzers can collect up to 4000 points per trace. You will need to set the number of points such that you have at least one point/sub-channel. If you have more than one point/sub-channel, the highest measured power in the sub-channel is used in the report. For instance, if you are interested in monitoring the 500 MHz to 600 MHz, and you want 25 kHz channel spacing, then you will need at least $(600 \text{ MHz} - 500 \text{ MHz})/25 \text{ kHz} = 4000$ trace points.

Occupancy Report Generator works with auto-archived databases or manually created Vision database. To begin with select Open Folder Location from File menu. You can also select Recent Database Locations to quickly choose a desired folder location. Choose an already saved database file from the selected location in your computer and click OK button.

Note that each folder is listed by name or location under Folder section. Make sure to check/uncheck the check box next to the folder to include or exclude particular folders in the generated report. Specify the folder location that holds the desired database by selecting an appropriate .db file from File drop-down menu included in the Channel Setup Parameters section. Refer to [Figure 11-3](#). Auto-archived databases are stored in a sub-folder of the active database folder. Each archived database has its own sub-folder, named with the date and time stamp at which the archive was created. The databases will be listed on the left side of the report generator window.

Finally, to generate the Occupancy Report, click Generate from the Report menu on the Occupancy menu bar, or press **F5** as a shortcut. It may take several seconds to generate the report, depending on the number of traces and archive folders being processed. There can be a lot of data to process. The upper right-hand corner of the window has a progress bar that indicates the progress in green through the selected archive databases. See [Figure 11-3 on page 11-4](#).

The report includes Frequency, Count, Minimum, Mean and Maximum channel power values. The color-coded Power bars have following significance:

Green: Maximum power measured in a sub-channel is below this threshold, the channel passes.

Yellow: Maximum power exceeds the threshold, but the average power is below the threshold.

Red: All saved traces in a given sub-channel is above the threshold.

The power bar for each sub-channel also shows three vertical black lines. The first is the minimum power measured, the second is the mean power, and the third is the maximum power measured for the given sub-channel.

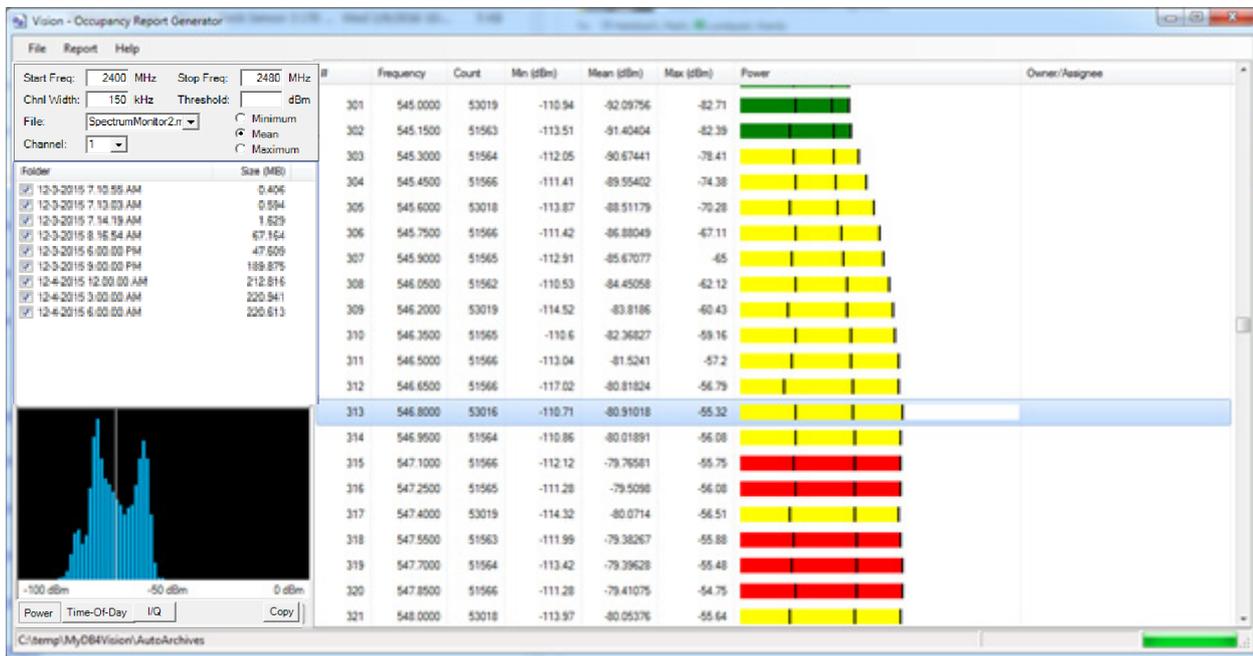


Figure 11-3. Occupancy Report

Owner/Assignee

The last column in the Occupancy Report shows the assigned owner’s name for each sub-channel. This is for reference. This column can be edited by clicking in the column and typing the desired information. An Owner List must be loaded each time you generate a report, as the report comes directly from the database, which does not contain information about channel assignments or ownership. To load Owner/Assignee list go to File menu and select Load Owner/Assignee List. If you have edited the owner/assignee list in the currently generated Occupancy Report, be sure to click Save Owner/Assignee List from the File menu before closing the window or generating a new report, otherwise, your edits may be lost.

Setting Channel Setup Parameters

Start Freq: Type in the Start Frequency. Press “k” (kHz), “M” (MHz), or “G” (GHz). Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

Stop Freq: Type or enter the channel Stop Frequency. Press “k” (kHz), “M” (MHz), or “G” (GHz). Range is 9 kHz to maximum range of measuring instrument up to 54 GHz.

Chnl Width: Type in the Channel Width (kHz).

Threshold: Type in the Power Threshold (dBm).

File: Displays the selected database file.

Channel: Lists the channel number out of total number of channels.

Minimum: Select this radio button to display the sub-channels based on minimum power per set Threshold value.

Mean: Select this radio button to display the sub-channels based on mean power per set Threshold value.

Maximum: Select this radio button to display the sub-channels based on maximum power per set Threshold value.

Folder: Displays the selected folder location.

Histogram

There are 3 types of histograms that are supported by Occupancy measurement. These graphs are located right under the Folder check box in the lower left side of the window.

Power histogram is displayed by default which depicts the power at the selected sub-channel as shown in [Figure 11-4](#).

Click Time-Of-Day button to view the histogram of the time-of-day power readings for the selected sub-channel as shown in [Figure 11-5, “Time-of-Day Power Histogram”](#). The gray shading indicates there is no data available during that time. If it is black, no shading and no bar, then there are traces at those time, but everything was below threshold.

Click I/Q button to view the

Click **Copy** button to replicate the graph onto the Windows Clipboard.

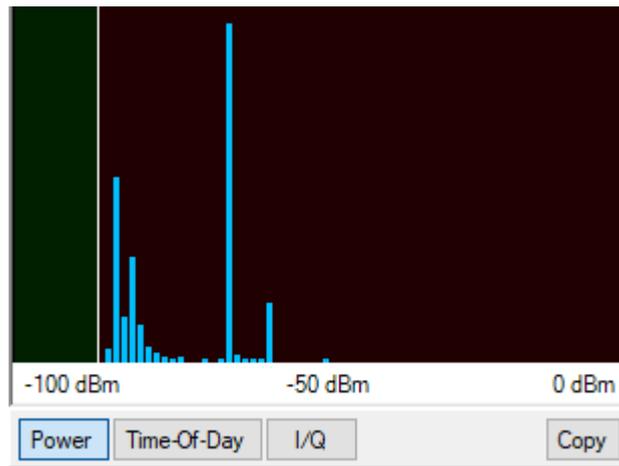


Figure 11-4. Power Histogram of Selected Sub-Channel

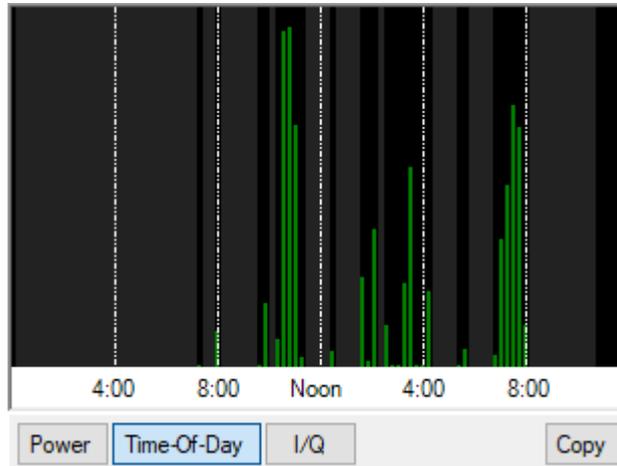


Figure 11-5. Time-of-Day Power Histogram

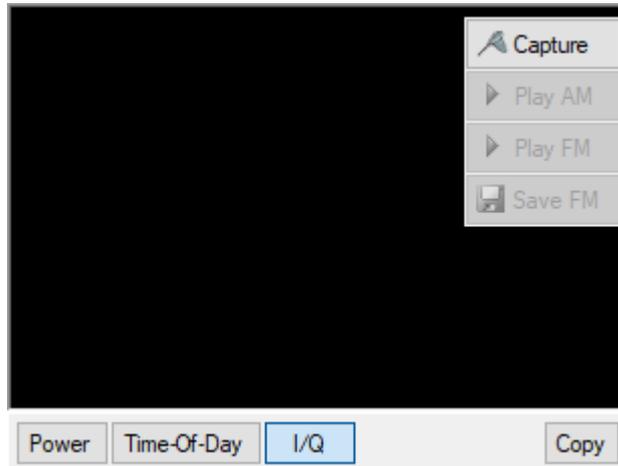


Figure 11-6. IQ Histogram

Under the Report menu there are two options for exporting the report to a standard disk file, as follows:

Export to Browser: Opens the Save As dialog to save the created HTML file to the desired folder. Then the file will open in the default web browser. This is a convenient way to store reports so that they can be called up and reviewed at later times. The Report Generator does not have an internal Print function, so hard copies are most easily generated by exporting and printing from the web browser. See [Figure 11-7](#).

Vision Occupancy Report

Generated: 7/24/2025 11:15:18 AM
 Root folder: O:\21016520\PUBS\WIP\Field-Site-Master\10580-00418R-MX280001A-Vision-UG\Input\Vision Database
 Power Threshold: -110 dBm
 Monitor Description: RSM Description 13
 Monitor Location: 38.23110°; -121.56150°

#	Frequency	Count	Min (dBm)	Mean (dBm)	Max (dBm)	Power	Owner/Assignee
1	2,400.00000	1866	-111.9	-111.3997	-111		
7	2,400.15000	1866	-111.2	-110.4039	-102.6		
14	2,400.32500	1866	-111.1	-110.0957	-101.1		
20	2,400.47500	1866	-111	-110.0225	-97		
27	2,400.65000	1866	-111	-110.2522	-99.9		
33	2,400.80000	1866	-111.2	-110.3761	-98.8		
39	2,400.95000	1866	-111.1	-110.2345	-102		
46	2,401.12500	1866	-111	-110.2265	-99.1		
52	2,401.27500	1866	-111	-110.3095	-93		
59	2,401.45000	1866	-111.2	-110.3418	-93.3		
65	2,401.60000	1866	-110.8	-110.0369	-103.9		
71	2,401.75000	1866	-109.2	-108.5104	-95.8		
78	2,401.92500	1866	-107.3	-106.4009	-100		
84	2,402.07500	1866	-106.8	-105.9471	-96.6		
91	2,402.25000	1866	-108.8	-107.9915	-95.1		
97	2,402.40000	1866	-111.1	-110.3151	-103.9		
103	2,402.55000	1866	-111.9	-111.1918	-94.1		
110	2,402.72500	1866	-111.8	-111.1339	-93.4		
116	2,402.87500	1866	-111.7	-110.9024	-101.2		
123	2,403.05000	1866	-111.3	-110.4275	-93.1		
129	2,403.20000	1866	-110.5	-109.6431	-95.6		

Figure 11-7. Export to Browser (HTML)

Export to CSV: Opens the Save As dialog to save the created .csv file to the desired folder. Click Save immediately saves the file to the desired folder. To view the CSV file, import the report into a spreadsheet such as Microsoft Excel. See [Figure 11-8](#).

1	Vision Occupancy Report							
2	Generated: 9/2/2022 1:22:54 PM							
3	Root folder: C:\User:							
4	Power Threshold: dBm							
5	Monitor Description: RSM Description 1							
6	Monitor Location: 38.24020°; -121.57030°							
7								
8	#	Frequency	Count	Min (dBm)	Mean (dB)	Max (dBm)	Owner/Assignee	
9	1		2	400	2216	-111.8	-111.4	-111
10	2		2	400.15	2216	-111.2	-110.154	-68
11	3		2	400.3	2216	-111	-109.884	-67
12	4		2	400.45	2216	-111	-109.786	-66.1
13	5		2	400.6	2216	-111	-110.034	-64.9
14	6		2	400.75	2216	-111.2	-110.117	-65.1
15	7		2	400.9	2216	-111	-109.995	-66.3
16	8		2	401.05	2216	-111	-109.985	-66.4
--	--	--	--	----	----	-----	-----	----

Figure 11-8. Export to CSV Report

Grouping Sub-Channels

Normally, the occupancy report will include the sub-channels in frequency order. To group the sub-channels by pass/fail status select Show By Pass/Fail Status under the Report menu. The channels with power levels within the set threshold values appear on the top indicated with green bars. Followed by marginally passing sub-channels indicated by yellow bars and failing threshold sub-channels indicated by red bars as shown in Figure 11-9.

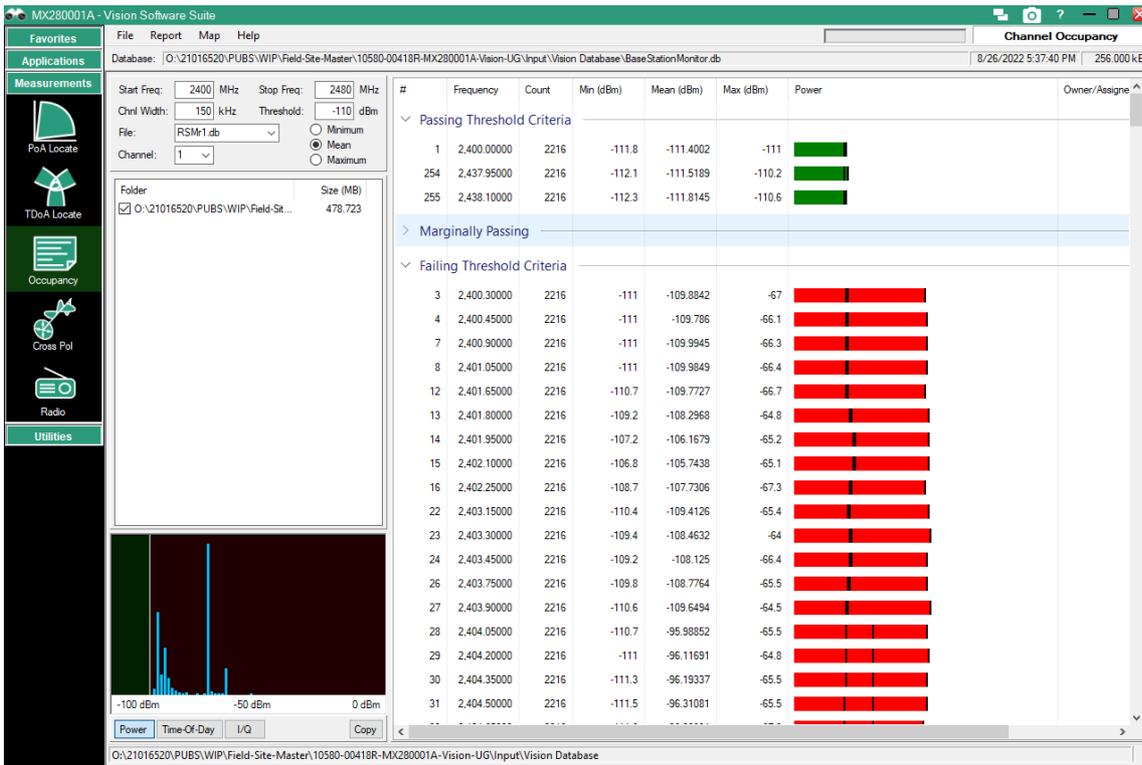


Figure 11-9. Occupancy Report Sorted Pass/Fail, Marginally Passing Section Collapsed

Show By Pass/Fail Status

From the Report menu click Show by Pass/Fail Status option to generate the report in the browser as shown in Figure 11-10.

Vision Occupancy Report

Generated: 7/24/2025 11:14:29 AM
 Root folder: O:\21016520\PUBS\WIP\Field-Site-Master\10580-00418R-MX280001A-Vision-UG\Input\Vision Database
 Power Threshold: -110 dBm
 Monitor Description: RSM Description 13
 Monitor Location: 38.23110°; -121.56150°

Passing Threshold Criteria

#	Frequency	Count	Min (dBm)	Mean (dBm)	Max (dBm)	Power	Owner/Assignee
1	2,400.00000	1866	-111.9	-111.3997	-111		
1518	2,437.92500	1866	-112.1	-111.5172	-110.3		
1524	2,438.07500	1866	-112.3	-111.7874	-110.6		

Marginally Passing

#	Frequency	Count	Min (dBm)	Mean (dBm)	Max (dBm)	Power	Owner/Assignee
7	2,400.15000	1866	-111.2	-110.4039	-102.6		
14	2,400.32500	1866	-111.1	-110.0957	-101.1		
20	2,400.47500	1866	-111	-110.0225	-97		
27	2,400.65000	1866	-111	-110.2522	-99.9		
33	2,400.80000	1866	-111.2	-110.3761	-98.8		
39	2,400.95000	1866	-111.1	-110.2345	-102		
46	2,401.12500	1866	-111	-110.2265	-99.1		
52	2,401.27500	1866	-111	-110.3095	-93		
59	2,401.45000	1866	-111.2	-110.3418	-93.3		
65	2,401.60000	1866	-110.8	-110.0369	-103.9		
97	2,402.40000	1866	-111.1	-110.3151	-103.9		

Figure 11-10. Show By Pass/Fail Status Report

Include Detail Graphs in Web Report

From the Report menu click Include Detail Graphs in Web Report to generate the report in the browser as shown in Figure 11-11.

Vision Occupancy Report

Generated: 7/24/2025 11:04:23 AM

Root folder: O:\21016520\PUBS\WIP\Field-Site-Master\10580-00418R-MX280001A-Vision-UG\Input\Vision Database

Power Threshold: -110 dBm

Monitor Description: RSM Description 13

Monitor Location: 38.23110°; -121.56150°

Passing Threshold Criteria

#	Frequency	Count	Min (dBm)	Mean (dBm)	Max (dBm)	Power	Owner/Assignee
1	2,400.00000	1866	-111.9	-111.3997	-111		
1518	2,437.92500	1866	-112.1	-111.5172	-110.3		
1524	2,438.07500	1866	-112.3	-111.7874	-110.6		

Figure 11-11. Include Detail Graphs in Web Report

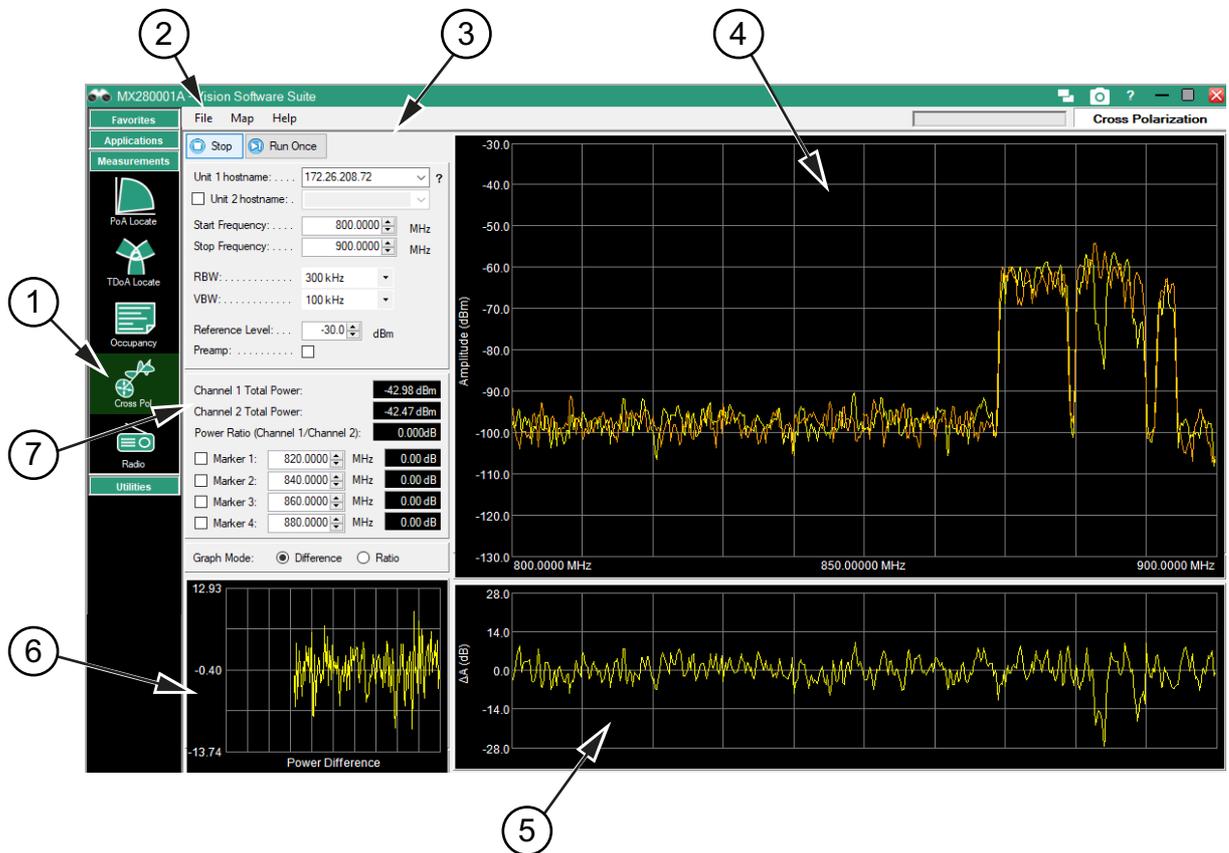
Chapter 12 — Cross Polarization

12-1 Introduction

Cross Polarization measurement monitors two antennas measuring the same signal, one turned 90 degrees relative to the other. Determine the difference in receive power between 2 antennas by tuning the position of an antenna for maximum benefit. Cross polarization measurements can be made with a multiport RSM or by using two RSMs.

12-2 Cross Polarization Menu

The cross polarization measurement menu is shown in [Figure 12-1](#).



1. Cross Polarization (Cross Pol) Menu Button
2. Menu Bar
3. Parameters Entry Panel
4. Cross Polarization Signal Display

5. Averaging Trace - Signal Delta
6. Channel Power Function of Time
7. Channel Marker Window

Figure 12-1. Cross Polarization Menu

Cross Polarization Menu Bar

The Cross Polarization menu bar is shown in [Figure 12-2](#).

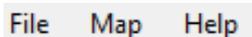


Figure 12-2. Cross Polarization Menu Bar

The Cross Polarization menu bar is described in [Table 12-1](#).

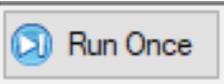
Table 12-1. Cross Polarization Menu Bar Description

Menu	Description
File	Open Database: Opens the database folder that has been set from “Set Database Root Folder”. Exit: Exit the File menu.
Map	Load Map: Load a customer selected map to the screen. Existing Maps: Load a map from an existing map folder.
Help	Help: See “ Help Menu ” on page 5-3.

Measurement Parameters

The cross polarization parameters window is described in [Table 12-2](#).

Table 12-2. Cross Polarization Parameters Panel

Menu	Description
	Run Button: Click once to operate the cross-polarization measurement continuously. Click again to stop.
	Run Once: Click to run cross polarization measurement once. Click again to run the measurement once again.
Unit 1 hostname: <input type="checkbox"/> Unit 2 hostname: . .	Hostname: Enter a Unit 1 hostname. A multiport RSM requires only 1 hostname. If using two RSMs, check the “2 hostname” box and type the hostname of the second RSM. If using two RSMs, both will be using a Port 1.
Start Frequency: Stop Frequency:	Start/Stop Frequency: Type or use the increment/decrement keys to enter the start and stop frequency in MHz. Range is 7 kHz to 6 GHz.
RBW: VBW:	RBW/VBW: Click the arrow key to set the RBW and VBW.
Reference Level: . . .	Reference Level: Set the reference level for the cross polarization measurement. Range is –80 dB to 20 dB.
Preamp: <input type="checkbox"/>	Preamp: Check to turn on the preamp.

Power Measurements

The cross polarization power measurements window is described in [Table 12-2](#).

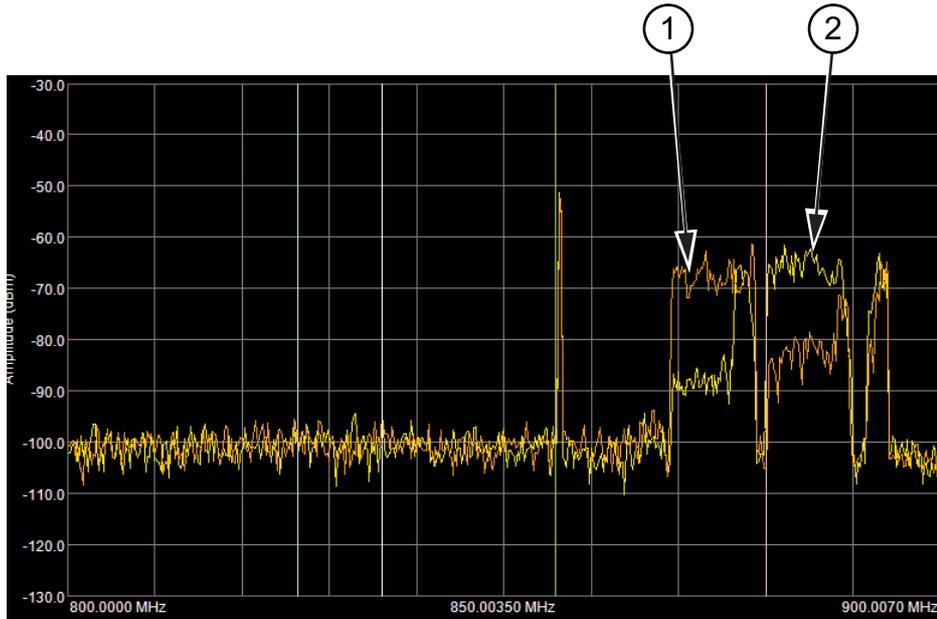
Table 12-3. Cross Polarization Parameters Panel

Menu	Description
Channel 1 Total Power:	Run Button: Click to run cross polarization measurement continuously. Click again to stop.
Channel 2 Total Power:	Run Once: Click to run cross polarization measurement once. The measurement will run one time. Click again to run the measurement once again.
Power Ratio	Hostname: Type or click the pull-down arrow to enter a unit 1 hostname. A multiport RSM requires only 1 hostname. If using two RSMs, check the “2 hostname” box and type the hostname of the second RSM. If using two RSMs, both will be using a Port 1.
<input checked="" type="checkbox"/> Marker 1: <input checked="" type="checkbox"/> Marker 2: <input checked="" type="checkbox"/> Marker 3: <input checked="" type="checkbox"/> Marker 4:	Marker (n): Check the box to display the marker 1 through 4 on the trace data display. See “Marker Measurement Display” on page 12-5 .
Graph Mode:	<p>Graph Mode: Set the time graph display to show either the difference or ratio of the channel power between the two signals as a function of time.</p> <p>Difference: Set time graph to Difference mode.</p> <p>Ratio: Set time graph to Ratio mode.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div data-bbox="703 1073 1002 1339"> </div> <div data-bbox="1023 1073 1321 1339"> </div> </div>

Trace Display

Trace data from two antennas are displayed in the trace data graph as shown in [Figure 12-3](#).

If using one RSM, the trace data from the antenna on port 1 is yellow, the other is burnt orange color. If using two RSMs, the trace data from the 1st RSM is yellow, and the 2nd RSM is burnt orange color.



1. Trace One - Burnt Orange Color
2. Trace Two - Yellow Color

Figure 12-3. Trace Display

Averaging Trace

The averaging trace is a result of averaging the delta change between the two traces. The straighter the average is a result of a better alignment of the two antennas. [Figure 12-4](#) is an average delta trace of the two signals shown in [Figure 12-3](#).

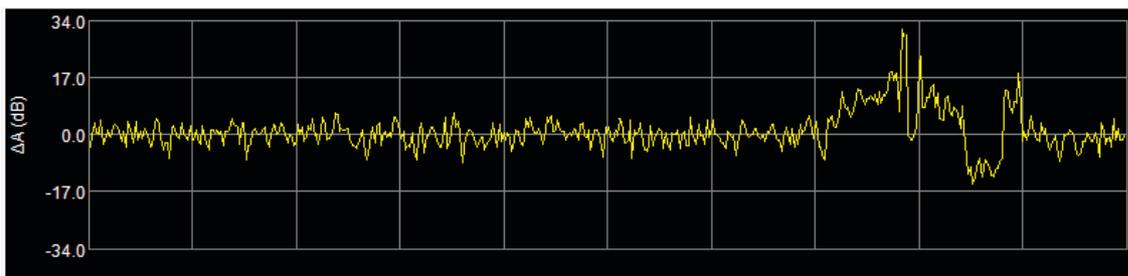


Figure 12-4. Delta Average

Marker Measurement Display

The cross polarization measurement display shown in [Figure 12-5](#) shows the two traces superimposed. The active marker readouts in the power/marker panel display the corresponding marker in the trace display graph.

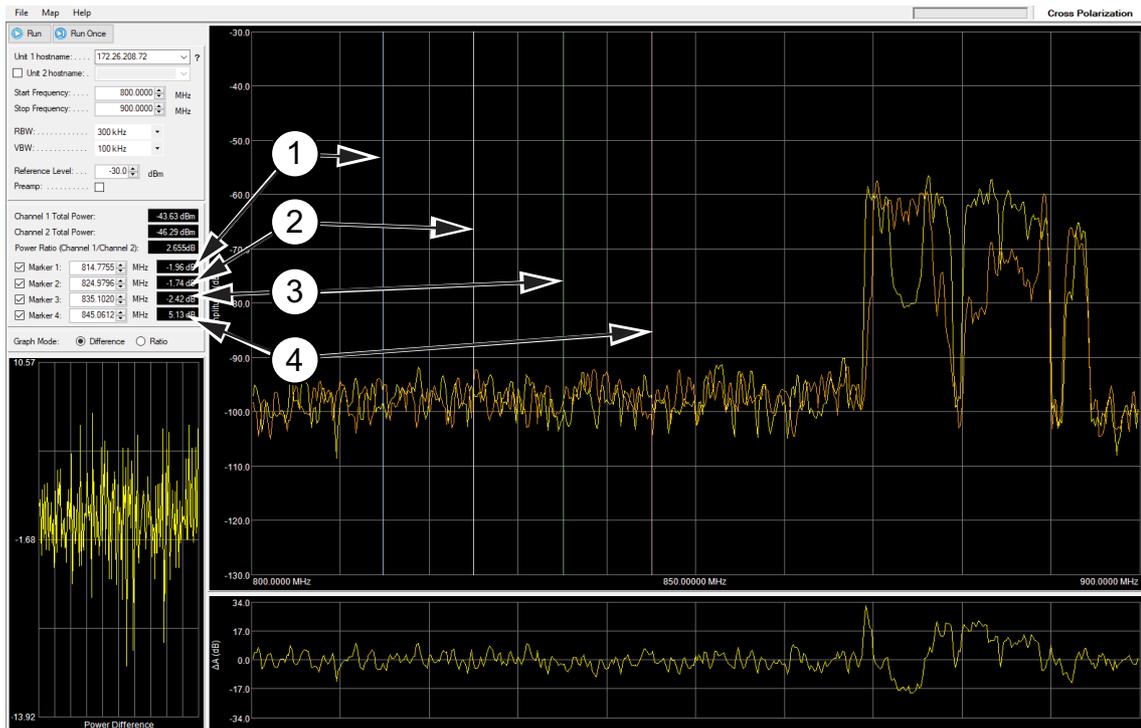
The markers can be displayed by checking the corresponding box in the channel marker window a keyboard-click function to set the marker on a specific location on the display:

Marker 1 (blue marker): Click on the trace display.

Marker 2 (white marker): Shift-click on the trace display.

Marker 3 (green marker): Ctrl-click on the trace display.

Marker 4 (red marker): Alt-click on the trace display.



1. Marker 1 Readout with Blue Colored Marker Displayed
2. Marker 2 Readout with White Colored Marker Displayed
3. Marker 3 Readout with Green Colored Marker Displayed
4. Marker 4 Readout with Red Colored Marker Displayed

Figure 12-5. Power/Marker Menu

Chapter 13 — Geo-Location Techniques

13-1 Introduction

Vision Monitor includes three algorithm methods for locating RF emitter signals.

- Power of Arrival (PoA)
- Angle of Arrival (AoA)
- Time Difference of Arrival (TDoA)

13-2 PoA, AoA, TDoA Algorithms

Power of Arrival (PoA) is the default location algorithm for locating interference signals and it places a bullseye icon on the map to indicate a location estimation. Time Difference of Arrival (TDoA) is a method for locating an RF emitter based on the differential time of arrival of the transmitted signal to 3 remote monitors. TDoA may not always produce a single unique estimation, so the PoA estimate can help in choosing the most likely location for the RF source. Angle of Arrival (AoA) provides bearing information for the position of a transmitted signal.

Power of Arrival

Power of Arrival (PoA) is a Geo-location algorithm that uses Spectrum Analyzer to capture and compare instantaneous power levels detected at three physically separated locations. By detecting relative power levels, an approximate location of a signal of interest can be found. PoA works with both modulated and non-modulated (CW) signal types. PoA techniques can also be used with burst or pulsed signals. Measurement signals for each spectrum analyzer are time synchronized in order to maximize accuracy.

Angle of Arrival

Angle of Arrival (AoA) requires Options 400 and 401. One advantage of AoA vs TDoA/PoA is that only one location is needed in order to perform geo-location. Both TDoA and PoA require three positions in a 'triangle' format. However, AoA only provides bearing information. The signal of interest lies somewhere along a trajectory line from the position of the AoA monitor to the interference signal's position.

Directional antennas are used by the AoA algorithm to computer bearing lines. Power is automatically measured at each antenna port, where calculations are made based on received signal strength.

[Figure 13-1 on page 13-2](#) shows a setup example for AoA. Either the MS27103A (12 or 24 RF Inputs) or the MS27102A (outdoor monitor with the option of 4 or 6 RF Inputs) can be used for the AoA application.

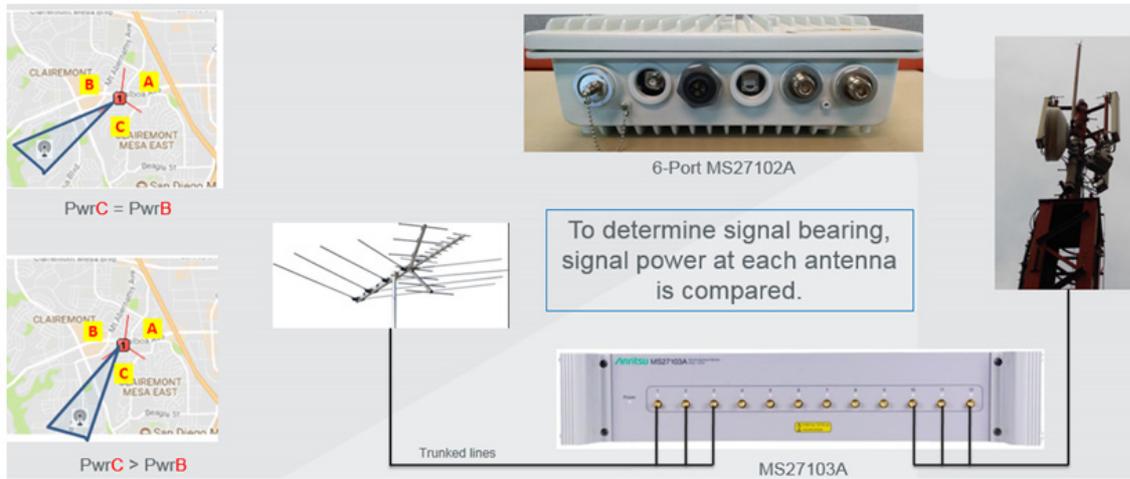


Figure 13-1. Angle of Arrival

Time Difference of Arrival

Time Difference of Arrival (TDoA) is a very powerful technique to locate interference sources and other modulated broadcasters. However, it is not universally useful, and it does take considerable care and experience to use it effectively. Many sources of interference are CW or just noisy electronics. There is nothing about these type of signals that can be time-aligned and those emitters will not be locatable with TDoA. To use TDoA to locate interference sources, the following considerations need to be made:

Modulated Source: The source must be modulated. TDoA looks for features in the RF spectrum as measured at 3 locations. Those features are time-aligned, and the difference in the time for the signals to reach each spectrum analyzer is used to calculate the location. If the signal of interest does not have features that can be aligned in time, then TDoA will produce meaningless results. Typically that means the signal must be modulated.

Clean IQ: Clean IQ diagram produces much more accurate results. The better you can setup the Spectrum Analyzer to capture IQ data, the more accurate the position estimate will be. This means more time may be needed to set up each spectrum analyzer, adjusting the frequency, span, reference level and preamp settings to get the best possible IQ capture. Strong signals that are close by will be relatively better, but weaker signals, and especially distant signals take some care to get meaningful results.

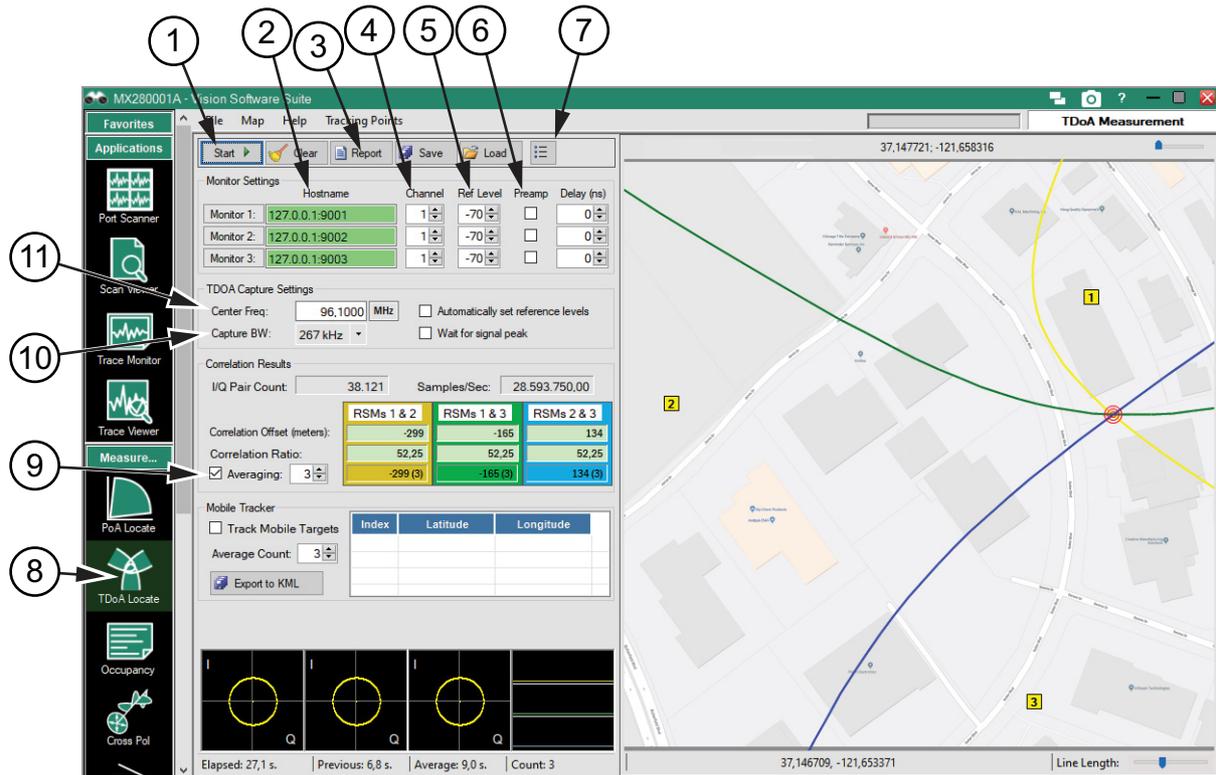
Triangulated Positioning: Three spectrum analyzers are used to do the TDoA triangulation of the RF source. Best results will be achieved if the source is contained inside a triangle made by connecting the spectrum analyzer locations. TDoA works for sources outside this triangle, and may be used to locate a source that is many kilometers outside the triangle, but it is more accurate for sources that are close by.

The reason distance matters is due to the uncertainty in any measurement made. We are looking for the intersection of three lines. Where those lines intersect at nearly right angles, then any uncertainty in the line positions produces a similar uncertainty in the intersection. However, if the lines approach each other at very shallow angles, then the lines may be within the distance of uncertainty for several kilometers. Distant sources outside the triangle of the spectrum analyzers will almost always produce lines that have very small incident angles, and that can greatly multiply the uncertainty in position.

13-3 TDoA Settings & Control

To use TDoA, verify the spectrum analyzers are installed with Option 400 and 401. Click the TDoA menu button to display the TDoA menu as shown in [Figure 13-2](#).

See [Chapter 7, “TDoA Locate \(Option 401\)”](#) for more information regarding the TDoA menu.



1. Start Button

2. Hostname Entry

3. Report Button

4. Channel Entry

5. Reference Level Entry

6. Preamp Checkbox

7. TDoA settings Button

8. TDoA Locate Measurement

9. Averaging Checkbox and Entry

10. Capture Bandwidth Entry

11. Center Frequency Entry

Figure 13-2. TDOA Settings and Control

TDoA Measurement Procedure

Use the following procedure to perform a TDoA measurement:

1. Enter IP addresses for three RSMs in use. After entering each address, the program will attempt to communicate with the RSMs. The background color of the IP Address box will change to green if the unit responds and has the required options (400 & 401). It will turn red if no response or options are missing.
2. If the RSMs are multi-port units, select the antenna channel, otherwise leave Channel at '1'.
3. Optionally set the Reference Level. Or, the program will auto-detect the appropriate reference level.
4. Optionally, check the Preamps box to turn on. This is subject to normal spectrum analyzer control. If the reference level or attenuation are too high, the preamps will not turn on.
5. Set the center frequency of the RF signal that is being used for geo-location.

6. Set an appropriate capture bandwidth. Wider captures use more data and the measurement is slower, but wider captures have greater time resolution so the accuracy of the TDoA measurement improves. Do not set the capture bandwidth wider than the occupied bandwidth of the signal.
7. Set the desired measurement count for averaging. 3 is an appropriate rough estimate; 10 is a good typical number.
8. Click the Start button to begin data acquisition. The initial estimate takes longer as each RSM has to set up. Subsequent averaging measurements will be quicker. How long it takes to complete depends on many factors, such as the network connection communication and the capture bandwidth. This will continue until the measurement average count is obtained, or the user clicks 'Stop' to cancel. Results for each measurement will be displayed.
9. Click the Report button to show measurement details as shown in [Figure 13-3](#).

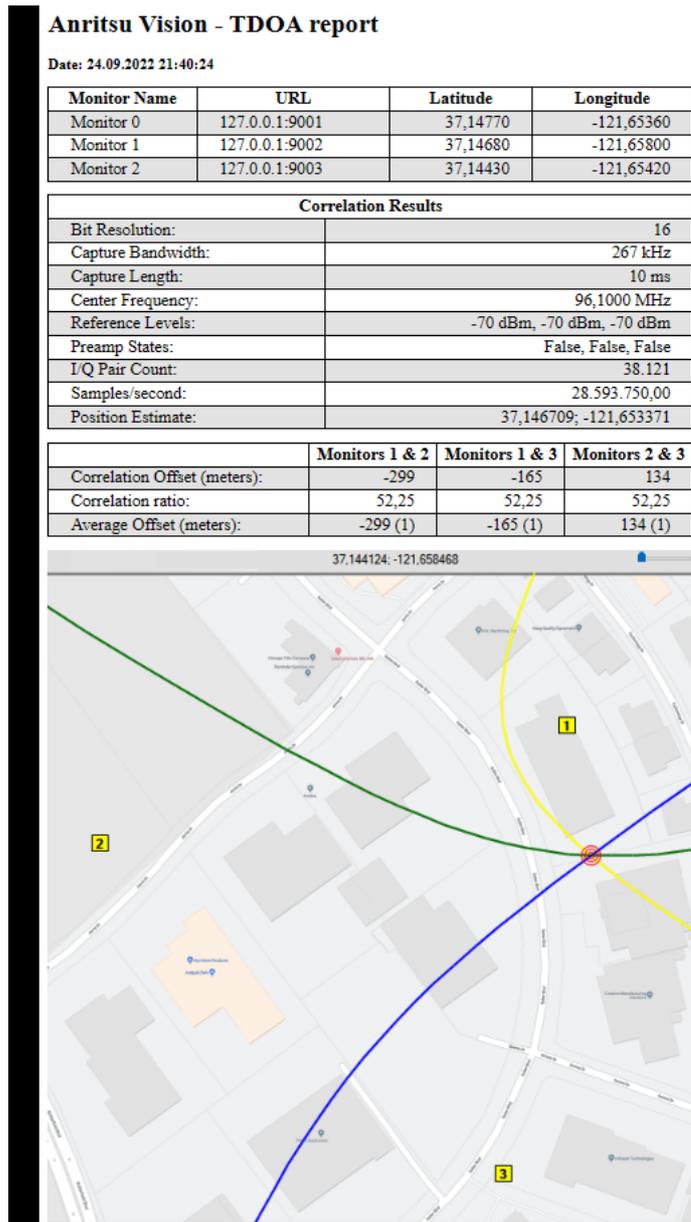


Figure 13-3. TDoA Report

Chapter 14 — Vision API

14-1 Introduction

An Application Programming Interface (API) is available for Vision. APIs are presented both for control of Anritsu's spectrum analyzer hardware as well as for Vision software. In order for these options to work, the spectrum analyzer hardware must have the applicable options enabled. See [Table 1-2, “Instrument and Vision Enabled Options”](#) on page 1-2 for the listing of options available for each instrument.

14-2 Using the Spectrum Analyzer API

The Spectrum Analyzer API provides the programmer with a library of building blocks to develop a Vision application program. These build blocks can create the programs for geo-locating RF emitter signals - Power On Arrival (PoA) and Time Difference of Arrival (TDoA). Other programs that can be developed are Port Scanner, Radio Monitoring, and Map Creation.

For further description regarding Vision API, please refer to the Vision API Programming Manual. It will be located in the Vision Tools folder after clicking the **Start** button and navigating through the following directories: **All Programs** > Anritsu > Vision Tools.

Appendix A — Simulator

A-1 Introduction

The Vision software suite provides a monitor Simulator program used to practice and demonstrate using Vision. Although the simulator does not understand and respond to all Monitor SCPI commands, it does respond to the complete sub-set of commands that Vision uses. You can run multiple active simulators on the same PC with each simulator representing a different monitor in a database. Each simulator can be started with a command line reference to a control file to set the sweep parameters, GPS location, installed options and other parameters. For example, activate a set of simulators and coordinate their responses to simulate a moving target.

A-2 Using the Vision Simulator Control Program

The Vision Simulator Control program provides a single screen interface. A user selected map is loaded from the Simulator program and displays a geo map as shown in [Figure A-1](#). This shows the location of the simulated monitors along with a series of locations that are used to simulate RF sources. These RF source locations can represent:

- Interference sources when working with Power of Arrival (PoA) or Time Difference of Arrival (TDoA).
- A series of locations when tracking a moving RF emitter.

Simulator Program Menu

The Simulator menu is shown in [Figure A-1](#).

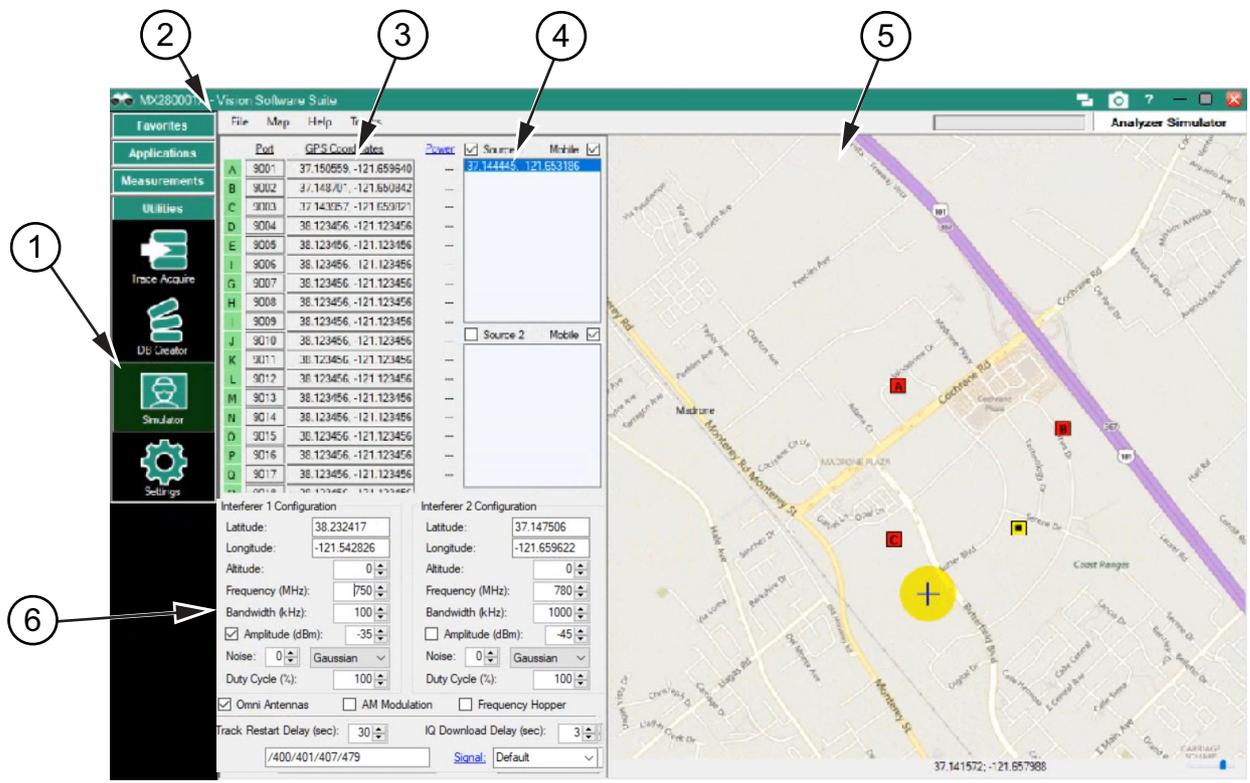


Figure A-1. Simulator User Interface

1. Simulator Menu Button	4. Source 1 and Source 2 Interferer Tracking
2. Menu Bar	5. Map Window
3. Port and GPS Coordinates	6. Interferer Settings

Figure A-1. Simulator User Interface

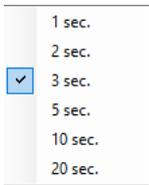
Simulator Menu Bar

The Simulator menu bar is shown in [Figure A-2](#) and described in [Table A-1](#).



Figure A-2. Simulator Menu Bar

Table A-1. Simulator Menu Bar Description

Menu	Description
File	<p>Open Configuration File: Open simulator files (*.sim), Tracking files (*.trx), and All files (*.*)</p> <p>Save Configuration File: Save file to user selected folder location.</p> <p>New Configuration File (Clear): Clears content of the Source 1 and Source 2 lists</p> <p>Exit: Exit the File menu.</p>
Map	<p>Load Map: Load a user selected map to the screen.</p> <p>Existing Maps: Load a map from an existing map folder.</p>
Help	<p>Help: See "Help Menu" on page 5-3.</p>
Tracking Points	<p>Clear Track List: Clear the track list.</p> <p>Import from file: Import from user selected folder for Tracking files (*.trx; *csv, *.txt).</p> <p>Sort Tracks: Sort tracks order from top to bottom or bottom to top.</p> <p>Step Through tracks: Steps through the tracks one at a time.</p> <p>Step Interval: Set step interval speed of each step to:</p> <div data-bbox="853 1297 1002 1482" data-label="Image">  </div>

Load the Map File Into the Simulator

When using the Simulator Program, click "[Map](#)" from the Simulator menu bar. Either load an existing map or load a map from an online map source. To load the coordinates, see "[Enter Map Edge Coordinates](#)" on [page A-5](#).

GPS Coordinates

The simulator GPS coordinate section provides the input/readout fields and power of each monitor as shown in Figure A-3.

	Port	GPS Coordinates		Power
A	9001	38.2402,	-121.5703	-106.0
B	9002	38.2405,	-121.5645	-106.6
C	9003	38.2401,	-121.5583	-103.0
D	9004	38.2403,	-121.5524	-108.6
E	9005	38.2371,	-121.5673	-101.2
F	9006	38.2373,	-121.5615	-104.5
G	9007	38.2372,	-121.5553	-107.2
H	9008	38.2343,	-121.5705	-104.9
I	9009	38.2341,	-121.5643	-105.4
J	9010	38.2344,	-121.5584	-102.1
K	9011	38.2342,	-121.5525	-103.8
L	9012	38.2312,	-121.5673	-99.70
M	9013	38.2311,	-121.5615	-102.8
N	9014	38.2313,	-121.5553	-103.4
O	9015	38.2281,	-121.5703	-107.2
P	9016	38.2283,	-121.5644	-104.9
Q	9017	38.2282,	-121.5583	-101.9
R	9018	38.2281,	-121.5525	-99.70
S	9019	38.2252,	-121.5673	-102.1
T	9020	38.2253,	-121.5615	-102.2
U	9021	38.2251,	-121.5554	-102.2
V	9022	38.2221,	-121.5700	-99.30
W	9023	38.2223,	-121.5640	-106.4
X	9024	38.2221,	-121.5580	-104.6

- | | |
|---------------------------|-----------------|
| 1. Slot ID | 4. Power Column |
| 2. Port Column | 5. Busy State |
| 3. GPS Coordinates Column | |

Figure A-3. Spectrum Analyzer Port GPS Coordinates

Slot ID: The monitors are named A-X with green labels along the left edge. Click a label and the label changes color. This deactivates the monitor. Click again to reactivate the monitor in the simulator.

Port Column: This column lists the spectrum analyzer ports. Maximum number that can be added to the list is 24. Click on the Port number for one of the simulators and note that the background color changes color. This marks it as Busy.

GPS Coordinates Column: This column lists the GPS coordinates of the spectrum analyzer listed in the Port Column. To load the GPS coordinates, see [“Enter Map Edge Coordinates” on page A-5](#).

Power Column: Toggle the Power button to start/ stop the simulator Source 1 and Source 2 activity. Press the power label will sweep each spectrum analyzer frequency indicated in the Interferer 1 Configuration. The power of the interferer 1 frequency is then displayed for each spectrum analyzer. Toggle the Start/Stop Button to Start will initiate the sweep again.

Busy State: Left click a spectrum analyzer activates a busy status flag. When it is set, the spectrum analyzer shows 'BUSY' prominently on the Web GUI. This is a User setting that can be used or ignored.

Right-Click to Activate/Deactivate the monitor – This setting will turn off the spectrum analyzer or toggle to turn back on.

Position the mouse pointer over a port will display the monitors configuration as shown below.

```
Left-click to toggle Busy State. Right-click to Activate/Deactivate the probe.  
Start Frequency: 2.400 GHz  
Stop Frequency: 2.480 GHz  
Center Frequency: 2.440 GHz  
Frequency Span: 80.000 MHz  
Trace Mode: NORM  
IQ Capture Bandwidth: 133 khz  
IQ Capture Bit-depth: 16  
IQ Capture Length: 5000 ms
```

Spectrum Analyzer Communication

Spectrum Analyzers normally communicate on Ethernet port 9001. This is the port that the simulator uses by default. You can only have one program using a port at a time on a single PC, so we set each simulator to use a different port, 9001 through 9024.

Simulator Entries

Below the tool-bar is a list of simulators. Click the Source check box to activate a simulator. Uncheck the check box to deactivate the simulator. Simulator Control supports twenty-four simulators.

GPS Coordinates

Next to each port number are the GPS coordinates that each simulator will respond with. You can copy and paste numeric values into these boxes, or edit with the keyboard. You can also place the mouse over the GPS coordinates and the roll the mouse wheel up and down to shift the Latitude North or South. Use Ctrl-mouse wheel to shift east and west.

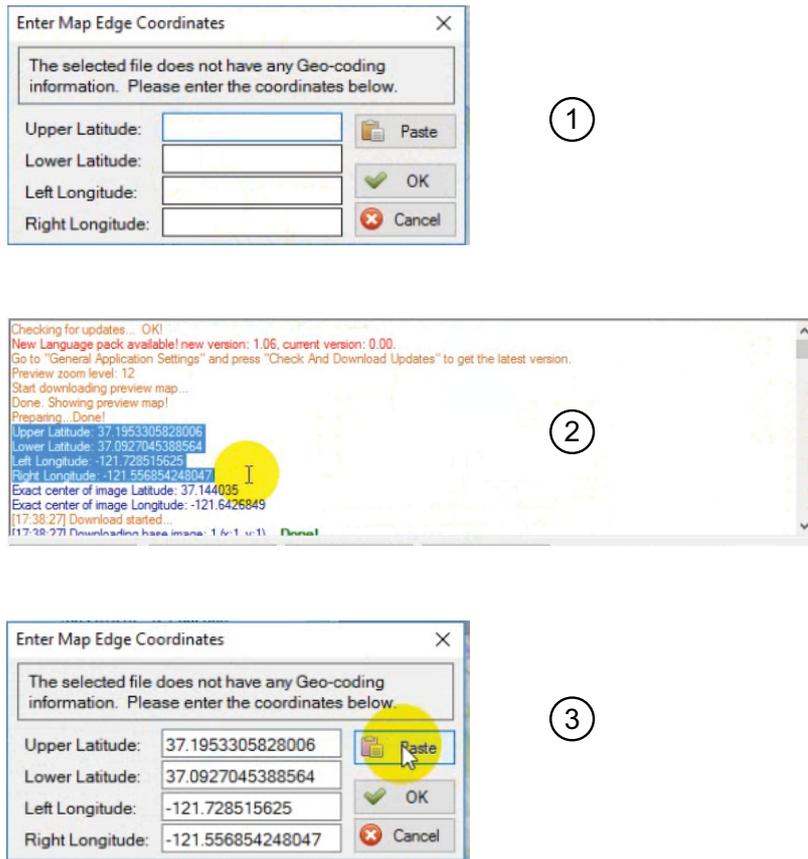
Power Levels

Displays the simulator signal strength readout.

Enter Map Edge Coordinates

After loading the map file into the program, a dialog box appears to Enter Map Edge Coordinates as shown in [Figure A-4](#). Initially, the map is not pointed to the exact coordinate location. To enter the coordinates:

1. Go to the MapPuzzle Download status box and scroll up to the beginning of the download process.
2. Copy the Latitude and Longitude coordinates in one sweep of the mouse pointer.
3. Go back to the Enter Map Edge Coordinates dialog box and click paste. The copied coordinates will paste into the coordinate fields.
4. Click OK in the Enter Map Edge Coordinates dialog to launch the map with the designated coordinates in the Simulator Program as shown in [Figure A-5](#).



- | | |
|--------------------------------------|----------------------|
| 1. Enter Map Edge Coordinates Dialog | 3. Paste Coordinates |
| 2. Copy Coordinates | |

Figure A-4. Enter Map Edge Coordinates

Map Features

Once the map is loaded:

1. Zoom and move the map by a click-hold of the mouse to drag the map into position.
2. Roll the mouse wheel to zoom the map in and out.
3. Click on the map to place markers as shown in [Figure A-5](#) on page A-6.

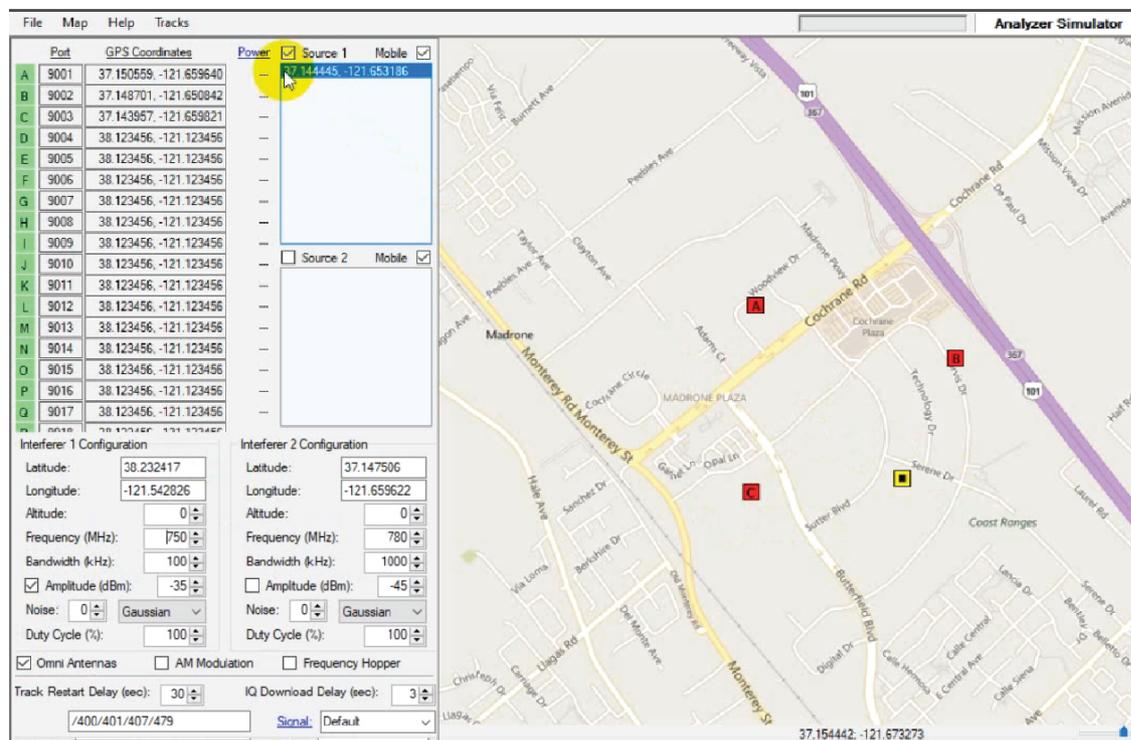


Figure A-5. Map File loaded Into the Simulator Program

4. Source Position

Indicates the current position of the tracked signal. The “[Step Interval](#)” setting determines the speed of each step through the path. Click on a track point on the map to change and set the current interferer location. The tracking point list corresponds to the changed tracking point that is set.

Simulator Monitors and Emitter Tracking.

Features of the map control include:

- Zoom and pan control with the mouse.
- Zoom control with the slider in the lower right-hand corner of the map.
- Right-click the map to view the context menu.
- Move the mouse around and view the latitude and longitude coordinates are displayed at the bottom edge of the map.

The simulator monitors and emitters displayed on the GUI map provide a visual tracking of the signal source emitters and monitors. Red markers are simulator monitor positions. Yellow markers are RF emitters. A “[Interferer Configuration](#)” in the middle of a marker represents the current active emitter as described above.

Emitter Position and Control

Activate an emitter on the map by either clicking its marker on the map, or by clicking the marker coordinates that are listed on the right side of the screen. Each time a different emitter is selected, the markers are redrawn to indicate which one is active.

Add or Remove an Emitter

Add an emitter to the list by double-clicking on the map. Remove an emitter from the list by clicking the emitter in the list and click the 'Delete' key. You cannot reposition an emitter, except to delete and add a new one in the desired location.

Sorting the Displayed Emitters

You can change the order of the emitters in the list. Click one and press the keypad Ctrl-Up or Ctrl-Down. This moves the selected item up or down in the list. Click ["Sort Tracks"](#) to resort the entire list so that each emitter follows the one closest to it.

When sorting, the first emitter does not change positions. The closest to the first geographically is moved to the second position, the next closest to the second item is then moved to the third position and so forth. This makes it possible to add and delete emitters along a desired path and then order them at any time.

Saving a List of Emitters

Once you have created a list of emitters, you will want to save the list to a file. This is done with the 'Save' button in the toolbar. The saved list can be reloaded using the 'Load' button.

When saving, the entire configuration is saved, including the list of simulated monitors with their sweep configuration, GPS coordinates, the interferer location and power, and other program settings. All parameter settings in the panel on the left side of the program window is saved and reloaded.

Interferer Configuration

The Simulator's Interferer Configuration is a User defined interface for setting the interferer 1 and interferer 2 parameters as shown in [Figure A-6](#).

Figure A-6. Interferer Configuration and Spectrum Analyzer Settings

Latitude and Longitude: The Interferer's Latitude and Longitude boxes are overwritten each time you click an emitter on the map. Edit the coordinates and click Send Setup to locate the interferer somewhere different than at a location in the emitter list.

Frequency (MHz): User defined Interferer signal frequency.

Bandwidth (kHz): User defined Interferer bandwidth.

Amplitude: Click the Amplitude Modulation check box to add extra noise to the interferer power level with each sweep, simulating a signal that is amplitude modulated.

Noise: Type or select a noise level. The noise types that are set from the pull-down menu are Gaussian or Square. The noise selection is used to inject noise into return data for both sweep traces and IQ data. At a value of 0, very small noise is injected. This is so that each return trace is not identical. Setting it all the way up to 3 will add so much noise that IQ cannot be used to do TDoA. Please note: With IQ data, the noise also increases with distance. So as an emitter moves further from the simulated monitors, the IQ data (and TDoA results) will get noisier until the signal is dropped and TDoA stops.

Duty Cycle (%): Set a duty cycle from 10 % to 100 %

Interferer Line Shape: Click Square or Gaussian deviation.

Omni Antennas: Checked assumes omni-directional antennas. When not checked, the interference power depends on the direction between the source and the spectrum analyzer.

Amplitude Modulation: Modulate the amplitude of the interference signal.

Frequency Modulation: Add a frequency hopping signal.

Spectrum Analyzer Settings

Start Frequency: The Simulator sweep default start frequency.

Stop Frequency: The Simulator sweep default stop frequency.

Options: Displays the options used in a real spectrum analyzer scenario.

Track Restart Delay (sec): Set the restart tracking time from 0 to 600 seconds.

IQ Download Delay (sec): To better simulate the return of IQ data, type or select the delay 1 to 60 seconds.

Signal Editor: Click the Signal Editor label displays the Trace View window. See [Section "Signal Editor" on page A-9](#).

Signal Editor

The Signal Editor provides a trace view of the monitors background sweep as shown in [Figure A-7](#). The Monitor Simulator always uses the same background sweep trace for all monitors, and superimposes the two interferer signals. The signal editor provides the tools to graphically edit the background signal. Signals are save, recalled, and stored in the simulator configuration file. This is useful for testing and tracking, where you need to insert a spurious signal and see how it is handled.

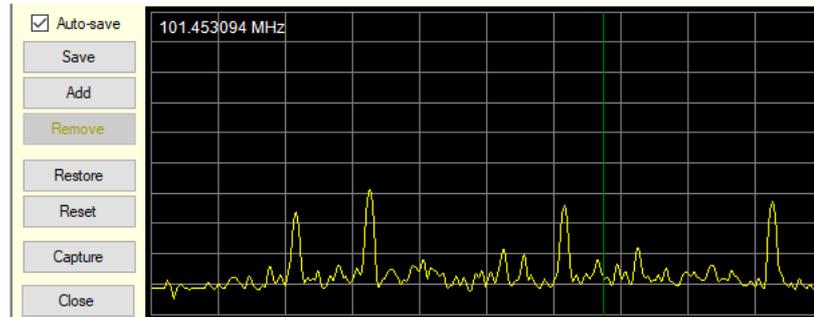


Figure A-7. Signal Editor Trace Viewer

Auto Save: Check automatically saves the edited trace internally.

Save: Save edited trace internally and start using.

Add: Add current trace to signal list.

Remove: Remove the current trace from the list.

Restore: Restores to previous values.

Reset: Reset to factory default.

Capture: Capture trace from spectrum analyzer.

Close: Close the Signal Editor.

Signal Editor Trace Display

The Signal Editor trace display shown in [Figure A-7](#) provides some signal information. When the mouse pointer is moved across the display, a green marker tracks the mouse pointer. Positioning the marker in the trace view display will show the frequency of the sweep at that point. The top left corner of the display provides the frequency at the peak region of the signal as shown. The bottom of the display shows the bandwidth edge frequencies and the center frequency of the sweep.

The User can edit the signal with the mouse. Right-click and drag the mouse to move the signal to the level of the mouse over the path. Roll the mouse wheel up or down to adjust amplitude at the current mouse coordinates.

Source 1, Source 2 Column

The simulator Source 1 and Source 2 column displays the coordinate location of the interferer signal. Two interferer can be monitored simultaneously. Either Source 1 or Source 2 can be enabled or disabled. Each Source will be set as stationary. When a coordinate within a source column is selected, the other source column darkens indicating other source column is the focus as shown in [Figure A-8](#).

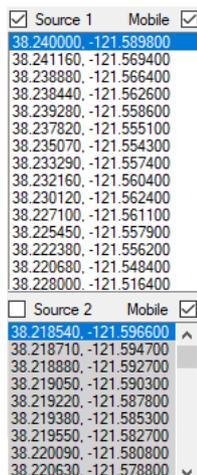


Figure A-8. Two Simultaneous Tracks

Source 1, Source 2: Click the Source 1 and/or Source 2 check box provides a simulated source interferer on the map. Uncheck removes the source from the map.

Mobile: Click the Mobile check box mobilizes the signal on the map. Uncheck keeps the signal stationary on the map.

Right-click a Source list displays the dialog box as shown in [Figure A-9](#).



Figure A-9. Tracks List Context Menu

Double Track Points: Doubles the tracking points to the simulated path. Continuing to click Double Track Points will continue to double the tracking points on the map display.

Half Track Points: Reduce by half the tracking points displayed. Continuing to click Half Track Points will reduce the remaining tracking points by half on the map display.

Smooth Track Points: Smoothing does a running average over the track points to make the line through them smoother. As a visual indicator, the corners of each track become rounded on the map.

Reorder (Sort) Track Points: Sorts the Track points.

Reverse Track Points: Reverses the direction of the displayed tracking points.

A-3 Build a Simulator Application

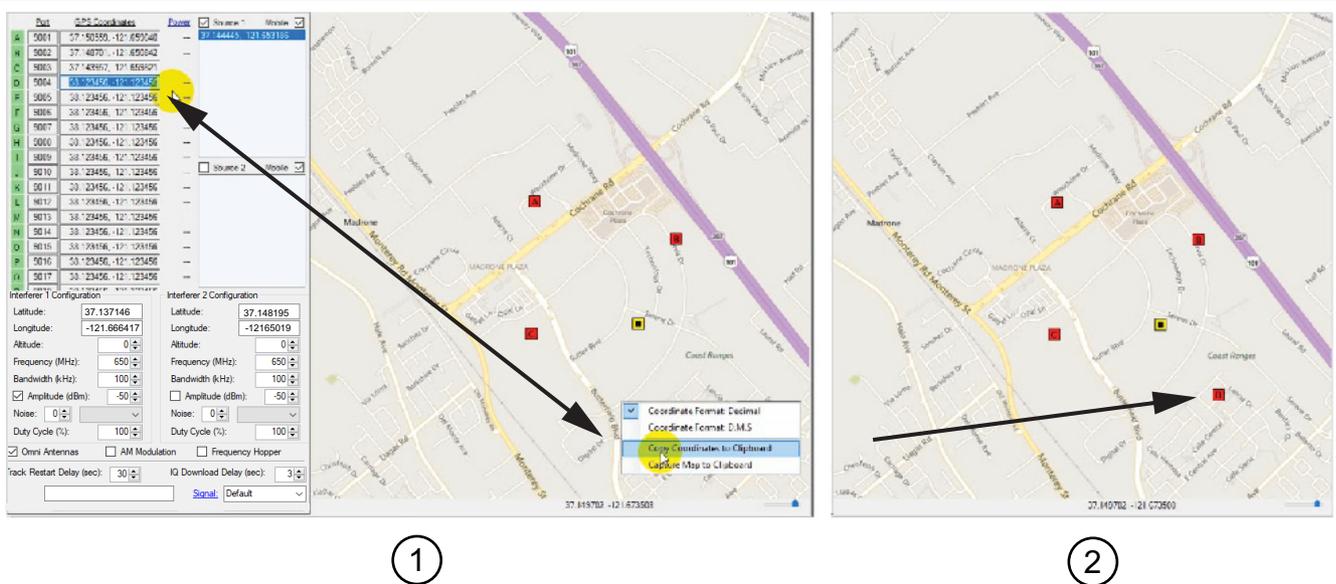
Figure A-10 shows a basic simulator screen that consists of three monitors and one interferer. The monitors are shown in red and the interferer is shown in yellow.

Add a Monitor

Add a monitor to the map. Refer to Figure A-10.

1. On the map, right-click a desired monitor location. A context menu is displayed.
2. Click Copy Coordinates to Clipboard.
3. In the GPS Coordinates column, slide the mouse over a latitude and as shown. This will perform the copy coordinate function.

Note that the coordinates for monitor ports 5 through 24 are positioned beyond the zoomed-in map and will not display.



1. Copy Monitor D Coordinates
2. Added Monitor D

Figure A-10. Add a Monitor

Monitor a Signal

Each monitor on the screen will produce a simulated measured signal. To display a signal to monitor, open the Port Scanner program from the Applications menu and add a signal as shown in Figure A-11.

1. Open the Port Scanner program from the Applications menu.
2. Click the Add button on the Port Scanner task bar to display the Add Channel dialog.
3. Type the port from the Simulator program that will display the signal. In the example below, type 127.0.0.1:9002.

- Click the Add button at the bottom of the “Add Channels” dialog to show the Hostname with its signal parameters. This will add port 9002 and it’s parameters to the display.

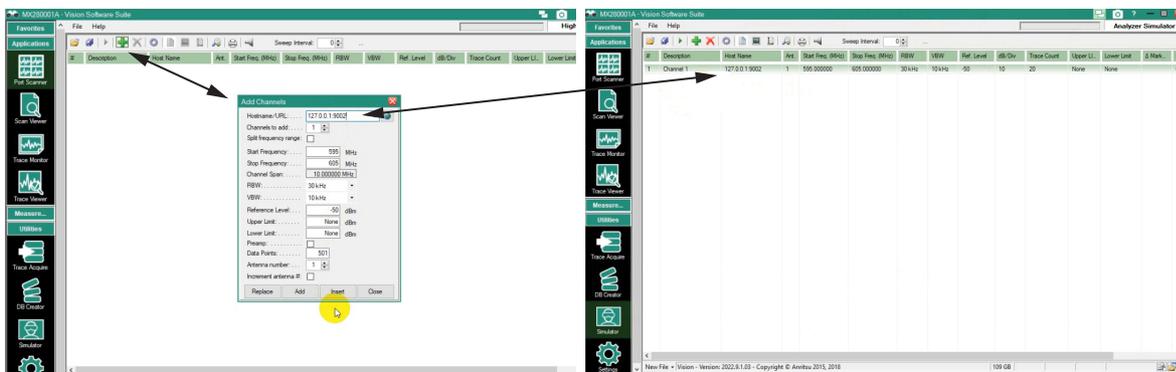
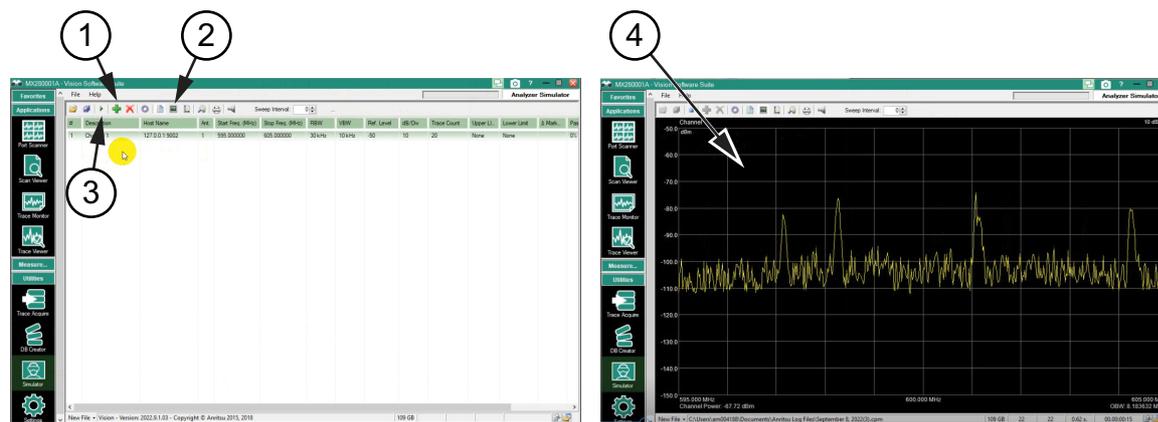


Figure A-11. Show Signal to Monitor

View Signal Display

View the selected signal from the Simulator.

- Press the Plus button to add.
- Press the View Signal button.
- Press the Run button. The signal will display as shown in [Figure A-12](#).

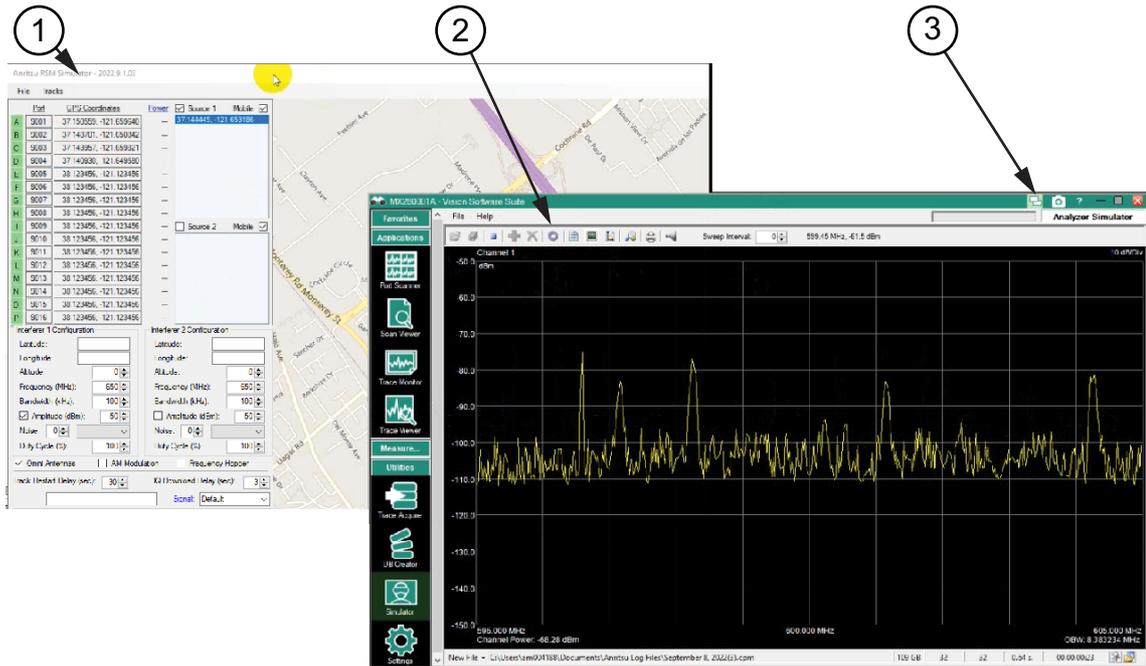


- Add Button
- Show Signal Button
- Play Button
- Displayed Simulator Signal on the Port Scanner Display

Figure A-12. Display Simulator Signal.

Pop-out Active Windows

Use the pop-out button to view the signal and navigate the Simulator control; at the same time. Press the pop-out button shown in **Figure A-13**. The two windows can be viewed simultaneously.



1. Simulator Window
2. Port Scanner Window
3. Pop-out Button

Figure A-13. Pop-out Window

View Interferer Signal

Show both the Simulator window and Port Scanner window to view the interferer signal as shown in [Figure A-14](#).

The screen below shows four red monitors: Port A, Port B, Port C, and Port D. The interferers are added by double-clicking a position on the map. Shown below, the active interferer is yellow with a black square in the middle. The Coordinates for this interferer are displayed in the Interferer 1 Configuration window and also in the Source 1 Window. The frequency is typed in as 601 MHz so it shows within the Port Scanner bandwidth display. Changing other Interferer 1 Configuration parameters will also be displayed on the Port Scanner window.

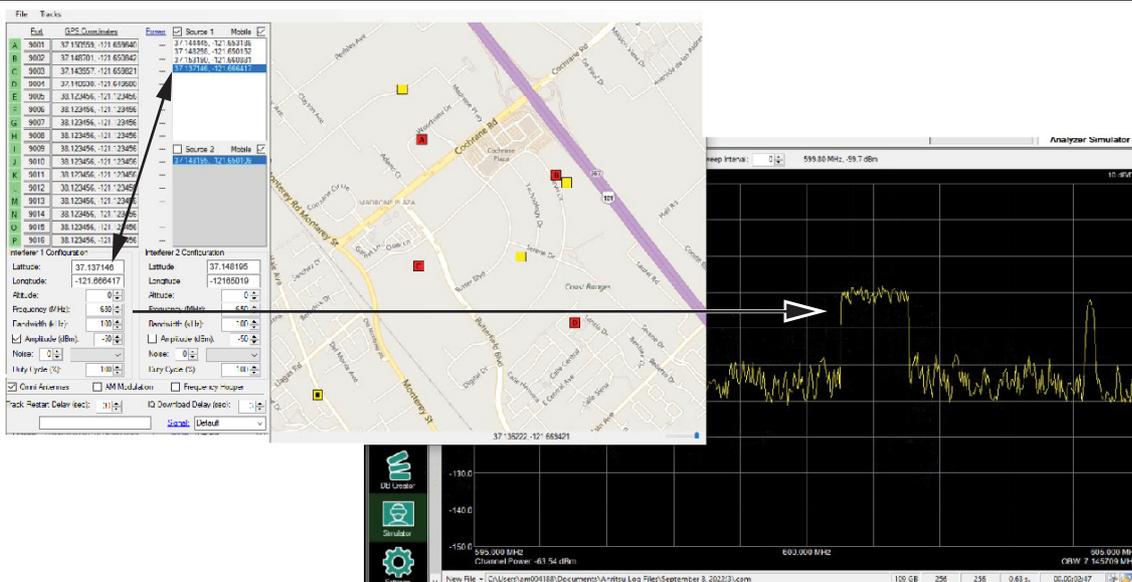


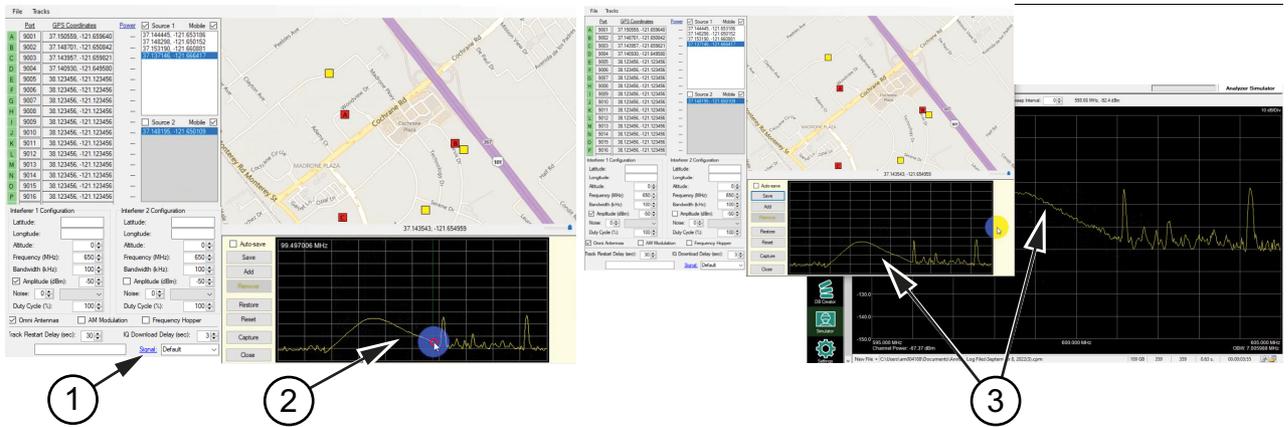
Figure A-14. View Simulator Interferer Signal

Draw a Signal

Use the Signal editing window to manually create a signal to display as shown in [Figure A-15](#).

1. Press the Signal button on the Simulator Program.
2. Click-hold to draw a signal as desired across the Simulator signal display to create a signal that will also display on the Port Scanner program display.

3. Continue to draw as much as desired and then press Save to create the signal in the Port Scanner display. Or check autosave will save each drawn signal.

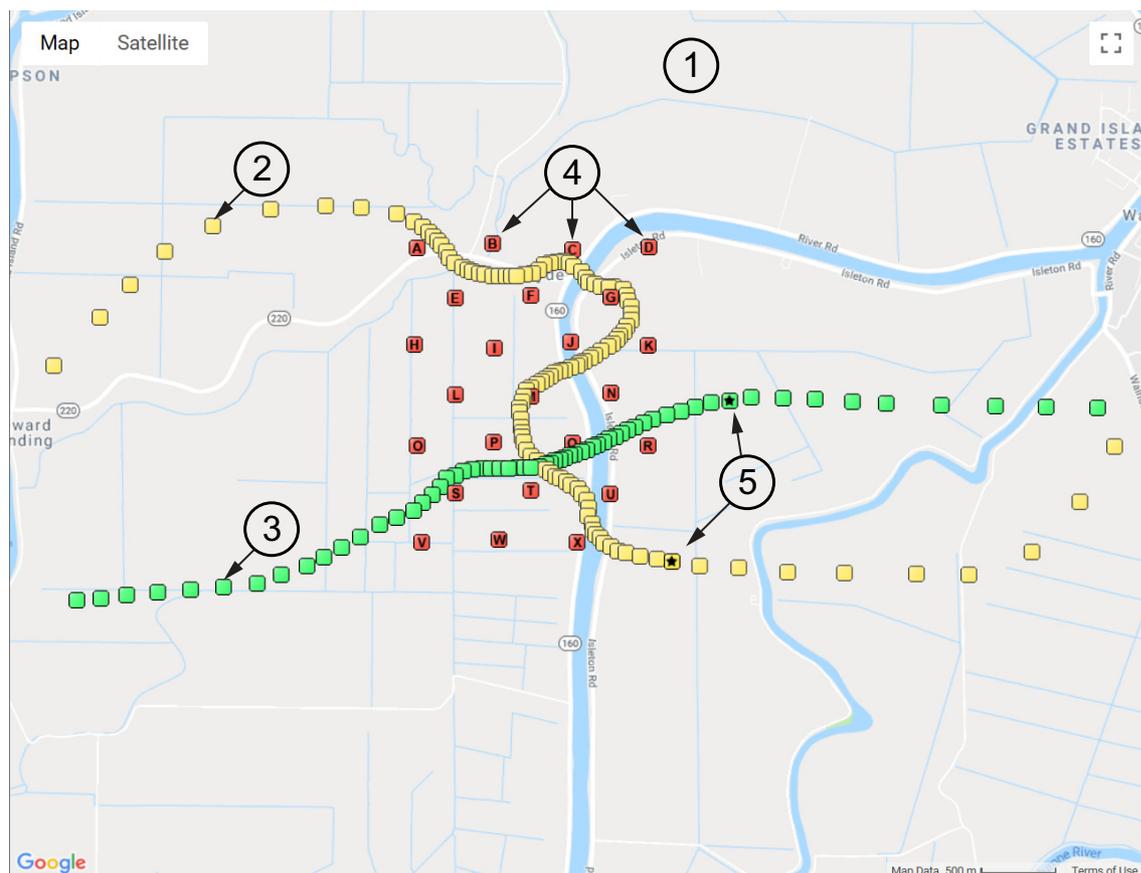


1. Signal Button
2. Draw a Signal
3. Drawn Signal and Port Scanner Signal Display

Figure A-15. Draw Signal

Track a Moving Target

The Simulator map display provides a moving interference signal over a geographical area. spectrum analyzers are positioned in the area to capture signal interference activity as it moves through the monitored zone as shown in [Figure A-16](#).



- | | |
|------------------|-----------------------------|
| 1. Map Display | 4. Spectrum Analyzer Probes |
| 2. Source 1 Path | 5. Source Position |
| 3. Source 2 Path | |

Figure A-16. Map Activity

Map Display: The map display is a user defined map that is applied to the GUI when “Load Map” or “Existing Maps” is clicked.

Source 1 Path: The yellow breadcrumb display simulates the path the interferer 1 signal.

Source 2 Path: The green breadcrumb display simulates the path the interferer 2 signal.

Spectrum Analyzer Probes: 24 spectrum analyzers can be positioned on the map as indicated. The letter of each probe position corresponds to the Port probe listed in the first column. With the mouse pointer over one of the simulator GPS coordinates, scroll the mouse wheel back and forth. This will adjust the GPS coordinates and move the on-map icon. Click the Control button while scrolling and see that the icon moves in the parallel direction.

Source Position: Indicates the current position of the tracked signal. The “[Step Interval](#)” setting determines the speed of each step through the path. Click on a track point on the map to change and set the current interferer location. The tracking point list corresponds to the changed tracking point that is set. Simulator Probes and Emitter Tracking.

Features of the map control include:

- Zoom and pan control with the mouse.
- Zoom control with the slider in the lower right-hand corner of the map.
- Right-click the map to view the context menu.
- Move the mouse around and view the latitude and longitude coordinates are displayed at the bottom edge of the map.

The simulator probes and emitters displayed on the GUI map provide a visual tracking of the signal source emitters and probes. Red markers are simulator probe positions. Yellow markers are RF emitters. A “[Interferer Configuration](#)” in the middle of a marker represents the current active emitter as described above.

Emitter Position and Control

Activate an emitter on the map by either clicking its marker on the map, or by clicking the marker coordinates that are listed on the right side of the screen. Each time a different emitter is selected, the markers are redrawn to indicate which one is active.

Add or Remove an Emitter

Add an emitter to the list by double-clicking on the map. Remove an emitter from the list by clicking the emitter in the list and click the ‘Delete’ key. You cannot reposition an emitter, except to delete and add a new one in the desired location.

Sorting the Displayed Emitters

You can change the order of the emitters in the list. Click one and press the keypad Ctrl-Up or Ctrl-Down. This moves the selected item up or down in the list. From the menu bar, press Tracks, then Sort Tracks to resort the entire list so that each emitter follows the one closest to it.

When sorting, the first emitter does not change positions. The closest to the first geographically is moved to the second position, the next closest to the second item is then moved to the third position and so forth. This makes it possible to add and delete emitters along a desired path and then order them at any time.

Saving a List of Emitters

Once you have created a list of emitters, you will want to save the list to a file. This is done with the ‘Save’ button in the toolbar. The saved list can be reloaded using the ‘Load’ button.

When saving, the entire configuration is saved, including the list of simulated probes with their sweep configuration, GPS coordinates, the interferer location and power, and other program settings. All parameter settings in the panel on the left side of the program window is saved and reloaded.

Appendix B — Load Maps

B-1 Introduction

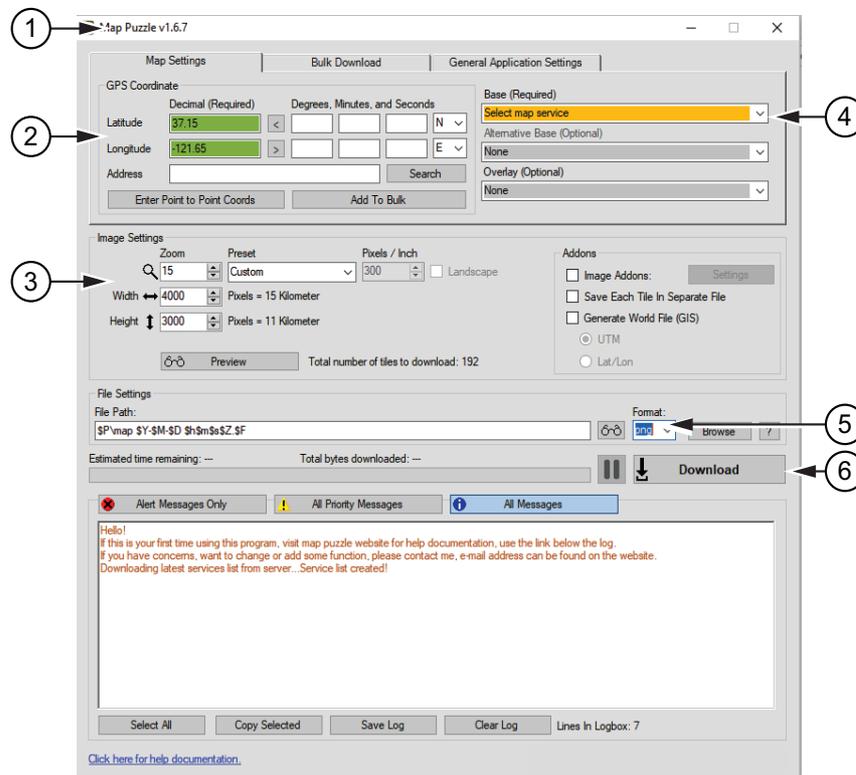
Maps geo-locate the spectral probes and display positions of interferer signals using Power of Arrival (PoA) and Time Distance of Arrival (TDOA) algorithms in the Vision applications.

Users may want to use their own mapping solutions. There are many Map sources available. This section provides an example of how to create picture maps using off-line map solutions.

B-2 Using MapPuzzle

MapPuzzle is a free program for Windows to download maps for Bing or other public mapping services. For more information not covered in this section using MapPuzzle, visit <http://www.mappuzzle.se/doc.htm>.

1. Install MapPuzzle onto your local drive.
2. Run the executable to load the MapPuzzle interface as shown in [Figure B-1](#). Maps are also supported in the Anritsu Simulator Program and the Anritsu TDOA Demo Application.



- | | |
|-------------------------|----------------|
| 1. MapPuzzle | 4. Map Service |
| 2. Coordinates settings | 5. Map Format |
| 3. Image Settings | 6. Download |

Figure B-1. MapPuzzle User Interface

Create a Map

Create a map using MapPuzzle.

1. Type the coordinates settings of the map location.
2. Type the Image Settings for the Zoom level, Width, and Height of the map as it will appear on the screen.
3. Click the map service section to show a list of map services to pick from.
4. From the list, click the desired format of the map. Selections include .jpg, .gif, .bmp, .png, and .tiff.
5. Click to preview to confirm the map is centered around the area to be Spectrum Analyzed as shown in [Figure B-2](#).

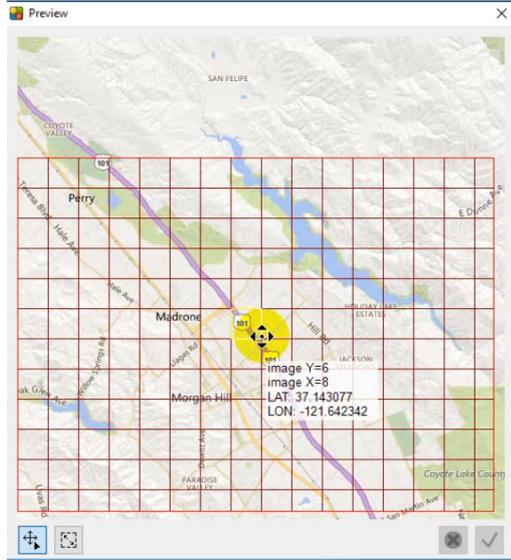


Figure B-2. Preview Map

6. Click Download to load the selections and view the map.
 - The map will take a short amount of time to download. The loading green-bar indicator and the amount of time remaining for the download process to complete is indicated by the MapPuzzle user interface as shown in [Figure B-3](#).

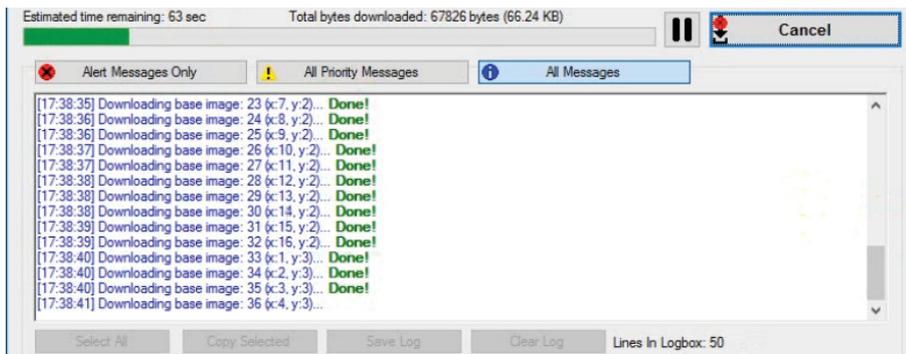


Figure B-3. Download Map In-Process

Once the download is complete, the map file is stored in the downloads folder as shown in [Figure B-4](#).

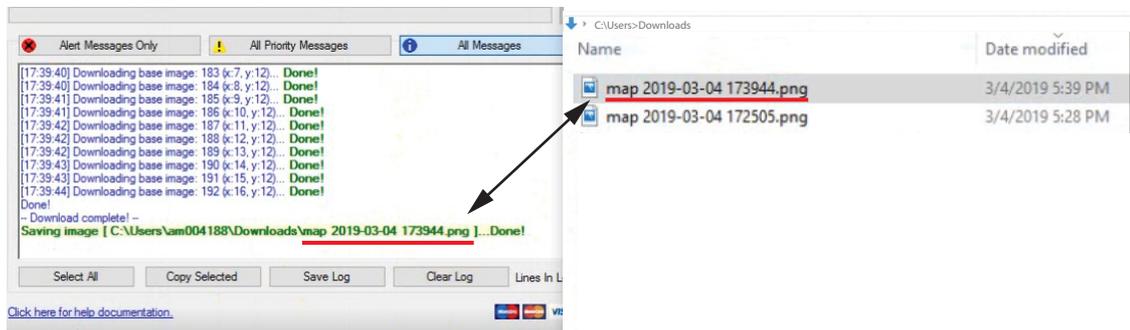


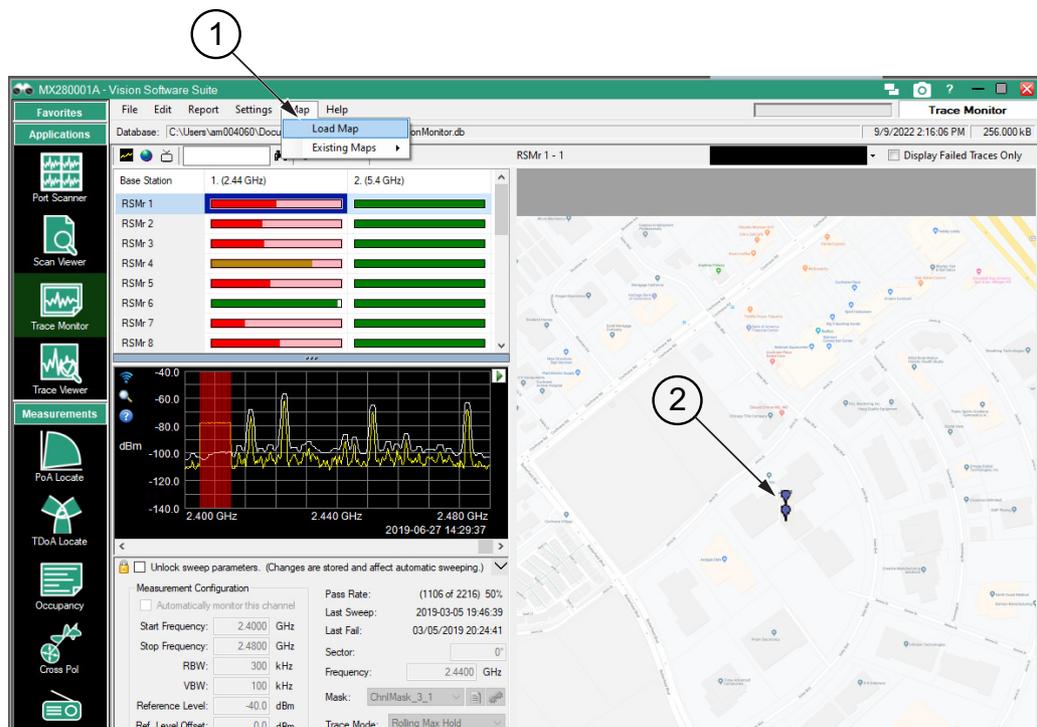
Figure B-4. Download Complete

B-3 Load the Map Into Trace Monitor

From the Vision Trace Monitor toolbar:

1. Click Map Source.
2. Click Load an Off-line Map as shown in [Figure B-5](#).
 - Load the off-line map from the Downloads folder.

To load the coordinates, see [“Enter Map Edge Coordinates” on page A-5](#).



1. Map Menu
2. Loaded Coordinates

Figure B-5. Vision Trace Monitor Map Source

Anritsu



 Anritsu utilizes recycled paper and environmentally conscious inks and toner.

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