RFVENCE RF Spectrum Data Logger for UHF Band Wireless Audio Devices User Guide

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RFVENCE RF Spectrum Data Logger for UHF Band Wireless Audio Devices

Specifications

- Product Name: Spectrum Recorder
- Usage: RF Spectrum Data Logger for UHF Band Wireless Audio Devices
- Connections:
  - 1 Ethernet / PoE RJ45 connection
  - 2 USB-A connection (for storage drive)
  - 3 USB-C (for 5V, 1A supply)
- Indicator LEDs:
  - Activity – Blinks once per second while operating
  - USB – Indicates file copying to USB drive
  - Ready – Indicates new files available for retrieval

Product Usage Instructions

Getting Started

1. For stand-alone operation, attach the included antenna to the Spectrum Recorder's RF input. For analyzing existing systems, connect to the system's output.
2. For network operation, connect the recorder to the LAN via a network cable. Power can be through PoE or using the 5V supply.
3. Power on the Spectrum Recorder. It will start scanning and recording immediately.

Operation

The Spectrum Recorder synchronizes its clock with an online server for timestamped CSV files every 10 minutes. If synchronization fails, files will have a simplified naming convention. Each CSV file is approximately 165 kB and contains 12000 lines of data in the format: Frequency (MHz) and Amplitude (dBm).

Retrieving Files

Using USB Drive

1. Insert a USB drive (formatted in FAT32, 2 GB min) into the USBA port. The device will copy recorded data automatically.
2. Data will be saved on the USB drive. Session files will be organized within a folder named 24 Hour Spectrum Files.

Via Network Connection
When connected to a LAN, obtain the device's IP address to access data files from another computer on the network.

Spectrum Recorder

RF Spectrum Data Logger for UHF Band Wireless Audio Devices

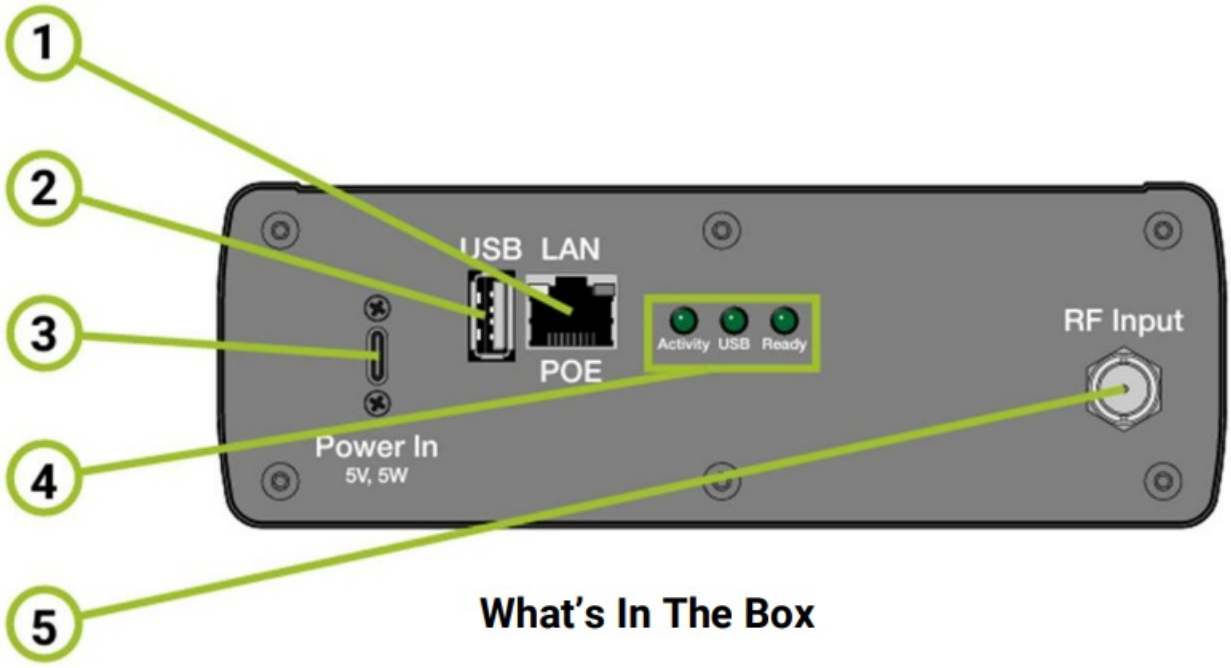
Rear Panel Features

1. Ethernet / PoE RJ45 connection.
2. USB-A connection (for storage drive).
3. USB-C (for 5V, 1A supply); used for power if PoE is not available. A 5-volt DC power supply is included.
4. Indicator LEDs

   Activity — Blinks once per second while the Spectrum Recorder is operating.

   USB — Indicates files are being copied to a storage drive plugged into the USB port.

   Ready — Indicates that one or more new files are available to retrieve.
5. RF input from an antenna or antenna distribution system. Maximum input level is -20 dBm (10 µW). A wideband whip antenna is included for standalone operation.



What's In The Box

- Spectrum Recorder
- UHF Wideband whip antenna
- 5V USB-C power supply with cable

Getting started

1. For stand-alone operation, such as a pre-build survey of the RF environment, attach the included antenna to the Spectrum Recorder's RF input. For analyzing the RF environment of an existing system, connect the recorder to the system's distribution output.
2. For network operation, connect the Spectrum Recorder through a network cable to the LAN. The Spectrum Recorder can be powered via the cable by Power Over Ethernet (PoE), but it is not necessary for network operation.
3. Connect power to the Spectrum Recorder, either with the included 5V supply (or equivalent) through the USB-C port, or with PoE connected to the RJ45 Ethernet port. The Spectrum Recorder will begin scanning and recording immediately. The Activity LED will blink once per second to indicate operation. When one or more CSV files are ready for retrieval, the Ready LED will come on.

Operation

The Spectrum Recorder is a dedicated device for continuous monitoring of the UHF frequency band primarily used for wireless audio transmission. Upon activation, it begins a new recording session and subsequently initiates a fresh session every 24 hours. The recorder scans the 400 to 700 MHz spectrum in 25 kHz increments every 20 seconds. To provide data analysis, it calculates and stores average values of the preceding 30 scans every 10 minutes as CSV files. Additionally, it generates daily reports containing average, maximum, and dynamic frequency activity data. These reports aid in identifying frequency usage patterns and potential interference sources. The device can store up to 99 recording sessions, after which it overwrites the oldest data.

The Spectrum Recorder attempts to synchronize its internal clock with an online time server when connected to a network. If successful, CSV filenames generated every 10 minutes will include a timestamp in the format nn_xxx_yyyymmdd_hhmmss.csv. If a network connection is unavailable or time synchronization fails, CSV files will be named in a simplified format: nn_xxx.csv.

In either case, the session number is nn and the file number is xxx. The date and time information is depicted in integers as yyyymmdd and hhmmss. See Descriptions of file types on page 3 for more details.

Each CSV file is approximately 165 kB in size and contains 12000 lines of data per the standard format used in wireless audio.

- **The first column is ff.fff:** The frequency in MHz
- **The second column is vv.v:** The amplitude in dBm.

Retrieving files

Using USB drive (simplest method)

1. To transfer data from the Spectrum Recorder, insert a USB drive formatted in FAT32 with a minimum capacity of 2 GB into the USB- A port. The USB indicator will illuminate while the device automatically copies all recorded data to the drive. Ten-minute scan files will be saved directly in the root directory of the USB drive, while the

three daily session files will be organized within a folder named “24 Hour Spectrum Files.”

2. When the transfer is done, the LED will turn off and you may remove the drive.
3. The Spectrum Recorder will also have created a folder called Configuration. In it will be a log file, log.txt, that lists all the files copied to the drive by the Spectrum Recorder. Another file, version.txt, will contain the Spectrum Recorder’s vital information: firmware version, serial number, session number, number of files in the session, session span time, Media Access Control (MAC) address, Internet Protocol (IP) address, and the system time when the file dump occurred. The IP address and MAC address may be of use for other functions.

Via a Network Connection

When connected to a local network (LAN), the Spectrum Recorder typically obtains an IP address automatically from the network’s DHCP server, usually located in the router. To access the device’s data files from another computer on the same network, you will need this IP address.

- For reliable device identification, connect a USB storage drive to the Spectrum Recorder. The device will create a “Configuration” folder on the drive, containing a file named “version.txt”. This file provides essential information, including the Spectrum Recorder’s IP and MAC addresses.
- If your network allows it, you may be able to determine the Spectrum Recorder’s IP address by using its device name. This method requires network administrator permissions. Specific instructions for Windows and macOS systems are below:

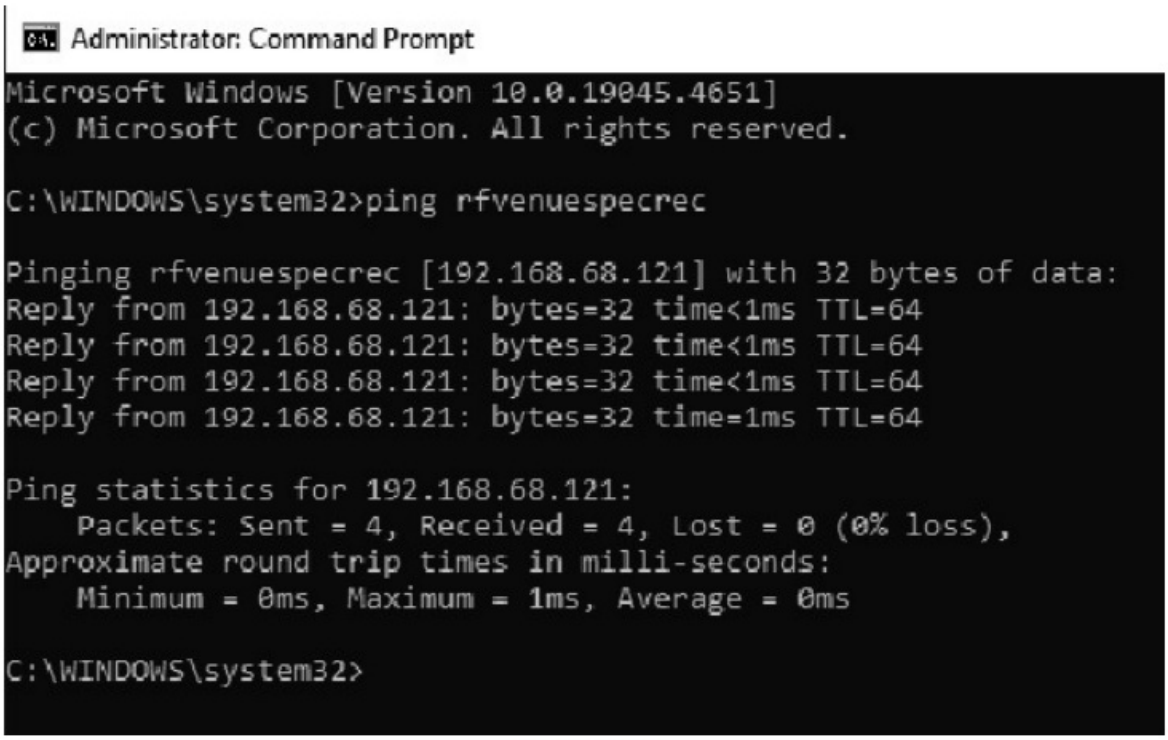


Figure 1

  - **Windows**

    Open a terminal app or command prompt and run it as an administrator. Type ping rfvenuespecrec and press Enter. If the Spectrum Recorder is connected to the network and has an IP address assigned, you will see this response on the terminal: See Figure 1

    If network permissions allow, pinging rfvenuespecrec will return the Spectrum Recorder’s IP Address

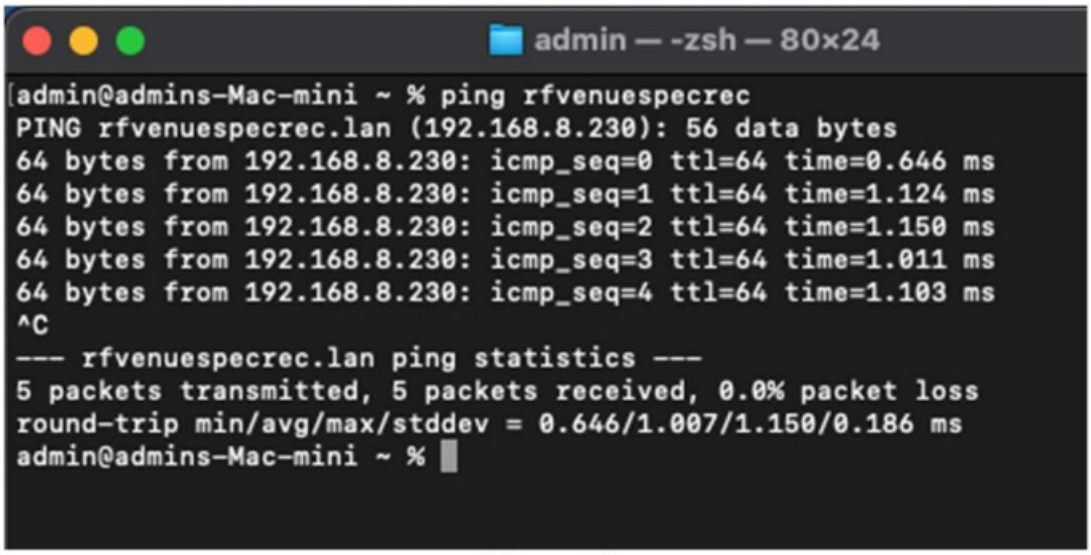


Figure 2

- **Mac**

  Open the Terminal app. Type ping rfvenuespecrec and press return. If the Spectrum Recorder is connected to the network and has an IP address assigned, you will see this response in the terminal. If the ping keeps running, press Contril-C to stop: See Figure 2

Accessing Files on Windows

- Open File Explorer, and in the address bar, type two backslashes, followed by the Spectrum Recorder's IP address.

  Example: \\192.168.68.121
- In the window, open the folder called share. Here you will find all the scan data file in CSV format. See Figure 3. You may copy the files and use them in frequency coordination or analysis tools such as Wireless System Builder (on the RF Venue web site), Wireless Workbench, Soundbase, and others.

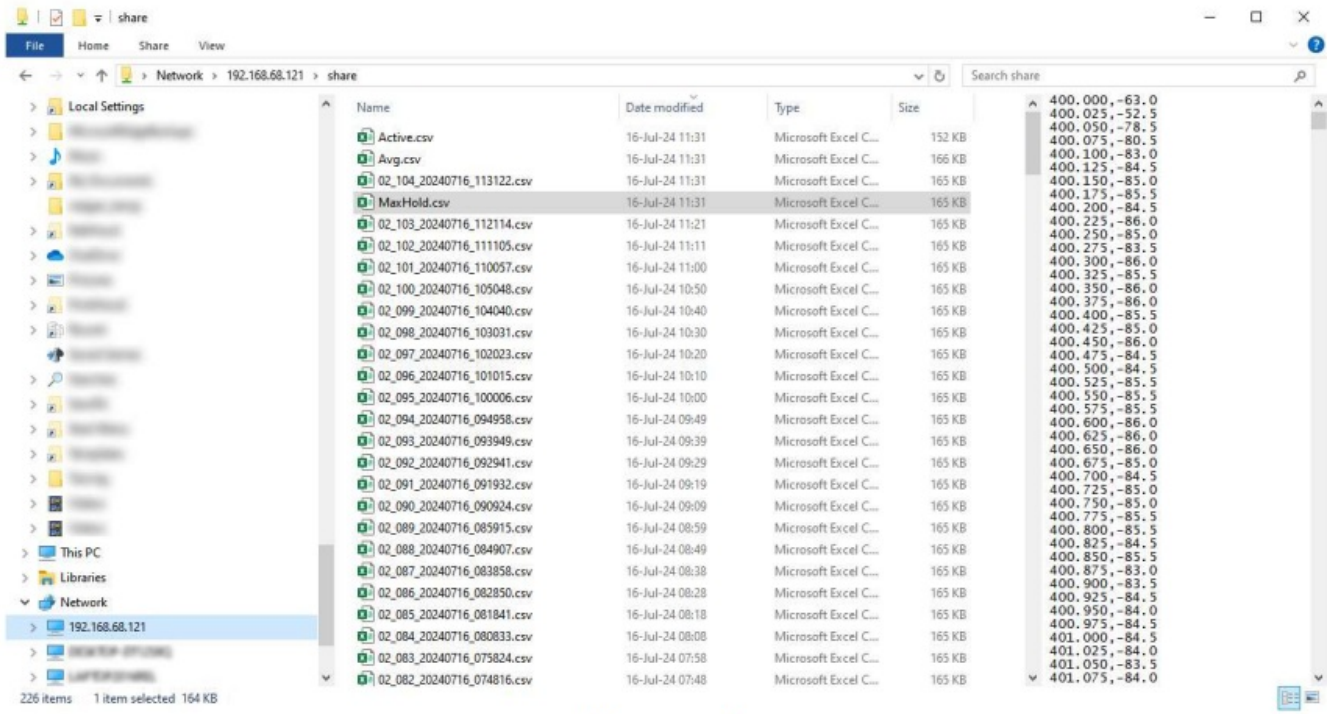


Figure 3

Accessing Files on Mac

- Press Command+K to connect to a network drive.
- In the address bar at the top of the Connect to Server window type smb:// followed by the Spectrum Recorder's IP address, then click Connect. (If asked connect as Guest) See Figure 4.
  Example: smb://192.168.12.248
- A Finder window will open, in that window open the folder called share. Here you will find all the scan data files in CSV format. You may copy the files and use them in frequency coordination or analysis tools such as Wireless System Builder (on the RF Venue web site), Wireless Workbench, Soundbase, and others.

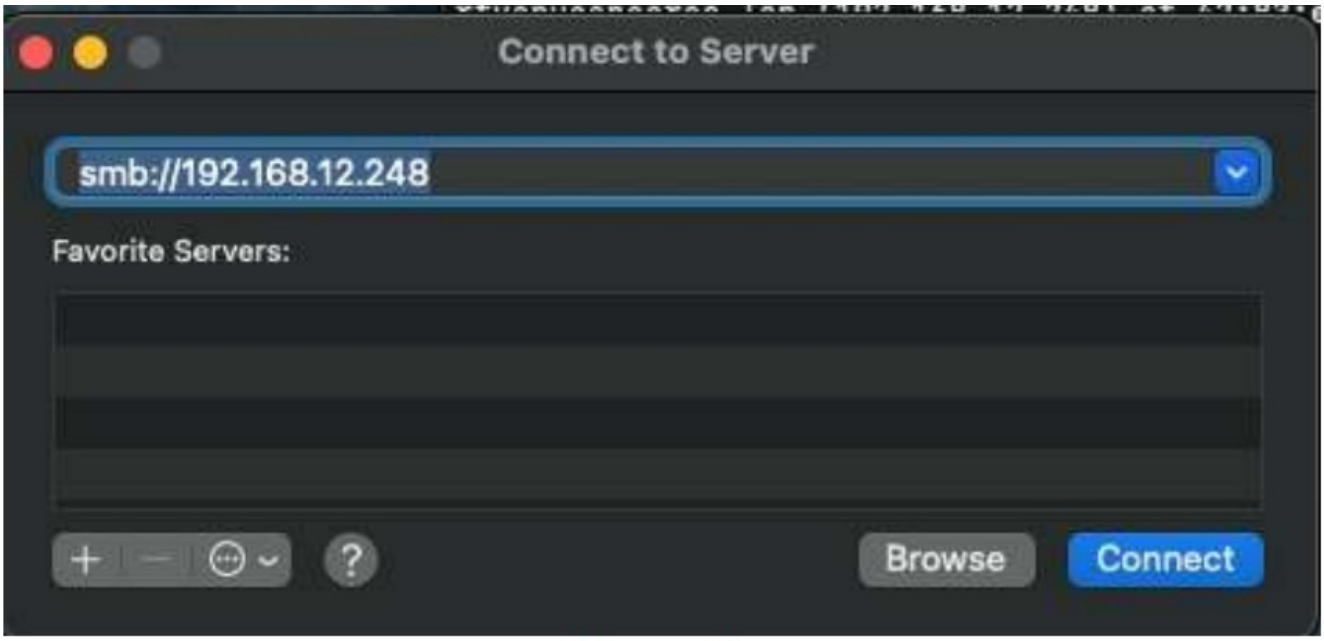


Figure 4

Description of the file types

Scan Files
The Spectrum Recorder completes a scan of 400 to 700 MHz every 20 seconds. Every 10 minutes, the system aggregates 30 scans conducted during this period and writes a CSV file. These three additional files are generated and updated from this data:

Average Capture File (Avg.csv):
This file represents the average frequency spectrum capture over the last 24 hours or since the device was turned on. It is updated every 10 minutes.

Maximum Hold Detection File (MaxHold.csv):
This file represents the highest values detected across all scans over the last 24 hours or since the device was turned on. It is updated every 10 minutes.

Active Frequencies File (Active.csv):
This file highlights the dynamically active frequencies by showing the differences between the maximum hold and the average values for each frequency step over the last 24 hours or since the device was turned on. It is updated every 10 minutes.

Accessing the Spectrum Recorder GUI

The Spectrum Recorder incorporates a built-in web server that offers a graphical user interface (GUI) accessible through a web browser.

To access this interface:

1. Determine the Spectrum Recorder's IP address within your network.
2. Open a web browser on a computer connected to the same network as the Spectrum Recorder.
3. Type the Spectrum Recorder's IP address into the browser's address bar and press Enter.
4. Allow a few moments for the GUI to load. The Spectrum Recorder's interface will appear in the browser window.

Configurable Parameters

- **Date and Time**: Text is not editable inline. To edit date and time, click on the calendar icon. From here, a selection box drops down where you can adjust date and time. When changes are made, the box will turn red. Click Update Device to apply the changes. Please note that changing the date or time begins a new session.
- **Set timezone automatically from network**: When checked, the Timezone box is automatically filled by the time zone detected on the local network and cannot be edited.
- **Timezone**: Click the box to choose a different time zone. Changes do not go into effect until you click Update Device.
- **Comments**: Comments exist only on the GUI. These are for identifying individual Spectrum Recorder devices.
- **Update Device**: This button applies changes made in any of the previous fields.

Purge Internal CSV Files

To erase all the accumulated CSV files, click Erase All Files…. Click OK to proceed with erasing the files.

Device Information (Read-Only)
This section contains information about the device which cannot be edited directly by the user.

1. **Current Session Number**: Indicates the current session number, from 1 to 99. Total CSV Files
2. **Available**: This is the total number of CSV files: all the 10-minute scans, as well as the Avg.csv, MaxHold.csv, and Active.csv files.
3. **Device Model Device SN:** The serial number of the Spectrum Recorder.
4. **Firmware Version**: The current firmware version in the Spectrum Recorder.
5. **IP Address Local** / **Internet**: Lists the two IP addresses held by the device, both local and Internet.

Determining the MAC address of the Spectrum Recorder

- The most reliable way to discover the Spectrum Recorder’s MAC address is by viewing the version.txt file that

the device writes onto a USB storage drive, as described under Retrieving files.

- If the network admin allows discovery of MAC address, you may use the Terminal or Command Line app. Use the arp command to list the devices with their IP addresses and MAC addresses.
- If you have multiple Spectrum Recorder devices on the same network, you will need to know their MAC addresses. This will allow your network administrator to assign them separate hostnames the default is in the Devices settings of the network router.

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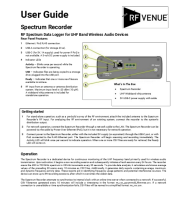
FAQ'S

Q: How do I know when new files are available for retrieval?
A: The Ready LED indicator will illuminate when new files are ready to be retrieved.

Q: What is the size of each CSV file?
A: Each CSV file is approximately 165 kB in size and contains 12000 lines of data.

Documents / Resources

	RFVENCE RF Spectrum Data Logger for UHF Band Wireless Audio Devices [pdf] User Guide RF Spectrum Data Logger for UHF Band Wireless Audio Devices, RF Spectrum Data Logger for UHF Band Wireless Audio, Devices, Data Logger for UHF Band Wireless Audio Devices, UHF Band Wireless Audio Devices, Wireless Audio Devices, Audio Devices, Devices

References

- The Best Wireless Sound Systems for Reliable Performance | RF Venue
- User Manual