

Unbounded Labs™ Protocol Analyzer Manual

Installation

Two components are required to install the Protocol Analyzer software, the main program and the Wireshark plugin.

To install the Protocol Analyzer software and Analyzer plugin:

1. Make sure you have Wireshark installed.
2. Double-click "**Protocol Analyzer Setup.exe**".
3. Follow the instructions to complete the setup.
4. If you update Wireshark to a newer version, you will need to run this installer again to reinstall the plugin.

To configure the Analyzer plugin for first use:

1. Start Wireshark, or restart it if it was already running.
2. In order for the main Protocol Analyzer program to communicate with Wireshark, the Analyzer must be assigned to a **DLT** number in the **DLT_USER** table. This table can be found in Wireshark by going to **Edit > Preferences**.
3. In the window that opens, expand the **Protocols** tree on the left side, and scroll down to find **DLT_USER**.
4. Click **DLT_USER**, and then click the **Edit...** button next to "Encapsulations Table".
5. Click the "+" button at the bottom of the Window. This will add a new user-defined encapsulation.
6. Set the **DLT** field to your desired **DLT** number. The Protocol Analyzer program uses 147 by default. If you don't know what this is already, just enter **147**.
7. Set the **Payload Protocol** field to "lora". If Wireshark cannot find the plugin, it may not be installed in the correct location, or Wireshark may need to be restarted.
8. Click **Ok**. The plugin should now be installed correctly.

Basic Usage

1. After connecting an **Unbounded Labs™ 8-Channel RF Concentrator** to your computer, open the Protocol Analyzer. All connected **Concentrators** should be automatically detected, and will be connected automatically.
2. To begin a capture session listening on the default channels, click the **Start Capture** button. This will open Wireshark and tell the **Concentrator** to start listening.
3. Once the **Concentrator** finishes starting its radio, you should now be able to capture and WAN uplink traffic on the default channels, which are the first 8 channels in the US 915MHz band, or the required channels in the European 868MHz Band.

Reference

Concentrator

Connection

When the **Protocol Analyzer** is started it will attempt automatically connect to all **Concentrators** that are plugged into your computer. For each connected **Concentrator**, a tab labeled “COMX” will appear, where *X* is some positive number corresponding to the concentrator’s serial port. To disconnect from any concentrator, click the **Disconnect** button on that concentrator’s **Connection** tab. Only concentrators with an active connection will be used in the capture.

The **Rescan Ports** button is useful if you forget to connect your **Concentrator** prior to starting the Protocol Analyzer, as it will scan again for **Concentrators** to connect to. However, due to how Windows handles serial ports, it is not recommended to disconnect a device while the Protocol Analyzer program is still running, as the corresponding serial port may stay around, and you will see error messages when the Protocol Analyzer tries to automatically connect to these ports.

Configuration

To change an Concentrator’s settings, click on the **Preferences** tab.

The **Preferences** tab is divided into the **RF Chain** settings and the **IF Chain** settings.

The **RF Chains** correspond to the two physical radios that are present in the **Concentrator**. Each **IF Chain** corresponds to a physical listener that can be attached to either of the **RF Chains**. For each **RF Chain**, a **Center Frequency** is specified, and each **IF Chain** listens on a frequency offset from that **Center Frequency** by some **Offset Frequency** within ± 400 kHz. For example, if **RF Chain 0** has a center frequency of 900000000 Hz, and **IF Chain 1 (IF1)** is attached to it and has an **Offset Frequency** of 330000 Hz, then **IF1** is listening on 903300000 Hz (903.3 MHz).

Each **IF Chain** listener listens on a bandwidth of 125kHz, and can only receive packets sent on that frequency which are not spectrally inverted. This means that downlinks cannot be heard, as they are sent from the gateway to end-devices inverted.

After modifying the settings, to send the new settings to the **Concentrator**, click the **Set on Device** button.

Settings can be saved and loaded as easily readable JSON files using the **Save To File...** and **Load From File...** buttons.

The **Set as Device Default** button will save the current settings to the **Concentrator**’s non-volatile memory, allowing the settings to persist even when the device is reset.

The **Reset to Factory Defaults** button will reset the device’s settings to the defaults.

Wireshark

Wireshark is a very flexible piece of software, and supports many options for filtering, color-coding, and inspecting captures. All of these features are available when capturing from the **Protocol Analyzer**. The Wireshark documentation is available at wireshark.org/docs.

Configuration

The two configurable options for the Protocol Analyzer capture session are the **WAN** checkbox and the **DLT** number.

The **WAN** checkbox is located in the **Connection** tab for each **Concentrator**, and when checked, the Analyzer plugin will attempt to dissect the payload of each RF packet received as a WAN packet. This configuration is per-**Concentrator**, and will be saved with the rest of the concentrator's configuration if you save the configuration to a file.

The **DLT** number can be set to a different number to match the **USER_DLT** table in Wireshark. If you do not use any other user-defined protocols in Wireshark, the default of 147 should be fine.