frontline **SODERA**™
WIDEBAND *BLUETOOTH* ® PROTOCOL ANALYZER

Quick Start Guide

Computer System Requirements

Supported Systems
- Operating System: Windows 10 and 11
- USB:USB 2.0 and later

Minimum Requirements
- Processor: Core i5 at 2.7 GHz
- RAM: 4 GB
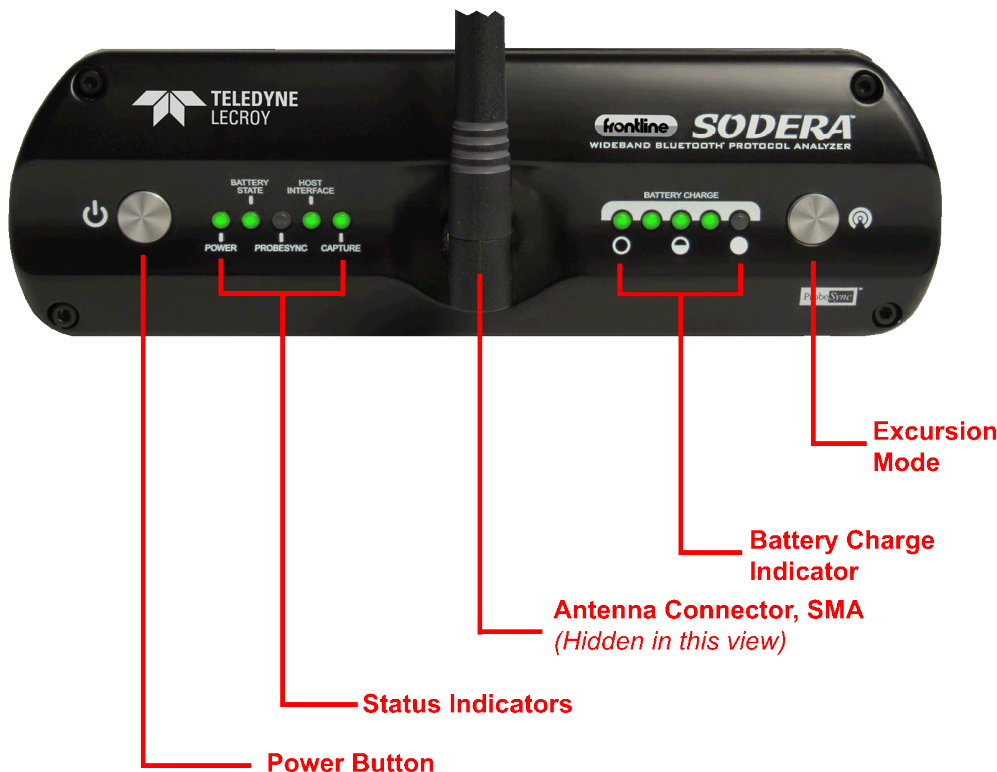- Free Hard Disk Space on C: drive: 20 GB

Install Software

- From Download: Download the latest Frontline installer from FTE. https://fte.com/products/default.aspx. Once downloaded, double-click the installer and follow the directions.

  When the installation is complete pin the Wireless Protocol Suite icon to your taskbar.

1. Front Panel Controls

The Teledyne LeCroy Sodera™ front panel is shown below. The panel provides controls to power up and shut down the Frontline Sodera hardware, and it provides indicators to show the power, battery, and capture status.

Excursion Mode

Battery Charge Indicator

Antenna Connector, SMA
(Hidden in this view)

Status Indicators

Power Button

Sodera Front Panel Controls and Indicators

Power On/Off Button: Press and hold the button for at least 1/2 second, and then release the button to power on or power off the system.

Pressing and holding the button for at least five seconds will initiate an **emergency shut down** sequence.

Status Indicators: Colored LEDs show the status of power and capture.

Table 1 - Sodera Front Panel Status Indicators

Indicator	Color	State	Status Indicated
Power	None	Off	Unit is powered off
	Green	Constant	Unit is switched on
	Red	Blinking	Unit is approaching its maximum thermal load and should be shut down.
		Constant	Unit has been automatically disabled due to thermal overload.
	Amber	Constant	Unit is powering down.
Battery State	None	Off	No battery present
	Green	Constant	Battery present and is at normal operating voltage
		Slow Flash	Battery charging
	Amber	Fast Flash	Battery fault
Host Interface	None	Off	No host interface is connected.
	Green	Constant	Host interface is connected.
	Amber	Constant	Internal error
Capture	None	Off	Unit is not actively capturing data
	Green	Constant	Unit is capturing data
	Red	Constant	Unit has engaged RF overload protection; the RF signal is too strong.

Antenna SMA Connector: Antenna attaching point.

Battery Charge : The following table shows the charge state of the installed battery. When the battery is not installed, all LEDs are off except when the unit is in the process of powering up. In that case they repeatedly light up in sequence.

Table 2 - Sodera Battery Charge State
LED Indicators

Indicator LEDs	Charge Status
🟢🟢🟢🟢🟢	Greater than 80%
🟢🟢🟢🟢⚫	Between 60 and 80%
🟢🟢🟢⚫⚫	Between 40 and 60%

Table 2 - Sodera Battery Charge State LED Indicators(Continued)

Indicator LEDs	Charge Status
🟢🟢⚫⚫⚫	Between 20 and 40%
🟢⚫⚫⚫⚫	Less than 20%
⚫⚫⚫⚫⚫	Not Active

Excursion Mode: When configured for Excursion mode, pressing this button will begin data capture—the same as the **Record/Recording** button on the Sodera Window DatasourceToolbar. The **Excursion Mode** button is inactive when Sodera is connected to a computer. To operate in the Excursion mode, the Sodera hardware must have been previously configured from the Wireless Protocol Suite prior to disconnecting from the computer. Refer to the Wireless Protocol Suite Hardware and Software User Manual for Excursion mode operating details.

2. Rear Panel Connectors

The rear panel is shown below. The panel provides connectors for external power, **ProbeSync™**, HCI, and for connection to the computer hosting the **Wireless Protocol Suite**.

Sodera Rear Panel Connectors

+12 VDC: Connection to the Teledyne LeCroy supplied AC-to-DC power adapter, or a 12 VDC auxiliary vehicle outlet system can be used.

ProbeSync™ IN/OUT: Used for synchronizing multiple capture devices. Sodera can act as a clock source (central) device providing the clock to synchronize timestamping with connected target (peripheral) devices. When operating as a central device the **OUT** RJ-45 connector provides the synchronizing clock. The synchronizing clock can be attached to a peripheral Sodera or a Frontline 802.11, for example. When operating as a peripheral device, the IN RJ-45 connector receives the synchronizing clock from the central Sodera unit.

HCI USB 1/HCI USB 2:USB Type B and a USB Type A connectors allow capture of HCI USB data. HCI USB 1 and HCI USB 2 are independent groupings of the Type A and Type B connectors. The HCI USB 1 connectors use the same Sodera unit internal interface as the Sodera HCI POD1 UART pins. Likewise the HCI USB 2 connectors use the same internal interface as the Sodera HCI POD2 UART pins. Therefore you cannot simultaneously capture USB and UART on the "1" interface or on the "2" interface. Refer to Connecting for USB Capture and Connecting for HCI/WCI-2 & Logic Capture in the Wireless Protocol Suite Hardware and Software User Manual.

PC HOST : USB 2.0 port for connecting Sodera to the host computer where the Wireless Protocol Suite resides. This connector provides host computer command, control, and data transfer.

> **Note:** At this time all other rear panel connectors are inactive.

3. Attach Antenna
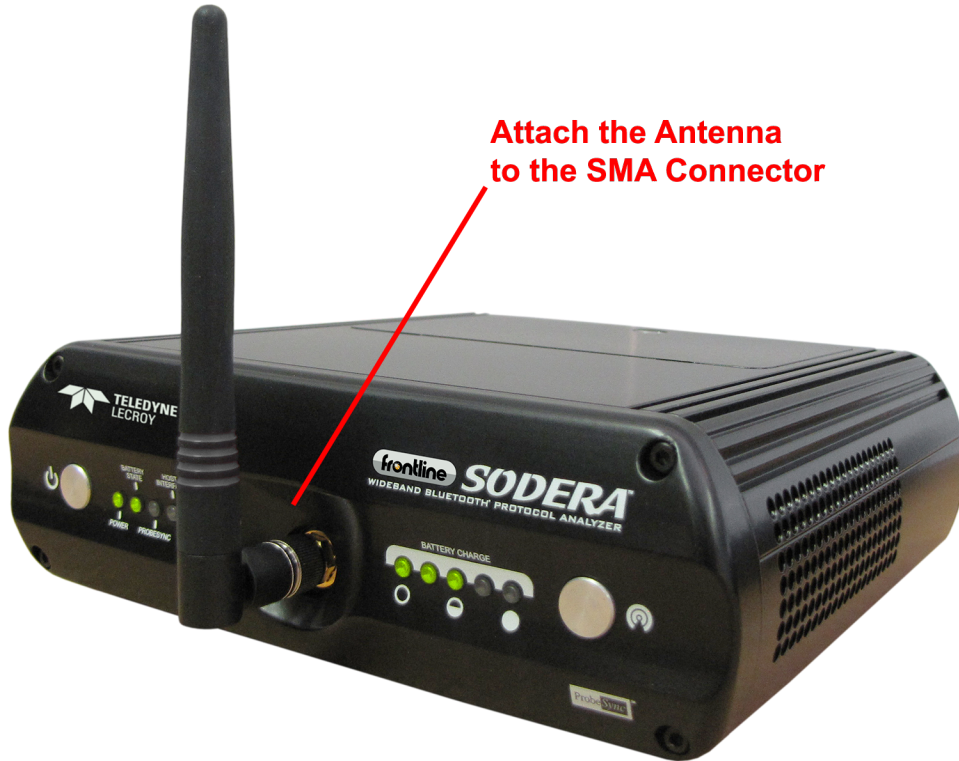
**Attach the Antenna
to the SMA Connector**

Antenna Attachment Point

Remove the Frontline Sodera™ hardware from the box and attach the antenna to the SMA connector on the front panel. The base of the antenna can be carefully rotated by 90 degrees, so that the antenna points upward.

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4. Connecting for ProbeSync™

ProbeSync allows a Frontline Sodera unit and a 802.11 hardware to be connected together to run off of a common clock, ensuring precise timestamp synchronization while capturing *Bluetooth* and WiFi technologies. One device will act as the *central* device by providing the clock to the *peripheral* device receiving the clock. The devices are connected in a daisy-chain configuration. The Sodera unit must be the *central* device. Refer to the following tables, to , and to the 802.11 back panel shown in the image below.

Sodera Synced to 802.11

Sodera	802.11	Sodera		802.11	
		PROBESYNC OUT	**PROBESYNC IN**	**OUT**	**IN**
Central	Peripheral	X			X

Using a CAT 5 Ethernet cable, less than 1.5 meters (4.9 feet), insert one end into the central device connector. Insert the other end into the peripheral device connector.

Each central/peripheral device will have a separate datasource window open. The *Bluetooth* and WiFi packets can be viewed in the **Coexistence** View for either datasource.

ComProbe 802.11 Back Panel

5. Applying Power

The Sodera hardware is powered by three methods: the Teledyne LeCroy supplied AC-to-DC adapter, an external DC power source that can include power from an automobile auxiliary power source and an optional internal battery.

To apply power to Sodera use one of the three methods:

1. Connect the provided AC-to-DC power adapter to the **+12VDC** connector on the rear panel and then connect the adapter into an AC source.
2. Connect a DC power source supplying +12 VDC directly to the **+12VDC** connector on the rear panel.
3. Install the battery.

To start the Sodera Analyzer, depress the Power button on the front panel for at least 1/2 second and then release . This action will provide a clean start for Sodera hardware. The battery charge state indicator LEDs will repeatedly flash in sequence while the unit powers up.

The front panel **Power** indicator LED will be green.

Should the front panel **Power** indicator begin blinking red, the Sodera hardware is approaching thermal overload temperature between 50 °C and 60 °C (122 °F and 140 °F) and should be shut down. When the hardware reaches thermal overload it will automatically shut down and the **Power** indicator will be a constant red.

6. Sodera Data Capture Method

When the **Sodera Analyzer** is connected to the Host PC running the **Wireless Protocol Suite** the **Start Page** window will display the **Sodera** option.
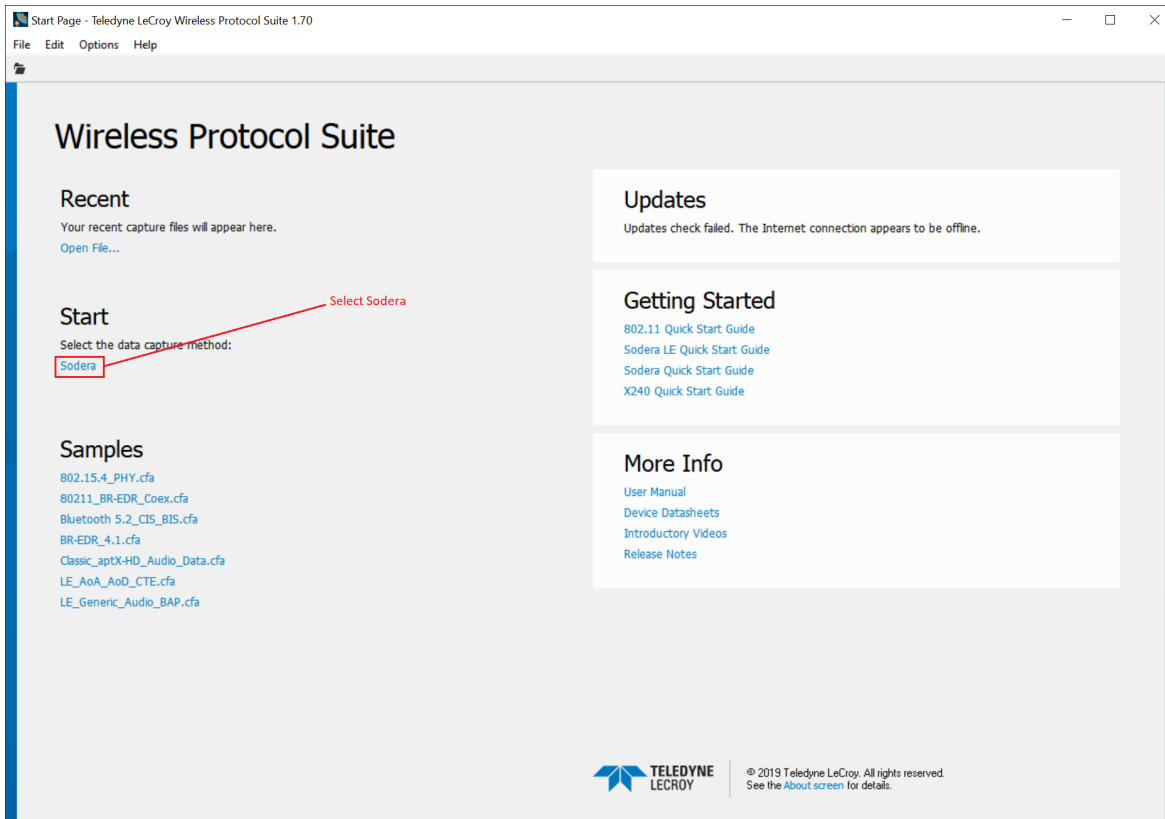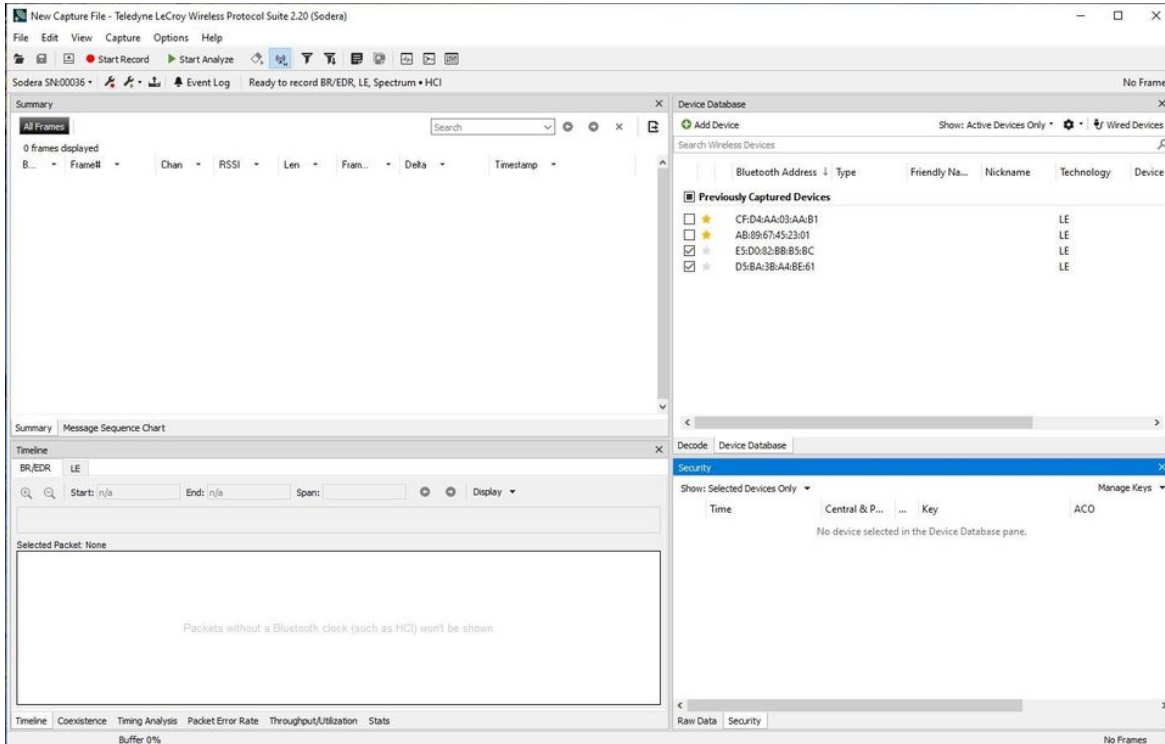

Wireless Protocol Suite: Start Page

Select **Sodera** to bring up the **Wireless Protocol Suite** window. The Wireless Protocol Suite Application icon will be placed in your taskbar at the bottom of your screen.

Wireless Protocol Suite Application Icon

7. Wireless Protocol Suite

Wireless Protocol Suite

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8. User Configuration Overview

The Frontline product Sodera is capable of simultaneously capturing and demodulating RF channels and packet types defined in Bluetooth Specifications up to and including 5.1. The user is not required to specify the addresses of the devices to be captured or their roles (central or peripheral) during the connection lifetime. Prior to capturing data the user does not need to enter any information (PIN, OOB, long term key, link key) used to encrypt or decrypt data. Sodera provides live simultaneous capture of all 79 Classic Bluetooth channels and 40 Bluetooth low energy channels storing data for both live and post capture analysis.

Sodera uses a two-stage capture-analysis process. First, **Record** will activate the Sodera to begin capturing data from all Bluetooth devices in range. In the Analyze stage, the user selects one or more wireless or wired devices for analysis and Sodera will begin sending captured data that is to/from those devices to the Wireless Protocol Suite software. The data appears in various views: **Summary Pane, Message Sequence Chart, Coexistence View, Bluetooth Timeline, Low Energy Bluetooth Timeline, PER Stats**, etc.

If any keys needed for decryption are known from past captures those keys are automatically applied to the devices under test. Prior to protocol analysis the user can enter any unknown keys. Sodera will identify the specific key necessary for data decryption, for example Link Key, Passkey, PIN, Temporary Key. Decryption keys are entered into the **Security** pane. The Security pane is available from the View menu.

Security Pane

The user can configure the record options from the Analyzer Toolbar. The default settings are sufficient for capturing most Bluetooth connections. Details of the configuration settings are in the Wireless Protocol Suite Hardware and Software User Manual available to download from FTE.com or in Frontline Sodera on-line help.

9. Record: Begin Capture

When starting a capture session all of these actions occur:

- The active status of all devices is cleared in the **Device Database** pane and the **Wired Devices** pane.
- The **Security** pane is emptied.
- The **Event Log** pane retains all prior logged events.

● Start Record   On the **Wireless Protocol Suite** Toolbar, click on the **Start Record** button or select **Start Record** from the **Capture** menu option. The **Start Record** button is also available in the **Wireless Protocol Suite** main window. In the Main window you can also select **Start Recording** from the **Capture** menu option. When the **Start Record** button changes to **Stop Record**, the Sodera hardware is capturing data from all active *Bluetooth* devices within range and is recording data on the PC.
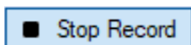
■ Stop Record   On the **Wireless Protocol Suite** Toolbar, clicking on the **Stop Record** button, or selecting **Stop Recording** from the **Capture** menu options will halt live capture. From the Main window you can click the **Stop Record** button or select **Stop Recording** from the **Captur**e menu list to stop recording as well.

The **Device Database** View populates with any newly discovered devices. Selecting devices for analysis can be done while recording.

The **Security** View will show all encrypted *Bluetooth* links.

The **Event Log** View will begin to populate with information, warnings, and error messages.

The **Status Bar** will show a running total of captured packets.

> **Note:** Starting a new capture session will clear all unsaved data from both the Sodera hardware and the **Wireless Protocol Suite**. If it has not been saved, then a pop-up warning message will appear.

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10. Selecting Devices for Analysis

Once a capture session starts by clicking on **Start Record** on the Main Window Toolbar, data from all active devices within range or data from wireless or wired connections is being captured. To analyze the data using the **Wireless Protocol Suite**, select specific devices of interest to include in the analysis.

In the **Device Database** view, place a check in the row of each active device 📶/ 🎵 to be analyzed. Active devices can also be selected while the recording is in process.

> **Note:** Data filtered by the device selection is an "OR" function, not an "AND" function. When selecting device1, device2, device3,... the recorded data filtered into the analyzer is data involving device1 OR device2 OR device3 OR .... However, if in the Options menu, analysis of LE Empty packets is selected, an AND function is included. For example: (device2 AND LE Empty packets) OR (device3 AND LE Empty packets).

The following table lists some common data capture and device selection scenarios.

Table 3 - Common Data Capture and Device Selection Scenarios

Scenario	Wireless/Wired Devices View Selection
Analyzing traffic between a Peripheral Device Under Test (DUT) and its Central.	Select only the Peripheral DUT for analysis

Table 3 - Common Data Capture and Device Selection Scenarios (continued)

Scenario	Wireless/Wired Devices View Selection
Analyzing all traffic involved in Inquiries	In the Options menu select **Analyze Inquiry Process Packets**

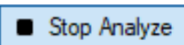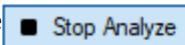Once Devices are selected, analysis of the capture can begin.

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11. Starting Analysis
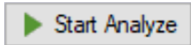
▶ **Start Analyze**   The analysis begins by clicking on the **Start Analyze** button or Selecting **Start Analyze** from the **Capture** menu. Alternatively, click on the **Start Analyze** button in the **Wireless Protocol Suite** Main window. In the Main window you can also select **Start Analyzing** from the **Capture** menu. The Sodera analyzer will begin sending captured packets involving the selected device(s) to the Wireless Protocol Suite software.
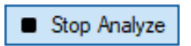
■ **Stop Analyze**   Once analysis has begun, you cannot change the device selection. All device rows in the **Device Database** View are grayed-out. To stop the analysis, click on the **Stop Analyze** button. You can then change your device selection and restart analysis by clicking on the **Start Analyze** button.

To stop the analysis, click on the [■ Stop Analyze] button in the Sodera datasource or click the [■ Stop Analyze] button on the **Wireless Protocol Suite** Main window You can also select the **Stop Analyze** option in the **Capture** menu in the Sodera datasource or **Stop Analyzing** option in the **Capture** menu in the Main window as well.

Conducting analysis from a capture file is identical to the live capture method.

Wireless Protocol Suite: Main Window
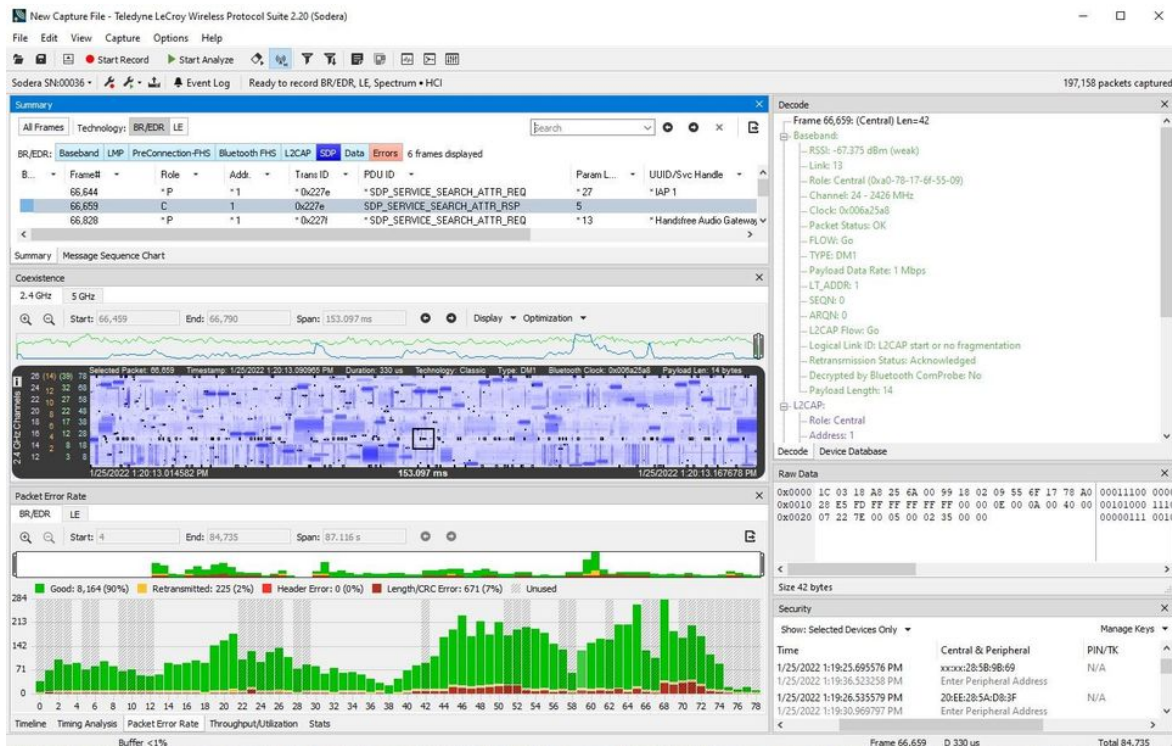
The Application Window icon will be shown in your task bar, see below:

Wireless Protocol Suite Application Icon

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12. Saving Analyzed Data to Disk

> **Note:** **Start Record** is not available when viewing a previously recorded Capture file. **Start Analyze/Stop Analyze** is available in **Wireless Protocol Suite** application window, allowing different analyses to be performed on previously recorded and saved captures.

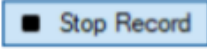> **Note:** Choose File Location from the File menu to change the default file location.

1. Click on either

   - the **Start Record** button on the datasource toolbar.,
   - or the **Start Record** under Capture in the datasource,,
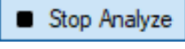   - or the Start Recording under the Capture option in the Main window.

   The Sodera analyzer will begin capturing data from all wireless devices within range and from all connected wired devices.

2. In the **Device Database** and **Wired Device**s View select the active devices for analysis.

3. : Click on either

   - the **Start Analyze** button Start Analyze under the Capture menu in the Sodera datasource window,
   - or c kick on Start Analyze button in theWireless Protocol Suite Main window,
   - or Start Analyzing under Capture menu

   to begin capturing data traffic.

4. Files are placed in **My Capture Files** folder by default and have a .cfa extension.

5. Watch the Status Bar on the Wireless Protocol Suite Main window to monitor how full the file is.

6. Click on **Stop Record** button to stop recording.

7. Click the **Stop Analyze** button to stop analyzing.

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8. To clear captured data, click the **Clear** icon .

- If you select **Clear** after stopping analysis, a dialog appears asking whether you want to save the data.
  - You can click **Save File** and enter a file name when prompted .
  - If you choose **Do Not Save**, all data will be cleared.
  - If you choose **Cancel,** the dialog closes with no changes.
- If you select the **Clear** icon while a capture is occurring:
  - The capture stops.
  - A dialog appears asking if you want to save the capture.
  - You can select **Yes** and save the capture or select **No** and close the dialog. In either case, the existing capture file is cleared and a new capture file is started.
  - If you choose **Cancel**, the dialog closes with no changes.

13. **Sodera Technical Specifications/Service Information**

- Dimensions: 159 mm wide X 57 mm tall" X 165 mm deep" (6.3" X 2.3 " 6.5" X mm)
- Weight: 1.0 kg (2.2 lb)
- Humidity: Operating: 0% - 90% (0 °C – 35 °C)
- Temperature: -10 °C to +40 °C (14 °F to +104 °F)
- Power Input: 12 VDC (tip positive)
- Max Power: 25 W
- Battery: NB2037FQ31

Caution: There is a risk of explosion if the battery is replaced by an incorrect type. Dispose of old batteries according to your local regulations.

Service Notes

The Sodera hardware does not contain any user serviceable items. Any repairs and maintenance must be performed by a service technician that has been trained and approved by Teledyne LeCroy.

Before any service is performed on Sodera, all power sources must be removed. This includes removing the battery and disconnecting any power sources from the 12 VDC input power connector on Sodera. Typical power sources include external AC/DC power supplies or auxiliary power sources from a vehicle.

Internal Fuse Information

- Manufacturer: Littlefuse
- Type: OmniBlok
- Current rating: 5A
- Speed rating: Very Fast Acting
- Voltage rating: 125V ac/dc

This quick start guide provides sufficient information to begin the data capture. Detailed hardware and software information is contained in the Frontline Sodera User Manual. The manual is available on FTE.com.

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