LeCroy

LeCroy UWB*Tracer*™/Trainer™

Ultra-Wideband Protocol Analyzer

User Manual

Manual Version 3.0

For Software Version 3.0

August 2007

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FCC Conformance Statement Compliance with 47 CFR 15.519 (a)(1)

This device complied with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Rule 47 CFR 15.519 (a)(1) states that "A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgement of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting. "

This equipment may only be operated indoors. Operation outdoors is in violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties.

Note: This device must be installed in a location that is not accessible to the general public. Install the device so that the antenna is more than 20 cm from unsuspecting personnel. Failure to install this device as described will result in a failure to comply with FCC rules for RF exposure and is discouraged. Only antennas approved with the device may be used. This device may not be co-located with other transmitters without further approval by the FCC.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the operator's authority to operate the equipment.

EU Declaration of Conformity

This equipment including all its options is in conformity with the provisions of the following EC directives(s), including all the latest amendments:

73/23/EEC   Low Voltage Directive

89/336/EEC   EMC Directive

Conformity with Council Directive 73/23/EEC is based on:

EN 61010-1:   2001 Safety requirements for electrical equipment for measurement, control and laboratory use

Conformity with Council Directive 89/336/EEC is based on:

EN 61326/A3:   2003 EMC requirements for electrical equipment for measurement control and laboratory use

Emissions	EN 55011/A2:2002 (Conducted and Radiated Emissions)
	EN 61000-3-2/A2:2005 (Harmonic Current Emissions)
	EN 61000-3-3/A2:2005 (Voltage Fluctuations and Flicker)
Immunity	EN 61000-4-2/A2:2001 (Electrostatic Discharge)
	EN 61000-4-3/A1:2003 (RF Radiated Electromagnetic Field)
	EN 61000-4-4:2004 (Electrical Fast Transient/Burst)
	EN 61000-4-5/A1:2001 (Surge)
	EN 61000-4-6/A1:2001 (RF Conducted Electromagnetic Field)
	EN 61000-4-11:2004 (Mains Dips and Interruptions)

Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

WEEE Program

This electronic product is subject to disposal and recycling regulations that vary by country and region. Many countries prohibit the disposal of waste electronic equipment in standard waste receptacles.
For more information about proper disposal and recycling of your LeCroy product, please visit www.lecroy.com/recycle.

Part number: 730-0077-00

Section 1. General

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Chapter 1: Overview

This chapter describes the UWB*Tracer/Trainer*™ product and Ultra-Wideband technology in general.

1.1 UWB*Tracer/Trainer* Ultra-Wideband Analyzers

The LeCroy UWB*Tracer/Trainer* is a portable Ultra-Wideband (UWB) test and debug platform that combines non-intrusive recording with extensive decoding features. The RF (wireless) recording functionality is designed to record non-intrusively off-the-air WiMedia UWB traffic from one or more devices, while the MPI recording functionality is designed to connect to the specification-defined MAC-PHY Interface (MPI) bus between the MAC and the PHY subsystems in WiMedia-compliant devices and to capture the traffic between them. The WiNet protocol uses the MUX sublayer and services of the WiMedia MAC for data networking.

By leveraging years of experience in protocol analysis tools for emerging markets, UWB*Tracer/Trainer* blends sophisticated functionality with practical features to allow designers and validation engineers to easily specify multi-level, conditional trigger scenarios to pinpoint intermittent problems in the UWB connection.

System-level validation requires non-intrusive monitoring. UWB*Tracer/Trainer* ensures accurate data collection by providing transparent electrical taps. At the heart of UWB*Tracer/Trainer* is the CATC BusEngine™ protocol processor that features a real-time recording engine for UWB MAC-to-PHY traffic.

UWB*Tracer/Trainer* also supports remote operation over a LAN and unattended control of the analyzer with an Automation API. UWB*Tracer/Trainer* includes an advanced search capability that allows to search for specific fields in the recorded trace and to navigate faster to places of interest inside the trace.

UWB*Tracer/Trainer* features a real-time statistics display that continuously monitors and presents metrics for the recorded MAC-to-PHY traffic, providing a high-level view of network performance.

For complete product information, please visit **www.LeCroy.com**.

Table 1.1 summarizes key UWB*Tracer/Trainer* features.

Table 1.1 UWB*Tracer/Trainer* Features

Feature	Benefit
Wireless capturing & recording	Allows off-the-air (and non-intrusive) recording of UWB traffic
MPI capturing & recording	Probes the WiMedia specification-defined bus between the MAC and PHY layers, while remaining non intrusive. Suitable for three different popular connector types.
Simultaneous RF and MPI recording	Capable of recording one RF and one MPI channel at the same time and display a combined trace
Advanced Triggering	Robust capability of setting complex triggering and filtering sequences and act in real-time on those settings on each of the channels.
Trace View	Comprehensive viewing of the recorded traffic with convenient customization through the trace display options.
Advanced search	Fast and comprehensive trace searches.
Collapsible/expandable header	Increased drill-down on exchanges, sequences, or individual frames.
Real-time performance monitoring and statistics	Allows easy identification of throughput problems and anomalies.
Dynamically-allocated memory pool	(2 GB) Captures long time-windows for analysis and problem-solving.
Interchangeable Radios and room for future expansion	The modular design of the UWB*Tracer/Trainer*™ and the CATC 5K platform permits interchanging modules and radios
WiNet protocol	Uses the MUX sublayer and services of the WiMedia MAC for data networking

1.2 Ultra-Wideband Technology

UWB technology was available for over 40 years for military and civilian applications and was originally called either impulse radio or carrier-free communications. Today, the FCC definition for UWB is any radio technology with a spectrum that occupies greater than 20 percent of the center frequency or a minimum of 500MHz.

In 2002, the FCC allocated unlicensed radio spectrum from 3.1 GHz to 10.6 GHz expressly for enterprise and consumer applications. The FCC defined a specific minimum bandwidth of 500 MHz at a -10dB level. As current UWB implementations allow communication that requires high data rates over short distances, one immediate UWB application is WPAN (Wireless Personal Area Network).

The Multi-band OFDM technology, promoted by the WiMedia Alliance, is one of the technologies that can utilize the allocated band for UWB. The MB-OFDM transmits data simultaneously over multiple carriers spaced apart at precise frequencies. This approach provides benefits like high spectral flexibility and resiliency to RF interference and multi-path effects.

The WiMedia UWB specifications are available from the WiMedia Alliance. The URL for the WiMedia website:

http://www.wimedia.org

1.3 WiMedia UWB Specification Ecosystem

The WiMedia Alliance has developed specifications for ultra-wide-band (UWB) devices. The main goal of the WiMedia UWB specifications is to create a UWB "ecosystem" that allows easy and secure operation of UWB devices.

The WiMedia UWB specifications have a first-generation data rate of 480 Mbps, which enables a multitude of innovative wireless devices. UWB devices that follow the WiMedia UWB specifications can co-exist in the same physical environment, even if they have unrelated applications.

Markets for two major application types are emerging:

- Certified Wireless-USB (WUSB)
- WiNet

1.3.1 Certified Wireless USB Overview

The WiMedia UWB specification first-generation data rate of 480 Mbps provides a basis for delivering WUSB devices that can perform comparably with USB 2.0 devices.

The Certified Wireless-USB protocol maintains the same host-device model as the wired USB protocol, but the Certified Wireless-USB protocol makes many optimizations for operating efficiently on a wireless medium.

The first Certified Wireless-USB-protocol products are various Wire Adapter devices, which operate as wired-to-wireless bridges. Host Wire Adapters (HWA) enable any PC with USB 2.0 to become a WUSB Host. Device Wire Adapters (DWA) are wireless hubs that can connect wired USB 2.0 devices to a WUSB Host.

For Certified Wireless-USB-protocol devices, UWB *Tracer/Trainer* provides full protocol decoding from low-level packets to high-level Wire Adapter transfers.

The WUSB specification is available from the USB Implementers Forum (USB-IF). The URL for the USB-IF website is:

http://www.usb.org/home

1.3.2 WiNet Overview

WiNet is a protocol that uses the services of the WiMedia MAC for data networking.

The WiNet protocol uses the MUX sublayer and service defined in the WiMedia MAC specification. The MUX sublayer combined with the WiNet protocol corresponds to the logical link control sublayer of the standard ISO/OSI IEEE 802 reference model.

For more information about the WiNet protocol, MUX sublayer and service, and WiMedia MAC specification, see the WiNet specification at **www.WiMedia.org**.

Chapter 2: Hardware Description

This chapter describes the CATC 5K-based UWB*Tracer/Trainer*™ Analyzer and Exerciser and other components and accessories that accompany it.

2.1 CATC 5K Platform

CATC 5K Platform

The CATC 5K is a lightweight and modular platform, designed to be mobile and flexible. The two front slots can accommodate up to two plug-in modules with a variety of options. The CATC 5K platform is powered by a small external power supply. Quiet built-in fans provide all the necessary cooling.

Connection to Host Machine

The CATC 5K platform connects to a Windows®-based PC (the host machine) through a single USB cable. Though the system can operate over USB 1.1 protocol data rates, it is advisable to use a USB 2.0 connection between the Analyzer and the host machine to obtain faster upload of traffic.

2.2 UWB*Tracer/Trainer* Analyzer and Exerciser

The basic UWB*Tracer/Trainer* analyzer configuration includes a CATC 5K platform and a UWB Analyzer plug-in module (UW002MA or UW003MA) that is inserted into the right-side slot.

In addition, the USB Analyzer plug-in module (US007MA) can be inserted into the left-side slot and be used for capturing USB Association traffic, retrieving the information required for pairing two WUSB devices. See "USB Cable Association for Certified WUSB" on page 212 for more information.

The UWB Exerciser plug-in module can be inserted into the left-side slot and be used for traffic generation.

2.3 System Components

Basic Components

The UWB*Tracer/Trainer*™ basic package includes the following components:

- Installation CD-ROM, with the installation program and all documents
- *UWBTracer/Trainer Getting Started* manual, to help set up the system quickly
- CATC 5K Platform: See photograph on front cover. Also see "CATC 5K Front Panel with the UWB Analyzer Plug-in" on page 14 and "CATC 5K Rear Panel" on page 18.
- CATC 5K Power Supply and Power Cord
- Carrying case
- Vertical Stand
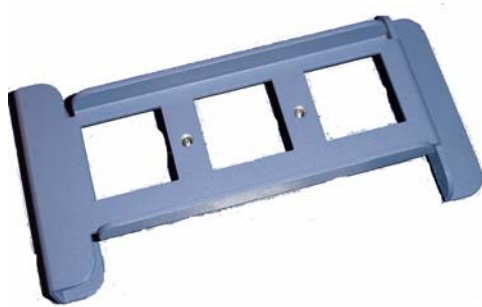
Figure 2.1   Vertical Stand

- UWB Analyzer Module and RF Antenna

Figure 2.2   UWB Analyzer Plug-in Module with Antenna (UW002MA or UW003MA)

- RF Coaxial Cable (SMA) [in Standard Cable Kit]
- USB cable for connecting the analyzer to a host machine

Figure 2.3   USB cable and RF Coaxial Cable (SMA)

- Synchronization Cable for synchronizing multiple analyzers. The Synchronization Cable connects to the SYNC IN and SYNC OUT connectors located on the UWB*Tracer/Trainer* rear panel (Figure 2.15). (For more information about setting up multiple analyzers, see Section 10.3, "Multiple Analyzer Synchronization" on page 152.)

Figure 2.4   Synchronization Cable and Trigger Cable

- Trigger Cable (TRIG-IN/TRIG-OUT BNC Y-cable) for connecting to external equipment (for example, for triggering capturing in a LeCroy oscilloscope).

Optional Components

In addition to the basic package, optional components are available:

*   USB Analyzer plug-in module for capturing USB Cable Association traffic (US007MA)

Figure 2.5   USB Analyzer Plug-in Module (US007MA)

*   UWB Analyzer plug-in module with PHY (radio) from a different vendor (UW002MA or UW003MA)
    [see Figure 2.2]
*   MPI Kit (please refer to the Data Sheet for detailed information)
    [see next page]

- UWB*Trainer* Exerciser plug-in module and RF Antenna

Figure 2.6   UWB Exerciser Plug-in Module with Antenna (UW005MGA)

MPI Kit

The MPI kit is designed for hooking to the MPI bus in two types of setups:

1. PHY subsystem connects to the MAC subsystem through a short (ribbon) cable.

2. PHY subsystem piggybacks directly on the MAC subsystem. The two subsystems connect through an adapter board without the use of cables.

Three types of connectors are common for current designs:

1. IDE 40-pin connector

2. Hirose 68-pin Connector

3. Hirose 60-pin Connector

The optional MPI Kit includes:

Figure 2.7   MPI Kit

• Cable Adapter for Hirose 68-pin or IDE 40-pin Connectors

Figure 2.8   Cable Adapter for Hirose 68-pin or IDE 40-pin Connectors

- Probe Cable for IDE 40-pin Connectors and Hirose 68-pin Connectors (2)

**Figure 2.9   Probe Cable for IDE 40-pin Connectors and
                       Hirose 68-pin Connectors**

- Adapter Cable

Figure 2.10   Adapter Cable (with external SCSI type connectors)

- Board Adapter for IDE 40-pin Connectors, Board Adapter for Hirose 68-pin Connectors, and Board Adapter for Hirose 60-pin Connectors
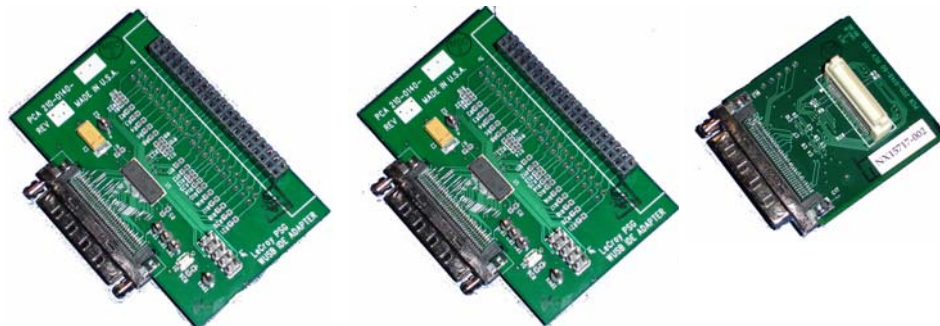
**Figure 2.11   Board Adapter for IDE 40-pin Connectors,
                       Board Adapter for Hirose 68-pin Connectors, and
                       Board Adapter for Hirose 60-pin Connectors**

2.4 UWB*Tracer/Trainer* Front Panel Description

When powered ON, the CATC 5K Analyzer activates user-accessible controls and LEDs on front and rear panels of the platform. This section covers front panel features. The next section covers rear panel features.
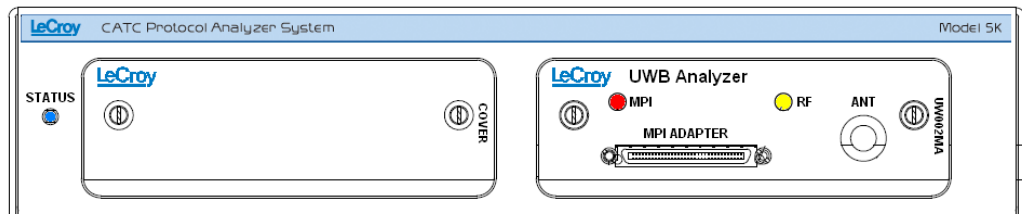

Figure 2.12   CATC 5K Front Panel with the UWB Analyzer Plug-in

CATC 5K Platform

The indicators on the CATC 5K platform (Figure 2.12) are:

STATUS (status of the platform)

LED	Description
● No light	System is not powered on
● Green Blink Slow	Initializing
● Blue	System is operational
● Red Blink Fast	System fault (contact Support)

UWB Analyzer Plug-in Module

LEDs (status of the MPI or RF channel)

LED	State	MPI Channel	RF Channel
● No light	Idle	Does not detect PCLK or PHY_ACTIVE	Does not detect wireless frames
● Yellow Blink Fast	Synching	Trying to synchronize to MPI traffic and waiting for PCLK and PHY_ACTIVE	Trying to synchronize to RF traffic and waiting for wireless traffic
● Yellow	Synched	Synchronized: Capturing MPI traffic with PHY_ACTIVE signal high	Synchronized: Capturing wireless frames
● Red Blink Slow	Recording Pre-Trigger	Recording Pre-Trigger traffic	Recording Pre-Trigger traffic
● Red	Recording Post-Trigger	Recording Post-Trigger MPI traffic	Recording Post-Trigger wireless traffic

Connectors
The connectors are:

• **MPI ADAPTER**: Connector to MPI Adapter
• **ANT**: SMA Connector for Antenna

USB Analyzer Plug-in Module for the
USB Cable Association

In the UWB*Tracer/Trainer*™ setup, the USB Analyzer plug-in module is used to capture USB Association traffic between pairs of WUSB devices that support the USB Cable Association Model described in the Certified Wireless USB specifications.
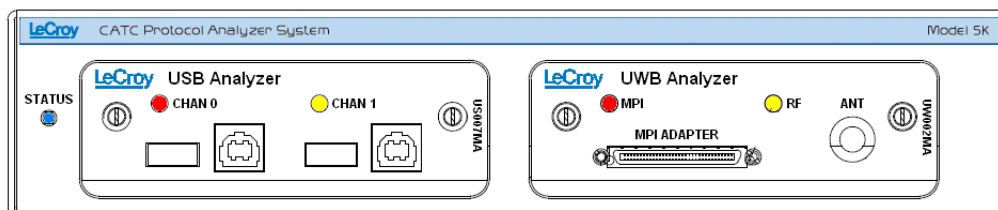
**Figure 2.13   CATC 5K Front Panel with the UWB Analyzer and
USB Analyzer Plug-in**

USB Cable Association traffic capture uses CHAN 0 of the module.
The second channel, marked CHAN 1, is for future expansion.

For instructions on how to set up and capture USB Cable Association traffic and use it for UWB traffic recording, see "USB Cable Association for Certified WUSB" on page 212.

LEDs (status of the USB Chan 0 channel)

LED	State
⬤ No light	Idle
🟡 Yellow Blink Slow	Synched to Full/Low speed USB traffic
🟡 Yellow Blink Fast	Synched to High speed USB traffic
🔴 Red Blink Fast a few times	Connection Context traffic detected

Note: For USB Chan 1, the LEDs are turned off because they are not used for the USB Cable Association traffic capture.

Connectors

The connectors are:

• **CHAN 0 USB PORTS:** For capturing USB Cable Association traffic
• **CHAN 1 USB PORTS:** Not currently used

UWB Exerciser Plug-in Module

When powered ON, the UWB Exerciser activates user-accessible controls and LEDs on front and rear panels of the platform. This section covers front panel features. The next section covers rear panel features.
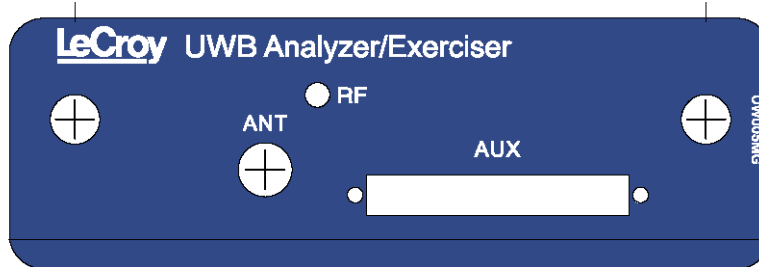
Figure 2.14   UWB Exerciser Plug-in Module

LEDs (status of the Exerciser RF channel)

LED	State
No light	Idle
Yellow Blink Fast	Scenario running
Yellow Blink Slow	Scenario waiting for condition
Yellow Solid	Scenario paused
Red Solid	Scenario error

Connectors

The connectors are:

* **ANT**: SMA Connector for Antenna
* **AUXILIARY**: Connector

2.5 UWB*Tracer/Trainer* Rear Panel Description

From left to right, the rear panel contains the following components:
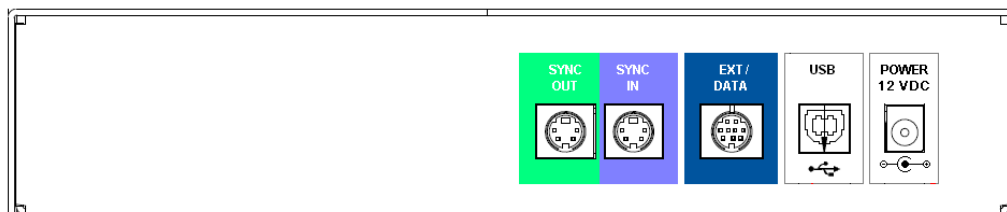
Figure 2.15   CATC 5K Rear Panel

- **SYNC IN/OUT**: For synchronized multi-analyzer operation, the analyzers must be connected in a daisy-chain topology to each other using the green/purple cable.
- **EXT DATA**: For attaching the TRIG-IN/TRIG-OUT BNC Y-cable (Trigger Cable) to external instruments
- **HOST**: For connecting the analyzer through USB to the host machine
- **POWER 12 VDC**: For connecting the external power supply to the analyzer. **Note**: There is no power switch on the analyzer.

Warning!   Do not open the CATC 5K enclosure. No operator serviceable parts are inside. Refer servicing to LeCroy.

2.6 Interchangeable Radios

Because WiMedia UWB specifications and technology are still evolving, a UWB*Tracer/Trainer*™ analyzer (with its CATC 5K platform) can use interchangeable plug-in modules, each incorporating different PHYs (radios).

Currently there are two UWB Analyzer plug-in modules that can be used with the UWB*Tracer*: model UW002MA and model UW003MA.

Please note that each UWB Analyzer plug-in module requires different initialization sequences that are executed according to a script that must be downloaded to the analyzer using the Analyzer Setup menu and window, as described in Section 16.4, "BusEngine, Firmware, and Plugin Init Updates" on page 262.

After you plug the module into the correct slot and check that you have the correct BusEngine, Firmware, and initialization script installed, you can record traces.

Section 2. UWB *Tracer/Trainer* Analyzer Software

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Chapter 3: Software Overview

The UWB*Tracer/Trainer™* software can:

- Control recording of UWB traffic.
- Manage one or more Analyzers, which can be connected directly to the host machine or connected through the Analyzer network.
- View, analyze, and create reports about recorded traces.

3.1 Installing the Software

For instructions about installing the software, refer to the *UWBTracer/Trainer Getting Started* manual.

3.2 Starting the UWB*Tracer/Trainer /Trainer* Program

You can use the *UWBTracer/Trainer /Trainer* with or without the analyzer unit. When used without an analyzer, the program works as a trace viewer to view, analyze, and print trace files.

To start the *UWBTracer/Trainer /Trainer* Program from the PC Start menu:

Step 1 Select **Start** > **Programs** > **LeCroy** > **UWBTracer** >
LeCroy UWBTracer
to display the application main window (Figure 3.1).
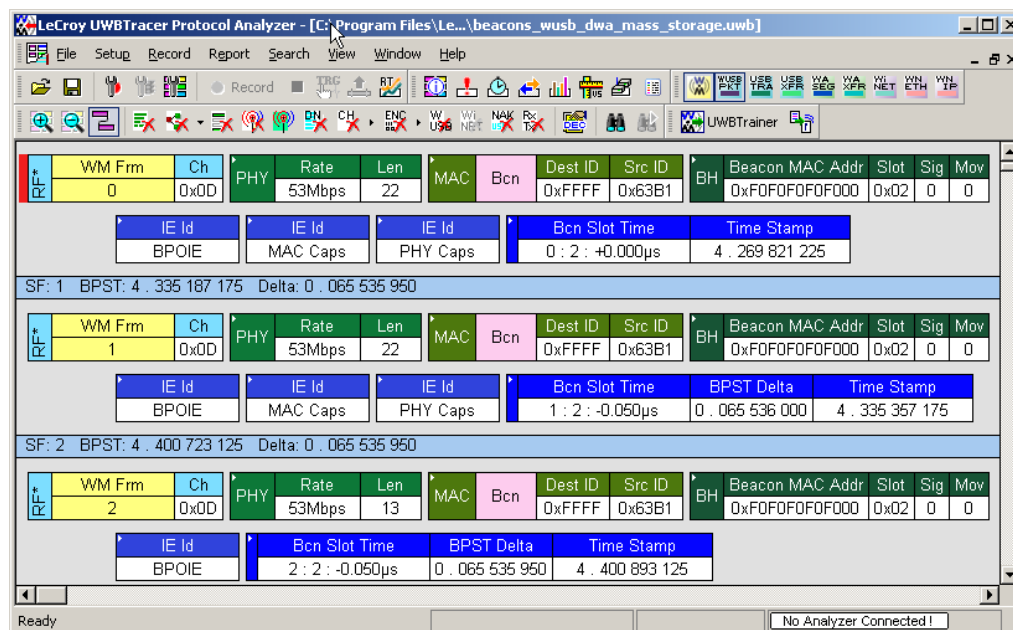
Figure 3.1   **UWB*Tracer/Trainer* Main Window**

3.3 Opening Sample Traces

A good way to gain familiarity with UWB*Tracer/Trainer* is to open some of the provided sample files and explore the menus, pop-up menus, and reports.

3.4 Opening Older Trace Files

The UWB*Tracer/Trainer* software has the capacity to open trace files created with earlier software versions. When an older trace file is opened, the program prompts you to convert the file to the current software version.

3.5 Tool Tips

Throughout the application, Tool Tips provide useful information about buttons on the toolbar.

To display a Tool Tip, position the mouse pointer over an item of interest such as part of the trace or a button (Figure 3.2).
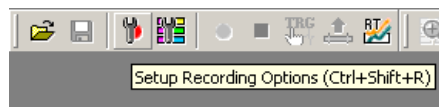
Figure 3.2 Tool Tip

3.6 Trace Tool-Tips

Many fields within the Trace display tool-tips when the mouse pointer is suspended over them. These tips may provide a simple legend for the cell or may give substantial added details about the field (Figure 3.3).

Figure 3.3 Trace Tool Tip

3.7 Menu Bar

Table 3.1 lists menus available from the Main window menu bar. Some menus and options are available only when a file is open.

Table 3.1 Menu Bar Menus

Menu/Option	Function
File	
<u>O</u>pen	Opens a trace file or traffic generation file.
<u>C</u>lose	Closes the current trace or generation file.
Save <u>A</u>s	Saves all or a specified range of frames with a specified name.
<u>P</u>rint	Prints part or all of the current trace or traffic generation file.
Print Pre<u>v</u>iew	Produces an on-screen preview before printing.
P<u>r</u>int Setup	Sets options for the current or new printer.
<u>E</u>dit Comment	Opens a dialog for entering a brief comment about the trace.
Expor<u>t</u>	**Packets to Text** (Packet View Format): Saves all or part of a trace to a text file. Used to save traces to floppy disk and to send in e-mail. **Packets to CSV Text**: Saves trace as a comma-separated-values text file for use with Microsoft® Excel.
	Packets to Ethereal/WireShark format: Exports WiNet data frames in Ethereal/Wireshark format and opens the exported file in the Ethereal/WireShark application (free Ethernet analyzer software).
	Packets to UWBTrainer script: Exports WiNet data frames to a **.uwbg** file for use in UWB*Trainer*.
Remove Identifying Info from Trace Files	Allows you to select trace files from which to remove identifying information and save them with the names **<original_name>_clean.uwb**.
E<u>x</u>it	Exits the UWB*Tracer/Trainer* program.
Setup	
<u>D</u>isplay Options	Opens a window that controls the recording process.
<u>R</u>ecording Options	Opens a window that controls display options.
<u>U</u>pdate Device	Update BusEngine™ and Firmware manually
Analyzer <u>N</u>etwork	Opens a dialog box for browsing to local and networked analyzers. Within the dialog, click Add to browse. The dialog lists PCs that are on the LAN. If a PC has an analyzer attached to it, and if DCOM permissions have been set on the selected PC, clicking Select establishes a connection.
All Connected <u>D</u>evices	Opens a dialog box with a list of analyzers connected to the host PC. Lets you select an analyzer and update the BusEngine, Firmware, and licensing information.
Record	
<u>S</u>tart	Causes the Analyzer to begin recording.
Sto<u>p</u>	Causes the Analyzer to stop recording.
Reupload	Opens a window that controls partial uploading.

Menu/Option	Function
Report	
File Information	Displays information about the recording such as the number of frames and triggering setup.
Error Summary	Displays the Errors report of the Traffic Summary, listing the numbers of each error type.
Timing Calculations	Calculates timing between two frames.
Traffic Summary	Summarizes the numbers and types of errors, packets, transactions, split transactions, and transfers that occurred in the open trace.
Device List	Lists the DUTs, active devices, archive devices, and wireless USB in the Device List window by DUTs, Type, EUI-48, Address, Alias, Last Updated, and User Notes.
Beacon/WUSB Timing Analysis	Opens the Timing Analysis window with a Beacon Period and/or WUSB Detail View.
Run Verification Script	Opens a window to allow you to run verification scripts over the open trace.
Search	
Go to Trigger	Positions the display to show the triggering event at the top.
Go to Frame/ Packet/Transaction/ Transfer	Positions the display to show a specific frame or decode level.
Go to Marker >	Positions the display to the selected marked frame.
Go to >	Positions the display to the specified item.
Find	Allows searches by multiple criteria.
Find Next	Looks for the next instance of an event specified with Goto or Find.
Search Direction	Allows the search direction to be changed from Forward to Backward or Backward to Forward.
Search Channel	MPI or RF

Menu/Option	Function
View	
Toolbars	Displays list of available Tool bars.
Analyzer Network Chat Bar	Opens a dialog that allows users to conduct chat sessions over an IP LAN. In order to send and receive electronic text messages, each user must be working with a PC that is on an IP LAN and also attached to an analyzer.
Status Bar	Switches display of the Status Bar ON or OFF.
Hide Traffic on Channels	Hides traffic on the channel (MPI or RF) selected from the popup list.
Hide Dec/Orig Traffic	Hides Decrypted or Original traffic, as selected from the popup list.
Hide Reserved Field Warnings	Hides fields that have a Reserved Field Warning.
Unhide Cells	Unhides the cells (hidden by Display Options) selected from the popup list.
Zoom In	Increases the size of the displayed elements.
Zoom Out	Decreases the size of the displayed elements.
Wrap	Wraps displayed Frames within the window.
Apply Decoding Scripts	Decoding scripts set the values of the display and recording options for optimum views of trace information from specific vendors or classes of data. The menu allows you to select the vendor or class of data for the request recipients and endpoints listed in the Request Recipients and Endpoints menu. You can keep the settings across recordings.
Real-Time Statistics	Displays trace statistics.
Window	
New Window	Opens another instance of the Main Window.
Cascade	Displays all open Main windows in cascaded format.
Tile Horizontal	Displays all open Main windows in tiled horizontal format.
Tile Vertical	Displays all open Main windows in tiled vertical format.
Arrange Icons	Arranges Main window icons at bottom of display area.
Windows	Displays a list of open windows.
Help	
Help Topics	Opens online help.
Update License	Opens a dialog box for entering license key information for the analyzer.
Display License Information	Opens a dialog box with information about the current status of the analyzer's license
About	Displays version information about UWB*Tracer/Trainer* .

3.8 Tool Bar

The Main window Tool bar provides quick access to most UWB*Tracer/Trainer* software functions. You can learn the function of each button by passing the mouse pointer over it. Button descriptions appear on the Status bar at the bottom of the window and as tooltips above each button.
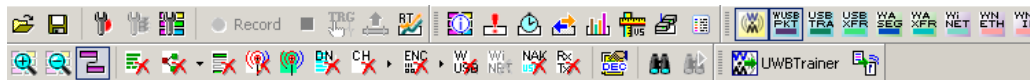
Figure 3.4   Main Window Toolbar

General Buttons

🗁	Open file	🔍	Zoom In
💾	Save As	🔍	Zoom Out
🔧	Setup Recording Options	🔲	Wrap
🔧	Setup Generation Options	🔍	Find
📋	Setup Display Options	🔍	Next
●	Start Recording	🔍	Find Next. Repeats last find.
■	Stop Recording	📋	Apply Decoding Scripts
TRG	Manual Trigger	⬆	Repeat Upload (Reupload/Partial Upload)
RT	Real-Time Statistics. Opens a window that shows realtime information on links activity.	📋	Apply Decoding Scripts

UWB*Trainer* Buttons

UWBTrainer	UWBTrainer	📋	Export To Script

Hide Buttons

![icon]	Hide Unassociated Traffic	![icon]	Hide Beacon Frames
![icon]	Hide Devices	![icon]	Hide Empty MMC Intervals
![icon]	Hide Empty Super Frame	![icon]	Hide Channels (MPI or RF)
![icon]	Show Only Beacons	![icon]	Hide Decoded/Original Traffic
![icon]	Hide WiNet	![icon]	Hide WUSB
![icon]	Hide Nak's	![icon]	Hide Rx/Tx W/O Data

Reports Buttons

![icon]	File Information Report. Opens a summary of general information about the trace file.	![icon]	Traffic Summary. Opens a summary of protocol-related information in the trace file.
![icon]	Error Report. Opens a summary of error information in the trace file.	![icon]	Bus Utilization. Opens a window that shows packet length by time.
![icon]	Timing and Bus Usage Calculations. Opens a calculator for measuring timing between frames	![icon]	Device List Window
![icon]	Run verification scripts. Opens a window to allow you to run verification scripts over the open trace.	![icon]	Timing Analysis

Decode Buttons

![icon]	View WiMedia Frame Level	![icon]	View WUSB Transaction Level
![icon]	View WUSB Packet Level	![icon]	View WUSB Transfer Level
![icon]	View Wire Adapter Segment Level	![icon]	View Wire Adapter Transfer Level
![icon]	View WiNet Frames	![icon]	View WiNet Ethernet Protocol Units
		![icon]	View WiNet IP Protocol Units

3.9 Floating the Decode Toolbar

You can float any of the toolbars by dragging them from their current location at the top of the screen. If you float the decode toolbar, it arranges the decode buttons in their hierarchical order. Click the triangle to add or delete buttons.
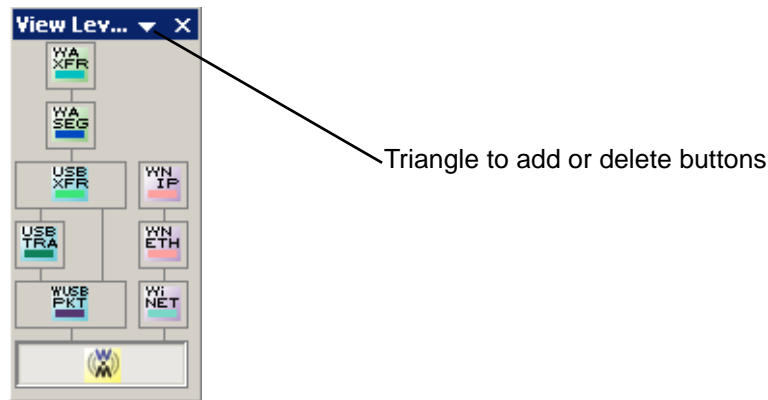
Triangle to add or delete buttons

Figure 3.5   Decode Toolbar in Hierarchal Arrangement

3.10 Pop-Up Menus

Pop-up menus within the trace provide options for formatting the trace.

Left Mouse Button

Left-clicking a header opens a menu for expanding fields, viewing data fields, and formatting the trace. The menu is context-sensitive and changes, depending on what part of the trace you have clicked. Figure 3.6 shows three examples.
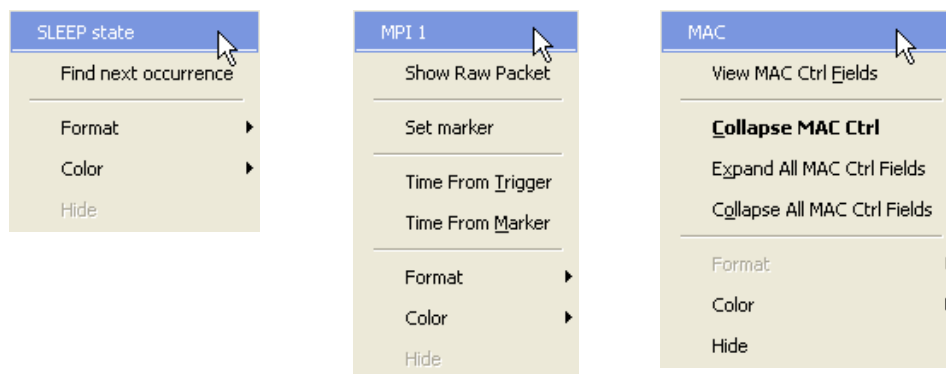
Figure 3.6   Trace Pop-Up Menus

Common options appear on most menus:

- **Format**: Presents choices for changing the numerical formatting of the data fields throughout the trace.
- **Color**: Presents choices for changing the color of the data fields throughout the trace.
- **Hide**: Hides data fields throughout the trace. To re-display hidden fields, right-click anywhere in the trace and select **Unhide Cells** and then one of the options from the sub-menu.

Left-clicking the small triangle in the upper left corner of the PHY, MAC, Payload, or Timing data block expands the data block to show all fields.

Figure 3.7   Expanded Data Block

If you double-click a cell of a PHY, MAC, Payload, or Timing data block, the trace displays all the fields of the block (see Figure 3.7). If you double-click a cell of an expanded block, the trace displays the truncated block

Right Mouse Button

If you right-click a cell in the trace, a pop-up menu allows changing display options, zooming in or out, wrapping the display, unhiding hidden cells, hiding the MPI or RF channel, hiding decrypted or original traffic, hiding fields with reserved field warnings, applying decoding scripts, and calculating real-time statistics (Figure 3.8).
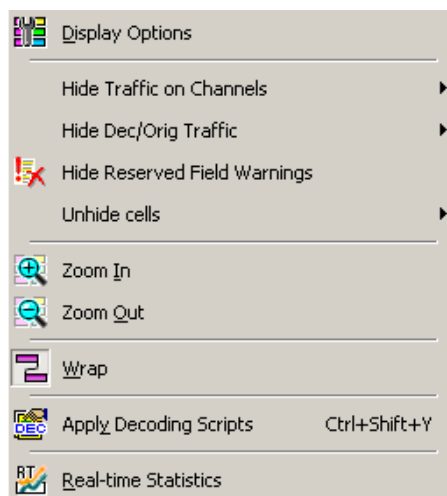
Figure 3.8   Trace Cell Pop-up Menu

3.11 View Settings Tools

You can zoom in and out, and wrap the trace to fit within the screen by using the following buttons:

Zoom In

Increases the size of the displayed elements, allowing fewer (but larger) Frame fields per screen.

*   Click [icon] on the Tool bar.

Zoom Out

Decreases the size of the displayed elements, allowing more (but smaller) Frame fields per screen.

*   Click [icon] on the Tool bar.

Wrap

Adjusts the Trace View so that frames fit onto the next line if they are longer than the size of the window. Without wrap, you can use the horizontal scroll bar to see the hidden part of a frame.

*   Click [icon] on the Tool bar.

In Figure 3.9, the timestamp extends off the right edge of the screen.

Figure 3.9   Trace With Wrap Turned OFF

In Figure 3.10, the entire frame appears in the window.

Figure 3.10   Trace With Wrap Turned ON

3.12 Adding Comments to the Trace

You can create, view, or edit the 100-character comment field associated with each Trace file.

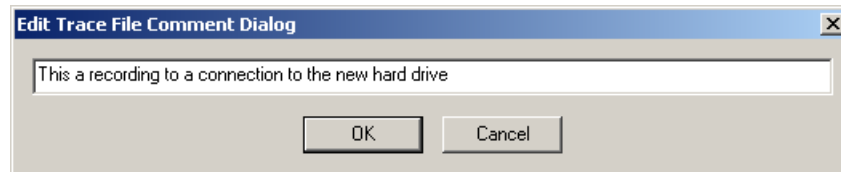**Step 1** From the **File** menu, select **Edit Comment** to display the **Edit Trace Comment** dialog box.

Figure 3.11   Edit Trace File Comment Dialog Box

Step 2 Create, view, or edit the comment.

Step 3 Click **OK**.

3.13 Set Marker

The Set Marker feature allows frames to be marked so you can navigate back to events of interest. Markers also provide you with a way of tagging events so you can perform timing calculations between them. A marker can be applied to any display entity (frame, WUSB packet, WUSB transfer, and so on).

The Set Marker command works in conjunction with the Go to Marker feature. Once you have marked a frame, you can navigate back to it by selecting **Search** > **Go to Marker**, and then selecting the marker of interest from the list.

To set a marker on a frame:

Step 1 In the trace, click the **MPI** field for the frame number you wish to mark.

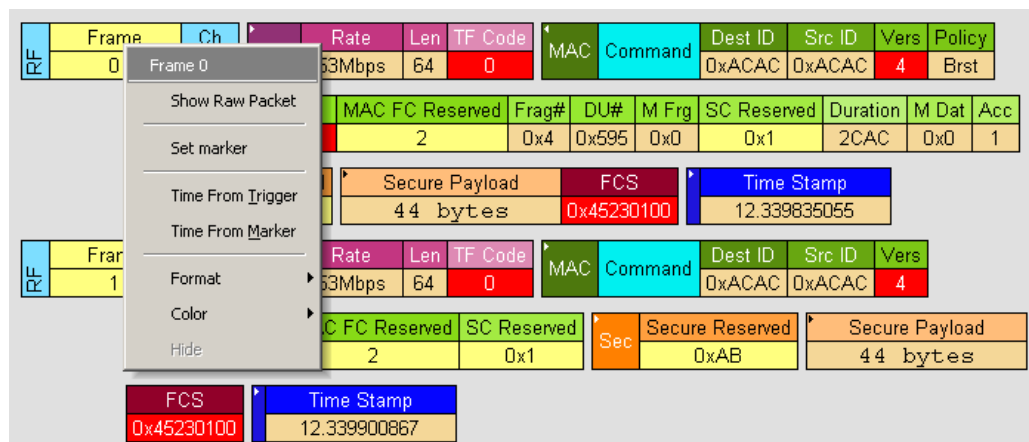**Step 2** From the pop-up menu that appears, Select **Set Marker** (Figure 3.12).

Figure 3.12   Setting a Frame Marker

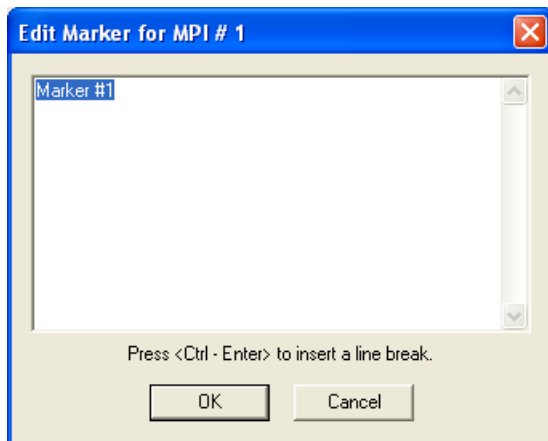**Step 3** The **Edit Marker for Frame #** dialog box appears (Figure 3.13).

Figure 3.13 Edit Marker for Frame Dialog Box

Step 4 Enter your comment.

Step 5 Click **OK**.

Step 6 A marked frame is indicated by a vertical red bar along the left edge of the Frame # block (left side of Figure 3.14).

Figure 3.14 A Marked Frame

3.14 Edit or Clear Marker

To clear a marker or edit comments associated with a Frame marker:

Step 1 Click **Frame #** for the chosen packet to display a pop-up menu (Figure 3.15).
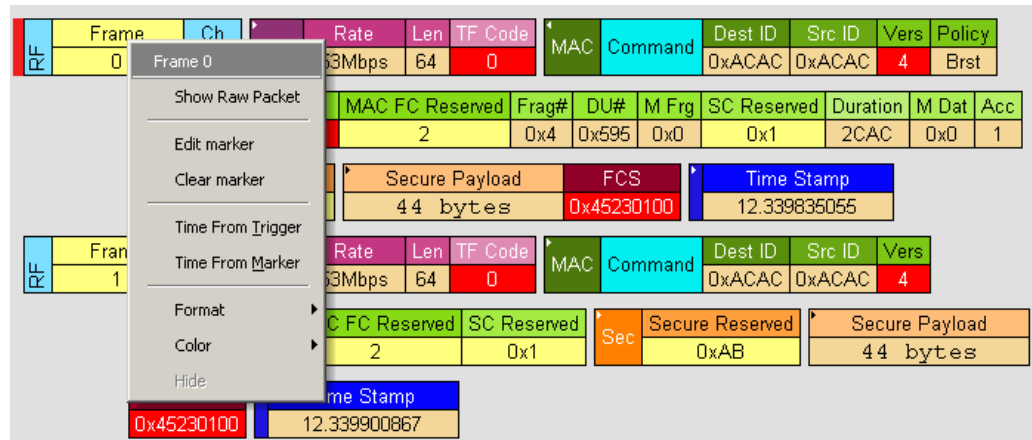
Figure 3.15   Editing a Frame Marker

Step 2 To edit the marker comment, select **Edit Marker**.to display the **Edit Marker for Frame #** comment window (Figure 3.13).

Step 3 Edit the comment.

Step 4 Click **OK**.

Step 5 To clear a marker, click **Clear marker** in the frame pop-up menu (Figure 3.15). The vertical red Marker bar disappears.

3.15 Timing Calculations on Markers

You can use markers as reference points to calculate timing between events. To do a timing calculation:

Step 1 Click the **MPI** field of the frame number that you want to use as the first point of reference in the time calculation.
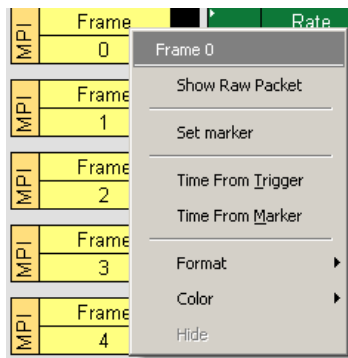

Figure 3.16   MPI Field Options

Step 2 In the pop-up that appears (Figure 3.15), select **Time from Marker** to display the Timing and Bus Usage Calculator. The first point is in the From Frame field.
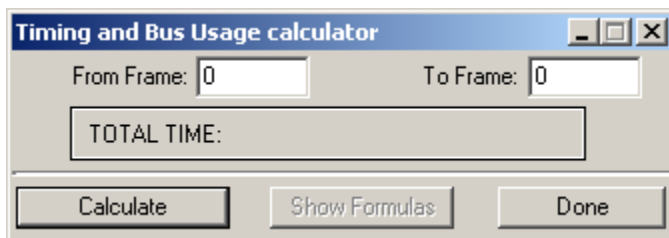

Figure 3.17   Timing Calculator Dialog Box

Step 3   In the All Markers window, select the marker that you want to use as the
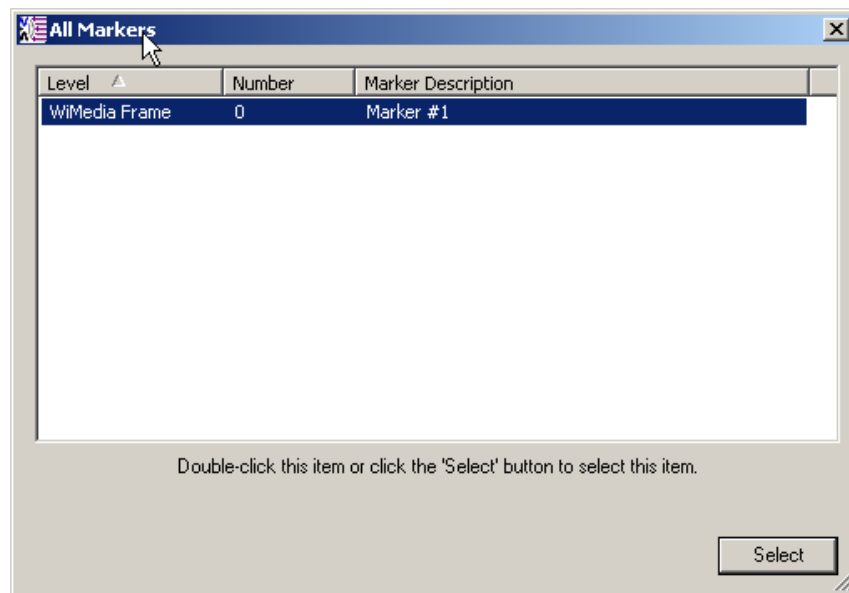second (To MPI) point of reference in the time calculation.

Figure 3.18   All Markers Window

Step 4   The time between the two markers appears in the Timing Calculator
dialog box.

3.16 Status Bar

The Status bar is located at the bottom of the Main window. Depending on the current activity, the bar can be divided into as many as four segments (see Figure 3.20):

1. Notifications and Help (connection, disconnection, and other messages)

2. Progress Bar and Progress Report (see "Recording Progress" on page 38)

3. Status (of the MPI and RF channels)
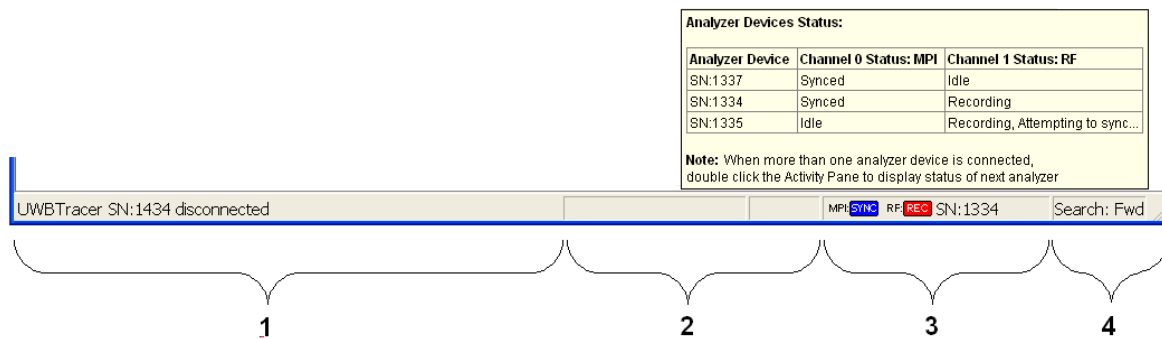
4. Search Direction (Forward or Backward)

Figure 3.19   Status Bar Segments

The left-most segment shows a message that an Analyzer with serial number 1434 was disconnected from the application

The status bar shows only the status of a single analyzer. If you **place the cursor on the status bar**, a tooltip pops up (Figure 3.20) and displays the status of all the analyzers connected to the application. In this example, three analyzers are connected to the application.

To select a different device from the list in the tooltip and display its status in the status bar, double-click **Segment 3**, the **Status** segment. The Status bar then displays information about the next device displayed in the tooltip list. Double-click **Segment 3** again to cycle through all the devices displayed in the tooltip list.

Figure 3.20 shows six examples of the Status bar, each displaying different states of the analyzer devices:
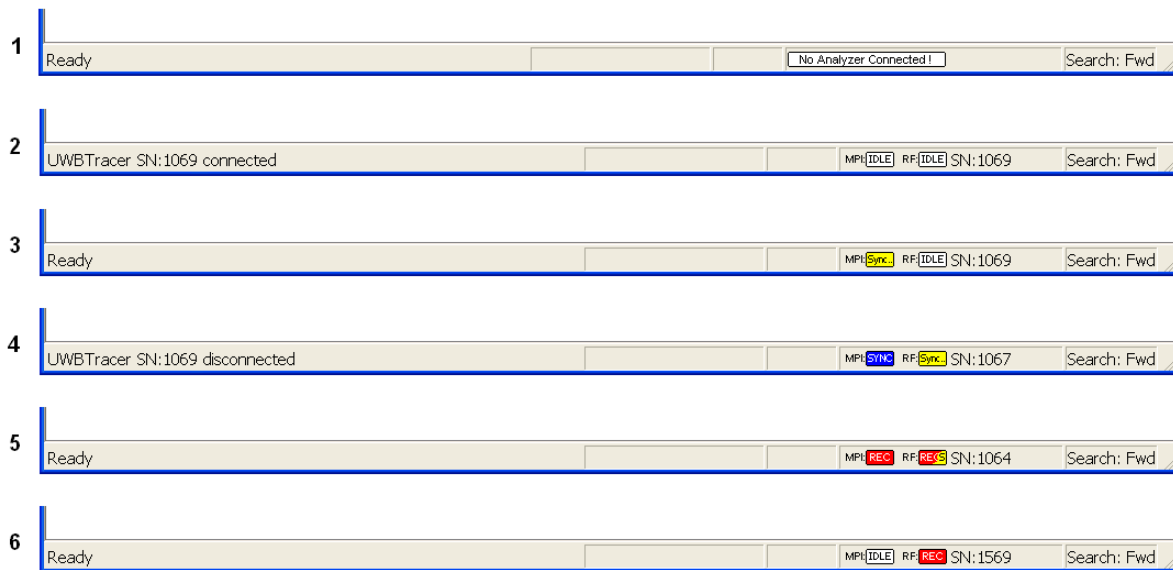

Figure 3.20   Status Bar Examples

Status Bar Example 1: No analyzer is connected to the application.

Status Bar Example 2: An analyzer with serial number 1069 was connected to the application and has both its MPI and RF recording channels in the IDLE state.

Status Bar Example 3: An analyzer with serial number 1069 is Ready. The MPI channel detects PCLK and is attempting to synchronize to the data. The RF channel is in the IDLE state.

Status Bar Example 4: An analyzer with serial number 1067 was disconnected from the application. Its MPI Channel is synchronized to the MPI data and PCLK. Its RF channel is attempting to synchronize to wireless traffic.

Status Bar Example 5: An analyzer with serial number 1064 is Ready. The MPI channel is synchronized to the MPI traffic and is recording. The RF channel is recording but has lost synchronization and is attempting to regain synchronization.

Status Bar Example 6: An analyzer with serial number 1569 is Ready. The MPI channel is in the IDLE mode, not synchronized to PCLK. The RF channel is synchronized to wireless traffic and is recording.

Recording Progress

When you begin recording, the left-most segment of the Status bar displays a recording Progress Indicator (left side of Figure 3.21).
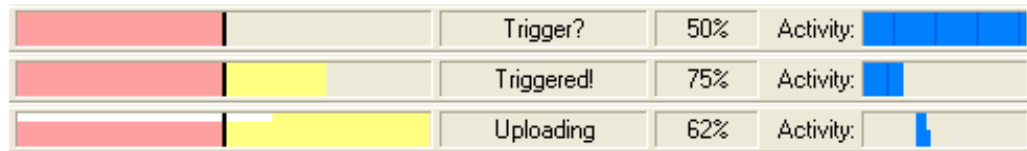

Figure 3.21   Example: Status Bar at Different Recording States

Keep the following in mind when reading the Progress Indicator:

- A black vertical line illustrates the location of the trigger position you selected in the Recording Options window. The pre-trigger progress is displayed in the field to the left of the trigger position.

- When the trigger position is reached, the progress indicator wiggles as it waits for the trigger.

- After the trigger occurs, the field to the right of the trigger fills in the post-trigger color specified in the Display Options window.

- When recording is complete, the upper half of the Progress Indicator fills in white, indicating the progress of the data upload to the host computer.

Some other key points about the Progress Indicator:

- If a trigger event occurs during the before-trigger recording, the before-trigger color changes to the after-trigger color to indicate that not all the expected data was recorded pre-trigger.

- When you click **Stop** before or after a trigger event, the Progress Indicator adjusts to begin uploading most recently recorded data.

- If you wish to abort an upload that is in progress, click the **Stop** button again.

- The Progress Indicator fills with color in proportion to the specified size and actual rate at which the hardware is writing and reading the recording memory. However, the Progress Indicator is normalized to fill the space within the Status bar.

Recording Status

During recording, current recording status is displayed in the next segment of the Status bar (Figure 3.21). When recording is begun, one of the following messages flashes (depending on options selected in the Recording Options window):

* Trigger?
* Triggered!
* Uploading

After recording stops, the following occurs:

* Flashing message changes to **Uploading data–x% done** (**x%** indicates the percentage completion of the data uploading process).
* Traffic data is copied to disk (overwriting any previous version of this file) using the default file name **data_xxx.uwb**, where **xxx** is derived from the unit's serial number. You can specify the file name in the Recording Options window.

When the data is saved, the Recorded Data file appears in the Main display window, and the Recording Status window is cleared.

* If the recording resulted from a trigger event, the first frame following the trigger (or the frame that caused the trigger) is initially positioned second from the top of the display.
* If the recording did not result from a trigger event, the display begins with the first frame in the traffic file.

Recording Activity

During recording, the next segment of the Status bar (Figure 3.21) displays recording activity as a series of vertical bars.

The more vertical bars that are displayed, the greater the amount of activity being recorded. If there are no vertical bars, there is no recorded activity.

During uploading, the percent of the completed upload is displayed.

Search Status

The rightmost segment of the Status bar (Figure 3.21) displays current search direction: Fwd (forward) or Bwd (backward).

3.17 Exporting Trace File Information

Exporting Packets to Text (Packet View Format)

You can save all or part of a trace to a text file. This option enables you to save traces to removable storage devices and to send traces as e-mail attachments.

Step 1 When a trace has WUSB frames, select
File > Export > Packets to Text.

Step 2 Save the exported file.

Exporting Packets to CSV Text

You can save a trace as a comma-separated-values text file for use with Microsoft® Excel.

Step 1 When a trace has WUSB frames, select
File > Export > Packets to CSV Text.

Step 2 Save the exported file.

Exporting Packets to Ethereal/WireShark Format

You can export WiNet data frames in Ethereal/Wireshark format and open the exported file in the WireShark/Ethereal application (free Ethernet analyzer software).

Step 1 When a trace has WiNet frames, select
File > Export > Packets to Ethereal/Wireshark format.
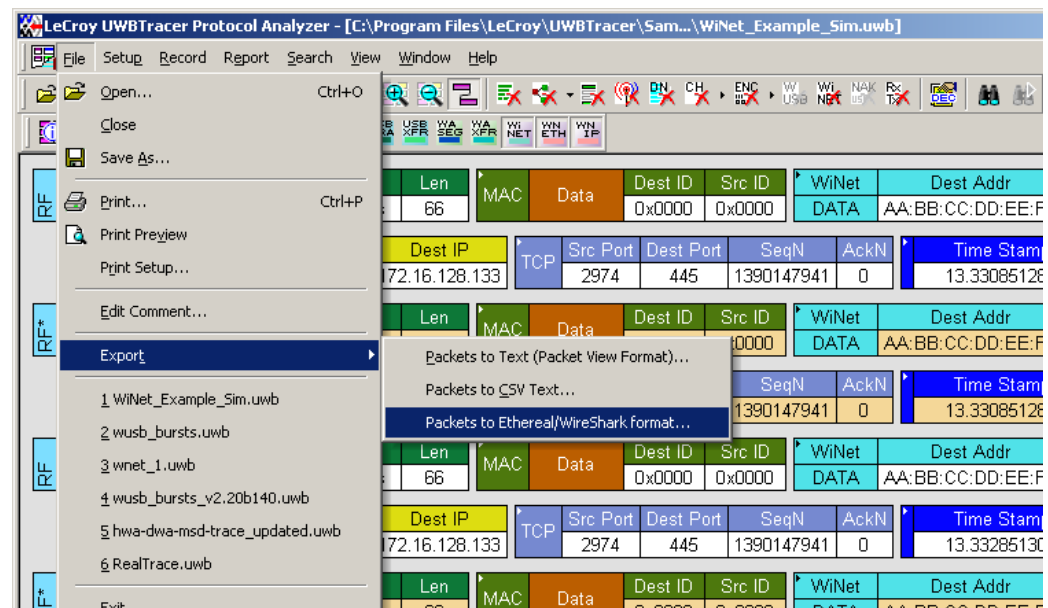
Figure 3.22   Export Packets to Ethereal/Wireshark format

Step 2 Enter parameters in the Export to WireShark/Ethereal format dialog box.
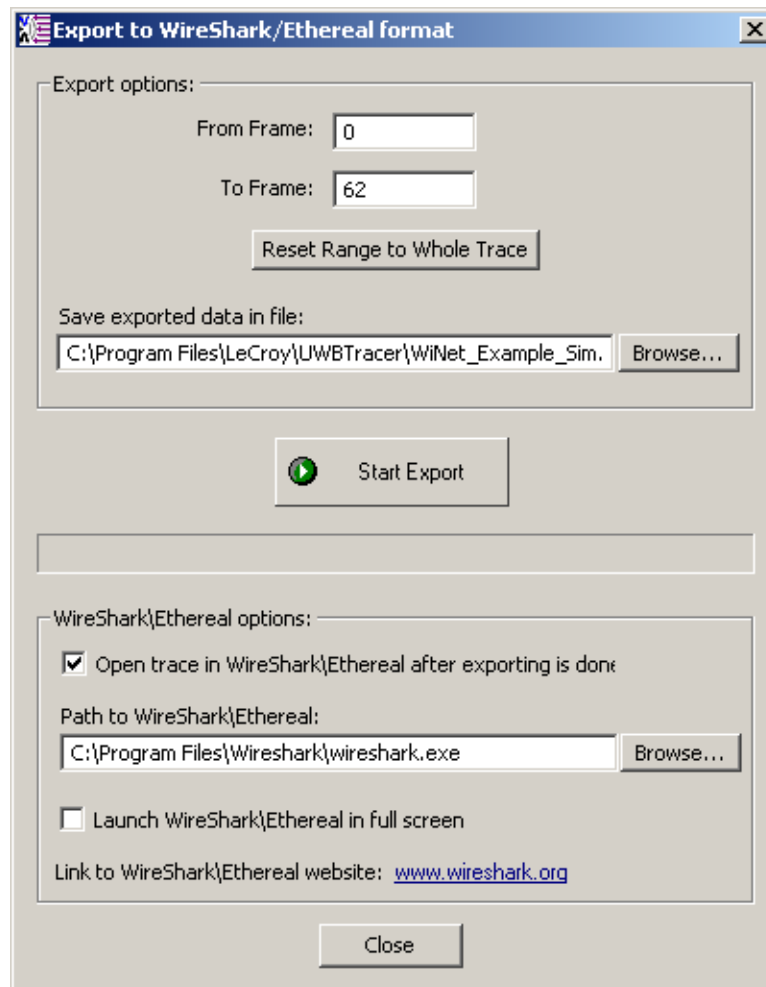
Figure 3.23   Export to Wireshark/Ethereal format

Step 3 In the Export Options section, enter the frame numbers
From Frame To Frame.

You can **Reset Range to Whole Trace**.

Step 4 Enter or Browse for the export file name in the
Save exported data in file field.

Step 5 In the WireShark/Ethereal Options section, select whether or not to
Open trace in WireShark/Ethereal after exporting is done.

Step 6 Enter the **Path to WireShark/Ethereal**.

Step 7 Select whether or not to **Launch WireShark/Ethereal in Full Screen**.

Step 8 Click **Start Export** to export and save the file.

If you selected that option, the WireShark/Ethereal application opens with the
exported file displayed.

Exporting Packets to UWBTrainer Script

You can export data frames to a **.uwbg** file for use in UWB *Trainer.* In the export dialog box, you can select the frame range and the channel (if more than one channel is in use).

Note: Only frames visible in the Trace View are exported.

Because you must edit the exported file before using it for traffic generation, the exported file must not have too much information.

To restrict the exported file information, use the Search menu options (see Chapter 5 "Searching Traces") to search for the frames you want before exporting. Use the Find dialog box or the Go To ... options to search for instances of MAC or PHY information or to go to specific frames, packets, transactions, transfers, or protocols.

Use the Hide options (such as Hide Decrypted Traffic) to hide information or use the View Levels options (such as View WUSB Packet Level) to select information.

After restricting the information using these methods, export a small number of frames starting at the position found using the Search menu.

To export packets to a UWB *Trainer* script (example):

Step 1 Open a trace file, then open the Find dialog.

Step 2 In the Search For field (at the top), select **WiMedia Frames**.

Step 3 In the Event Groups section, select **MAC: Source Addresses**.

Step 4 In the MAC: Source Addresses (Hex) section, select the address of the WUSB Host to be exported.

Step 5 Check the **Find All** box.

Step 6 In the Combining Specified Event Groups section, select the **Intersection** option.
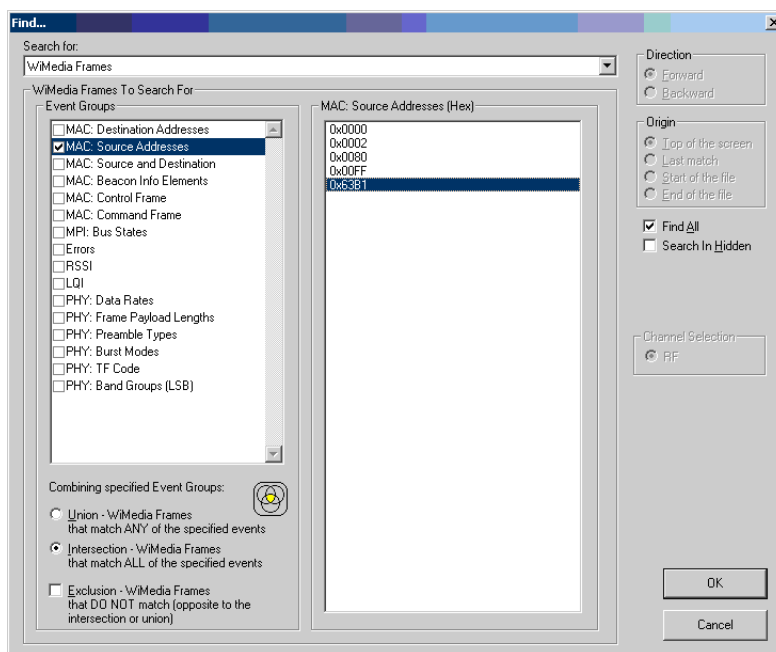
Figure 3.24   Example Find Dialog for Exporting to a UWBTrainer Script

Step 7   Click **OK** to open a new window opens showing only the matching frames.

Step 8   To export the displayed frames, click the Export To Script button 🔲, or select **File > Export > Packets to UWB Trainer script**.
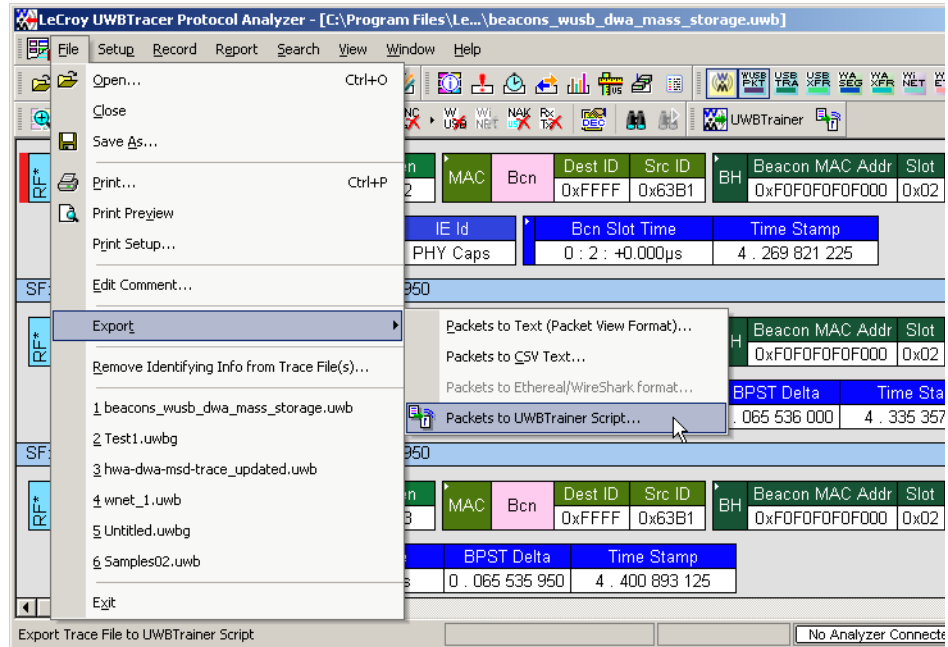

Figure 3.25   Export Packets to UWBTrainer Script Command

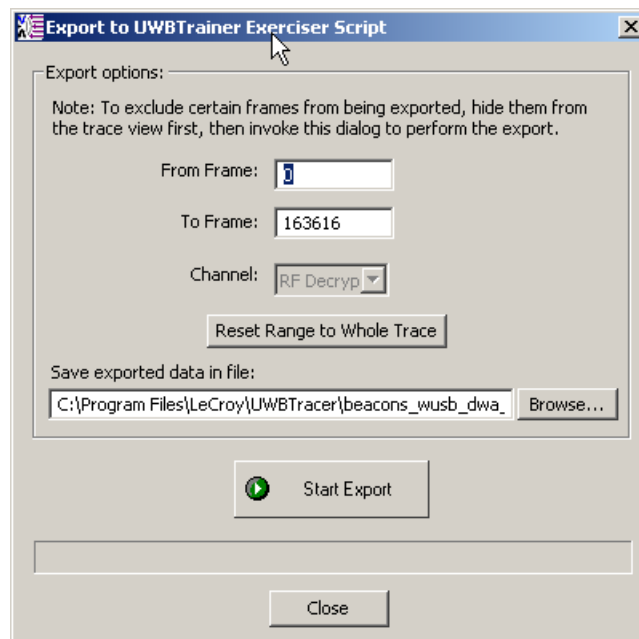**Step 9** Enter parameters in the Export to UWB*Trainer* Exerciser Script dialog
box.

Figure 3.26　Export to UWBTrainer Exerciser Script Dialog

Step 10 In the From Frame field, enter the starting frame number.

Step 11 In the To Frame field, enter the ending frame number.

> **Note:** If the trace has few frames, you can click **Reset Range to Whole Trace**
> to use all the frames.

Step 12 If the trace has more than one channel, in the Channel field, select the
channel or use the default channel.

Step 13 Enter or Browse for the export file name in the
Save exported data in file field.

Step 14 Click **Start Export** to export and save the file.

-Add the following example showing how to export only host-side WUSB packets:

Chapter 4: Reading Traces

This chapter describes how to read and manipulate trace displays.

4.1 Trace Display Overview

UWB*Tracer/Trainer* trace viewing software makes extensive use of color and graphics to fully document the captured (decoded) traffic (Figure 4.1).
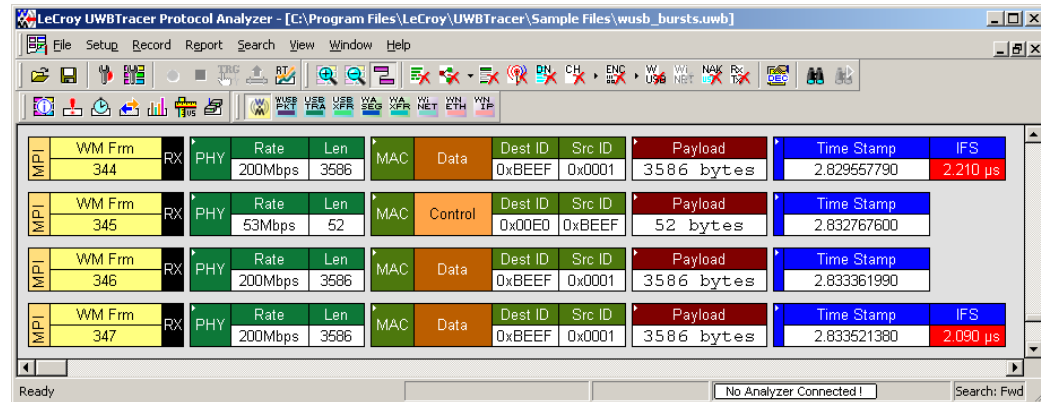
Figure 4.1   Trace Display Example

Frames are shown on separate time-stamped rows, with their individual fields both labeled and color coded. You can collapse data fields to save space in the display, and you can zoom in and out in the display. Pop-up Tool Tips annotate fields with detailed information about their contents.

The display software can operate independently of the hardware and so can function as a stand-alone trace viewer that may be freely distributed.

4.2 Changing Trace Level Views

You can select the trace viewing level in the Display Options window General tab Trace Viewing Level section (see Chapter 6, "Display Options") or with the Trace Viewing Level icons in the Tool bar (Figure 4.2).

Figure 4.2   Trace Viewing Level Buttons

Note: To find frames, packets, transactions, segments, or transfers, scroll through the trace or use the **Search > Find** command (see Chapter 9, "Searching Traces").
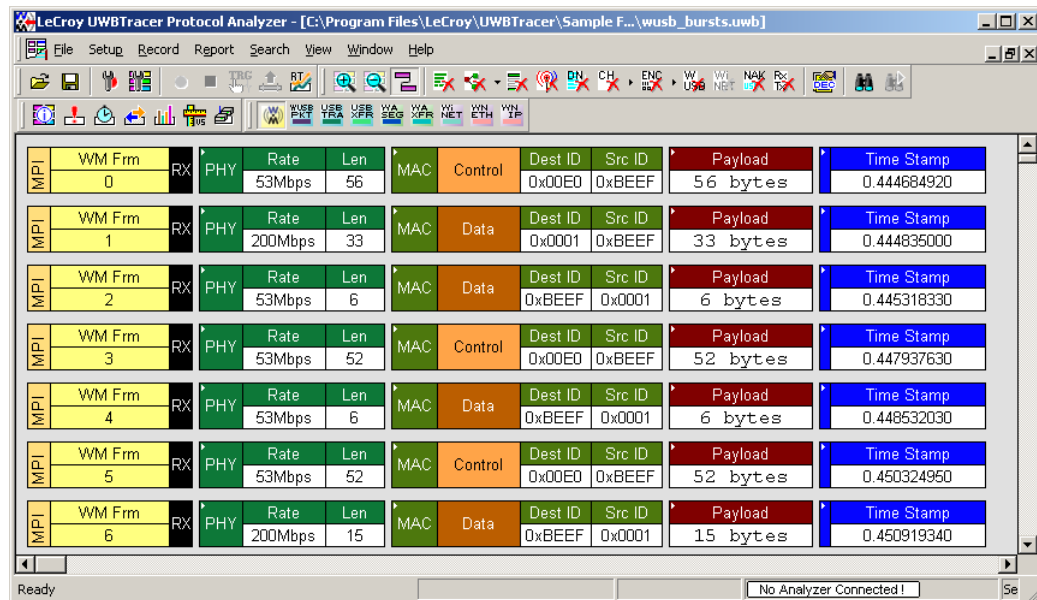
4.3 Trace Level Views for WUSB

You can display traces at these viewing levels, listed from lowest to highest:

- Frame (WiMedia Frame or MAC-PHY Interface equivalent) [default] (WM)
- WUSB Packet (WUSB PKT)
- WUSB Transaction (USB TRA)
- WUSB Transfer (USB XFR)
- WUSB Wire Adapter Segment (WA SEG)
- WUSB Wire Adapter Transfer (WA XFR)

Frame Level

The Frame view is the default decode level. It shows the WiMedia Frame Raw Payload and PHY/MAC Headers. An example MPI Frame level is in Figure 4.3.

Figure 4.3   Trace View: Frame Level

WUSB Packet Level

Click the **WUSB PKT** button to show the WUSB Packet Level view. An example packet level is in Figure 4.4.
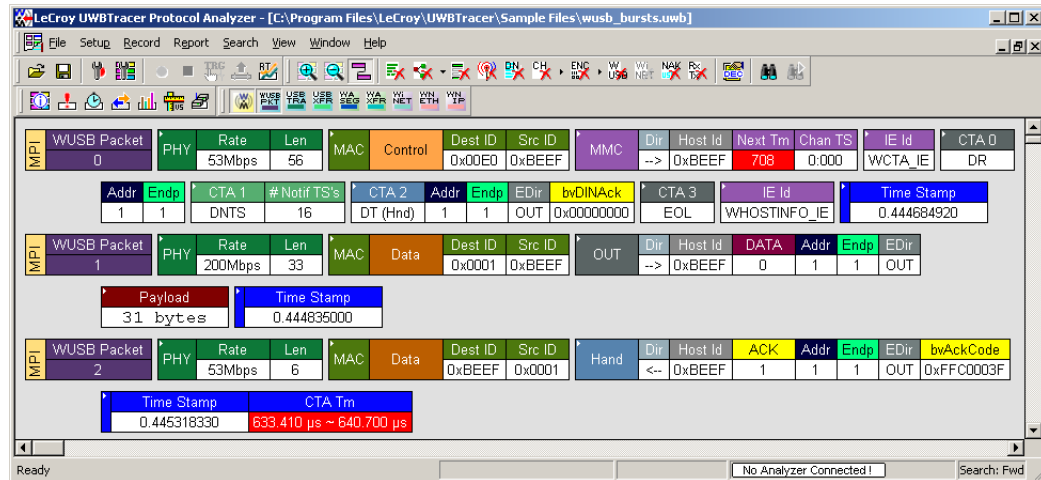
Figure 4.4 Trace View: WUSB Packet Level

The WUSB Packet Level is now a special way to decode the Frame Level. You can show or hide MAC Frame raw payload PHY/MAC headers when WUSB Packets are displayed. You cannot expand WUSB packets.

WUSB Transaction Level

Click the **USB TRA** button to show the WUSB Transaction Level view. An example transaction level is in Figure 4.5.
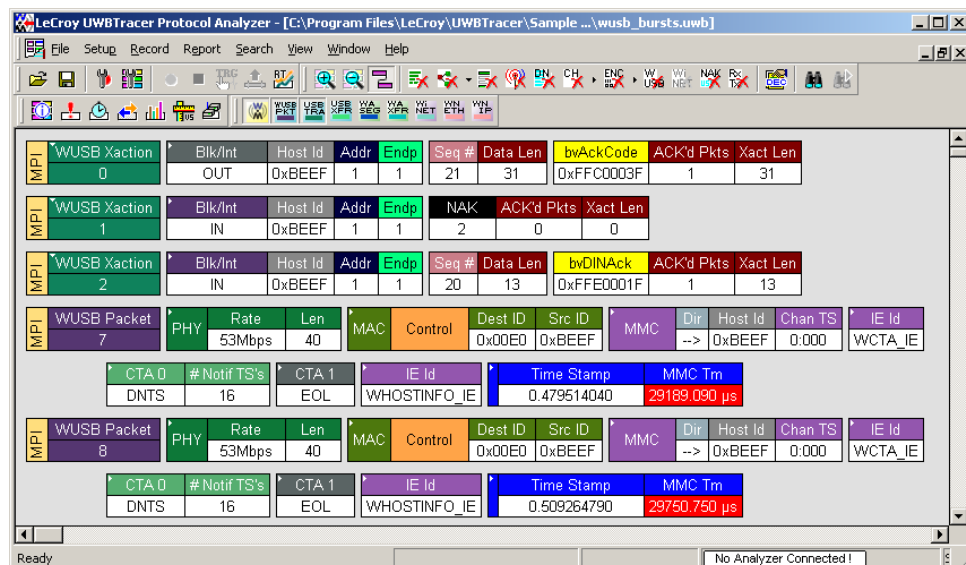
Figure 4.5 Trace View: WUSB Transaction Level

WUSB Transfer Level

Click the **USB XFR** button to show the WUSB Transfer Level view. An example transfer level is in Figure 4.6.
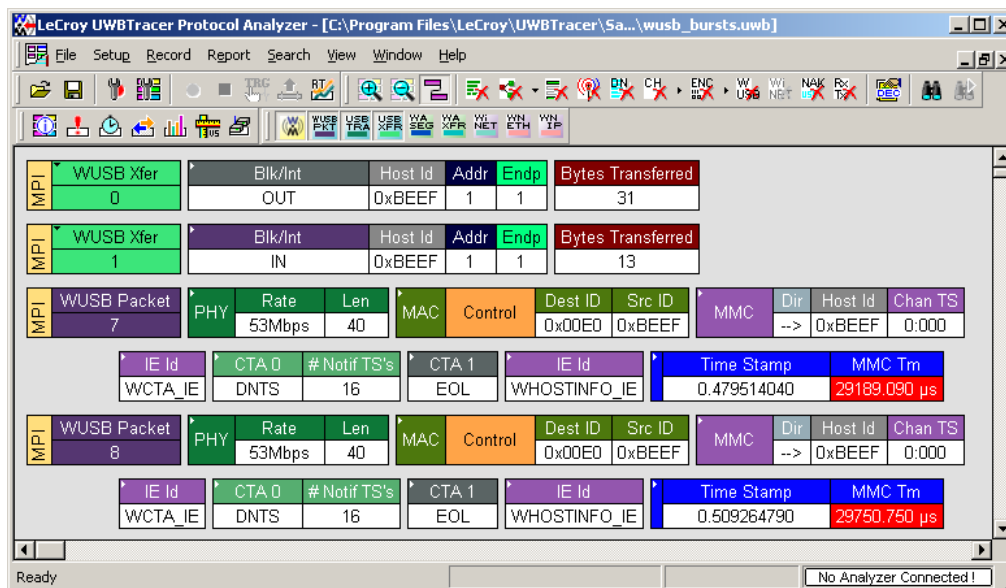
Figure 4.6 Trace View: WUSB Transfer Level

WUSB Wire Adapter Segment Level

Click the **WASEG** button to show the WUSB Wire Adapter Segment Level view. An example wire adapter segment level is in Figure 4.7.
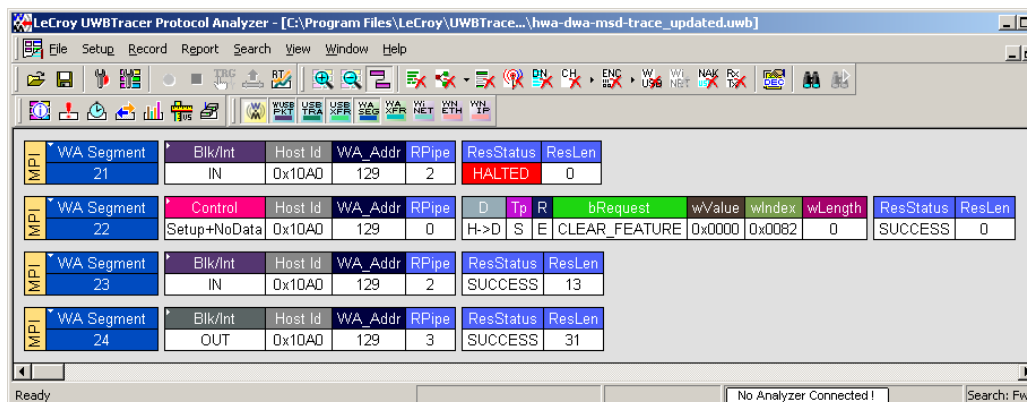
Figure 4.7 Trace View: WUSB Wire Adapter Segment Level

WUSB Wire Adapter Transfer Level

Click the **WAXFR** button to show the WUSB Wire Adapter Transfer Level view. An
example wire adapter transfer level is in Figure 4.8.
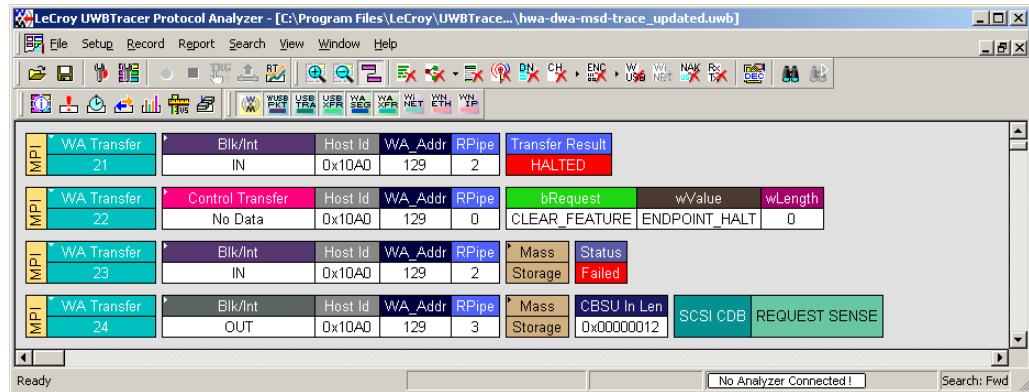
Figure 4.8 Trace View: WUSB Wire Adapter Transfer Level

4.4 Trace Level Views for WiNet

You can display traces at these viewing levels, listed from lowest to highest:

*   WiMedia Frames [default]
*   WiNet Frames (WiNET)
*   WiNet Ethernet Protocol Units (WN ETH)
*   WiNet IP Protocol Units (WN IP)

WiMedia Frame Level
The WiMedia Frame view is the default decode level. It shows the WiMedia Frame Raw Payload and PHY/MAC Headers. An example WiMedia Frame level is in Figure 4.9.

Figure 4.9 Trace View: WiMedia Frame Level

WiNet Frame Level

Click the **WiNET** button to show the WiNet Frame view. An example WiNet Frame level is in Figure 4.10.
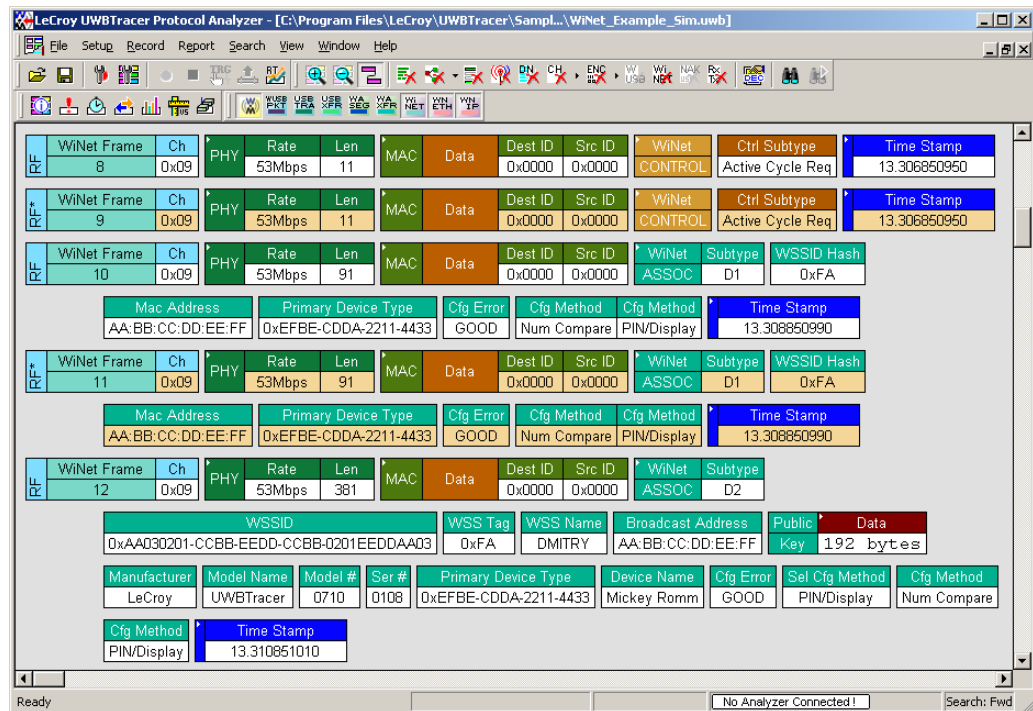

Figure 4.10 Trace View: WiNet Frame Level

WiNet Ethernet Protocol Unit Level

Click the **WN ETH** button to show the WiNet Ethernet Protocol Unit Level view. An example WiNet Ethernet Protocol Unit Level is in Figure 4.11.
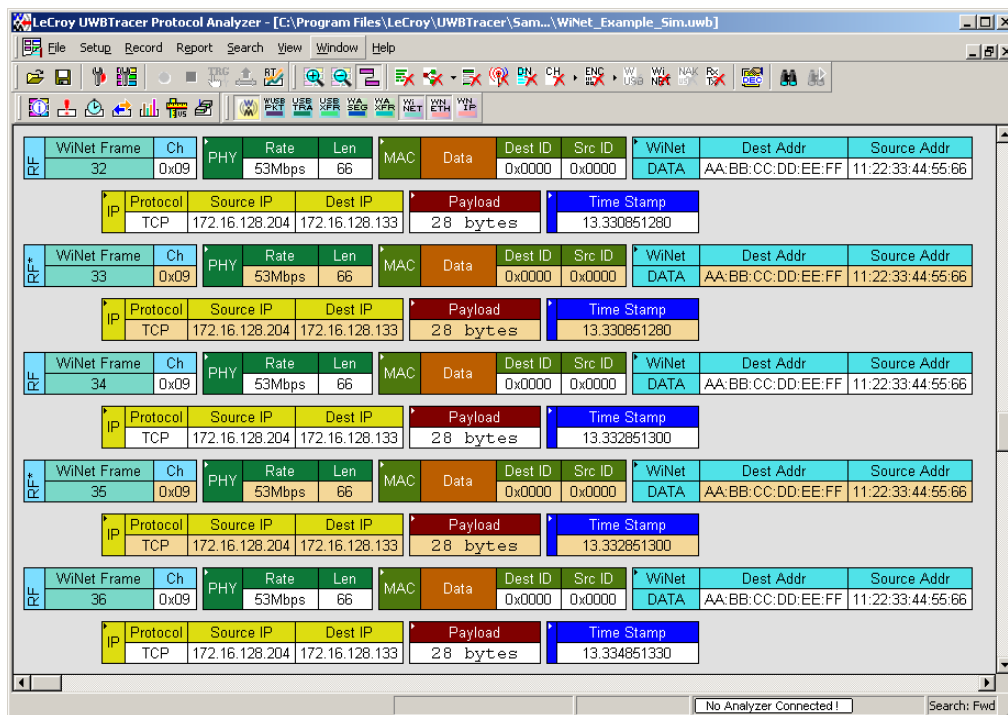

Figure 4.11 Trace View: WiNet Ethernet Protocol Unit Level

WiNet IP Protocol Unit Level

Click the **WN IP** button to show the WiNet IP Protocol Unit Level view. An example transaction level is in Figure 4.12.
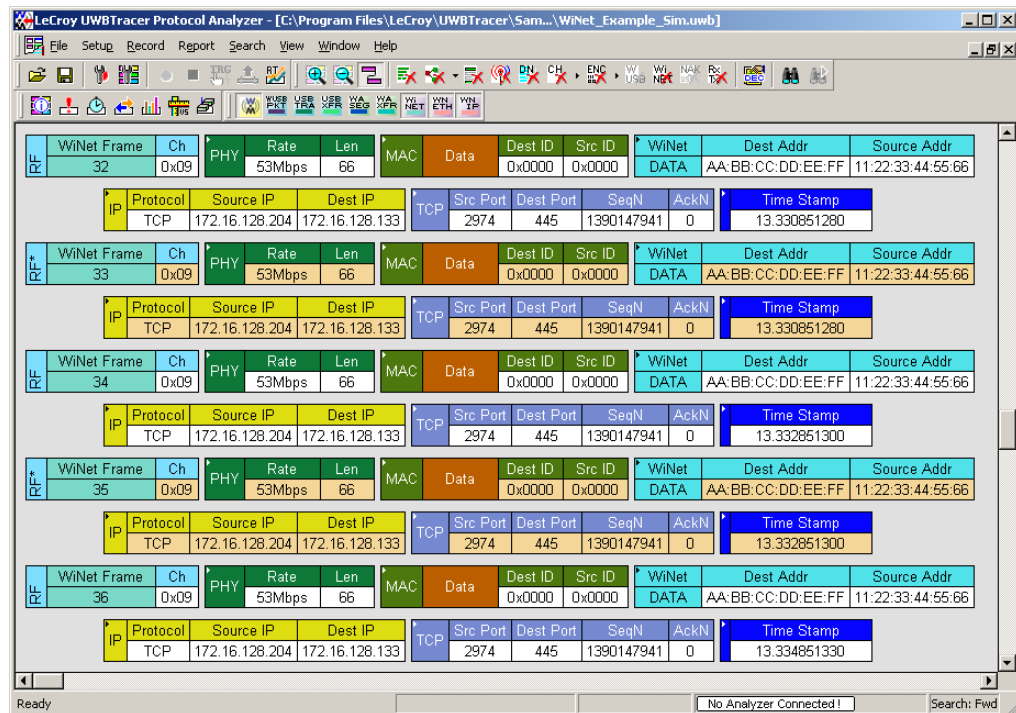

Figure 4.12 Trace View: WiNet IP Protocol Unit Level

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Chapter 5: Searching Traces

This chapter describes how to search for trace events.

5.1 Trace Search Overview

UWB*Tracer/Trainer™* has several search commands that let you navigate a trace view to search for key events, such as errors and triggers. The commands are on the Search menu (Figure 5.1).

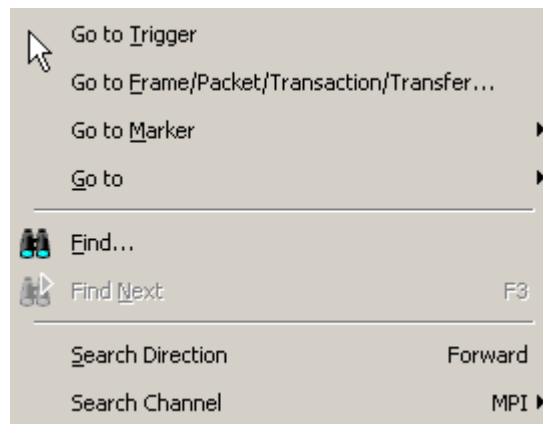To view the search options, click **Search** in the Menu bar.

Figure 5.1   Search Menu

You can:

- Change the Search Direction to Forward or Backward
- Select the MPI Channel, RF Channel, or All Channel

5.2 Go to Trigger

To display a trigger event, select **Go to Trigger** from the Search menu.

The trace view is repositioned with the first frame following the trigger event (or the frame that caused the trigger) at the top of your screen.

5.3 Go to Frame/Packet/Transaction/Transfer

To display a specific frame or decode level, follow these steps:

Step 1 From the Search menu, select**:**

Go to Frame/Packet/Transaction/Transfer
to display the Go to PLCP/Packet/Transaction/Transfer dialog box (Figure 5.2):
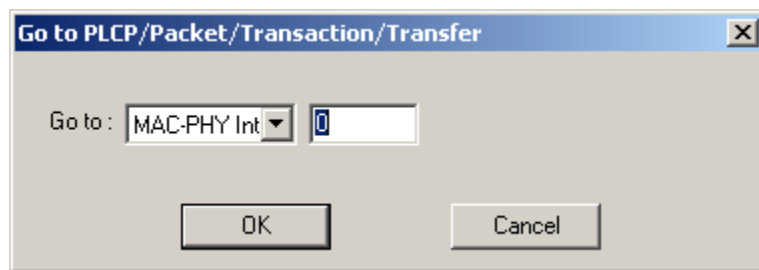

Figure 5.2 Go To PLCP/Packet/Transaction/Transfer Dialog Box

Step 2 Select the trace level view in the Go to field from the drop-down list.

Step 3 Enter the number of the frame, packet, transaction, segment, or transfer.

Step 4 Click **OK.**

The trace view shows the selected item at the top of the main window.

5.4 Go to Marker

To instruct the analyzer to display a marked frame, follow these steps:

Step 1 From the Search menu**,** select **Go to Marker** (Figure 5.3).
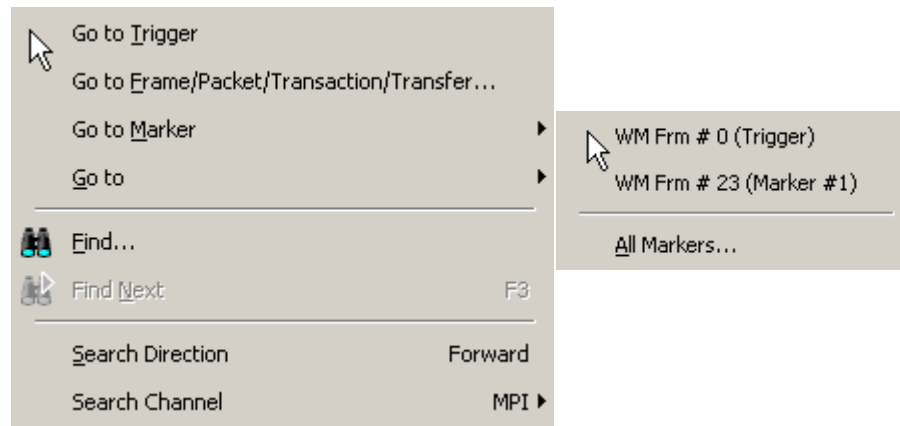

Figure 5.3 Selecting Go to Marker

Step 2 Select a frame or packet number from the listed markers. Alternatively, select **All Markers** to open the All Markers dialog box (see figure 5.17, "All Markers Window"), select a marker, and then click **Select**.

The trace view displays the selected item at the top of the main window.

Note: The **Go to Marker** feature functions in conjunction with the **Set Marker** feature. The comments within the parentheses following each marked Frame are added or edited with the **Set Marker** feature.

5.5 Go to

The **Go to** feature takes you directly to an item in the trace. After you select Go to, select the item from the listed items (Figure 5.4).
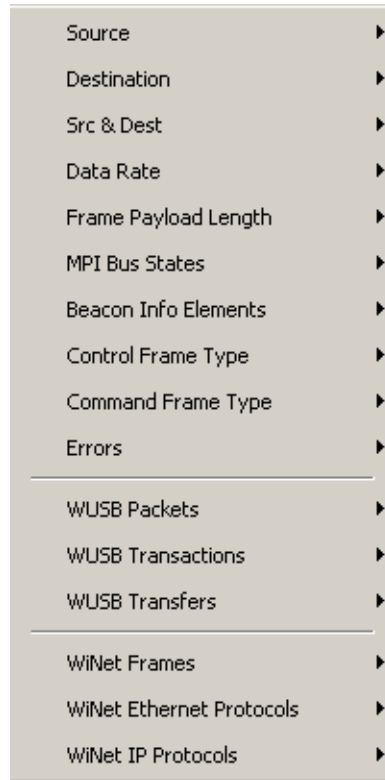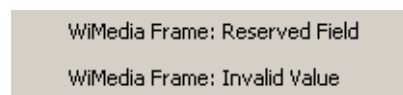

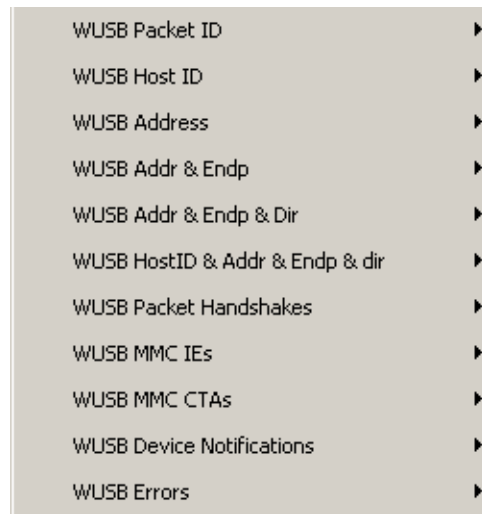**Figure 5.4   Go to Items List**

Figure 5.5   Go to Errors List

Figure 5.6 Go to WUSB Packets List
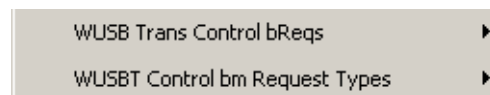

Figure 5.7 Go to WUSB Transactions List

Figure 5.8 Go to WUSB Transfers List

Frame Type ▶
Source EUI48 ▶
Dest EUI48 ▶
Src & Dest EUI48 ▶
WSS Tag ▶
Control Sub Type ▶
Association Sub Type ▶
Type / Length ▶

Figure 5.9 Go to WiNet Frames List

ARP Hdw Space ▶
ARP Ptcl Space ▶
ARP Opcode ▶

IPv4 Source Addr ▶
IPv4 Dest Addr ▶
IPv4 Src & Dest Addr ▶
IPv4 Protocol ▶

IPv6 Source Addr ▶
IPv6 Dest Addr ▶
IPv6 Src & Dest Addr ▶
IPv6 Next Header ▶

Figure 5.10 Go to WiNet Ethernet Protocols List

TCP Source Port ▶
TCP Dest Port ▶
TCP Src & Dest Port ▶

UDP Source Port ▶
UDP Dest Port ▶
UDP Src & Dest Port ▶

Figure 5.11 Go to WiNet IP Protocols List

5.6 Find

Find is a utility that allows you to conduct searches of one or more events in a trace. Find allows you to search for any of the WUSB and WiNet hierarchical levels within the trace.

To use Find:

• Select **Find...** under Search on the Menu bar

   OR

• Click 🔍 in the Tool Bar.
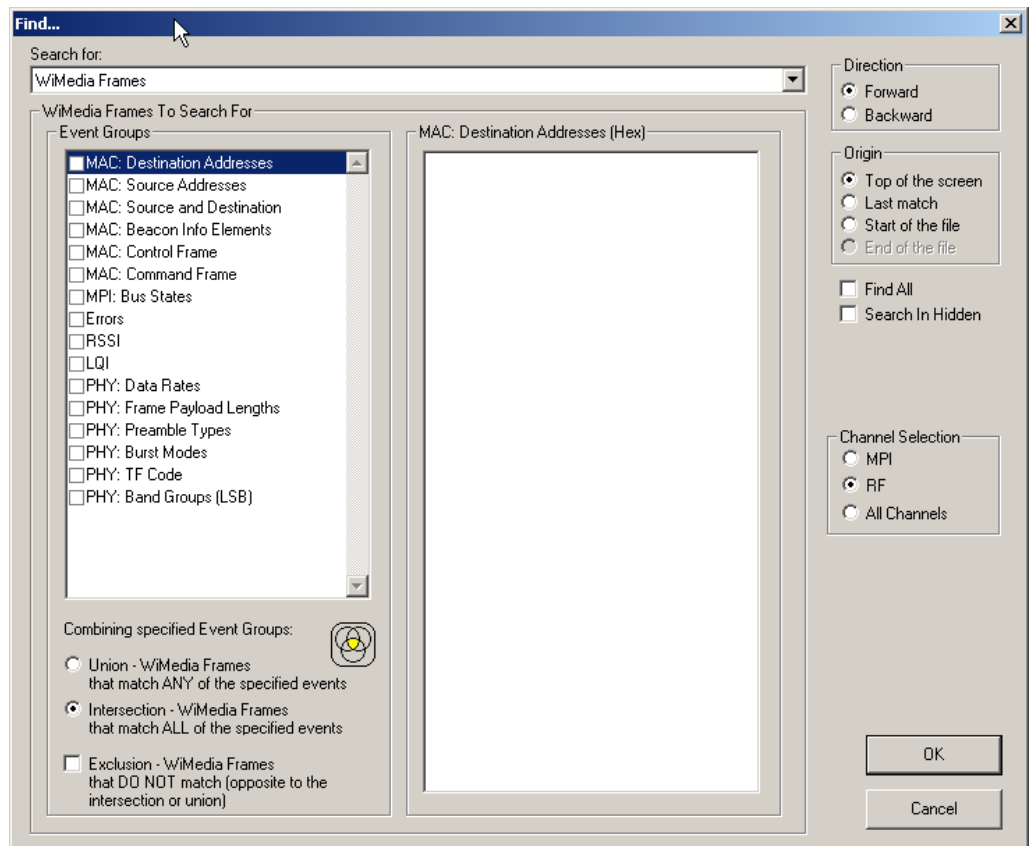
You see the Find window (Figure 5.12).

Figure 5.12 Find Window, Frames Checkboxes

Areas in Find Window

The **Find** window has three areas: Event Groups pane, a Context area to the right of the Event Groups pane (whose contents vary depending on items in the pane), and a Direction/Origin area at the right in the window.

Event Groups Pane

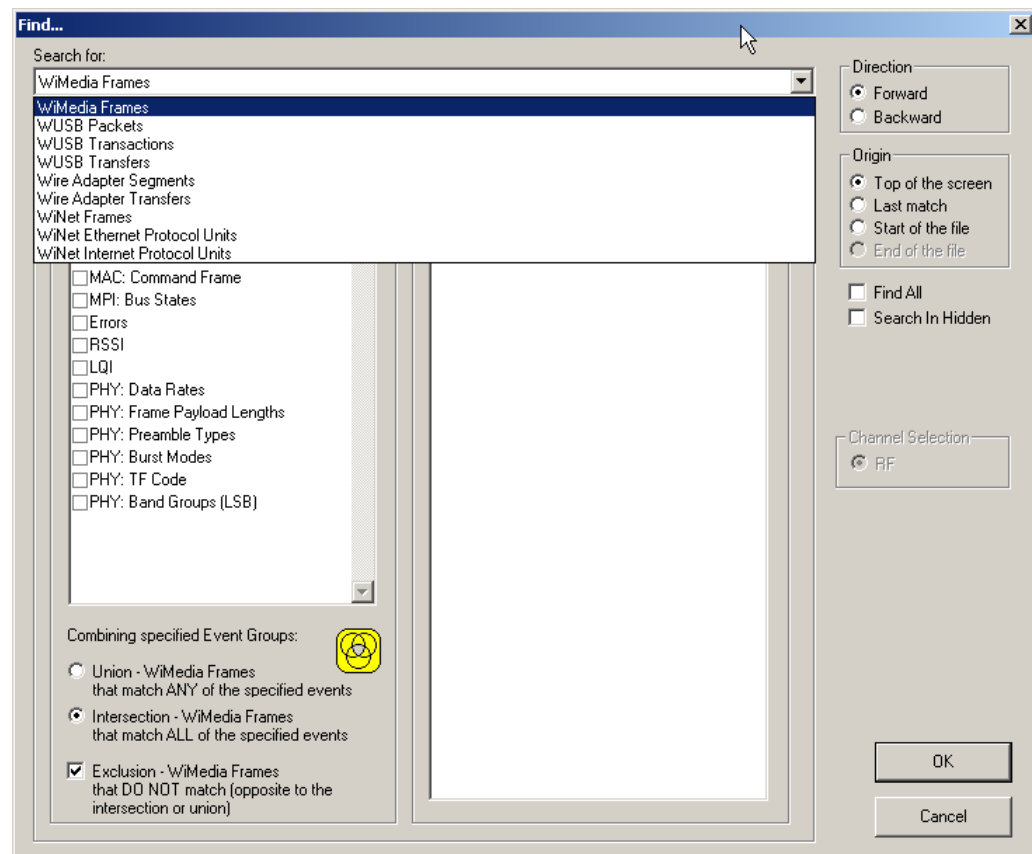The left area allows you to specify the events to find in the search.

Figure 5.13 Find Events Window, Search For Drop-down List

Use the Search For drop-down list to select the event type:

- WiMedia Frames
- WUSB Packets
- WUSB Transactions
- WUSB Transfers
- Wire Adapter Segments
- Wire Adapter Transfers
- WiNet Frames
- WiNet Ethernet Protocol Units
- WiNet Internet Protocol Units

For each Search For event, you can select as many checkboxes as desired (for multiple search events).
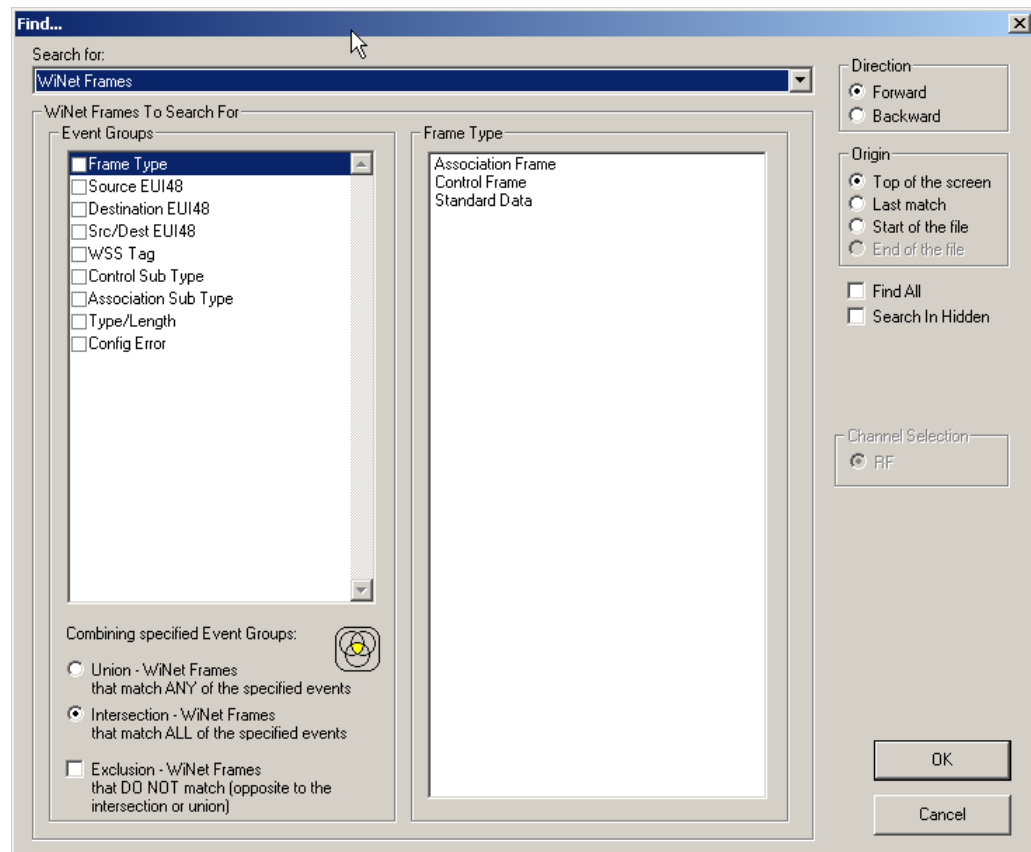
For WiNet Frames:

Figure 5.14 Find Events Window, WiNet Frames Checkboxes
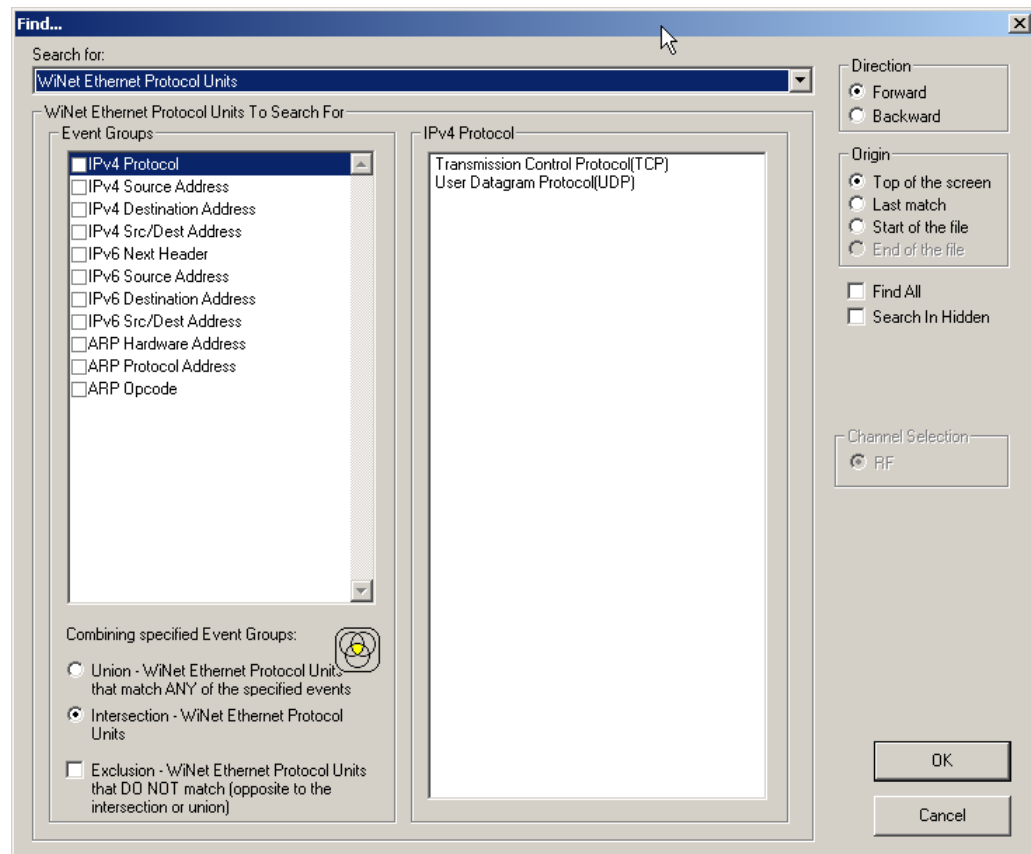
For WiNet Ethernet Protocol Units:

Figure 5.15 Find Events Window, WiNet Ethernet Protocol Units Checkboxes
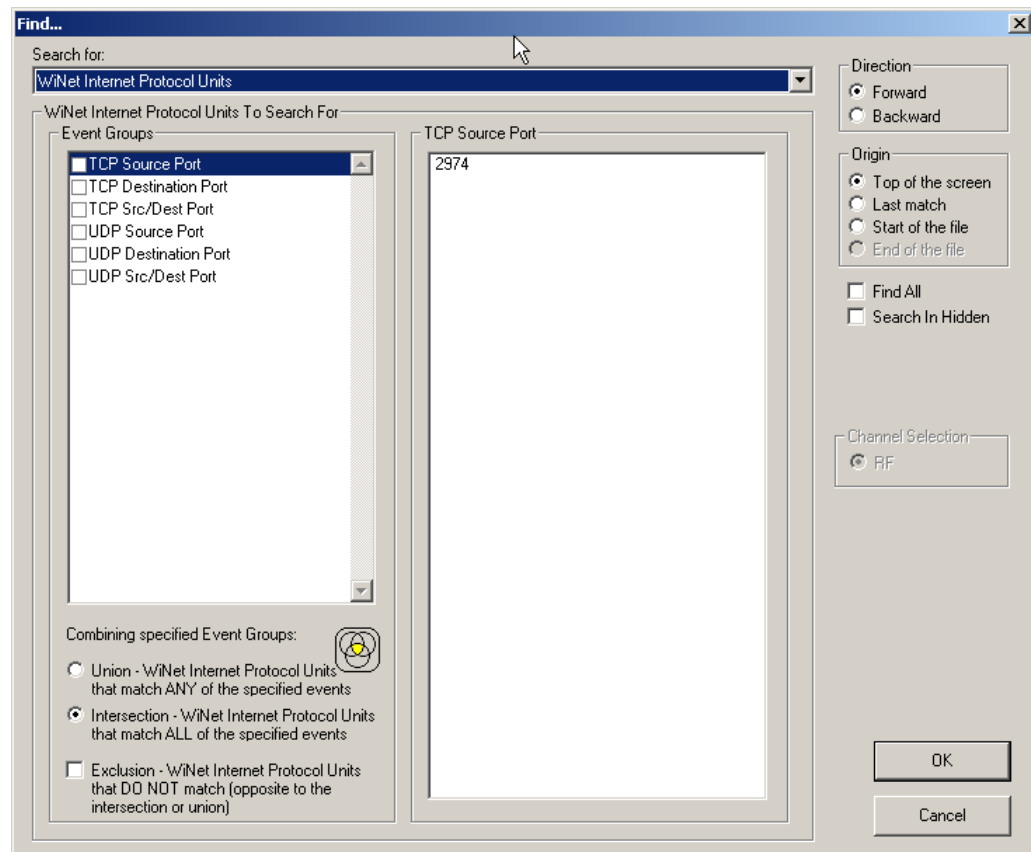
For WiNet Internet Protocol Units:

**Figure 5.16 Find Events Window, WiNet Internet Protocol Units
Checkboxes**

You also can combine specified event groups, meaning you can use logical relationships in your search: OR, AND, and NOT:

* **Union:** OR relationship. A Find operation searches for frames that include any of the items selected in the Event Groups pane.

* **Intersection:** AND relationship. A Find operation searches for only those frames that match all the items selected in the Event Groups pane.

* **Exclusion:** NOT relationship. A Find operation searches for frames that do not match any of the items selected in the Event Groups pane.

Context area

The central area provides further selection criteria for the Event Group active in the Event Groups pane. For example, in Figure 5.12, the MAC Destination Addresses Event Group is currently active (selected). The context area lets you select a range of MAC addresses. In Figure 5.17, the PHY Data Rates is the active Event group. A different display appears in the context area.
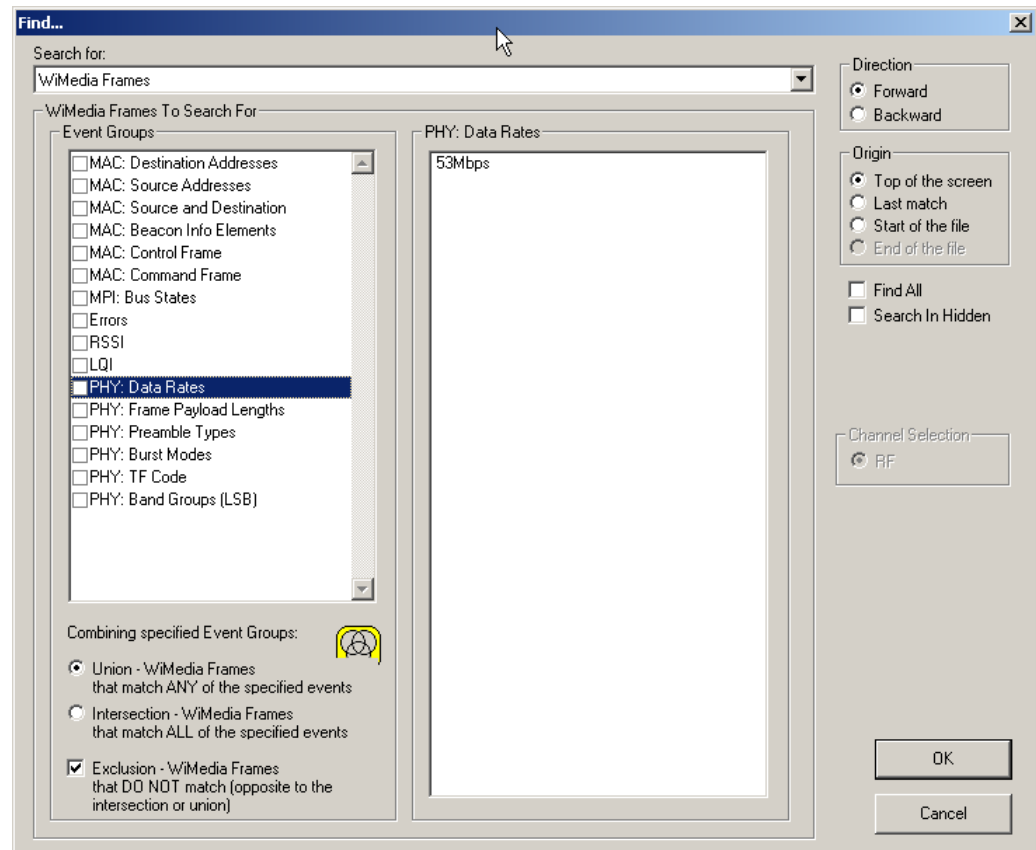

Figure 5.17 Find Events Window: PHY Data Rates Active

Direction/Origin

The radio buttons and checkboxes in the right part of the Find window let you specify where you want to start the search and search direction:

- **Direction:** You can search forward or backward in the file.
- **Origin:** You can choose the point-of-origin for the search.
- **Find All:** You can extract every instance of the search criteria into a separate view.
- **Search in Hidden:** You can search in frame elements that are hidden in the display as well as frame elements that are visible.
- **Channel Selection**: If available, choose the MPI Channel, RF Channel, or Both.

Chapter 6: Display Options

You can select what information to display in Trace Views using the **Display Options** window or the display options buttons on the Tool bar (see Section 3.8, "Tool Bar" on page 26).

To open the **Display Options** window:

• Select **Display Options** under **Setup** on the Menu Bar.
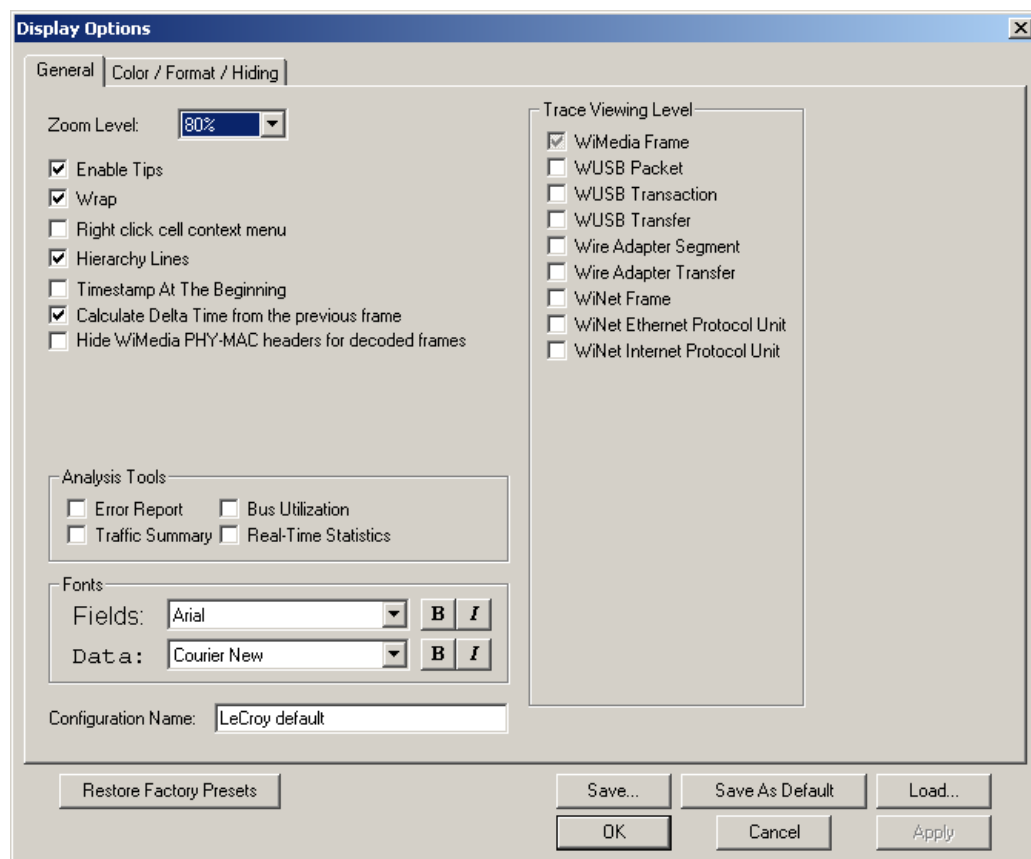   OR

• Click [icon] on the Tool Bar.

Figure 6.1 Display Options Window: General Page

You can select General and Color/Format/Hiding display options. The following sections describe these display options.

6.1 Display Options: General

You specify the main Trace View information types and settings using General tab of Display Options (see figure on previous page):

- **Zoom Level**: Zooms out from 100% (default) to 10% or zooms in from 100% to 200%.
- **Enable Tips**: Pops up text when you position the cursor over a field.
- **Wrap**: Wraps lines of traffic information instead of truncating lines at the right edge of the display.
- **Right click cell context menu**: By default, clicking the left mouse button on a field heading displays a context-sensitive pop-up menu providing commands about the field and clicking the right mouse button pops up a menu with display options. After selecting this option, clicking the right mouse button on a field heading displays the context-sensitive pop-up menu and clicking the left mouse button does nothing.
- **Hierarchy Lines**: Displays lines on the left side of Trace View showing the hierarchy from Packets to Transactions to Transfers if you show higher-level decodes.
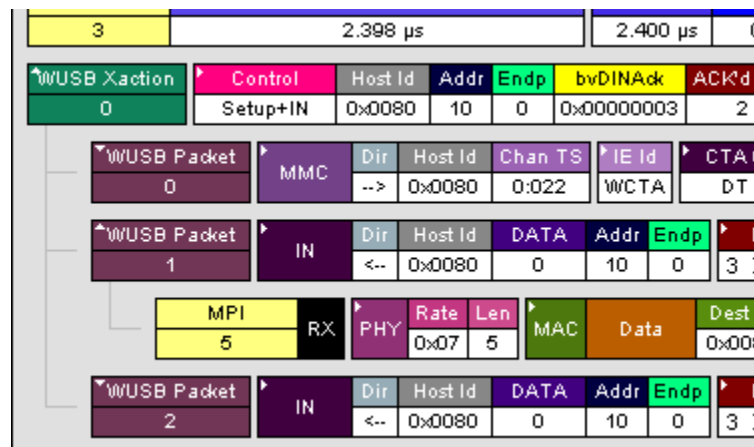

Figure 6.2 Hierarchy Lines

- **Timestamp At The Beginning**: Aligns the Timestamp field in a column on the left side of the Trace View. Selecting this option allows easier comparison with previous or following timestamps.
- **Calculate Delta Time from the Previous Frame**: Compute the time difference from the previous frame.
- **Hide WiMedia PHY-MAC headers for decoded frames**: Hide the headers of decoded frames.
- **Trace Viewing Level**: Displays WiMedia Frame, WUSB Packet, WUSB Transaction, WUSB Transfer, Wire Adapter Segment, Wire Adapter Transfer, WiNet Frame, WiNet Ethernet Protocol Unit, and WiNet Internet Protocol Unit.
- **Error Report**: Displays the Errors section of the Traffic Summary window.
- **Traffic Summary**: Displays the Traffic Summary window, showing all reports, including Packets, Transactions, Transfers, and Errors.

- **Bus Utilization**: Displays the Bus Utilization window, including Packet length, Bus usage, and Bus usage by device.
- **Real-Time Statistics**: Displays the Real-Time Statistics window, including Data Packet Count, Data Payload Throughput, and Bus Usage.
- **Fonts**: Sets the font type and bold or italic style for Fields and Data.
- **Configuration Name**: You can name the current set of Display Options values for use with an **.opt** file. (The options file can have a different name.)
- **Restore Factory Presets**: Sets all Display Options values to the installed values.

6.2 Display Options: Color, Format, and Hiding

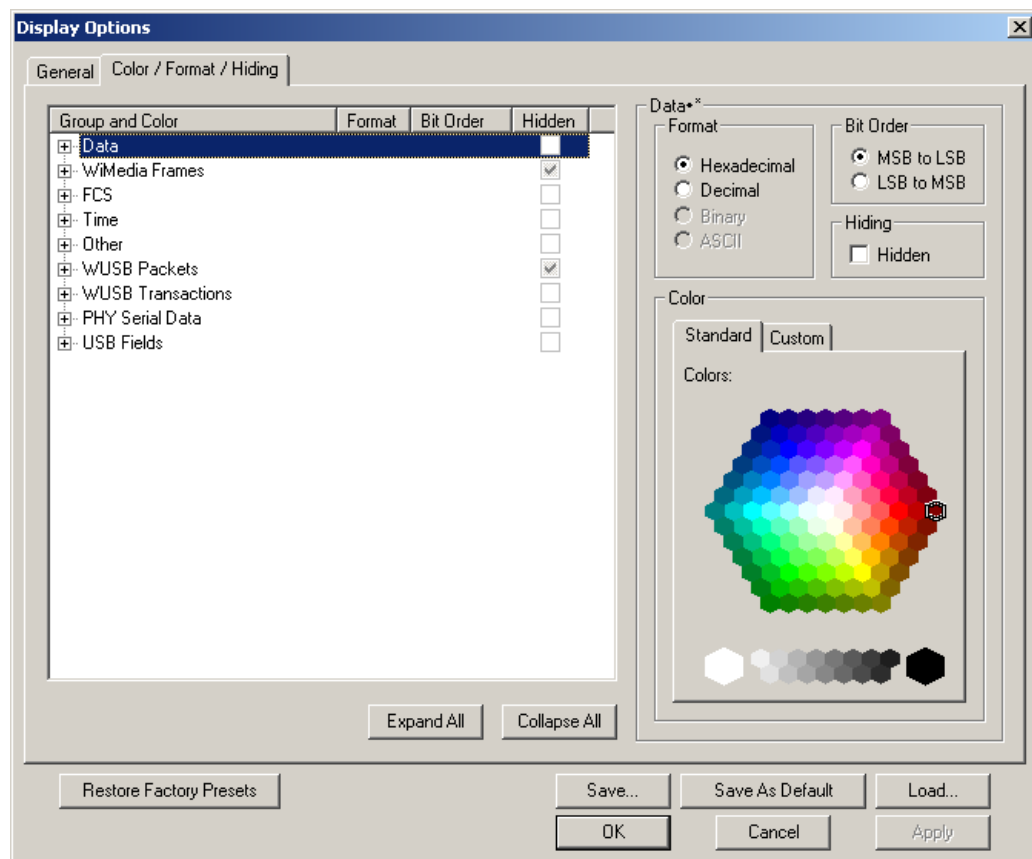To modify the colors, formats, and hiding options, select the Color/Format/Hiding tab.

Figure 6.3 Display Options Window: Color, Format, and Hiding Page

Setting Colors

The program uses a default set of colors for each type of data in each group of data. The colors and color combinations are appropriate for most graphic systems. You can alter any color.

To specify a color for an information type, in the Color/Format/Hiding tab, select a row (such as Data) in the Group and Color column and expand it (see Figure 6.2).

Select a data type (such as Data Length) in the Group, then select a color in the Color section, using Standard or Custom colors. Use a bright color for each important field

To customize colors, use the Custom tab.

Note: You cannot change color of an Invalid Data (packet error) field. It is permanently set to red.

Changing Field Formats

For each type of data in each group of data, the program has a default data format. Examples of number data formats are Bin (binary), Dec (decimal), and Hex (hexadecimal). Examples of date and time data formats are Hex uFrame, Dec uFrame, Date & Time, Time, Bit Time, seconds, microseconds, and nanoseconds. An example of a text data format is ASCII. You can alter some data formats.

To specify a data format for an information type, in the Color/Format/Hiding tab, select a row (such as Data) in the Group and Color column and expand it.

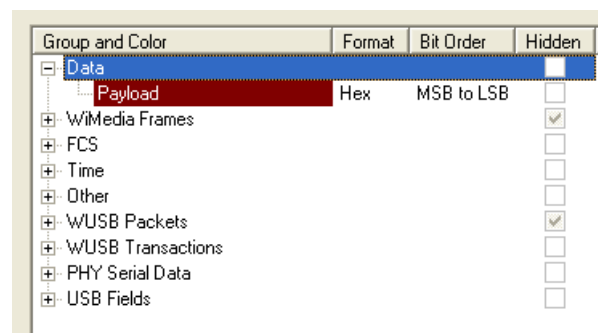Select a data type (such as Payload) in the Group:

Figure 6.4 Group and Color Pane: Display Units Selected

Select a format in the Format section. The following formats are available for Payload:
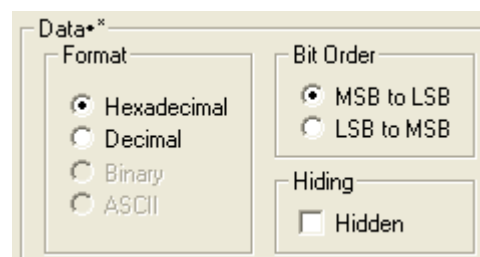

Figure 6.5 Formats for Payload

If available, select Bit Order in the Format section. The options are MSB to LSB or LSB to MSB.

Hiding Fields

To hide one or more fields, select the Group and Data type in the Group and Color column, then click the Hidden checkbox in the display or the Hidden checkbox in the Hiding section of the Format section.
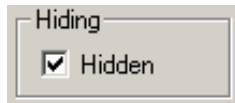

Figure 6.6 Hidden Check Box

6.3 Saving Display Options

You can save a set of Display Options values, make a set the default settings, or use a saved set of values with the commands at the bottom of the **Display Options** window:

- To save the current Display Options values in an options file for use in future sessions, click **Save**. Enter a file name without a file name extension. The program adds the **.opt** extension. (The file must have an **.opt** file name extension.)

- To load a previously saved **.opt** file, click **Load** and select a file name.

- To save the current Display Options values in the **default.opt** options file for use as the default display options, click **Save as Default**. (Do not delete the **default.opt** file.)

- To apply the current Display Options values, click **Apply**. The Display Options window remains open.

- To apply the current Display Options values and close the Display Options window, click **OK**.

- To cancel unsaved changes to display values and exit the Display Options window, click **Cancel**.

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