

Agilent E2951A/E2952A Analyzer InfiniBand

## User Guide



**Agilent Technologies**

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## Safety Summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies Inc. assumes no liability for the customer's failure to comply with these requirements.

### General

This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

All Light Emitting Diodes (LEDs) used in this product are Class 1 LEDs as per IEC 60825-1.

### Environmental Conditions

This instrument is intended for indoor use in an installation category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 95% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

### Before Applying Power

Verify that the product is set to match the available line voltage, the correct fuse is installed, and all safety precautions are taken. Note the instrument's external markings described under "Safety Symbols" on page 8.

### Ground the Instrument

To minimize shock hazard, the instrument chassis and cover must be connected to an electrical protective earth ground. The instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.



Parts of the instrument marked with this symbol are subject to damage by static electricity. In order to protect against electrostatic discharge to the instrument use static-free work stations.

### Safety Symbols



Caution (refer to accompanying documents)



Protective earth (ground) terminal

In the manuals:

## WARNING

Warnings call attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury or loss of life. Do not proceed beyond a Warning until the indicated conditions are fully understood and met.

## CAUTION

Cautions call attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the equipment. Do not proceed beyond a Caution until the indicated conditions are fully understood and met.

## Cleaning Recommendation

## WARNING

To prevent electrical shock, disconnect the instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean external case parts. Do not attempt to clean internally.

## Documentation History

All Editions and Updates of this manual and their creation date are listed below. The first Edition of the manual is Edition 1. The Edition number increments by 1 whenever the manual is revised. New Editions are complete revisions of the guide reflecting alterations in the functionality of the instrument. Updates are occasionally made to the guide between editions.

Edition 1.0 March 2001

Edition 1.1 July 2001

Edition 1.2 December 2001

Edition 1.3 April 2002

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# Contents

Overview	7
General Description	8
Analyzer PC Requirements	8
Configuration and Controlling	10
Features	11
General	11
Display Options	13
InfiniBand BusEngine	13
Getting Started with the Analyzer for InfiniBand	15
Quick Installation	15
Setting Up the Analyzer	16
Installing the Software	16
Your First InfiniBand Recording	17
Detailed Installation	20
System Components/Packing List	20
The Analyzer for InfiniBand Unit	21
Analyzer for InfiniBand System Setup	24
AC Power Source	24
PC Connection	24
Analyzer for InfiniBand Program Installation	25
Analyzer for InfiniBand Program Startup	26
Making a Recording	27

<b>Updating the E2951A/E2952A Analyzer for InfiniBand</b>	29
How to Get the Latest Software, Firmware, and BusEngine Revisions	29
How to Update the Software	31
How to Update BusEngine and Firmware	32
Automatic Updates	32
Manual Updates to BusEngine and Firmware	35
<b>Recording the Trace Information</b>	37
Setting the Recording Options	37
Opening the Recording Options Dialog Box	38
Saving Recording Options	39
Recording InfiniBand Traffic	40
Recording Progress	41
Resolving Reliable Connections	42
Displaying Real-Time Statistics	43
Customizing the Real-Time Statistics window	44
Working with Multiple Graphs in the Real-Time Statistics Window	45
Real-Time Statistics Buttons	46
<b>Specifying the Display of Recorded Trace Information</b>	47
Saving Display Options	48
Color Display Options	49
Formats Display Options	52
Hiding	53
Headers	57

<b>Reading an Agilent Trace</b>	<b>59</b>
<hr/>	
Trace View Features	59
Tool Tips	60
Set Marker	61
Edit or Clear Marker	62
Expanded and Collapsed Field Formats	63
Changing the Decoding Assignments for ADP and SRP connections	65
<b>Working with Reports</b>	<b>67</b>
<hr/>	
Displaying File Information	67
Displaying the Error Summary	69
Calculating Timing and Bandwidth Parameters	70
Displaying the Traffic Summary	71
Displaying Parameters of Bus Utilization	72
Customizing the Bus Utilization Window	73
Working with Multiple Graphs in the Bus Utilization Window	74
Bus Utilization Buttons	76
<b>Exporting InfiniBand Data</b>	<b>77</b>
<hr/>	
Exporting Packets into Text Files	78
Exporting InfiniBand data	79

Windows And Dialog Boxes Reference	81
Software Overview	81
The Main Display Menus	81
View Options	84
The Status Bar	86
Tool Tips	88
Analyzer for InfiniBand Keyboard Shortcuts	88
General Display Options	89
Recording Options	91
Recording Options - General	91
Recording Options - Events	95
Recording Options - Actions	111
Other Features	116
Search	116
Display Raw 10b Code	121
Edit Comment	121
Specifications	123
Operating Characteristics	123
Certification	124
Power Requirements	126

# Overview

The Agilent E2951A/E2952A Analyzer for InfiniBand is the newest member in Agilent Technologies' industry-leading line of high performance protocol analyzers.



The Agilent E2951A/E2952A Analyzer for InfiniBand is an ideal tool to analyze InfiniBand link data. Development Engineers will rely on the Analyzer for InfiniBand to resolve software, firmware and hardware problems encountered in the development of InfiniBand devices, host channel adapters and switches. Using the Analyzer for InfiniBand, Test and Quality Assurance Engineers will verify correct operation of InfiniBand products as well as compliance to the standard. In addition to these applications, anyone involved with the InfiniBand standard will use the Analyzer for InfiniBand Application as a stand-alone viewer to understand the InfiniBand protocol and to facilitate system level discussions and problem resolution of applications employing InfiniBand technology.

Please refer to the InfiniBand Specification, version 1.0a for details on the InfiniBand protocol. The InfiniBand specification is available from the InfiniBand Trade Association at its Web site

<http://www.infinibandta.org/>

## General Description

The Agilent E2951A/E2952A Analyzer for InfiniBand is a hardware unit for analyzing InfiniBand link data. Once installed, the Analyzer for InfiniBand can be easily configured and controlled by a portable or desktop PC connected via its USB port.

The Analyzer for InfiniBand is a non-intrusive testing tool for the InfiniBand protocol providing traffic capture and analysis. Hardware triggering allows real-time events to be captured. Hardware filtering allows the different types of packets to be filtered in or out of the recording. Filtering allows users to focus recordings on events of interest and to preserve recording memory so that the recording time can be extended.

Recorded data is presented in colored graphics in a trace viewer application. This application has advanced search and viewing capabilities that allow the user to quickly locate specific data, errors and other desired conditions, thereby focussing the user's attention on events of interest.

## Analyzer PC Requirements

The Analyzer for InfiniBand functions with any personal computer that meets the following requirements:

Please ensure that your PC complies with these requirements:

- Microsoft Windows 98<sup>®</sup>, Windows ME<sup>®</sup>, Windows 2000<sup>®</sup> or Windows XP<sup>®</sup> for recording and viewing traffic



**NOTE** On Windows NT<sup>®</sup> systems, only demo/offline mode is possible.

- At least 20 MB hard disk space, plus additional memory for recordings (as much as 800 MB when recording a full buffer size)

- Equipped with a USB port 2.0

All communications between the PC and the Analyzer is passed through a USB cable. If the PC is being used only as a trace viewer, the USB port is not necessary.

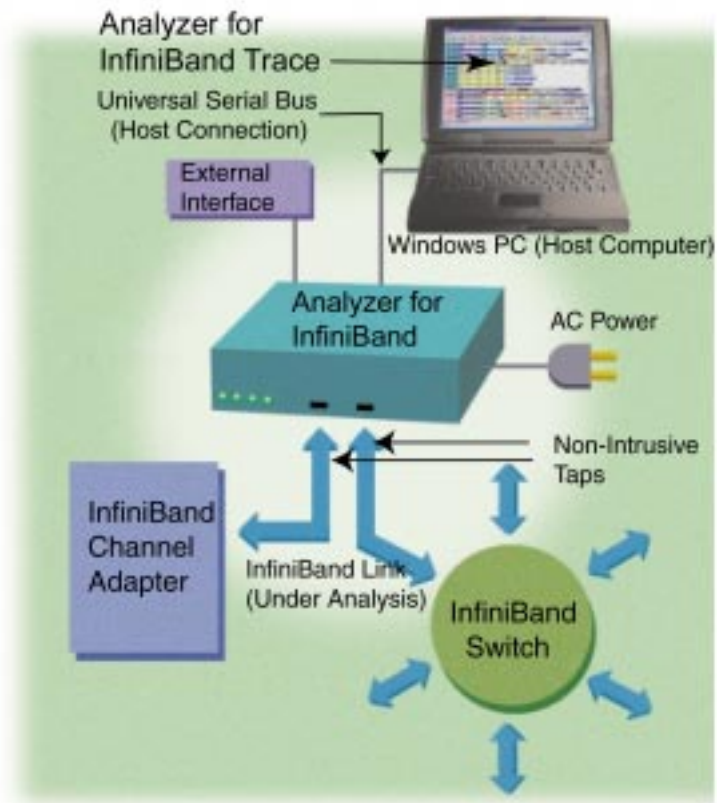
- Physical RAM of at least 128 MB

The amount you use should be double the amount of your largest recording — for example, if you plan to make 512 MB recordings, then your PC should have at least 1024 MB RAM.

- Monitor resolution at least 800x600 with thousands of colors

# Configuration and Controlling

The E2951A/E2952A Analyzer for InfiniBand is controlled from a personal computer USB port across a USB connection.



The Analyzer for InfiniBand provides on-the-fly detection of and triggering on such events as Packet Headers and Errors. Whether recording manually or with a specified trigger condition, the Analyzer for InfiniBand continuously records the link data in a wrap-around fashion until manually stopped or until the trigger event is detected and a specified post-trigger amount of link data is recorded.

Upon detection of a triggering event, the E2951A/E2952A Analyzer for InfiniBand continues to record data up to a point specified by the user. Real-time detection of events can be individually enabled or disabled to allow triggering on events as they happen. This includes predefined exception or error conditions and a user-defined set of trigger events.

The Analyzer for InfiniBand software provides powerful search functions that enable investigation of particular events and allow the software to identify and highlight specific events. In addition to immediate analysis, you can print any part of the data. Use the *Save As* feature to save the data on disk for later viewing. The program also provides a variety of timing information and data analysis reports.

## Features

The E2951A/E2952A Analyzer for InfiniBand provides a lot of useful hard- and software features.

### General

The general features of the Analyzer for InfiniBand are:

- Upgradeable firmware and recording engine
- Software operates stand-alone on any Microsoft Windows 98 or later computer as a “Trace Viewer”
- Link and data packets are displayed and fully decoded
- 10b encoding as reference for every packet
- Training sequences are displayed
- Transport level functions are fully decoded with a graphical illustration of the comprised packets and messages
- Errors at the physical, link and transport levels are highlighted in red
- On-line and context sensitive help
- The E2951A/E2952A can be administered by any desktop or portable Microsoft Windows-based computer with USB capability

## Physical Components

The E2951A/E2952A Analyzer for InfiniBand provides the following physical components:

- The Analyzer for InfiniBand unit
- Convenient Plug-and-Play USB installation
- Taps non-intrusively between two 2.5 Gbit/sec for the E2951A or 10 Gbit/sec for the E2952A InfiniBand ports using two standard cables
- External interface for probing and monitoring auxiliary digital signals and for cross triggering between other test instruments

## Recording Options

The Analyzer Software can record InfiniBand data, timing and control information. The E2951A can store up to 512 MB, the E2952A up to 2 GB. Additionally, the software provides the following features:

- Three recording modes: snapshot, manual trigger, and event trigger
- Selectable recording buffer size and trigger position
- Record the full data rate of a single 1x, 2.5 Gbit/sec (E2951A) or 4X, 10 Gbit/sec (E2952A) InfiniBand link
- Trigger on InfiniBand conditions like link training sequences or cable disconnect events
- Trigger on a comprehensive list of error conditions like running disparity, bad packets or bad variant or invariant CRCs
- Trigger on a sequence of packets to capture messages and transport level events
- Programmable triggering based on bit-wise pattern matching of InfiniBand headers and data payloads
- Optionally filter captured data or truncate long data payload

## Display Options

The Display Options offer various settings and features:

- Extensive use of color and graphics within the trace
- Packet errors and protocol violations are highlighted in red
- Skip ordered sets between packets are counted and an error marked when they are missed
- Packet color clearly indicates position before or after the trigger point
- Packets can be marked with text annotations that become tool-tips for future reference
- Tool-tips with complete definitions of most fields
- Search, show or hide only the data of interest using InfiniBand-specific criteria
- Packets are accurately time-stamped (1 symbol time or 4 ns resolution)
- Measure time, throughput or responsiveness between packet markers or relative to the trigger position

## InfiniBand BusEngine

The BusEngine™ Technology is at the heart of the new Analyzer for InfiniBand. The revolutionary BusEngine core uses state-of-the-art Electrically Programmable Logic Device (EPLD) technology and incorporates both the real-time recording engine and the configureable building blocks that implement data/state/error detection, triggering, capture filtering, external signal monitoring and event counting and sequencing. Like the flash-memory-based firmware that controls its operation, all BusEngine logic is fully field upgradeable. You can download the newest configuration files and software from the Agilent Technologies Web site ([www.agilent.com/find/infiniband](http://www.agilent.com/find/infiniband)).





# Getting Started with the Analyzer for InfiniBand

In this chapter you will learn how to install and use the Analyzer for InfiniBand and its software. You will also record your first InfiniBand data.

## Quick Installation

The Analyzer for InfiniBand is easily installed on most Windows-based personal computer systems. You can begin making InfiniBand™ recordings after following these initial steps. However, if you are unsure about what to do after reading the Quick Installation instructions, or if your analyzer does not work after you follow these instructions, read through the subsequent sections in this manual.

## Setting Up the Analyzer

To set up the Analyzer for InfiniBand please follow these steps:

- 1 Remove the Analyzer for InfiniBand from its shipping container.
- 2 Connect the AC power cable to the rear of the unit.
- 3 Turn on the power switch on the rear of the Analyzer.
- 4 Insert the Analyzer CD-ROM into the PC that will be controlling the Analyzer.
- 5 Connect the USB cable between the USB port on the back of the Analyzer and a USB port on the PC.

**NOTE** The USB port on the host PC must be at least a USB 1.1 port. A USB 2.0 port is recommended.

- 6 Follow on-screen plug-and-play instructions for the automatic installation of the Analyzer for InfiniBand as a USB device on your analyzing PC (the Analyzer for InfiniBand CD-ROM includes the required USB files).

## Installing the Software

After the Analyzer for InfiniBand is set up correctly you can install the software:

- 1 Run the program `d:\setup` (where `d:\` represents the CD drive) and follow the on-screen instructions to install the Analyzer for InfiniBand application on the analyzing PC's hard disk.
- 2 To start the application, launch the Agilent Technologies Analyzer for InfiniBand program from the Start Menu:

*Start > Programs > Agilent->Agilent E2951A-E2952A Analyzer for InfiniBand .*



## Your First InfiniBand Recording

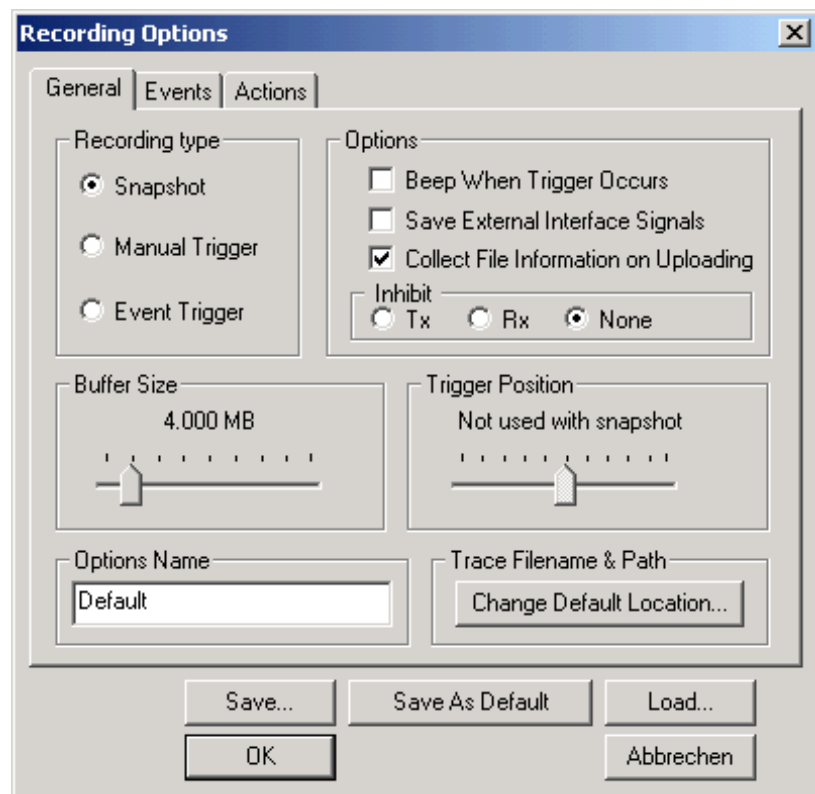
After installing and launching the software, you can test the Analyzer for InfiniBand by performing the following steps:

- 1 Plug in an InfiniBand cable to each of the two ports on the E2951A/E2952A unit, then connect the other ends to the device under test.

**NOTE** The USB port on the host PC must be at least a USB 1.1 port. A USB 2.0 port is recommended.

- 2 Select *Recording Options* under *Setup* on the menu bar.
- 3 Select the *General* tab.


The following dialog box opens showing factory default settings such as *Snapshot* and 4 MB buffer size. For your first recording, you can leave these settings unchanged.



- 4 Click *OK* to activate the recording options you selected.
- 5 Turn on the InfiniBand devices that are to be tested and cause them to generate InfiniBand traffic.

- 6 Click  on the tool bar.

Analyzer for InfiniBand starts to record the InfiniBand traffic immediately. After 4 Mbytes of traffic is recorded, the analyzer will upload the data and display the packets in the trace window.


- 7 If you wish to terminate the recording before the snapshot automatically completes, click  on the Tool Bar.

When the recording session is finished, the traffic is uploaded from the Analyzer to the hard drive on your PC as a file named `data.ibt` or whatever name you assigned as the default filename. While the file is being uploaded, you should see a white progress bar at the bottom of the screen. When the bar disappears, it indicates that the data has been uploaded to disk.

- 8 To save a current recording for future reference:

Select *Save As* under *File* on the Menu Bar.

- or -

Click  on the Tool Bar.

You see the standard *Save As* dialog box.

- 9 Give the recording a unique name and save it to the appropriate directory.

## Capturing Your First InfiniBand Trace

After a few moments, the recording will terminate and the results will be displayed.

Packet	Type	Link ID	Lane ID	TID	Symbol	Data	CRC	VCRC	Time Delta	Time Stamp
00120	TID	COM	0x00		48 48 48 48 48 48 48 48 48 48 48 48 48 48 48 48	0ms	000075000	11142		
00121	TID	COM	0x00		48 48 48 48 48 48 48 48 48 48 48 48 48 48 48 48	0ms	000075000	11143		
00122	TID	COM	0x00		48 48 48 48 48 48 48 48 48 48 48 48 48 48 48 48	0ms	000075000	11144		
00123	TID	COM	0x00		48 48 48 48 48 48 48 48 48 48 48 48 48 48 48 48	0ms	000075000	11145		
00124	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	0ms	000075000	11146		
00125	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11146
00126	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11147
00127	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11148
00128	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11149
00129	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11150
00130	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11151
00131	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11152
00132	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11153
00133	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11154
00134	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11155
00135	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11156
00136	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11157
00137	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11158
00138	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11159
00139	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11160
00140	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11161
00141	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11162
00142	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11163
00143	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11164
00144	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11165
00145	LRN	DLID	0x375C	0x11D2	RCMA WRITE RC DA	4 words	0x002015A	0x457A	50 ns	000075000 11166

# Detailed Installation

If you want to know more about the installation and configuration of the Analyzer for InfiniBand you can get into details here.

## System Components/Packing List

The Analyzer for InfiniBand package includes:

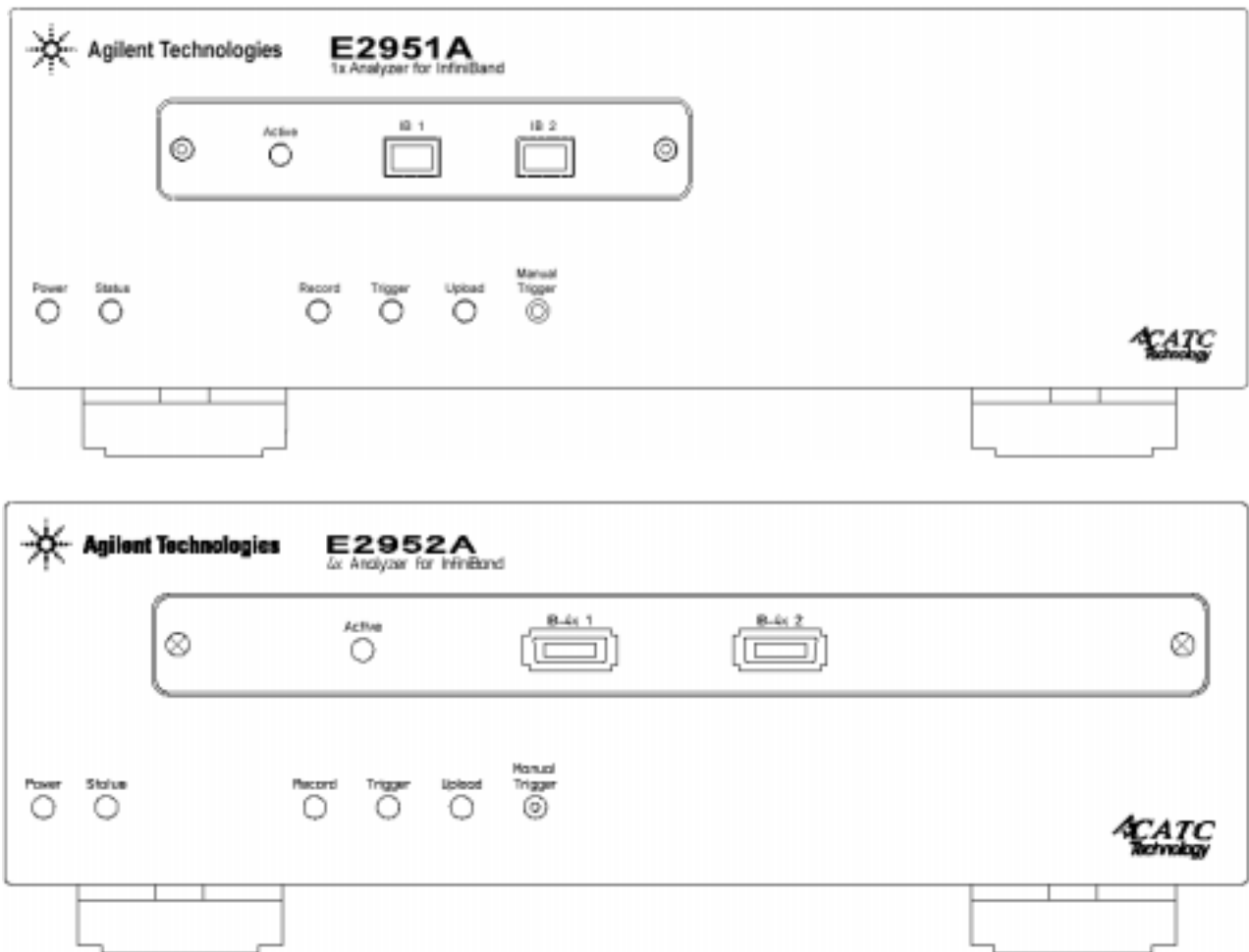
- One stand-alone Analyzer for InfiniBand module
- One 6-foot (2-meter) USB cable
- Two InfiniBand cables with the E2951A, only one with the E2952A.
- One Breakout Board with the E2952A
- Analyzer for InfiniBand software program installation CD-ROM
- Product documentation

## The Analyzer for InfiniBand Unit

This section provides descriptions of the E2951A/E2952A's front and rear panel elements.

### Elements of the Front Panel

If you look at the front panel, you will see LEDs, buttons and connectors.



**Left-most LEDs** There are two LEDs on the left-most side of the front panel:

- Green **POWER** indicator LED lights when the unit power is switched on.
- Red **Status** indicator LED lights during the boot up.

**LEDs and Button beneath the Connectors** The LEDs and button beneath the connectors on the front side show the status of the E2951A/E2952A unit:

- Green **RECORD** LED lights when the unit is recording.
- Orange **TRIGGER** LED lights when the unit triggers an event.

**NOTE** The orange **Trigger** LED under the right module slot also lights during power-on testing and will be turned off at the end of the power-on cycle. If the LED blinks at the end of this cycle, the hardware is faulty.

- Green **UPLOAD** LED lights when unit is uploading data to PC.
- **MANUAL TRG** push-button allows a manual Trace capture.

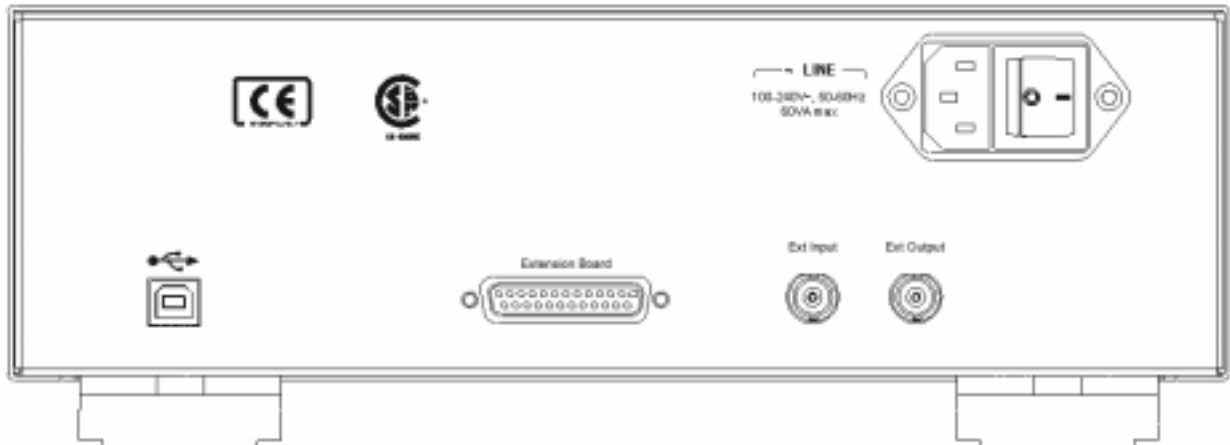
**Connectors** In the upper front area of the E2951A/E2952A the following elements are placed:

- Two InfiniBand connectors
- Green **Active** LED lights when the E2951A/E2952A is activated.

After beginning a recording session, press the **MANUAL TRG** switch to force a Trigger condition. The session completes when a specified post-trigger amount of link data is recorded or when you manually stop a recording session.

## Elements of the Rear Panel

If you look at the rear panel, you will see the following ports and connectors:



- Wide-range AC connector module
  - Power socket
  - Power on/off switch
- USB port
- External Interface Breakout Board connector  
DB-25 (25-pin) external interface connector
- External input
- External output

### WARNING

Do not open the unit enclosure. There are no operator serviceable parts inside. For servicing, refer to Agilent Technologies.

### WARNING

For prevention of ESD influence in measurements, setups with the E2951A/E2952A connected to data generators by signal lines must be performed in an ESD-protected environment.

## Analyzer for InfiniBand System Setup

The Analyzer System for InfiniBand is connected and controlled by a desktop or laptop PC via a USB connection.

To set up the system hardware:

- 1 Connect the Analyzer to an AC power source.
- 2 Connect to the analyzing PC via USB 2.0.
- 3 Connect InfiniBand cables to the devices under test.

## AC Power Source

The instrument can operate from any single-phase AC power source supplying 100-240 V in the frequency range from 50 to 60 Hz.

Use the power switch located on the rear panel to turn the analyzer unit on and off.

**NOTE** At power-on, the analyzer initializes itself in approximately 25 seconds and performs an exhaustive self-diagnostic that lasts about 45 seconds. The Status LED illuminates during the power-on testing and turns off when testing is finished. If the diagnostics fail, the Status LED blinks, indicating a hardware failure. If this occurs, call Agilent Technologies Customer Support for assistance.

## PC Connection

Use the USB cable that was provided to connect the host computer to the E2951A/E2952A.



## Analyzer for InfiniBand Program Installation

The Agilent E2951A/E2952A Analyzer for InfiniBand software is provided on CD-ROM and requires a Windows 98<sup>®</sup>, Windows ME<sup>®</sup>, Windows 2000<sup>®</sup> or Windows XP<sup>®</sup> operating system. If you are installing the Analyzer for InfiniBand software on a Windows NT<sup>®</sup> computer, you will only be able to run in demo/offline mode (that is, you can use the computer to view, analyze, and print data that was collected and saved on another system even if it does not have an Analyzer attached).

### Loading the Analyzer for InfiniBand USB Drivers

The USB drivers have to be installed to enable the communication between the Analyzer for InfiniBand and the PC. For installation please follow these steps:

- 1 Insert the Analyzer for InfiniBand CD-ROM into the PC.
- 2 Power on the Analyzer for InfiniBand.
- 3 Connect the USB cable to the rear of the Analyzer and to the PC.

The host operating system detects the Analyzer and begins to install the USB driver.

**NOTE** When Windows prompts you for a file, browse to the Agilent CD-ROM in the CD-ROM drive.

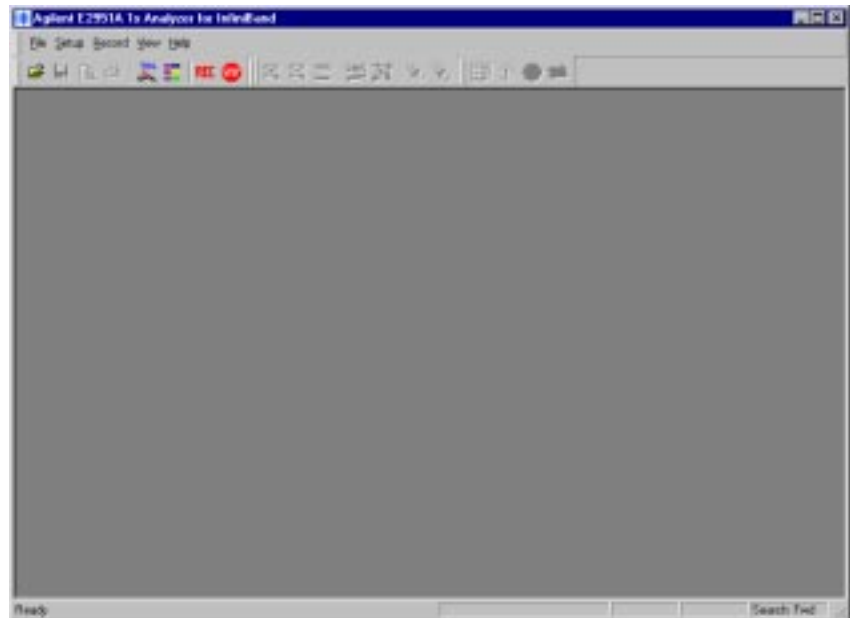
### Installing the Analyzer for InfiniBand Application Program

Run Setup.exe from the Analyzer for InfiniBand CD-ROM.

The Agilent E2951A/E2952A Analyzer for InfiniBand Install Wizard automatically installs the necessary files to the computer's hard drive. The Analyzer for InfiniBand software is installed in the C:\Program Files\Agilent\E2951A\E2952A 1x Analyzer for InfiniBand directory unless you specify otherwise. Follow the installation instructions on your screen.

## Analyzer for InfiniBand Program Startup

You can start the Analyzer for InfiniBand program from the Desktop or from the installed directory. The program always begins with its main screen active:




The software may be used with or without the E2951A/E2952A. When used without the E2951A/E2952A, the program functions in a Trace Viewer mode to view, analyze, and print captured protocol traffic.

When the program is used, and the Analyzer for InfiniBand is attached to the computer, you can set trigger conditions, record, monitor and analyze the activity of your InfiniBand device or fabric.

# Making a Recording


After installation, the software is configured to make a Snapshot recording of InfiniBand traffic.

**Start Recording** To make your first recording of this traffic:

- 1 Connect InfiniBand cables to both InfiniBand connectors on the front panel of the E2951A/E2952A module and plug the other ends into the device under test.
- 2 Cause the device under test to generate InfiniBand traffic.
- 3 Click  on the Tool Bar.

After 4 Mbytes of traffic is recorded, the analyzer will upload the data and display the packets.

**Terminate Recording** 4 To terminate recording before Inquiry time-out occurs:


Click  on the Tool Bar at any time before recording automatically terminates.

When the recording session is finished, the traffic is saved to the hard drive as a file named `data.ibt` or whatever name you assign as the default filename.

**Save Recording** 5 To save a current recording for future reference:

Select *Save As* under *File* on the Menu Bar.


- or -

Click  on the Tool Bar.

You see the standard *Save As* dialog box.

- 6 Give the recording a unique name and save it to the appropriate directory.





# Updating the E2951A/E2952A Analyzer for InfiniBand

From time to time as modifications are made to the Analyzer for InfiniBand, it is necessary to update the Analyzer for InfiniBand for optimal performance. Updates can be performed two ways: either automatically or manually. This chapter describes both procedures.

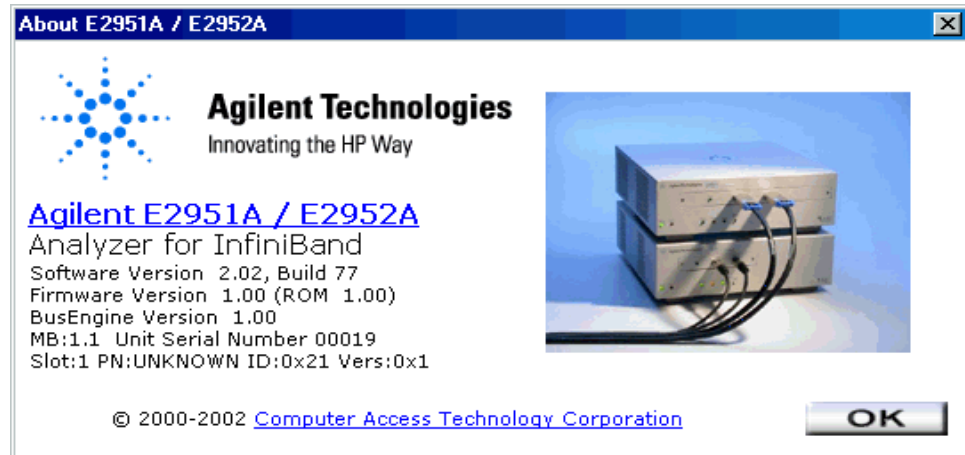
## How to Get the Latest Software, Firmware, and BusEngine Revisions

The `Readme.txt` file on the installation CD-ROM and in the installed directory gives last-minute updates about the current release. Included with each release are the most recent downloadable images of the firmware and the BusEngine. The `Readme.txt` file lists the latest versions and informs you if new firmware or a new BusEngine needs to be updated in your hardware.

Once the Analyzer has completed the self diagnostics and is connected to the PC, you can check the latest revision of the software and BusEngine:

- Select *About E2951A/E2952A...* in the Help Menu.

You see this screen:



*About E2951A/E2952A...* provides the revisions of the used software and hardware, for example:

- Analyzer for InfiniBand Software Version
- Analyzer for InfiniBand Firmware and ROM Versions
- BusEngine Version
- Unit Serial Number

**NOTE** When contacting Agilent Technologies for technical support, please have available all the revisions reported in the About E2951 window.

# How to Update the Software

When a new software release is available, it is posted on the Support page of the Agilent Technologies Web site at [www.agilent.com/find/infiniband/](http://www.agilent.com/find/infiniband/).

To update the software, follow these steps:

- 1 In the *About E2951A/E2952A* screen, verify which version of Analyzer for InfiniBand software you are currently running.
- 2 Find the latest released software version on the Agilent Technologies website under *E2950 Analyzer and Traffic Generator Series for 1x InfiniBand*.

If you are running the latest version of the software, no further action is needed.

If you are **not** running the latest version, continue to step 3.

- 3 Click on the link to download the files for your operating system.
- 4 Unzip the files into your choice of directory.
- 5 Click *Start*, then *Run*, and browse to where you unzipped the files.
- 6 Select the program named *Setup* and click *Open*.
- 7 Click *OK* to run the *Setup* and begin the installation.
- 8 Follow the on-screen instructions to complete the installation.
- 9 Read the *Readme.txt* file for important information on changes in the release.

# How to Update BusEngine and Firmware

BusEngine and Firmware updates often need to be performed when you update the Analyzer for InfiniBand software. These updates can be performed automatically or manually. Both processes are described.

## Updating the BusEngine and Firmware


The BusEngine core is the heart of the InfiniBand Analyzer. Using Electrically Programmable Logic Device (EPLD) technology, the BusEngine incorporates both the high-speed recording engine and the configurable building blocks that implement data/state/error detections, triggering, capture filtering, external signal monitoring, and event counting and sequencing. Both the BusEngine program and the firmware that manages the internal microcontroller are fully field updateable.

Within a new software release, it may be necessary to update the Analyzer's BusEngine hardware and/or firmware for proper operation. The Readme file that is delivered with the release lets you know if this is necessary.

## Automatic Updates

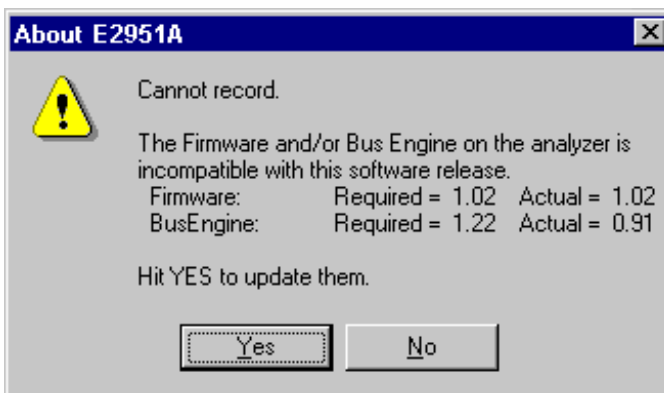
When the Analyzer for InfiniBand's software is updated, the software may become incompatible with the BusEngine and Firmware. If a recording is attempted, the Analyzer for InfiniBand will display an error message and then automatically begin an update process for the BusEngine and Firmware. If you prefer, you can abort this update and undertake the steps manually as described later in this chapter.

The steps to perform an automatic BusEngine and Firmware update are:

- 1 If needed, update the Analyzer for InfiniBand software using the steps outlined in *"How to Update the Software"* on page 31 described above.
- 2 Turn on the Analyzer.
- 3 On the toolbar, click the  button.

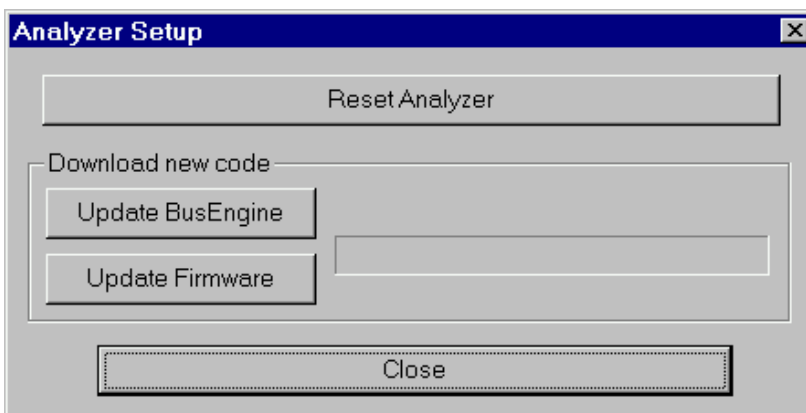
Since the BusEngine and/or the Firmware are incompatible with the current Analyzer for InfiniBand software version, an error message will appear displaying your current versions and indicating what versions you need to install.





4 Click *Yes*.

The above window closes and the Analyzer Setup window opens.

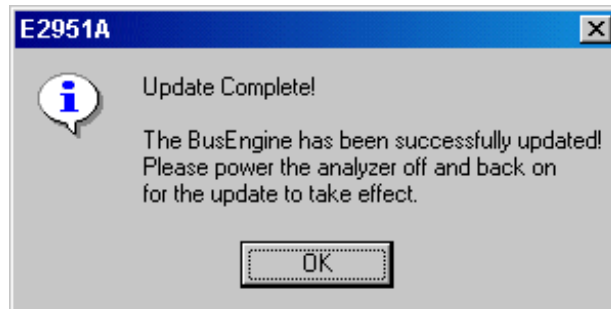


5 Click *Update BusEngine* or *Update Firmware*.

You can select only one item at this point. If both the BusEngine and the firmware need to be updated, the update will complete for the first item and then return to the above screen so the second update can be performed.

## Windows 98

If the PC runs under Windows 98<sup>®</sup>, the following message will tell you when the second update is completed.



In this case, power cycle the Analyzer for InfiniBand to complete the update.

## Windows 2000 and Windows XP

If the PC runs under Windows 2000<sup>®</sup> and Windows XP<sup>®</sup> the Analyzer will automatically reboot and the following message appears. When this message appears, click *OK*. You do *not* need to power cycle the Analyzer.

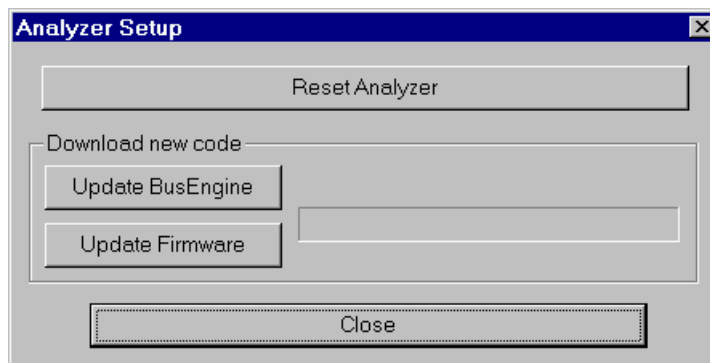


## Manual Updates to BusEngine and Firmware

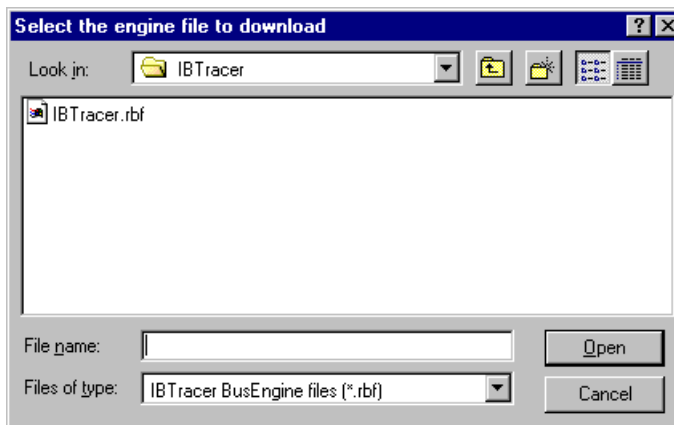
You can manually update Analyzer for InfiniBand's firmware and/or BusEngine by performing the following steps:

- 1 Select *Analyzer* under *Setup* on the menu bar.

You see the Analyzer Setup window:



- 2 If you need to update the BusEngine, click *Update BusEngine*. The *Select the engine file to download* window opens:



The program has already automatically searched for the correct file and displays it in the *File name* field.

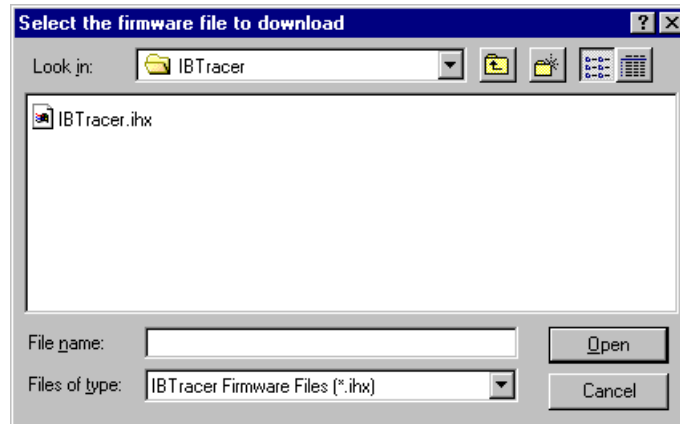
**NOTE** The most current Primary BusEngine file (ibafpga.rbf) was copied to your E2951A 1x Analyzer for InfiniBand directory when you installed the program.

- 3 Click *Open*.
- 4 Power-cycle the Analyzer. Otherwise, continue below.  
Re-initialization takes a couple of minutes.

To update the firmware:

- 1 Click *Update Firmware* in the Analyzer Setup window.

The *Select the firmware file to download* window opens:



The program has already automatically searched for the correct file and displays it in the *File name* field.

- 2 Click *Open*.

The Analyzer updates the firmware.

- 3 For all Windows® operating systems *except* Windows NT®, unplug the USB cable from the back of the Analyzer box and then reinsert it so the new firmware update can take effect.

When the USB cable is unplugged and reinserted, the Windows® OS automatically checks the connected devices (and thus, downloads the drivers for the new firmware).




# Recording the Trace Information

Before recording InfiniBand traffic, make sure the appropriate Recording Options have been set.

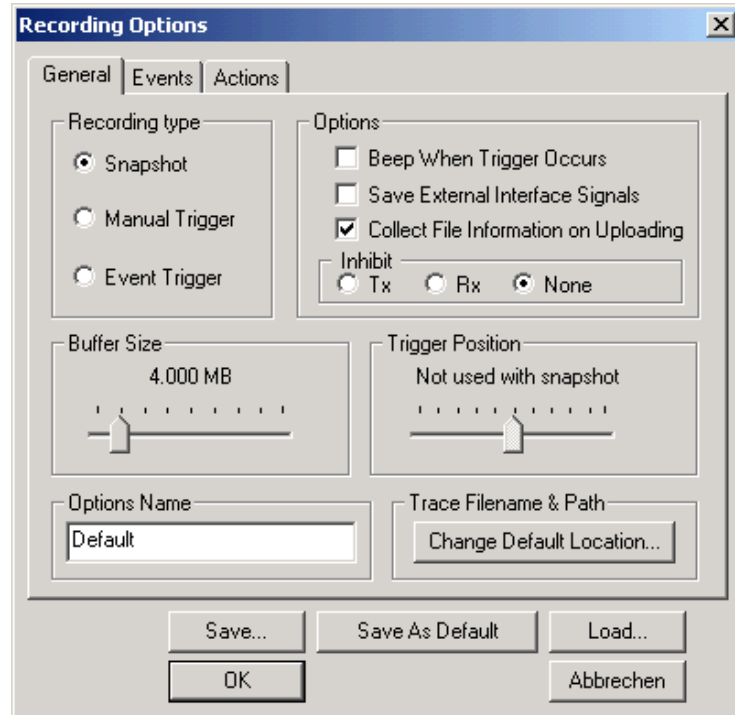
## Setting the Recording Options

The Recording Options dialog box controls how the Analyzer for InfiniBand records InfiniBand data. At the top of the Recording Options dialog box are three tabs that provide access to dialog boxes called General, Events, and Actions. Using these dialog boxes, you can configure the Analyzer for InfiniBand to create event triggers, increase or decrease memory allocation for recording, and interact with other InfiniBand devices in different ways.

## Opening the Recording Options Dialog Box

To open the Recording Options menu, click  on the tool bar or select *Recording Options* under *Setup* on the menu bar.

You see the Recording Options dialog box:



The Recording Options dialog box has three tabs:

- *General*
- *Events*
- *Actions*

For detailed information about setting the Recording Options please refer to "*Windows And Dialog Boxes Reference*" on page 81.

## Saving Recording Options

To complete your Recording Options settings, use the features at the bottom of the Recording Options screen. These features remain the same no matter which of the three Recording Options screens you are working in.


- Click *Save* to save the currently specified Recording Options for use in future recording sessions. Any file name can be specified, though use of the `.rec` is recommended; if no extension is specified, `.rec` is added by default.
- Click *Load* to load a previously saved `*.rec` file, thus restoring a previous set of Recording Options.
- The *Save as Default* function is equivalent to the *Save* function, specifying the file name `default.rec`. Whenever you start up the Analyzer, it automatically loads the `default.rec` file if one exists.
- Click *OK* to apply any changes and close this dialog box.
- Click *Cancel* to cancel any immediate changes you have made and exit the Recording Options menu.

# Recording InfiniBand Traffic

To start recording InfiniBand traffic once the appropriate Recording Options have been set:

- ◆ Select *Record > Start* from the menu bar.

- or -


Click  on the tool bar.

Your recording session can continue until it has finished naturally or you may need to stop manually by clicking  on the tool bar, depending on how you set the Recording Options.

To manually stop the recording:

- ◆ Select *Record > Stop* from the menu bar.

- or -

Click  on the tool bar.


**NOTE** The manual Stop Recording feature is primarily of use when recording low-volume traffic, which can take a long time to fill the recording buffer.

When the recording is finished, the traffic is uploaded to the hard drive and then saved as a file named `data.ibt` or whatever name you assign as the default filename.

To save a current recording for future reference:

- 1 Select *File > Save As* from the menu bar.

- or -

Click  on the tool bar.

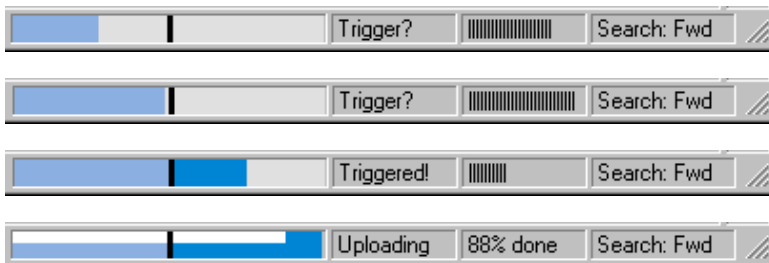
You see the standard Save As dialog box.

- 2 Give the recording a unique name and save it to the appropriate directory.



## Recording Progress

When you begin recording, the left-most segment of the Status Bar displays a Recording Progress Indicator:



As recording progresses, the Recording Progress Indicator changes to reflect the recording progress graphically:

- In the Progress Indicator, a black vertical line illustrates the location of the trigger position you selected in Recording Options dialog box.
- Pre-trigger progress is displayed in the field to the left of the trigger position in the before-trigger color specified in the Display Options dialog box.
- 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 position fills in the post-trigger color specified in the Display Options dialog box.
- 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.

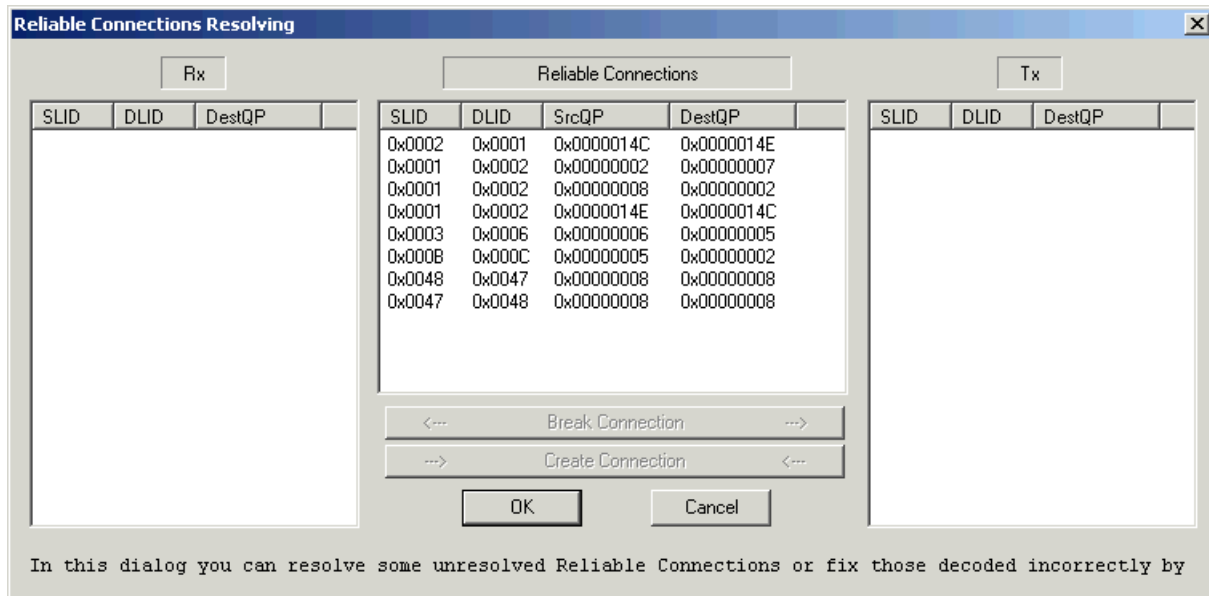
You should be aware of two exceptional conditions:

- If a trigger event occurs during the before-trigger recording, the color of the before-trigger section changes to the color of the after-trigger section to indicate that not all the expected data was recorded in the pre-trigger section.
- When you click *Stop* before or after a trigger event, the Progress Bar adjusts accordingly to begin uploading the most recently recorded data.

The progress bar reflects 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.

## Resolving Reliable Connections

This dialog box allows you to resolve unresolved Reliable Connections within the open trace. This dialog box opens automatically after a recording if there were any unresolved connections. You can open this dialog box at any time by selecting *View > Resolve Reliable Connections*.



Unresolved reliable connections occur if the recording does not capture key events in the traffic – for example, if a device is connected prior to beginning the recording. The Resolve Reliable Connections dialog box lets you manually assign one half of a connection to another.

You can leave connections unresolved by clicking *OK*.

### Breaking a Connection

To break a connection that you believe is incorrect, select it from the center column, then click the *Break Connection* button.


### Creating a Connection

To connect two halves of a connection, select an entry from the *Rx* column, and then select an entry from the *Tx* column that matches it. If the DLID and SLID values match, the *Create Connection* button is enabled. Click the button to make the connection.

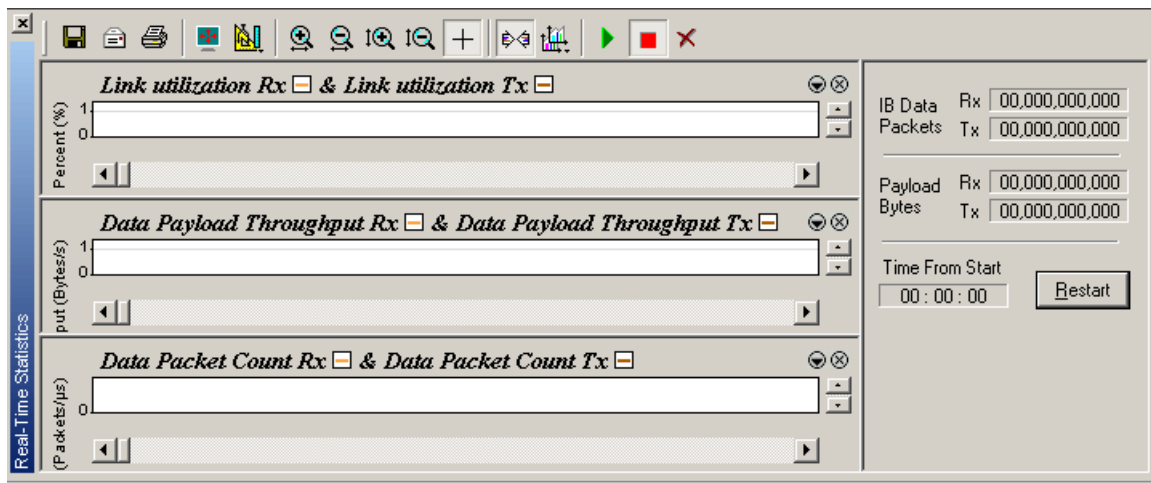
# Displaying Real-Time Statistics


You can display a graph of link activity.

To display the Real-Time Statistics:

- ◆ Click  in the tool bar.

The *Real-Time Statistics* window opens:



In order to see a graph of traffic, you need to start recording. After starting InfiniBand link activity, click  to start the Real-Time statistics monitor.


To stop the monitor, click .

As the traffic is recorded, the data will be streamed in real time to this window and presented in the format of your choice. You can select the graphs to be displayed in the Real-Time window. Refer to *Working with Multiple Graphs in the Real-Time Statistics Window* on page 45 for more information.

You can customize the appearance of the Real-Time window. Refer to *Customizing the Real-Time Statistics window* on page 44 for more information.

Refer to *Real-Time Statistics Buttons* on page 46 to get a description of the buttons located on the toolbar.

## Customizing the Real-Time Statistics window


By clicking the  button in the Real-Time Statistics window toolbar, a menu shows up, enabling to customize the Real-Time Statistics window the following ways:

- **Orient Horizontally**  
Select this command to exchange the (x,y) graph to (y,x). Once done, this command becomes *Orient Vertically*.
- **Tile Vertically**  
Select this command to tile the graphs vertically.
- **Show Markers**  
Select this command to place tick marks along the x axis on each graph.
- **Status**  
By selecting this command, a submenu appears enabling to display a status bar at the bottom of each graph (*Bar* command), tooltips (*Tooltip* command) or to hide both the status bar and tooltips (*None* command).
- **Grid Lines**  
Select this command to display only X-axis gridlines, only Y-axis gridlines, both or none.
- **Grid on Top**  
Select this command to move the grid lines above the graph.
- **Fonts and Colors**  
Select this command to set the colors and fonts used in the graphs.

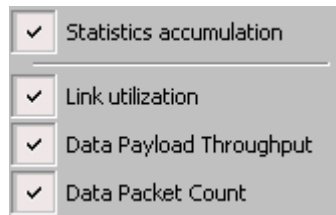
## Working with Multiple Graphs in the Real-Time Statistics Window

You have the possibility to display up to three graphs simultaneously.

To work with multiple graphs:

- 1 Click  in the Real-Time Statistics window.

The following menu opens:



- 2 Select the graphs you want to show:

- *Statistics accumulation*  
Displays the current coordinates and time of the data being recorded.
- *Link utilization*  
Plots the percentage of link utilization by non-idle traffic for both directions of the link.
- *Data Payload Throughput*  
Plots data payload throughput for both directions of the link.
- *Data Packet Count*  
Plots counts of InfiniBand Data Packets per second for both directions of the link.

- 3 Click the Start button .














Traffic is recorded, the data is plotted directly to the graphs.

## Real-Time Statistics Buttons

The Real-Time Statistics window has a row of buttons for changing the format of the displayed data and for exporting data:



The buttons have the following functions:

	Save the graphs as a bitmap file (*.bmp)		Vertical zoom in
	Create an email with a *.bmp file attachment of the graphs		Vertical zoom out
	Print		Click diagonally to select and zoom in on part of the graph
	Full Screen		Select Range
	Options for formatting the display. Refer to <i>"Customizing the Real-Time Statistics window"</i> on page 44 for more information.		If two or more graphs are displayed, synchronize the graphs to one another. Once synchronized, the positioning slider of one graph will move the other graphs.
	Horizontal zoom in		Options for displaying additional graphs of data lengths, packet lengths, and percentage of bus utilized. Refer to <i>"Working with Multiple Graphs in the Real-Time Statistics Window"</i> on page 45 for more information.
	Horizontal zoom out		


# Specifying the Display of Recorded Trace Information

Use the Display Options menu to specify the way InfiniBand Trace information is displayed.

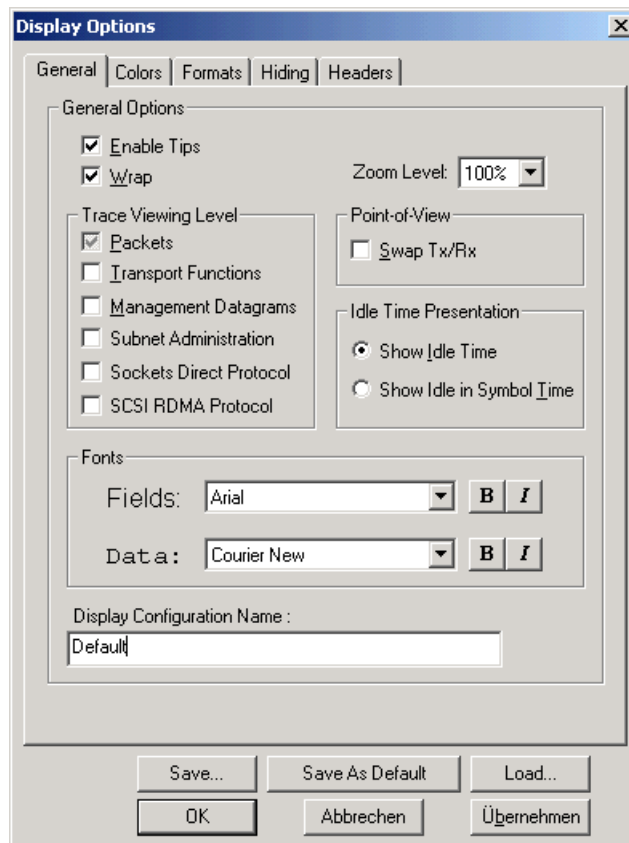
To open the Display Options menu:

- ◆ Select *Display Options* under *Setup* on the Menu Bar.

- or -

Click  on the Tool Bar

You see the *Display Options* dialog box:



The Display Options window always opens with the screen for the *General* tab displayed.

## Saving Display Options

To preserve your Display Options settings for future use:

- Click *Save* to save the currently specified Display Options for use in future sessions. Any file name can be specified, but you must use the .opt extension. If no extension is specified, .opt is added by default.
- Click *Load* to load a previously saved \*.opt file, thus restoring a previous set of Display Options.
- The *Save as Default* function is equivalent to the *Save* function, specifying the file name default.opt. Whenever you start up the analyzer, it automatically loads the default.opt file if one exists.
- Click *OK* to apply any changes you have made to Display Options and close this dialog box.
- Click *Cancel* to cancel any immediate changes you have made and exit the Display Options menu.
- Click *Apply* to apply your changes.



# Color Display Options

To adjust the settings for color display:

- ◆ Click the *Colors* tab on the Display Options screen.

You see the *Colors* page:



Use this menu to customize the colors associated with each field in the Trace View. You can experiment with this option to achieve the color combination best suited to a particular graphic system. A brighter color might be appropriate for a specific field that should stand out in the display (for example, the Packet Types).

**NOTE** The colors of the following packet types cannot be changed:

- Invalid Data (packet error)
- Field (red)
- Softbit Errors (yellow)

Two color fields are provided for packet number displays to differentiate between pre-trigger traffic and post-trigger traffic.

- The packet that causes the trigger and all the packets before it are colored with the - color.

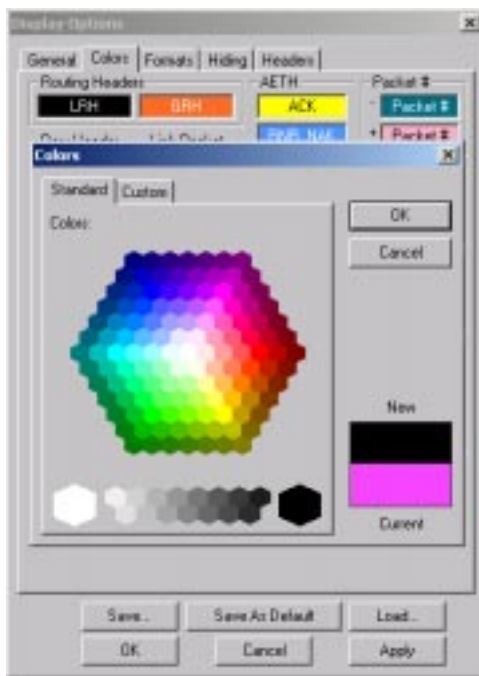
- The packet that follows a trigger is colored with the + color.
- All packets are colored with a + color when there is no trigger.

Use the color buttons labeled + and - under the Packet # section of the Colors screen to select a trigger color.

To select or change a color:

- 1 Click the appropriate color button.

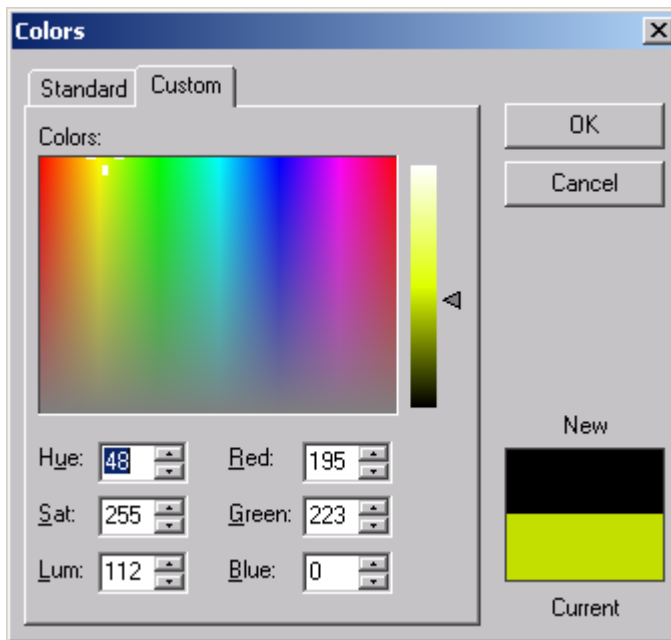
You see the color palette:



Use this palette to choose the desired color for fields within the trace such as Routing Headers, Base Transport Headers, CRC, and Packet #.

2 To select a custom color, click the *Custom* tab.

The following screen opens:



3 Select the desired color with the mouse.

4 Drag the triangle on the vertical bar to the desired shade.

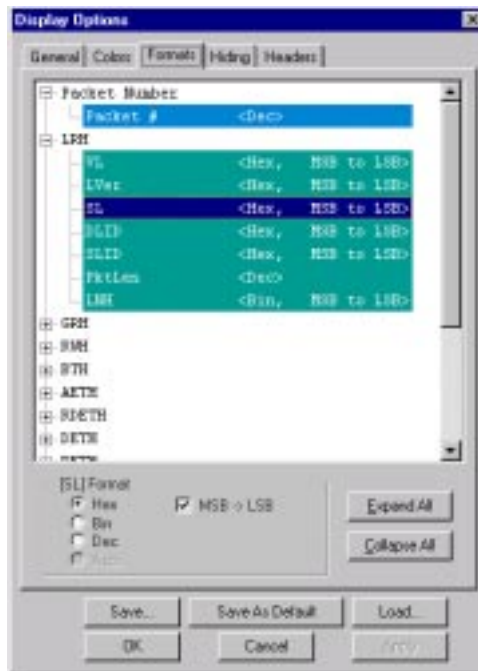
5 Click *OK* to use the color.

# Formats Display Options

The *Formats* page allows numerical data to be displayed in different formats. For example, you can change the format of a field from Hex to Binary.

- Click the *Formats* tab on the Display Options screen.

You see the *Formats* page:



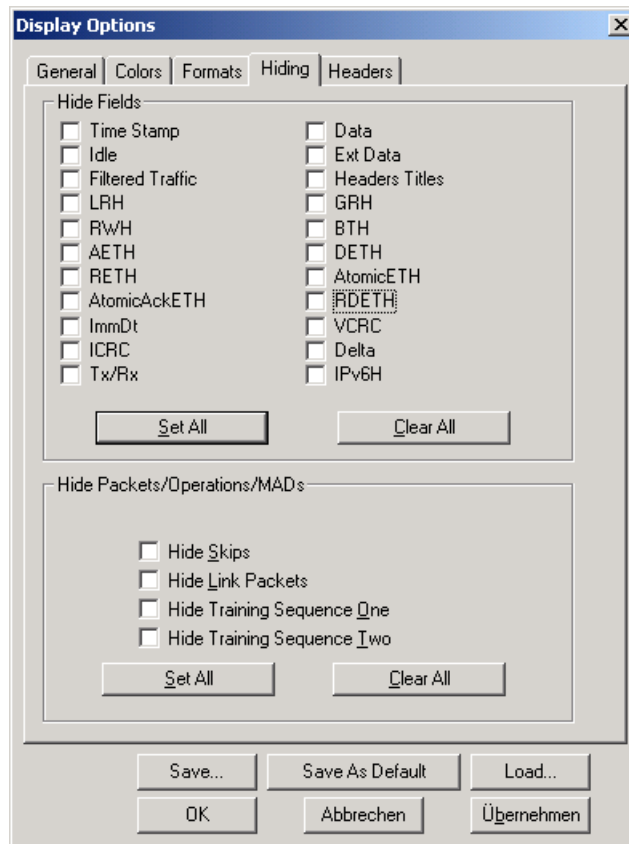
Click an item to display its current format characteristics and to display formatting buttons. Use the formatting buttons to change the format of the selected item.

# Hiding

Use the *Hiding* page to hide various fields, packets, messages, and protocols from the Trace View screen. You can modify these settings at will to display a specific area of a trace.

- Click the *Hiding* tab on the Display Options screen.

You see the *Hiding* page:

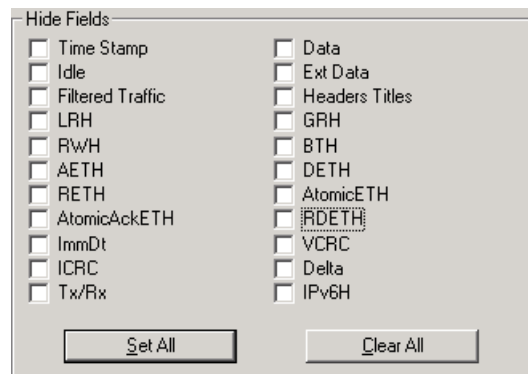


## Hiding Fields

The *Hide Fields* check boxes allow individual fields to be hidden within a trace. Click the check boxes of your choice to hide one or more fields.

## Hiding Packets and Transactions

The *Hide Packets and Transactions* group contains check boxes for hiding packets.



The screenshot shows a dialog box titled "Hide Fields" with two columns of checkboxes. The left column contains: Time Stamp, Idle, Filtered Traffic, LRH, RWH, AETH, RETH, AtomicAckETH, ImmDt, ICRC, and Tx/Rx. The right column contains: Data, Ext Data, Headers Titles, GRH, BTH, DETH, AtomicETH, RDETH, VCRC, Delta, and IPv6H. At the bottom of the dialog are two buttons: "Set All" and "Clear All".

**NOTE** Once display options have been set, they can be saved for future use with the Save command described in the chapter "Saving Display Options" on page 48.

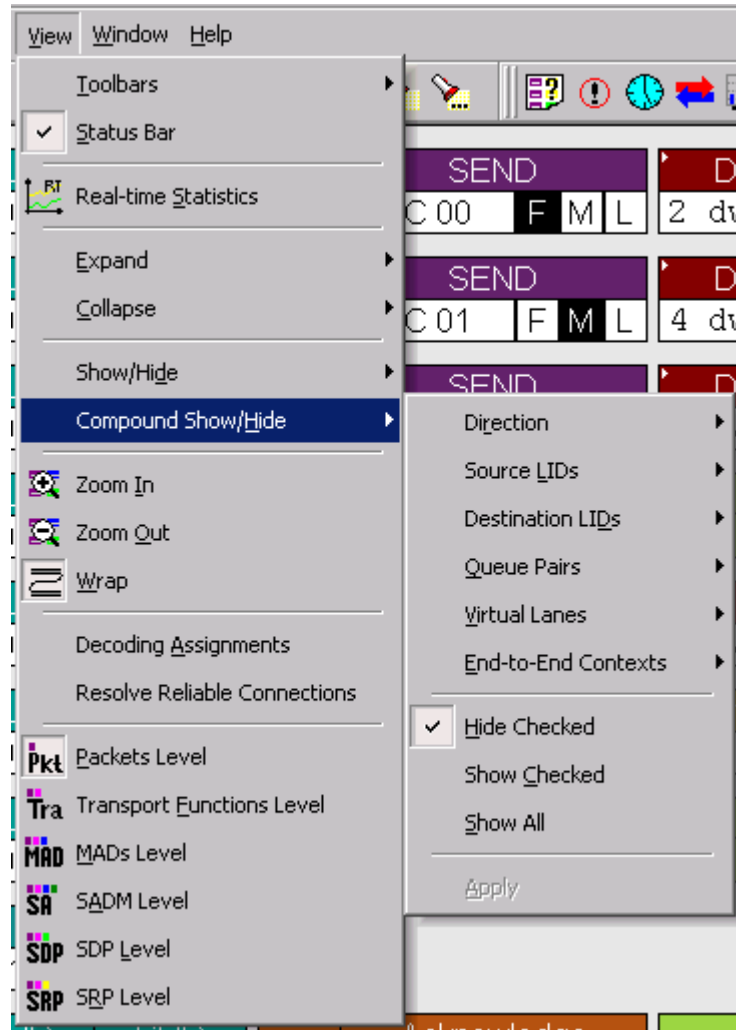
## Compound Hiding

The Compound Show/Hide command lets you select multiple elements in a trace to show or hide. This command is available from the menu bar.

To select which trace elements should be shown or hidden:

- 1 In the main window, select *View > Compound Show/Hide*.

A menu opens that shows all the InfiniBand elements in the trace.



This menu remains open while you make your selections. It does not close until you click *Apply*.

- 2 Select the type of action that should be performed:

- *Hide Checked*


The elements that fulfill the selected criteria are hidden in the trace.

- *Show Checked*




Only the elements that fulfill the selected criteria are shown in the trace, all other elements are hidden.

- *Show All*

All elements are shown.

**NOTE** You can turn compound hiding on or off at any point by clicking the  button (*Apply Compound Hiding*) on the toolbar.

There are also special buttons on the toolbar for showing and hiding link packets and training sequences:

- To show or hide link packets, click .
- To show or hide training sequences, click .
- To show or hide skip sequences, click .



# Headers

Use the *Headers* page to define which elements of the various IBA Packet Headers are shown on the Trace View Screen. You can change these settings at any time so that you can more quickly find the packets that are of interest.

- Click the *Headers* tab on the Display Options screen.

You see the *Headers* page:



Select any header type in the IPA Packet Header box, and then select which fields should be visible when the Packet Header is collapsed.

You can use the *Move Up* and *Move Down* buttons to specify the location in the Packet Header.



# Reading an Agilent Trace

Here you learn how to easily read and interpret an Agilent trace by using the features of the trace view.



## Trace View Features

The trace view display shows various information in a very sophisticated way:

- The Analyzer for InfiniBand packet view display makes extensive use of color and graphics to fully document the captured traffic.
- Packets are shown on separate rows, with their individual fields both labeled and color coded.
- Packets are numbered (sequentially, as recorded), time-stamped (with a resolution of 1 symbol time or 4 ns), and highlighted to show the transmitted speed (low-speed, full-speed, or high-speed).
- Display formats can be named and saved for later use.

- Pop-up tool tips annotate packet fields with detailed information about their contents.
- Several fields such as *Data* fields can be collapsed to occupy minimal space in the display.
- The display software can operate independent of the hardware and so can function as a stand-alone Trace Viewer that may be freely distributed.

## Tool Tips

You can get additional information about each field in a trace by holding your mouse pointer over a field. A tool tip will appear with details about the field.

TS2 Symbols			Idle	0
45 45 45 45 45 45 45 45 45 45 45 45 45 45			0 ns	0
Data symbols unique for Training Sequence Two				
VL	FCCL	LP CRC	Idle	Time Stamp
0x0	933	0xA684	0 ns	00000.174 24716

# Set Marker

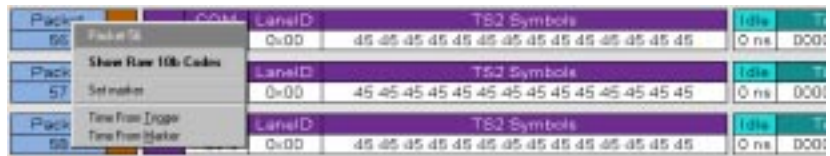
**NOTE** The Set Marker feature works in conjunction with the Go to Marker feature.

You can define a unique marker for each packet.

To place a marker on a packet:

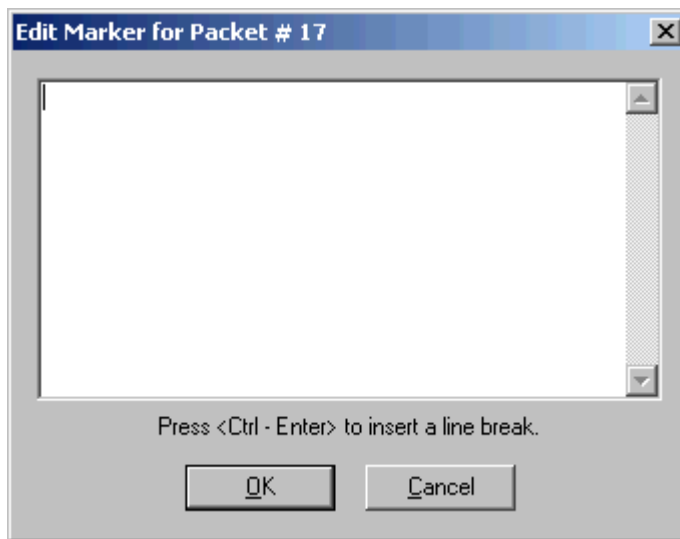
- 1 Left-click on Packet # for the packet you wish to mark.

You see the Packet menu:



- 2 Select *Set Marker*.

You see the Edit Marker Comment window where you can enter a unique comment about this packet:



- 3 Enter your comment.
- 4 Click *OK*.

A marked packet is indicated by a vertical red bar along the left edge of the packet # block:

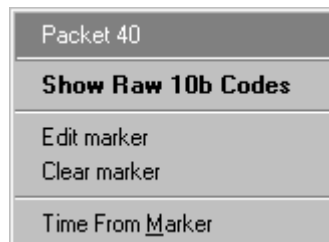
Packet	Tx	TS1	COM	LaneID	TS1 Symbols
39			K28.5	0x00	4A 4A 4A 4A 4A 4A 4A 4A 4A 4A 4A 4A

# Edit or Clear Marker

To clear or edit the comments associated with a packet marker, proceed as follows:

- 1 Left-click on Packet # for the chosen packet.

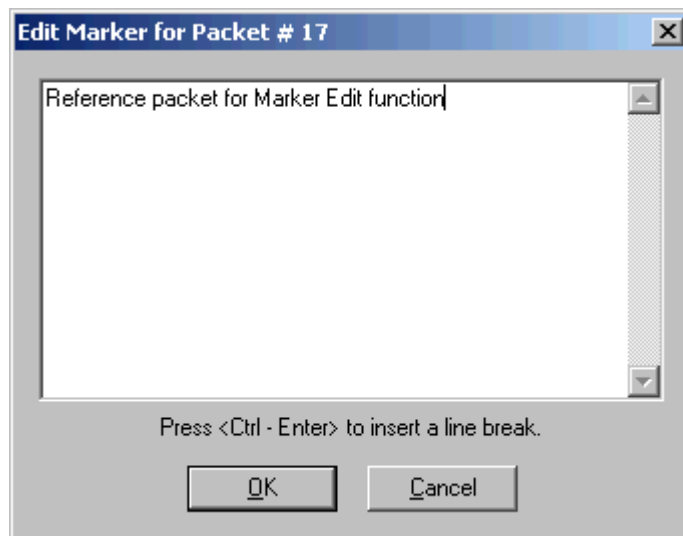
You see the Packet menu:



- 2 To edit the Marker Comment:

Select *Edit marker*.

You see the Edit marker comment window:



- 3 Edit the comment as desired.
- 4 Click *OK*.  
To clear a Marker:
- 5 Click *Clear marker*.  
The vertical red Marker bar disappears.

# Expanded and Collapsed Field Formats

Fields that have small triangles in their top left corners can be expanded to display greater detail or collapsed to a compact view. There are three ways to toggle between the two views.

## Left-clicking the Small Arrows in the Header and Data Fields

Some fields have small arrow in their top-left corners that allow the field to be expanded or collapsed.



## Double-Clicking

You can also expand or collapse a header or data field by double-clicking anywhere in the field.

## Using the Shortcut Menu

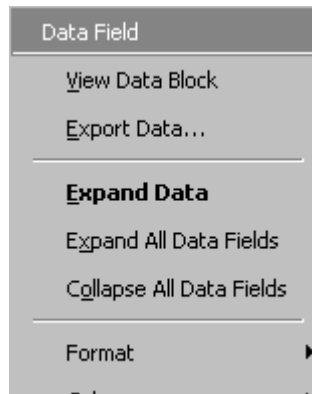
If you left-click on a data or header field, a menu will open for expanding or collapsing data fields.

- 1 Left-click on data in the data packet you want to expand or collapse.

If your Data Trace View is currently expanded, you see the Collapse Data menu:



If your Data Trace View is currently collapsed, you see the Expand Data menu:



Note that you can choose to expand or collapse:

- **Only** the Data in the selected Data packet.
- or -
- **All** Data Fields in the Trace View.

- 2 Select the desired Expand Data or Collapse Data menu item.

The Trace View is repositioned with the selected packet(s) adjusted in the format you have specified.

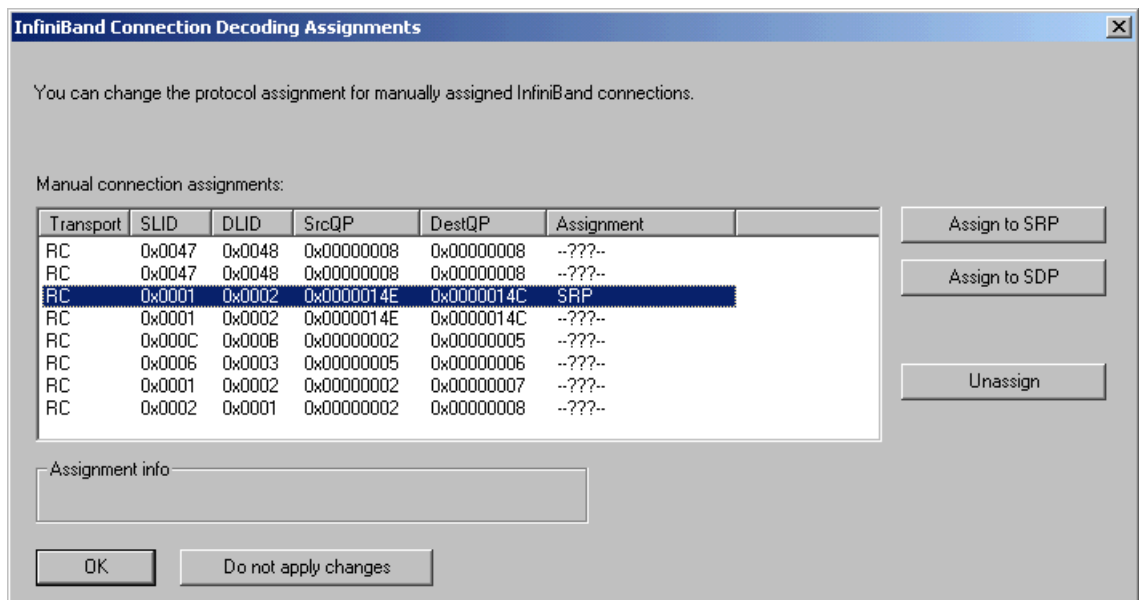


**NOTE** For headers, the same mechanism works for groups of cells. Vertical arrows are used for expanding and collapsing transport functions and higher level units. Click and hold applies to collapse and expand actions for elements in all views.

## Changing the Decoding Assignments for ADP and SRP connections

You can change the protocol assignments for manually assigned ADP and SRP connections:

- 1 Select *View > Decoding Assignments*, the Infiniband Connection Decoding Assignments dialog box shows up.
- 2 Select the connection of interest, and then click on *Assign to SDP* (respectively *Assign to SRP*) to assign the connection to SDP (respectively SRP).
- 3 Click *OK*.



**NOTE** When opening trace files that contain unrecognized connections, the software automatically opens the *Decoding Assignments* dialog box.





# Working with Reports

In this chapter you find detailed reference information about the several reports that help you analyze InfiniBand traffic recorded by the E2951A/E2952A.

## Displaying File Information


You can display a File Information report for the current file, providing the following information:

- File name
- Comment
- Number of packets
- Number of the trigger packet
- Version of the software and serial number of the of the analyzer used to record the data
- Number of markers
- License information
- Available features

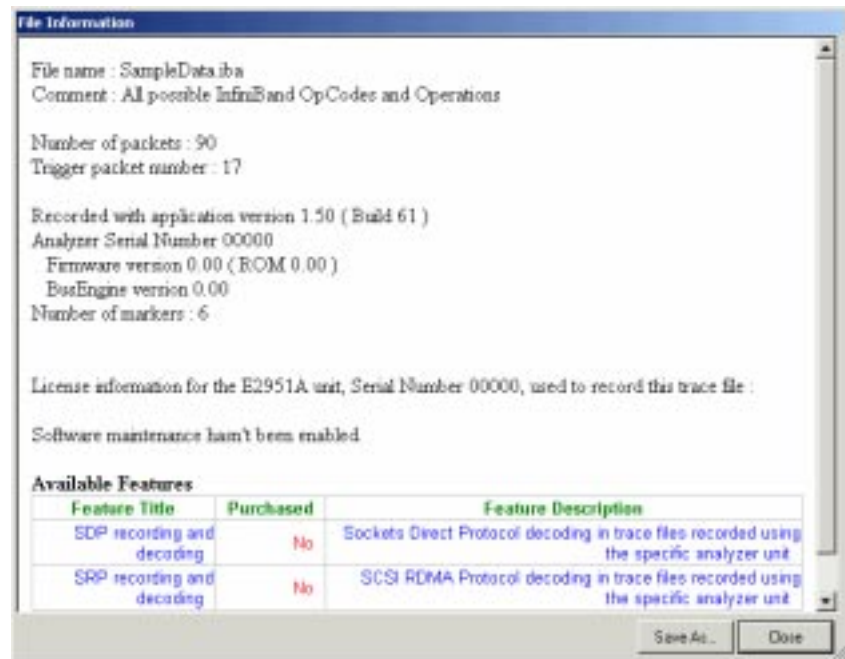
To display a File Information report:

- Select *File Information* under *Report* in the menu bar.

- or -

Click  in the tool bar.

The File Information screen appears.




# Displaying the Error Summary

You can display an error summary of the current trace file that allows you to go to a specific packet, and save the error file to a uniquely named file.

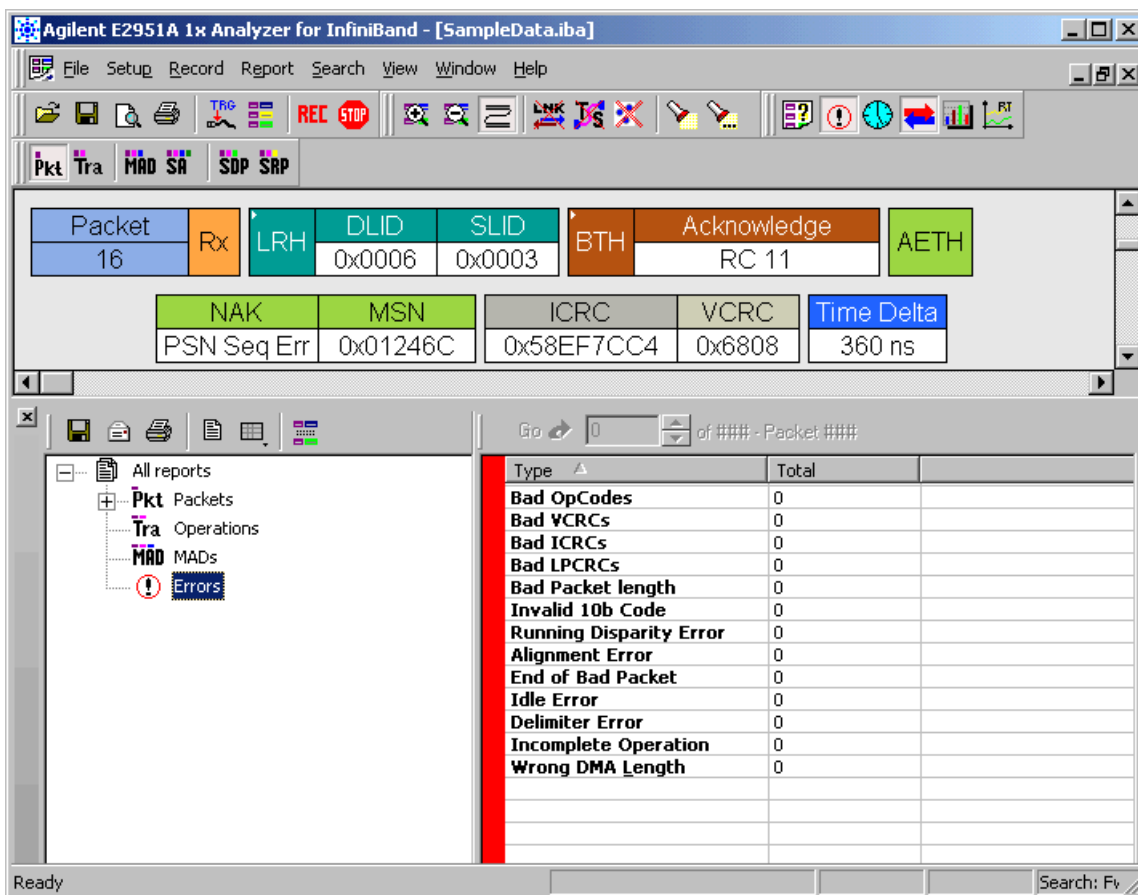
To display an Error Summary report:

- 1 Select *Error Summary* under *Report* in the menu bar

- or -

Click  in the tool bar.

The Error Summary appears below the trace:




# Calculating Timing and Bandwidth Parameters

You can display a Timing Calculations report in which you can calculate various timing and bandwidth parameters in the recording file.

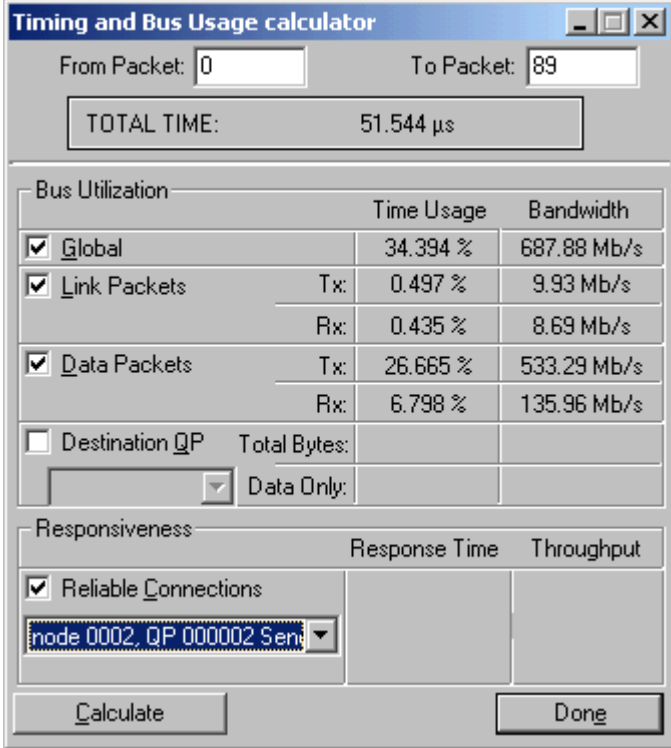
To display a Timing Calculations report:

- Select *Timing Calculations* under *Report* in the menu bar.

- or -

Click  in the tool bar.

The Timing and Bus Usage calculator dialog box shows up:



The dialog box, titled "Timing and Bus Usage calculator", contains the following fields and sections:

- From Packet:** 0
- To Packet:** 89
- TOTAL TIME:** 51.544  $\mu$ s
- Bus Utilization:**

	Time Usage	Bandwidth
<input checked="" type="checkbox"/> Global	34.394 %	687.88 Mb/s
<input checked="" type="checkbox"/> Link Packets	Tx: 0.497 %	9.93 Mb/s
	Rx: 0.435 %	8.69 Mb/s
<input checked="" type="checkbox"/> Data Packets	Tx: 26.665 %	533.29 Mb/s
	Rx: 6.798 %	135.96 Mb/s
<input type="checkbox"/> Destination QP	Total Bytes:	
<input type="checkbox"/> Data Only:		
- Responsiveness:**

	Response Time	Throughput
<input checked="" type="checkbox"/> Reliable Connections		
<input type="text" value="node 0002, QP 000002 Sent"/>		
- Buttons:** Calculate, Done

To calculate bus usage and bit rate errors:

- 1 Enter the range of packets to be examined in the boxes named *From Packet* and *To Packet*.

- 2 Click the *Calculate* button.

At this point, bus usage will be calculated.


# Displaying the Traffic Summary

You can display a summary of the types of traffic that occur in the current trace file. It also allows you to go to a specific packet.

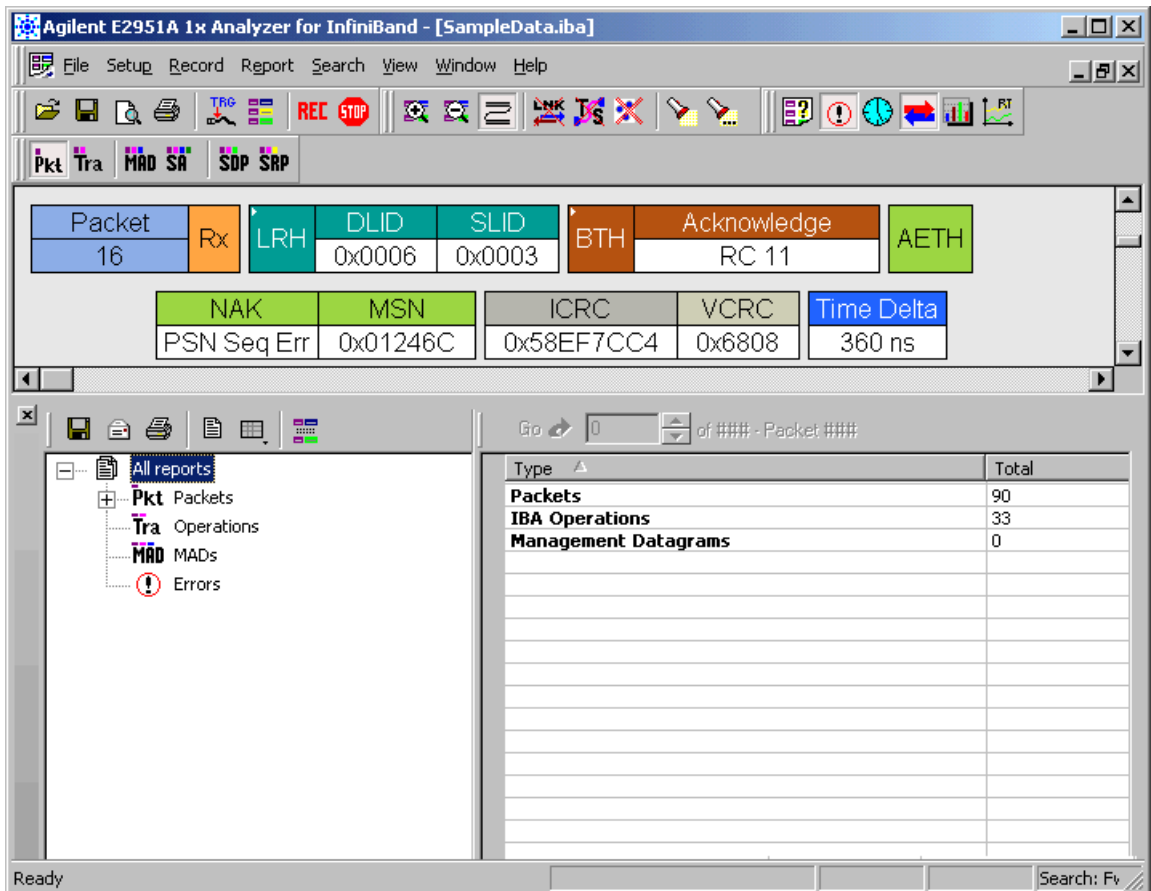
To display a Traffic Summary report:

1 Select *File Information* under *Report* in the menu bar.

- or -

Click  in the tool bar.

The Traffic summary screen appears below the trace:



The left-hand side displays the different protocol levels in tree view. When you click the icons with the plus symbol (+), this branch of the tree expands.

The right-hand side displays a summary of the traffic for the selected level.

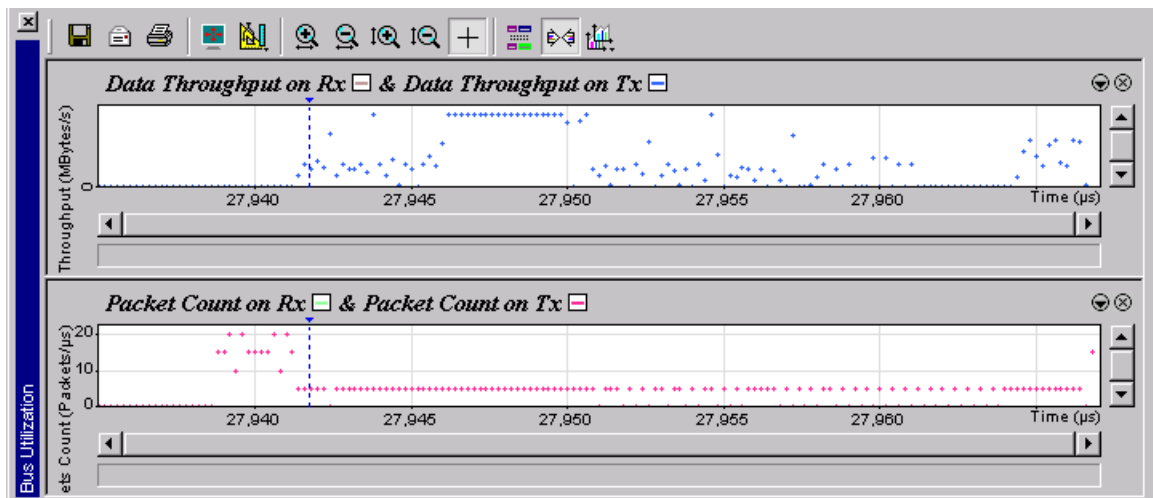
# Displaying Parameters of Bus Utilization

You can display the Bus Utilization report enabling you to access various parameters of bus utilization displayed as graphics.

To display the Bus Utilization report:

- ◆ Click  in the tool bar.

The Bus Utilization report opens:



You can use the Bus Utilization report to evaluate various aspects of the bus traffic, for example:

- Packet Count
- Packet Length
- Link Utilization


You can also customize the appearance of the graphs (for example, the color) to fit your needs. You can select the graphs to be displayed in the Bus Utilization window. Refer to "Working with Multiple Graphs in the Bus Utilization Window" on page 74 for more information.

You can customize the appearance of the graph. Refer to "Customizing the Bus Utilization Window" on page 73 for more information.

Refer to "Bus Utilization Buttons" on page 76 to get a description of the buttons located on the toolbar.



## Customizing the Bus Utilization Window


By clicking the  button in the Bus Utilization window toolbar, a menu shows up, enabling to customize the Bus Utilization window the following ways:

- **Orient Horizontally**  
Select this command to change the orientation of bus usage to horizontal. Once done, this command becomes *Orient Vertically*.
- **Tile Vertically**  
Select this command to tile the graphs vertically.
- **Show Markers**  
Select this command to place tick marks along the x axis on each graph.
- **Show Plumb Line**  
Select this command to display a vertical line enabling to check for the alignment of one of the plot data on the different graphs.
- **Status**  
By selecting this command, a submenu appears enabling to:
  - Display a status bar at the bottom of each graph (*Bar* command), showing the coordinates of the cursor on the graph.
  - Display tooltips (*Tooltip* command). Once selected, place the cursor over one of the plot data, a tooltip window appears showing the coordinates of the current point.
  - Hide both the status bar and tooltips (*None* command).
- **Grid Lines**  
Select this command to display only X-axis gridlines, only Y-axis gridlines, both axes or none.
- **Grid on Top**  
Select this command to move the grid lines above the graph.
- **Fonts and Colors**  
Select this command to set the colors and fonts used in the graphs.

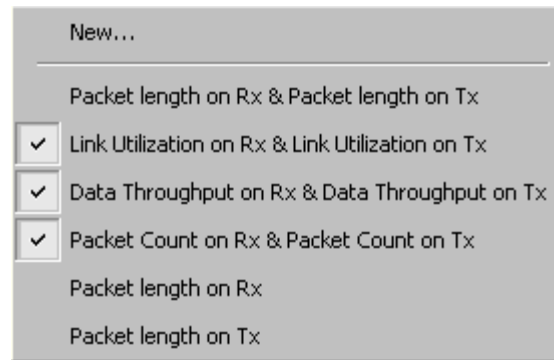
## Working with Multiple Graphs in the Bus Utilization Window

**Displaying multiple graphs** You have the possibility to display up to three graphs simultaneously in the Bus Utilization window.

To work with multiple graphs:

- 1 Click  in the toolbar of the Bus Utilization window.

The following menu opens:



- 2 Select the graphs you want to show:

- *Link Utilization*

Plots the percentage of link utilization by non-idle traffic for both directions of the link.


- *Data Payload Throughput*

Plots data payload throughput for both directions of the link.

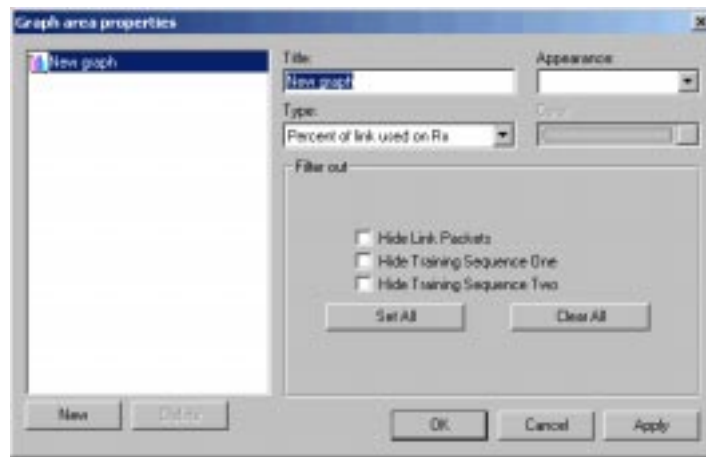
- *Data Packet Count*

Plots counts of InfiniBand Data Packets per second for both directions of the link.

**Appending a new graph** To append a new graph to the Bus Utilization window:

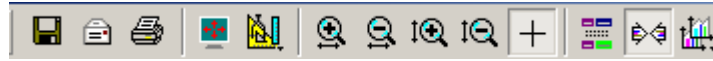
- 1 Click  in the toolbar of the Bus Utilization window.
- 2 Click *New*.

The following dialog box opens. It will display options for setting the title, data, color, and line type for the graph.
















## Bus Utilization Buttons

The Bus Utilization window has a row of buttons for changing the format of the displayed data and for exporting data:



The buttons have the following functions:

	Save the graphs as a bitmap file (*.bmp)		Vertical zoom in
	Create an email with a *.bmp file attachment of the graphs		Vertical zoom out
	Print		Click diagonally to select and zoom in on part of the graph
	Full Screen		Select Range
	Options for formatting the display. Refer to <i>"Customizing the Bus Utilization Window"</i> on page 73 for more information.		If two or more graphs are displayed, synchronize the graphs to one another. Once synchronized, the positioning slider of one graph will move the other graphs.
	Horizontal zoom in		Options for displaying additional graphs of data lengths, packet lengths, and percentage of bus utilized. Refer to <i>"Working with Multiple Graphs in the Bus Utilization Window"</i> on page 74 for more information.
	Horizontal zoom out		



# Exporting InfiniBand Data

The software allows you to export:

- Packets into text files.
- Data into binary or text files.

# Exporting Packets into Text Files

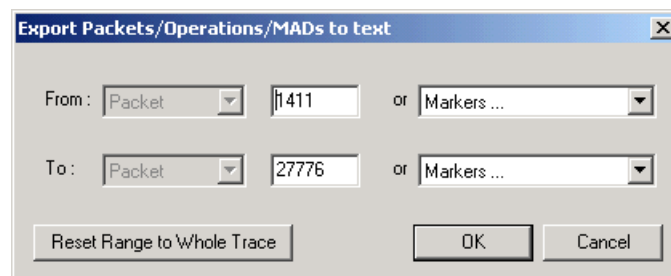
The software allows you to export packets into text files. The structure of the resulting text file reflects the graphical representation of the packet in the software. Here is an example of such a text file

```
File D:\Programme\Agilent\E2951A - E2952A Analyzer for
InfiniBand\SampleData4x.iba.
```

```
From Packet #1411 to Packet #27776.
```

```
Packet#
-----|-----
1411___| Tx LRH DLID(0x0002) SLID(0x0003) BTH RDMA WRITE(RC 0A) RETH
-----| Virtual Address(0x0000000000000000) Data(30 dwords) ICRC(0xE780365B)
-----| VCRC(0x2D56) Time Stamp(00000.1187 34396)
-----|-----
1412___| Rx Link FC(normal) FCTBS(0) VL(0x0) FCCL(1103) LPCRC(0x3A2B)
-----| Time Stamp(00000.1187 34584)
-----|-----
1413___| Rx LRH DLID(0x0003) SLID(0x0002) BTH Acknowledge(RC 11) AETH
-----| ACK(CC 0) MSN(0x000001) ICRC(0x69385884) VCRC(0x56BD)
-----| Time Stamp(00000.1187 34694)
-----|-----
1414___| Tx Link FC(normal) FCTBS(0) VL(0x3) FCCL(1766) LPCRC(0x257A)
-----| Time Stamp(00000.1187 34954)
-----|-----
1415___| Tx SKIP COM(K28.5) SKP Symbols(1C 1C 1C)
-----| Time Stamp(00000.1187 35692)
-----|-----
```

Use *File>Export>Packets to Text* command to export packets into text files. The *Export Packets/Operation/MADs to Text* dialog box opens, prompting you to specify a range for the packets.



# Exporting InfiniBand data

The software allows you to save a part or all of the trace to different formats: binary or text.

Use *File>Export>Packets to Text* command to export data in DWORD format. The *Export data* dialog box opens, prompting you to specify:

- The packet range
- The format of the file

You can choose to save the data in a binary file (with the *DAT* extension) or in a text file (with the *TXT* extension).

- The source of data

You can choose between:

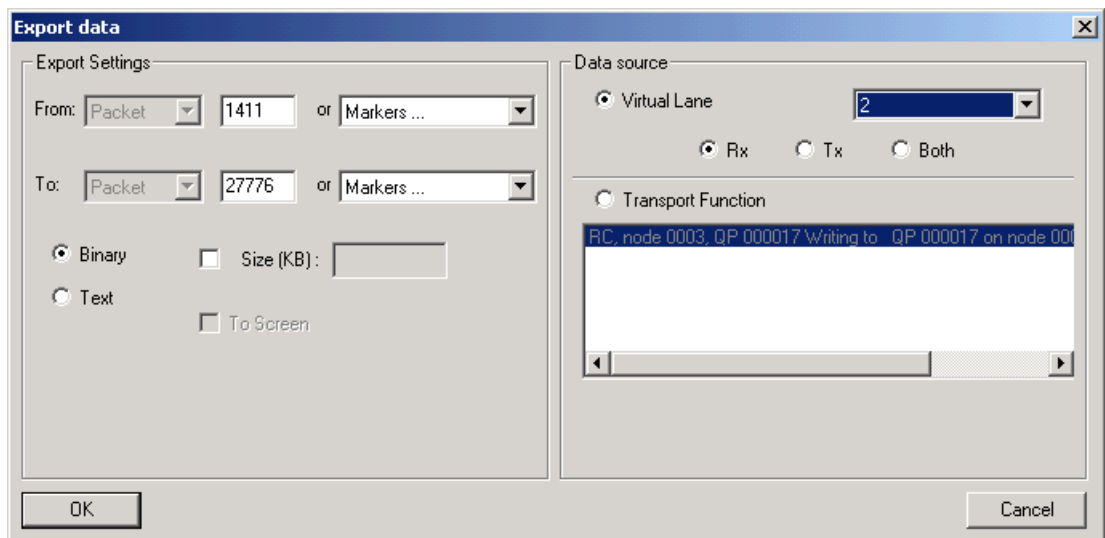
- Packet data coming through a given virtual lane.

In this case, you can store data corresponding only to incoming packets (*Rx*), outgoing (*Tx*) packets or all data transported on both directions.

- The Transport function itself

- The maximum size of the file.

If specified, the export process stops when the desired amount of data is reached.



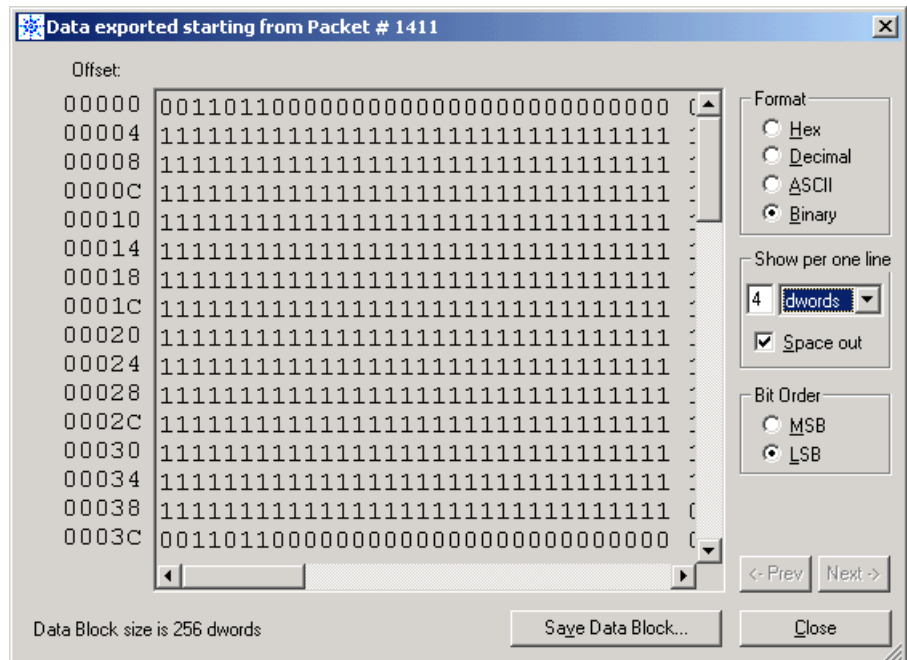
**NOTE** By default, the resulting file has the following format:

- Data represented as hexadecimal.
- 4 DWORD per line.
- Least Significant Bit order

You can change this default format by selecting *ToScreen* in the Export data dialog box.

The dialog box that opens allows you to choose:

- The format used to represent the data between hexadecimal, decimal, ASCII or binary.
- The amount of information per line
- The bit order between Most Significant Bit or Least Significant Bit.



After you have entered this information, click *Save Data Block* to store the data with its settings into a text file.



# Windows And Dialog Boxes Reference

In this chapter you find detailed reference information about the Analyzer for InfiniBand's various software features and options.

## Software Overview

To take advantage of the software's features, it is useful to know about its status displays and shortcuts.

### The Main Display Menu

While some of the Analyzer for InfiniBand's main display window options are familiar, many contain options specific to the E2951A/E2952A program.

**Table 1** Main Display Pull-Down Menus

Menu	Function
<b>File</b>	
Open...	Opens a file
Close	Closes the current file
Save As...	Saves all or a specified range of packets from the current file with a specified name
Print...	Prints part or all of the current traffic data file
Print Preview	Produces an on-screen preview before printing
Print Setup...	Sets up your current or new printer
Edit Comment...	Creates or edits the Trace file comment field
Export	Saves all or part of a trace to different formats: binary or text.
Last File	Lists the last files that were opened
Exit	Exits the Analyzer for InfiniBand program.

Menu	Function
<b>Setup</b>	
Display Options...	Provides the control of various display options such as color, formats, and filters.
Recording Options...	Provides setup options for recording, triggering events and filtering events.
Analyzer...	Allows the operator to reset the E2951A/E2952A or update the BusEngine and firmware.
<b>Record</b>	
Start	Causes the E2951A/E2952A to begin recording InfiniBand activity.
Stop	Causes the E2951A/E2952A to stop recording.
Disconnect/ Connect	(only available when connected to an E2952A) Break and then restore the InfiniBand link connection.
<b>Report</b>	
File Information	Details such information about the recording as number of packets and triggering setup.
Error Summary	Displays an error summary of the current trace file and allows you to go to a specific packet, and save the error file to a uniquely named file.
Timing Calculation	Starts the calculator dialog for calculating various timing and bandwidth parameters in the recording file.
Traffic Summary	Displays a summary of the bus traffic of the current trace file, and allows you to go to a specific packet.
Bus Utilization	Displays a summary of how the bus was used for the current trace file.
<b>Search</b>	
Go to trigger	Positions the display to show the first packet that follows the trigger event.
Go to Packet/ Operation/ MAD ...	Positions the display to the indicated element.
Go to Marker »	Positions the display to a previously marked packet
Go to »	Enables quick searching for specific events using a cascade of pop-up windows.
Find	This feature allows complex searches.
Find Next	Repeats the previous Find operation. Can also use F3 to find next.
Search Direction	Allows you to specify a forward or backward search of a trace file.

Menu	Function
<b>View</b>	
Toolbars	Displays list of available toolbars.
Status Bar	Switches display of the Status Bar on or off.
Real-Time Statistics	Opens a subwindow where the real-time statistics are evaluated graphically.
Expand	Allows field headers to be expanded.
Collapse	Allows field headers to be collapsed.
Show/Hide	Allows you to show/hide packets based on the set filter.
Compound Show/Hide	Allows you to set several filters for showing and hiding packets.
Zoom In	Zoom in increases the size of the displayed elements.
Zoom Out	Zoom out decreases the size of the displayed elements.
Wrap	Allows the display to wrap.
Decoding Assignments	Lets you create or edit protocol assignments to connections.
Resolve Reliable Connections	Lets you resolve reliable assignments within the open trace.
Packets Level	View packet level.
Transport Functions Level	View/Hide Transports Functions Level.
MADs Level	View/Hide MADs Level.
SADM Level	View/Hide Subnet Administration Level.
SDP Level	View/Hide Sockets Direct Protocol Level.
<b>Window</b>	
New Window	Switches display of the Tool Bar on or off.
Cascade	Displays all open windows in an overlapping arrangement.
Tile	Displays all open windows in a side-by-side arrangement.
Arrange Icons	Arranges minimized windows at the bottom of the display.
Windows	Displays a list of open windows.
<b>Help</b>	
Help Topics	Displays online help.
About Analyzer for InfiniBand	Displays version information about Analyzer for InfiniBand.

## View Options

You can hide, display or reset toolbars by selecting *View > Toolbars* from the menu bar.

### Toolbar



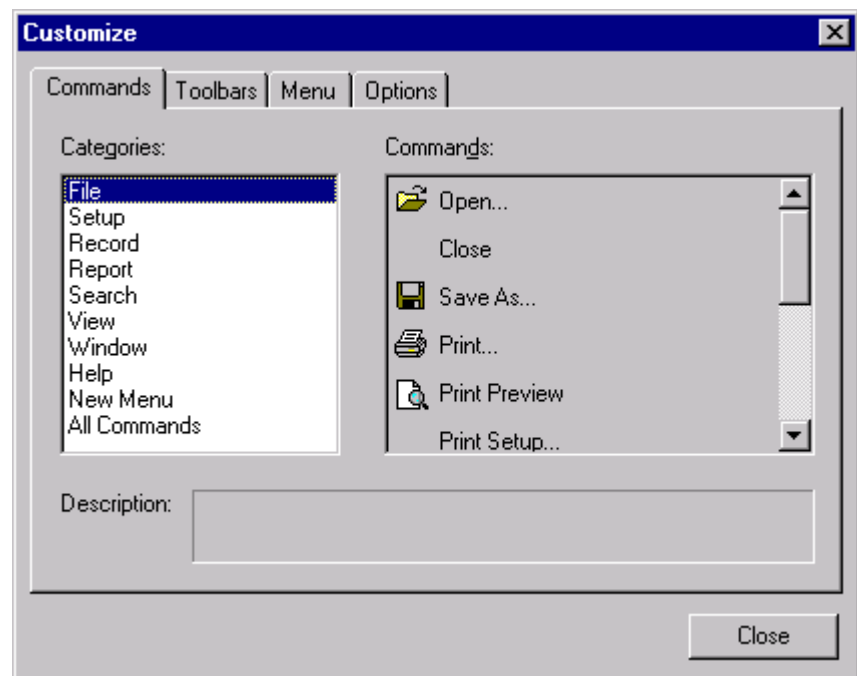
The toolbar provides access to the most popular program functions. Tool tips describe icon functionality as the mouse arrow is moved over the icon/item.

**Resetting the Toolbar** From time to time (such as following a software upgrade) it is possible that the buttons on the tool bar will no longer match their intended function.

To reset the toolbar:

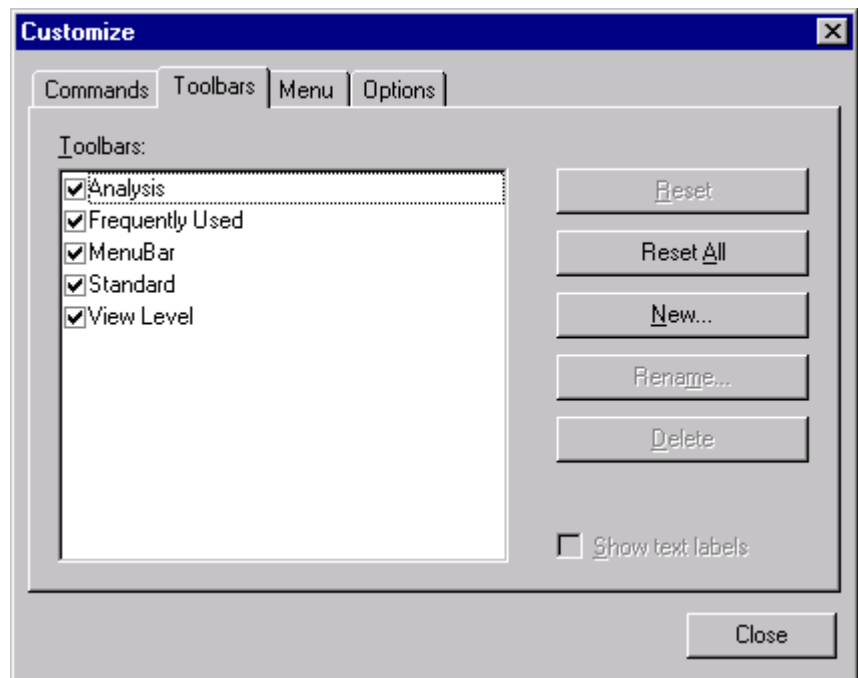
- 1 Select *View > Toolbars* from the menu bar.
- 2 Select *Customize* from the sub-menu.

The following dialog box opens:



3 Select the *Toolbars* tab.

















The following dialog box opens:

















4 Click the *Reset All* button.

The factory defaults are reset.

**Toolbar icons** The following icons are available in the default toolbar:

	Open file		Apply Compound Hiding
	Save As		Find
	Preview		Find Next
	Print...		File Information Report
	Setup Record Options		Error Summary
	Setup Display Options		Timing Calculations
	Start Recording		Traffic Summary
	Stop Recording		Bus Utilization

	Break and then restore the link (only available for the E2952A)		Real-Time Statistics
	Zoom In		View Packet Level
	Zoom Out		View Transport Functions Level
	Wrap		View MAD Level
	Hide Link Packets		View/Hide Subnet Administration Level
	Hide Training Sequences		View/Hide Sockets Direct Protocol Level
	Hide/View SKIP sequences (only available for data recorded with the E2952A)		View/Hide SCSI RDMA Level

## The Status Bar

The Status Bar is located at the bottom of the main display window. Depending on the current activity, the bar can be divided into as many as four segments.

## Recording Status

During recording activity, the current Recording Status is temporarily displayed in the next segment. When you activate the Record function, this segment flashes one of the following messages (depending on the selected Recording Options):

- Trigger?
- Triggered!
- Uploading


After the recording stops,

- the flashing message changes to **Uploading data-x% done** (x% indicates the percentage completion of the data uploading process).
- the traffic data is copied to disk (overwriting any previous version of this file) using the default file name `data.ibt` or a new name specified in the Recording options.

To abort the upload process:

◆ Press *Esc* on your keyboard.

- or -

Click  in the toolbar.

You are prompted to choose whether to keep the partially uploaded data or to throw it away.

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 packet following the trigger (or the packet 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 packet in the traffic file.

## Analyzer Status

The third segment in the status bar displays the analyzer status. During uploading, this segment displays the percent of the upload process completed.

**NOTE** If packets are filtered from the recording or data are truncated, the recording activity is reduced.

## Search Status

The rightmost segment displays the current search direction: **Fwd** (forward) or **Bwd** (backward).


## Zoom In

Zoom In increases the size of the displayed elements, allowing fewer (but larger) packet fields per screen.

Click  on the tool bar.

## Zoom Out

Zoom Out decreases the size of the displayed elements, allowing more (but smaller) packet fields per screen.

Click  on the tool bar.

## Tool Tips

Throughout the application, tool tips provide useful information.

To display a tool tip, position the mouse pointer over an item. The tool tip displays in a short moment if present. Tool tips can also be found over the Tool Bar and in areas of the packet view screen.

## Analyzer for InfiniBand Keyboard Shortcuts

Several frequently-used operations are bound to keyboard shortcuts.

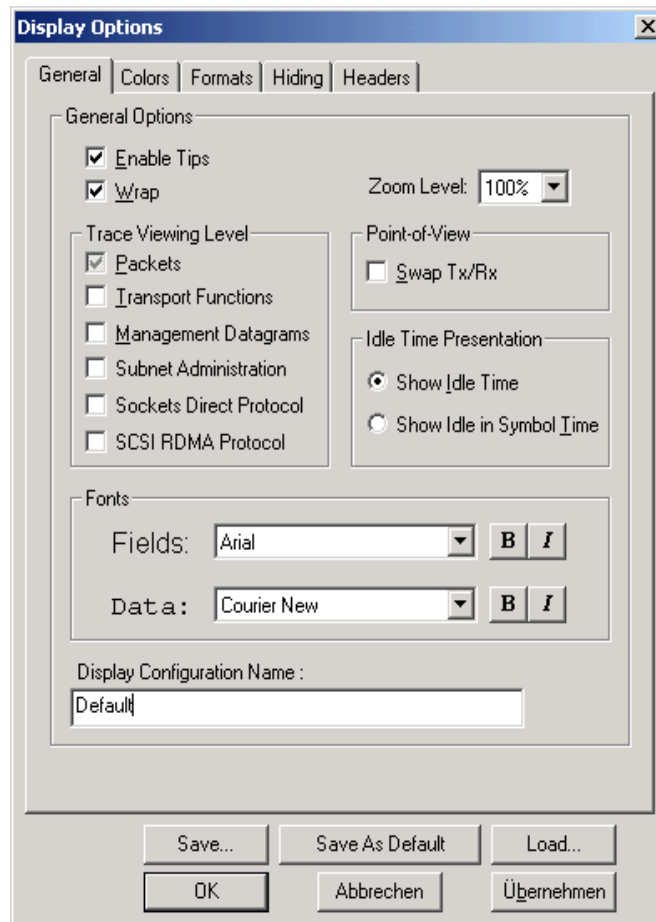
Table 2 Keyboard Shortcuts

Key Combination	Operation
Ctrl+C	Copy
Ctrl+Insert	Copy
Shift+Del	Cut
Ctrl+X	Cut
Ctrl+V	Paste
Shift+Insert	Paste
Ctrl+Z	Undo
Alt+Backspace	Undo
Ctrl+O	Open the file
Ctrl+S	Save the file
Ctrl+Home	Jump to first packet
F3	Find Next
Ctrl+B	Search Backward
Ctrl+F	Search Forward



# General Display Options

Use the General Display Options to specify the basic appearance of a Trace View. You open the Display Options dialog box by selecting *Setup > Display Options*.



- **Zoom Level**

Adjustable in discrete increments from 10% to 200% percent.

- **Enable Tips**

Select to enable tool tips with explanation text to pop up when you position your cursor over various fields in the Trace View.

- **Wrap**

Inhibits carriage returns in packets when they exceed the width of the window.

- **Trace Viewing Level**

Allows the trace to be displayed in different hierarchical levels: Packet, Transport Functions, Management Datagrams, Subnet Administration, Sockets Direct Protocol, SCSI RDMA Protocol.

- **Idle Time Presentation**

Causes the E2951A/E2952A Analyzer for InfiniBand to display Idle Time in one of two formats:

- Show Idle Time
- Show Idle in Symbol Time (1 symbol = 4ns)

- **Point of View**

Allows you to swap the transmit and receive directions in a trace (packets labeled as Transmit will become labeled as Receive and vice versa):

- Swap Tx/Rx

**NOTE** Swapping is also allowed in the Tx/Rx cell in the Trace view.

- **Fonts**

- Fields: Lets you define the appearance of field text.
- Data: Lets you define the appearance of data text.

- **Display Configuration Name**

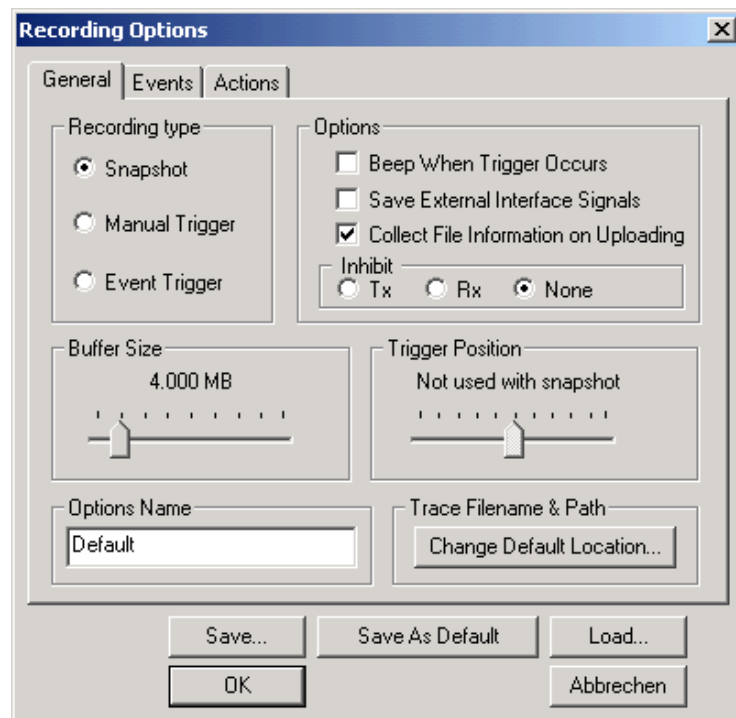
A Comment field associated with the \*.opt file containing the current Display Options values. You can also create and store your unique Display Options for future use.

# Recording Options

This section shows you how to adjust the recording options to match your special recording needs (for example, determining which and how data is recorded).

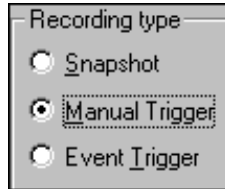
## Recording Options - General

The General tab is made up of boxes marked *Recording Type*, *Buffer Size*, *Trigger Position*, and *Options*.





## Recording Type

The Recording Type box presents three options that allow you to set how the Analyzer for InfiniBand begins and ends a recording. The options are: *Snapshot*, *Manual Trigger*, and *Event Trigger*.




**Snapshot** A Snapshot is a fixed-length recording whose size is determined by the *Buffer Size* group in the Recording Options dialog box or by a manual click of the Stop button.


Recording begins by clicking  on the Tool Bar and ends when either the selected buffer size is filled or you press the Stop button.

**Manual Trigger** A *Manual Trigger* recording is a one that is manually begun and ended. Recording is begun by pressing  on the Tool Bar.

Recording continues in a circular manner within the limits set by the buffer size.

Recording ends when  is clicked on the Tool Bar or the Trigger button is pressed on the Analyzer for InfiniBand's front panel. If you press the Trigger button, recording will continue until the post-trigger memory has been filled.

**Event Trigger** An Event Trigger recording is one that uses an event trigger to end the recording. Before recording begins, you define the event trigger in the Events Recording Options dialog box (accessible by selecting *Setup > Recording Options > Events* from the menu).

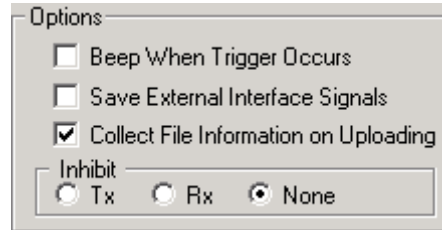
You begin the recording by clicking  on the Tool Bar.

Recording continues in a circular manner within the limits set by the buffer size. Once the trigger event occurs, some post-trigger recording occurs, then the recording ends.

**NOTE** In this mode, the recording can be stopped manually in the same way as for *Manual Trigger* mode.

## Options

The *Options* group contains the following options:



**Beep When Trigger Occurs** Will cause the PC to beep when a trigger event has occurred.

**Save External Interface Signals** When this option is selected, the Analyzer saves external interface signals from a break-out board as fields in the trace.

**Collect File Information on Uploading** When recording InfiniBand data, the software performs several operations after each packet is uploaded from the E2951A/E2952A to the host PC. These operations consist of decoding higher protocols and summarizing the traffic in various report windows. They can become time-expensive when recording a large amount on InfiniBand data.

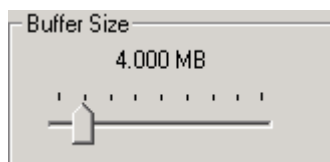
To save time, clear this option. The software will then perform these operations when displaying these data on screen.

**Inhibit** Allows you to block the E2951A/E2952A's reception of transmit and/or receive link activity. When a direction is inhibited, none of the other recording events will be detected.

## Buffer Size

The *Buffer Size* group has a slide bar for adjusting the recording buffer size from:

- 0.4MB to 512MB if the E2951A is connected
- 1.6 MB to 2048 MB if the E2952A is connected

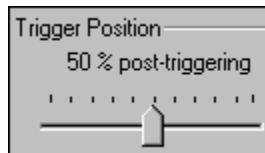


**NOTE** The scale is not linear; there is more granularity in smaller buffer sizes.

The Recording Type option determines how this buffer is used. Although there are 512 MB of physical memory in the E2951A/E2952A, the efficiency of the recording ranges from 2:1 to 4:1 ratios of physical memory to actual InfiniBand traffic. Shorter InfiniBand packets yield a less efficient recording. The non-traffic portion of physical memory is utilized for control and timing information.

## Trigger Position

The *Trigger Position* slide bar sets the amount of post-trigger recording that the Analyzer for InfiniBand will perform. It also allows adjustment of the location of the trigger within the defined buffer.



You can adjust the Trigger Position between 1 and 99% post-trigger. *Trigger Position* is available only when *Manual Trigger* or *Event Trigger* is selected as Recording type.

As an example, if the buffer size is set to 16 MB, then for the following Trigger Position settings, the amount of pre- and post-trigger data is

95% post-triggering	0.8 MB pre-trigger	15.2 MB post-trigger
75% post-triggering	4 MB pre-trigger	12 MB post-trigger
50% post-triggering	8 MB pre-trigger	8 MB post-trigger
25% post-triggering	12 MB pre-trigger	4 MB post-trigger
5% post-triggering	15.2 MB pre-trigger	0.8 MB post-trigger

**NOTE** You can use the external input and external output connectors on the rear of the Analyzer as triggers. This lets you daisy-chain the Analyzer into a test environment.

The external input is always on, and is edge-sensitive.

**NOTE** When a trigger occurs, recording continues until the post-trigger amount of the buffer is filled.

## Recording Options - Events

If you have selected the *Event Trigger* mode under the General tab in the Recording Options dialog box, you may now select specific InfiniBand events using the Events tab on the Recording Options dialog box. You can also use the Actions tab to define specific event sequences that will trigger the Analyzer for InfiniBand to record a InfiniBand session.

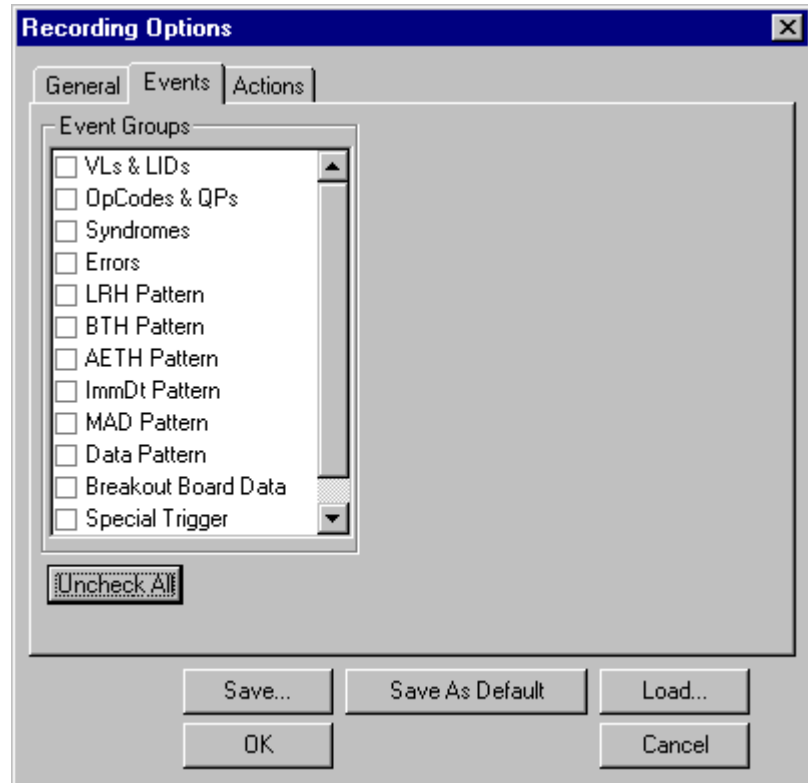
In addition, the Events and Actions pages allow you to specify which packets you want to include or exclude from the recording.

**NOTE** The choices you make on the Events page may cause other events to become unavailable for additional triggering or filtering. For example, if you select a *Syndromes* option and then open the *AETH* options window, you will see that a set of AETH check boxes are unavailable.

## Events Options

To see the *Events* page:

- ◆ Click the *Events* tab on the *Recording Options* dialog box.



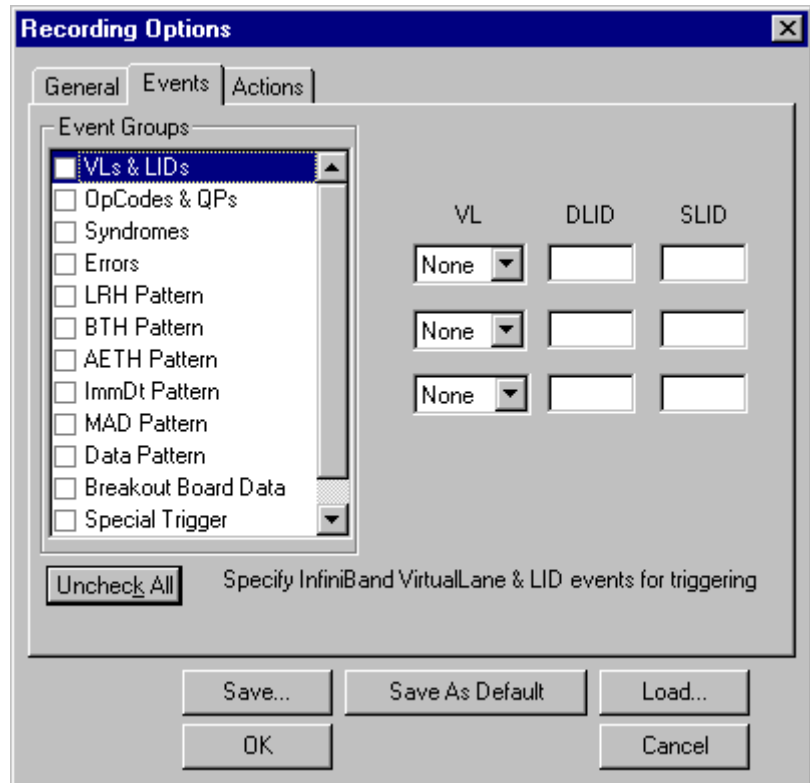
The *Events* page allows you to set event conditions for errors and/or a variety of packet characteristics. Its contents change with the analyzer in use.

Clicking a check box causes further options to be displayed in the right side of the window.



VLs & LIDs (only available when using the E2951A)

Clicking *VLs & LIDs* opens three sets of check boxes and menus on the right side of the window.

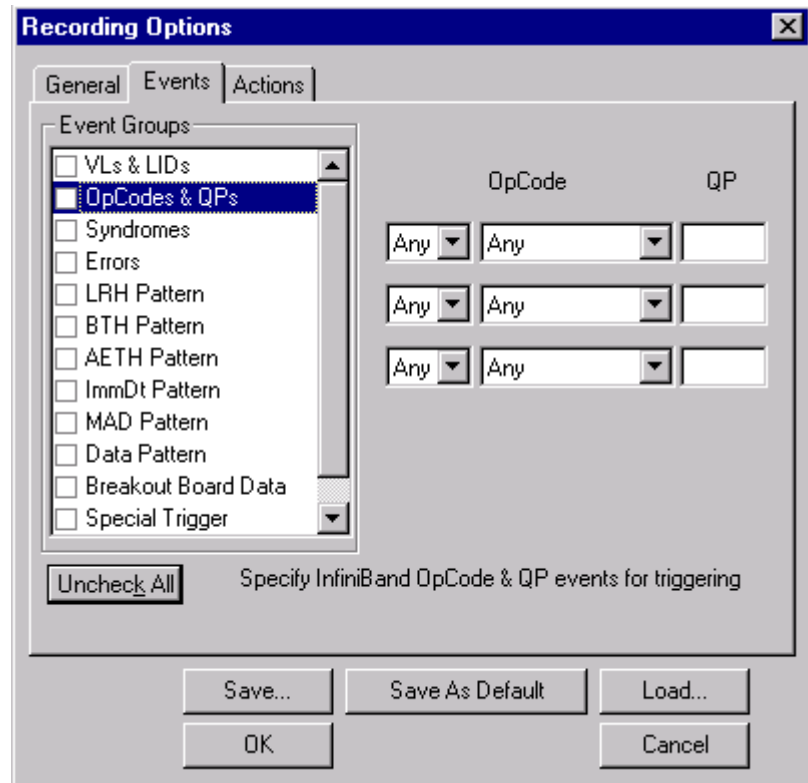


The abbreviations have the following meanings:

- VL (Virtual Lane)  
The VL drop-down menu presents a list of Virtual Lanes. Select a VL to trigger or filter on it.
- DLID (Destination Local Identifier)  
Enter a DLID into the text box if you want to trigger or filter on DLID.
- SLID (Source Local Identifier)  
Enter a SLID into the text box if you want to trigger or filter on SLID.

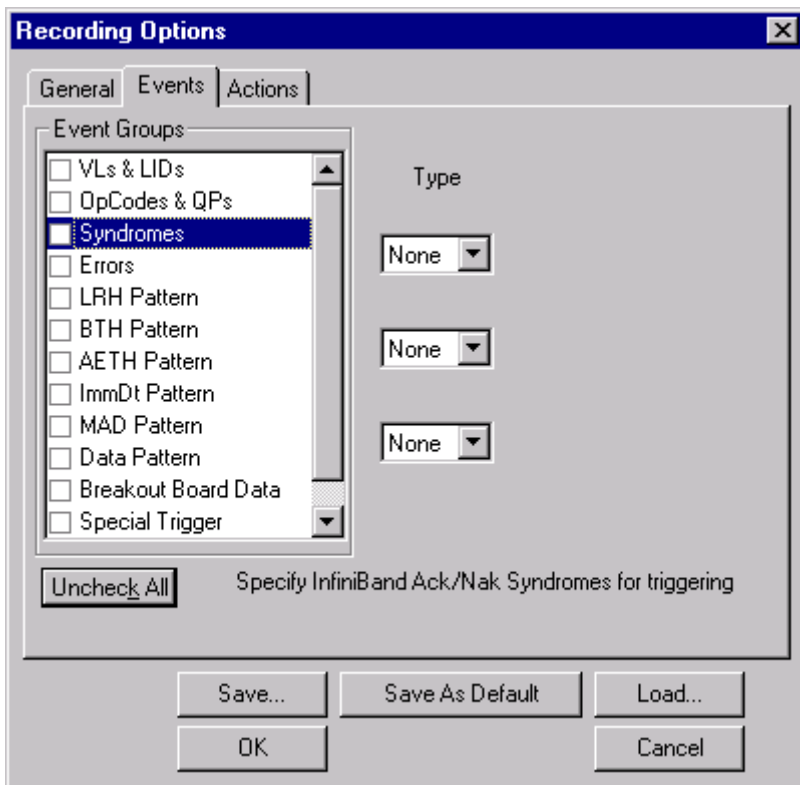
OpCodes & QPs (only available when using the E2951A)

Clicking *OpCodes & QPs* opens three sets of check boxes and menus on the right that represent Packet OpCodes and destination Queue Pairs.

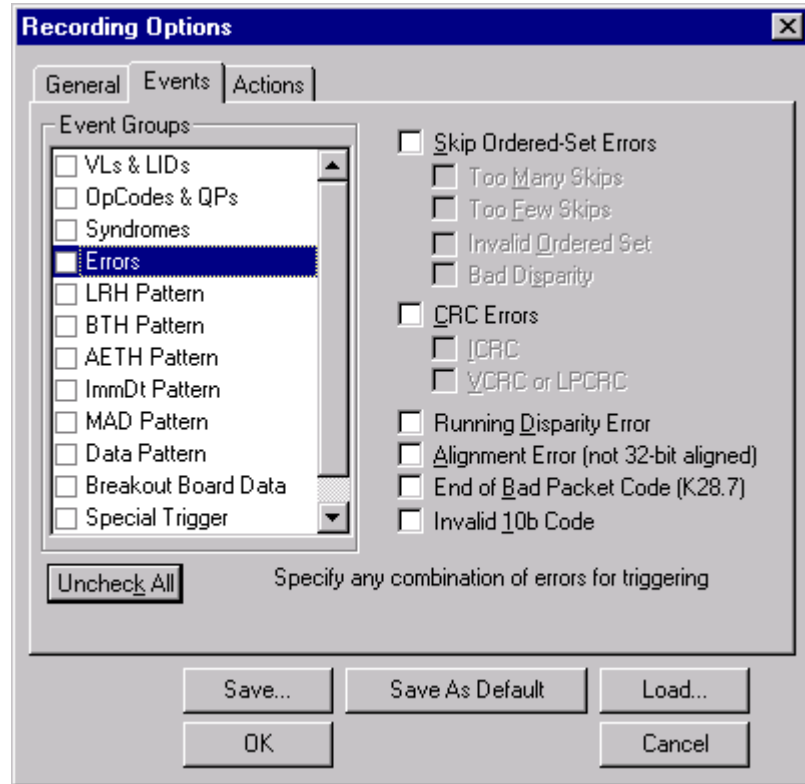


**Syndromes** (only available when using the E2951A)

Clicking *Syndromes* opens three drop-down menus that allow you to set triggers or filters on ACK or NAK Syndromes.

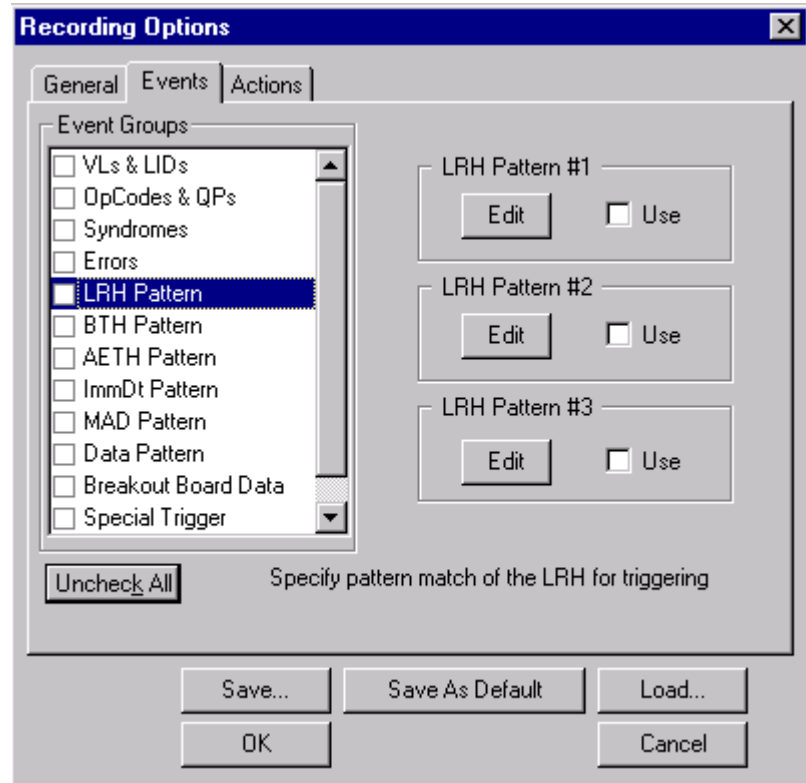


**Errors** Clicking *Errors* causes check boxes to appear for setting conditions for triggering based on packet/signaling/protocol errors. You can select one or a combination of errors.

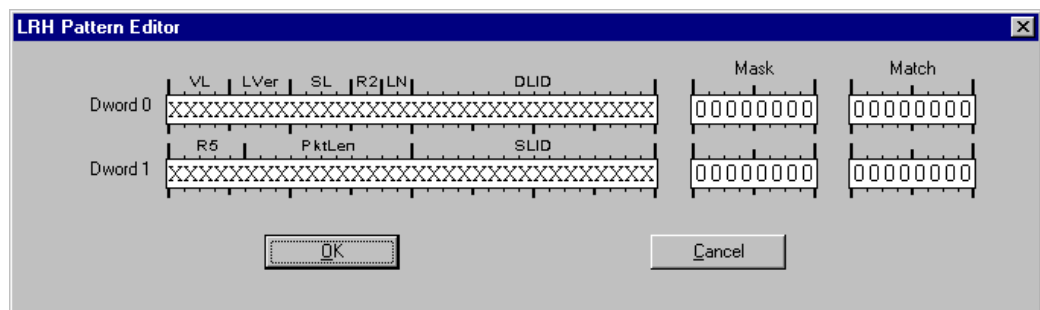


LRH Pattern (only available when using the E2951A)

*LRH Pattern* presents options for setting triggering and/or filtering on Local Route Headers. You can select one or a combination of up to three LRHs. The *Edit* button open pattern editors for setting bit-by-bit patterns.

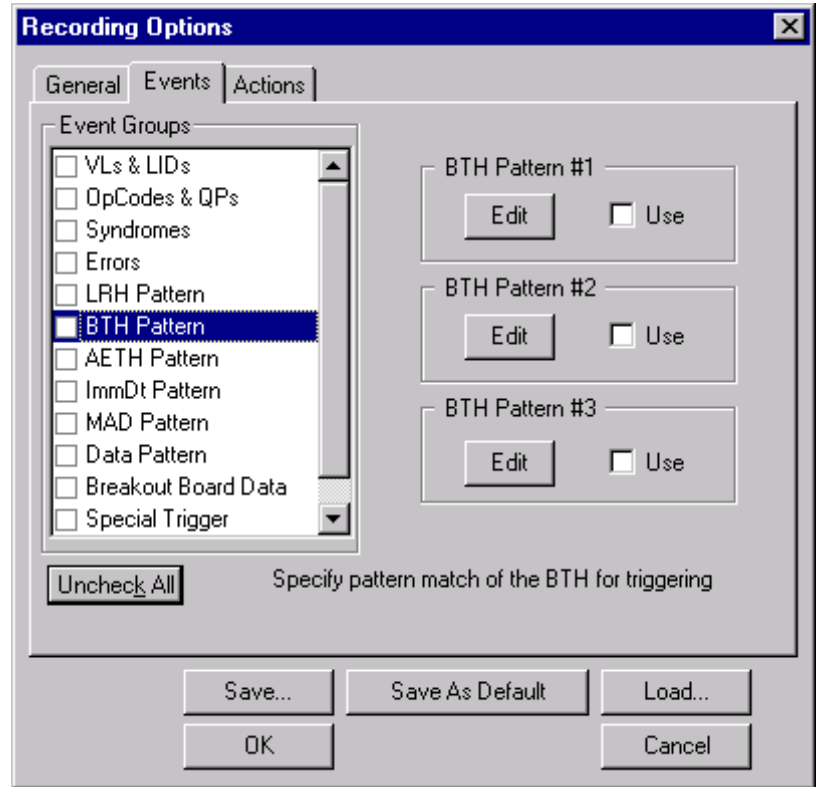


**LTH Pattern Editor** If you click one of the *Edit* buttons, a pattern editor box will open similar to the one shown below that will allow you to set bit-by-bit pattern.



BTH Pattern (only available when using the E2951A)

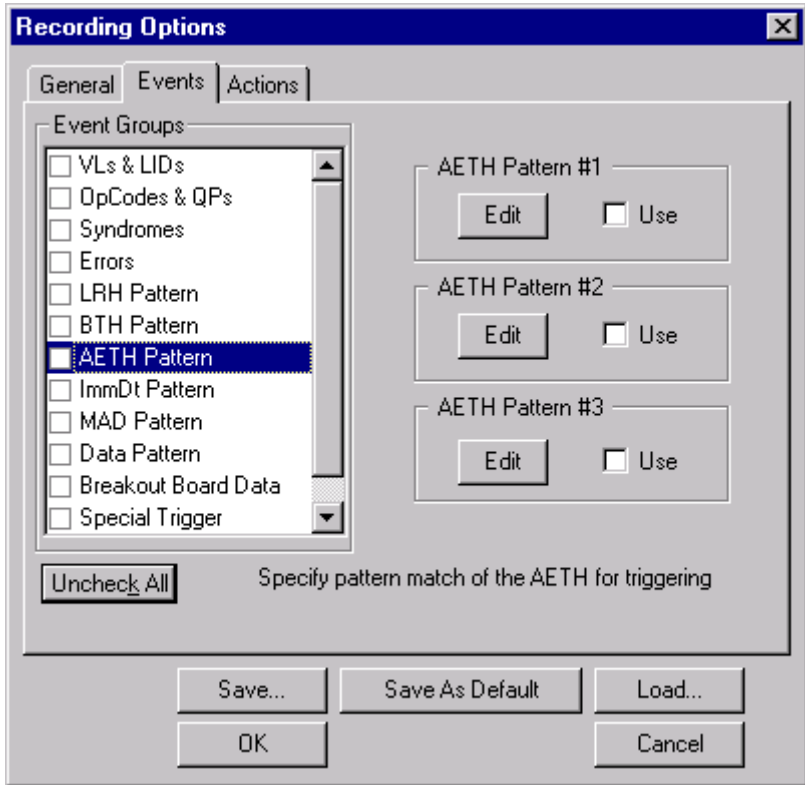
Clicking *AETH Pattern* causes check boxes and editing buttons to appear on the right for setting triggering and/or filtering on Ack Extended Transport Headers. You can select one or a combination of up to three BTHs.



If you click one of the *Edit* buttons, a pattern editor box opens similar to the one shown in "*LTH Pattern Editor*" on page 101, which allows you to edit up to three bit-by-bit patterns.

AETH Pattern (only available when using the E2951A)

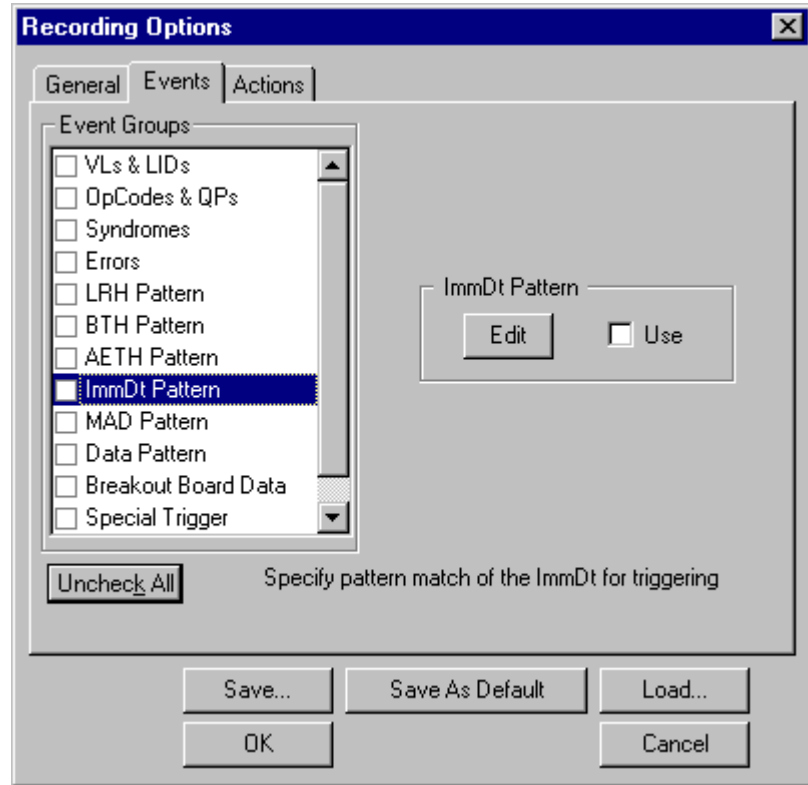
Clicking *AETH Pattern* causes check boxes and editing buttons to appear on the right for setting triggering and/or filtering on Ack Extended Transport Headers. You can select one or a combination of up to three AETHs.



If you click one of the *Edit* buttons, a pattern editor box will open similar to the one shown in "*LTH Pattern Editor*" on page 101, which allows you to edit a bit-by-bit pattern.

**ImmDt Pattern** Clicking *ImmDt Pattern* causes a check box and edit button to appear on the right for setting triggering and/or filtering on Immediate Data Headers. You can select one or a combination of up to three ImmDt patterns.

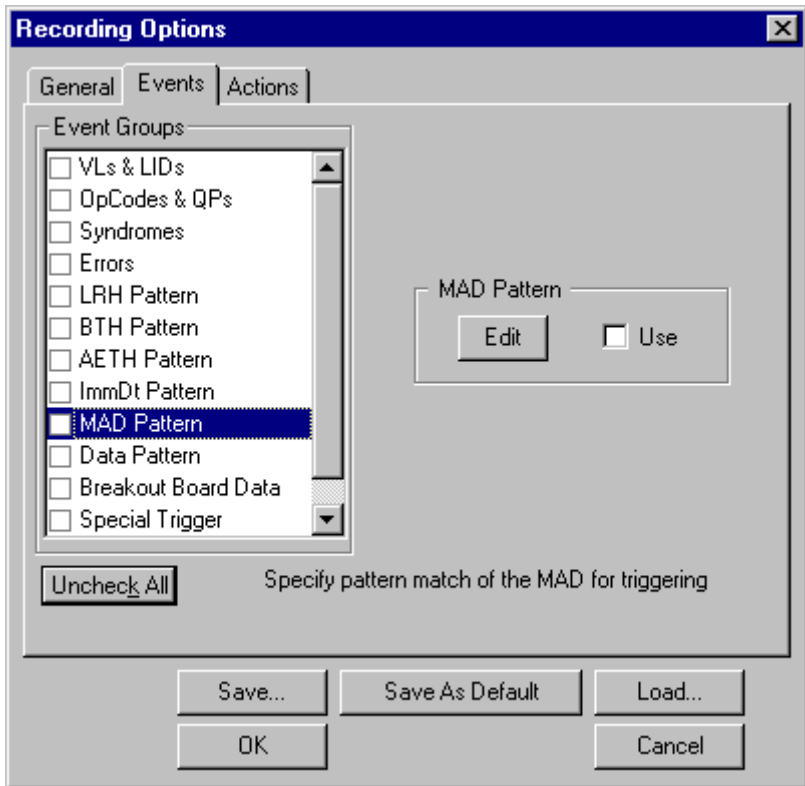
Select *Use* if you want to use your pattern for triggering/filtering.



If you click one of the *Edit* buttons, a pattern editor box opens similar to the one shown in "LTH Pattern Editor" on page 101, which allows you to edit up to three bit-by-bit patterns.

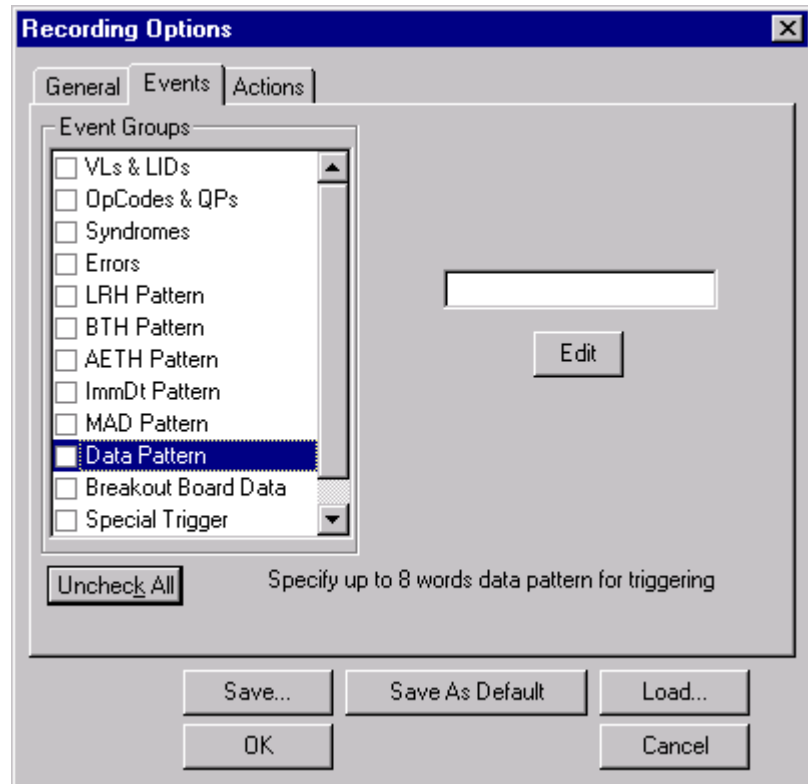


**MAD Pattern** Clicking *MAD Pattern* causes a check box and edit button to appear on the right for setting triggering and/or filtering on Management Datagram fields.

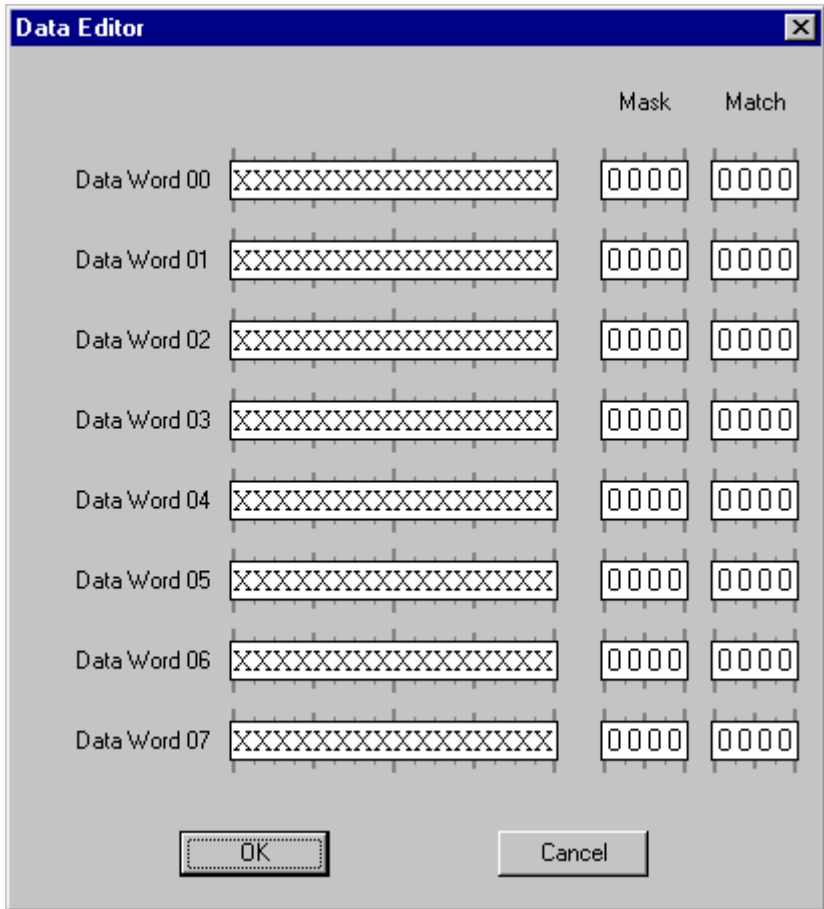


If you click one of the *Edit* buttons, a pattern editor box opens similar to the one shown in "*LTH Pattern Editor*" on page 101, which allows you to set a bit-by-bit pattern.

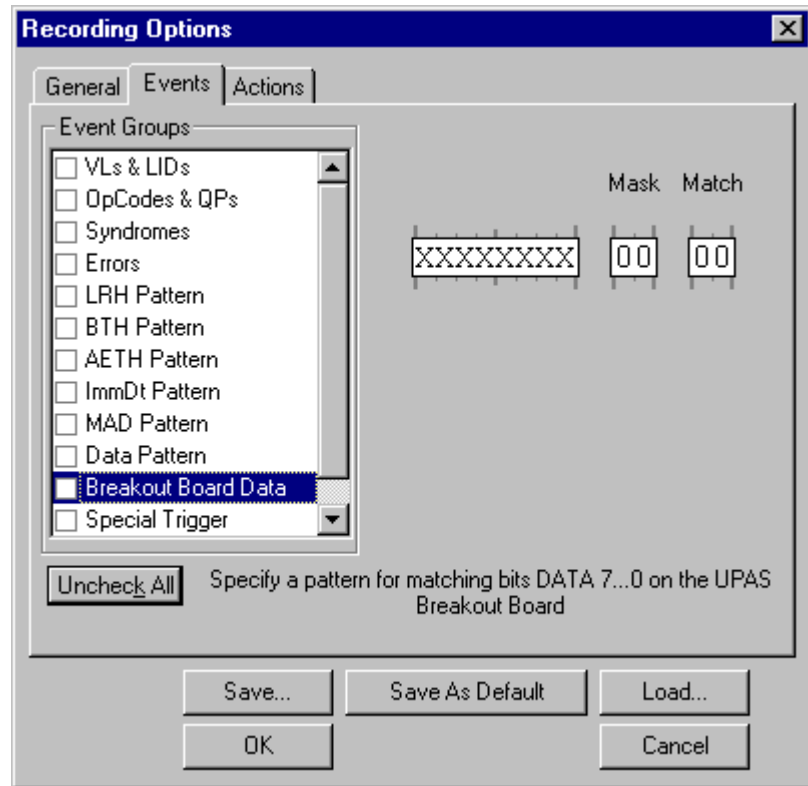
**Data Pattern** Clicking *Data Pattern* causes an edit field and button to appear on the right for setting data patterns for triggering.



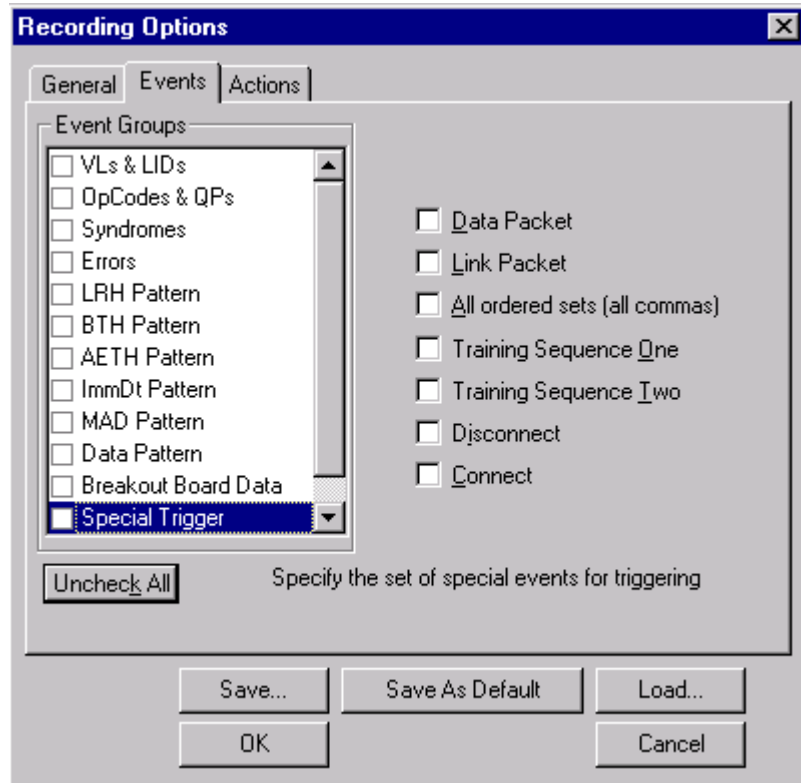
If you click the *Edit* button, a Data Editor box will open that allows you to set up to eight bit-by-bit patterns that will be used as triggers.



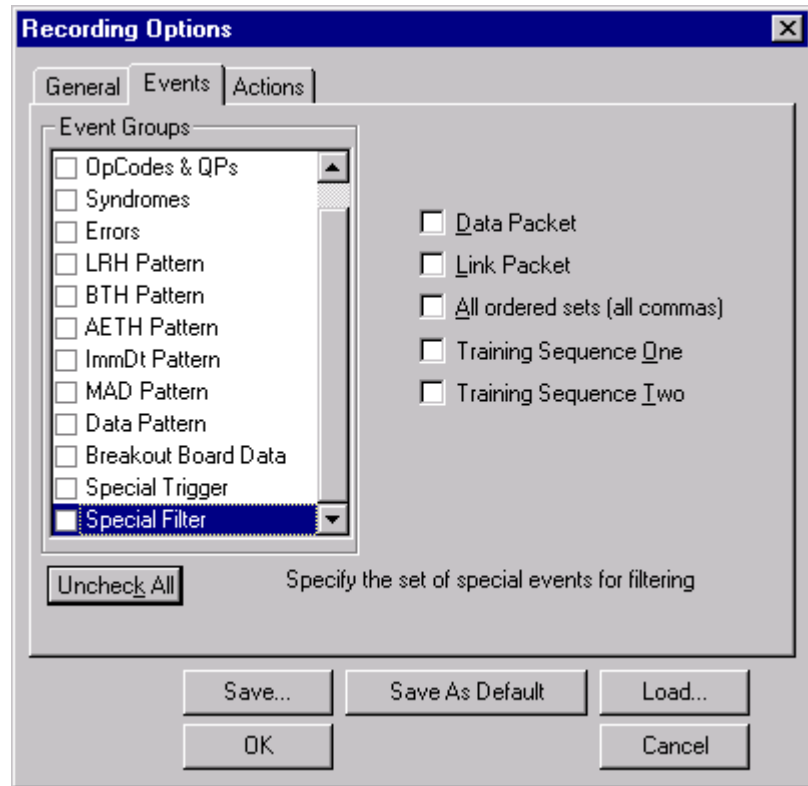
**Breakout Board Data** Clicking *Breakout Board Data* causes a pattern editor to appear on the right for setting triggering and/or filtering on Breakout board data. The pattern editor allows you to edit a bit-by-bit pattern.



**Special Trigger** Clicking *Special Trigger* causes check boxes to appear on the right for setting triggers on special types of events such as Data Packets and Link Packets. You can select one or a combination of events.



**Special Filter** Clicking *Special Filter* causes check boxes to appear on the right for setting filters on special types of events such as Data Packets and Link Packets. You can select one or a combination of events.



**Header Fields** (only available when using the E2952A)

This option enables to set up header parameters for triggering or filtering.

**Header Patterns** (only available when using the E2952A)

This option enables to set pattern matchers for every possible InfiniBand header type.

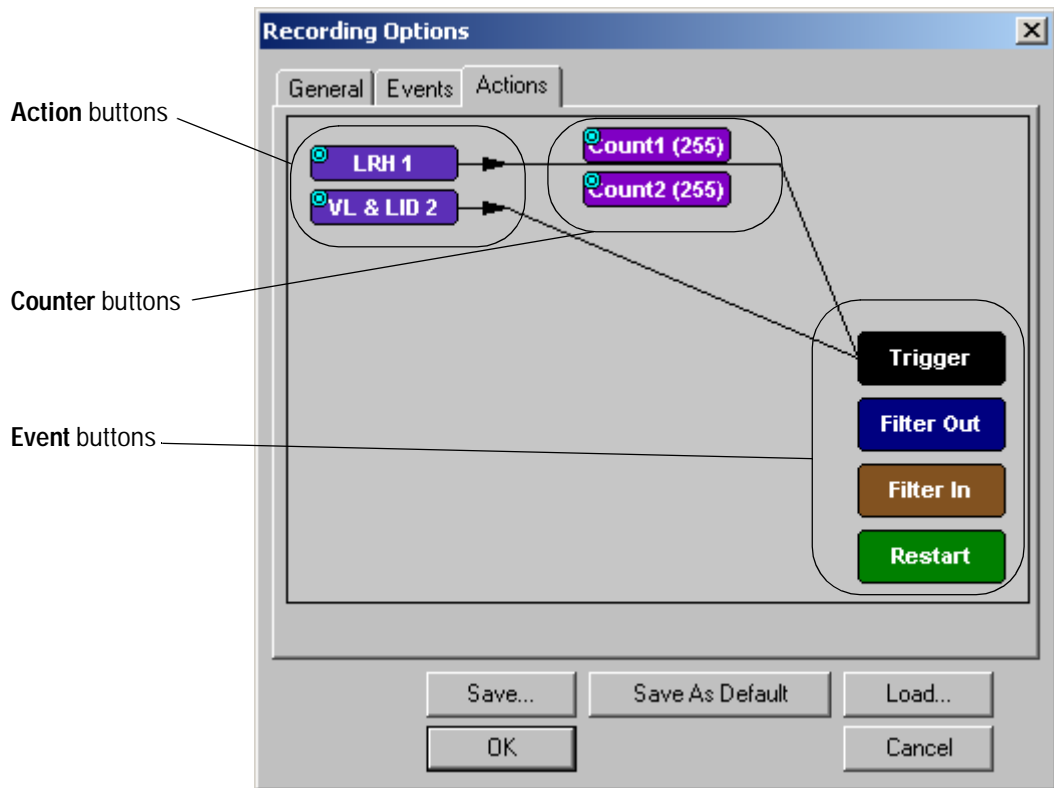
For each header type, select *Use* and then click the *Edit* button to edit the pattern matcher of interest.

Following topics provide detailed information about some of the pattern matchers:

- "LRH Pattern" on page 101
- "BTH Pattern" on page 102
- "AETH Pattern" on page 103

## Recording Options - Actions

The Actions page allows you to specify the type of action that occurs when the Analyzer for InfiniBand encounters the events you selected on the Events page.



### Actions Page Layout

*Events* appear as buttons on the left side. Event buttons are connected by lines to *Action* buttons. The lines indicate the actions that will occur when the events take place in the trace. By default, events are linked to the *Trigger*, meaning that the Analyzer will trigger when the events occur.

*Filter Out*, *Filter In* and *Restart* provide alternative actions that can be performed.

*Count1* and *Count2* provide a mechanism for counting events. This allows you to set a trigger that occurs after a specific number of events have occurred.

*Trigger* causes the Analyzer to trigger when an event occurs.

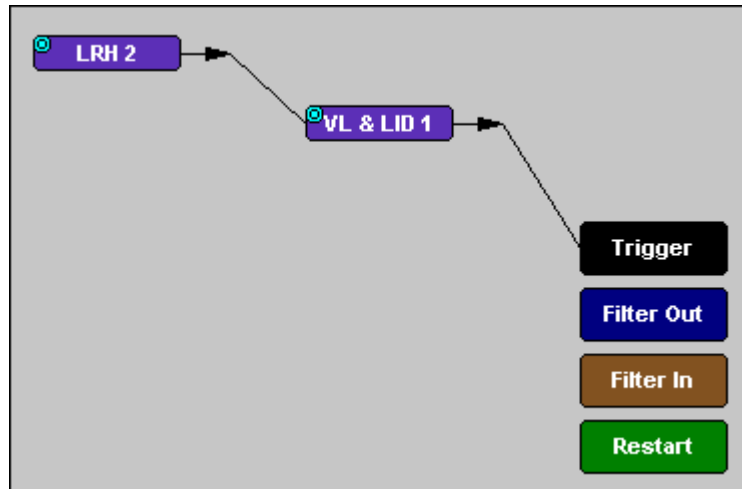
*Filter In* and *Filter Out* do what their names imply: They filter in or filter out traffic from the trace. If you filter *out* traffic, you prevent it from being recorded. If you filter *in* traffic, you allow only the chosen traffic to be preserved in the trace. Filtering affects the recording process itself – if you filter out traffic, for instance, it will not be preserved in the trace.

*Restart* causes *Event Sequencing* to restart. Event sequencing is the process of triggering or filtering on multiple events. To understand how this button works, we need to further examine sequencing.

## Event Sequencing

You can set up the Analyzer to trigger when various events occur in the trace. You can even set up sequences of events that have to occur before the Analyzer is triggered. There are two types of event sequences: AND and OR sequences.

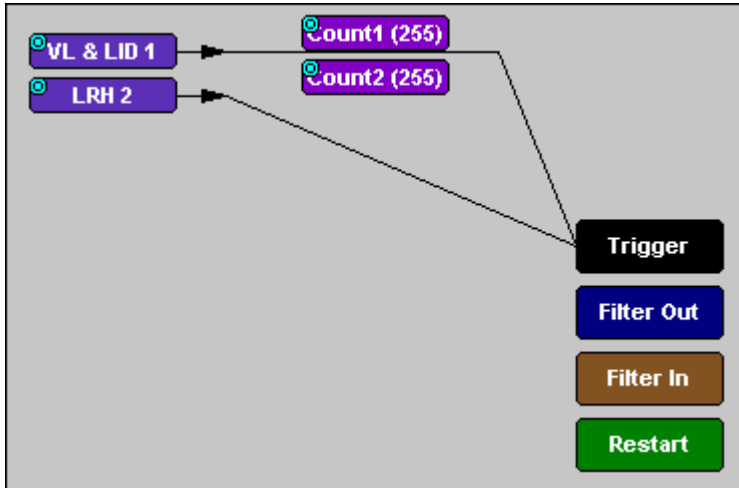
**AND sequences** If Events are strung together into a series, as shown below, the Analyzer will trigger or filter when it sees this sequence. Such a sequence can be thought of as an AND sequence: “Perform an action when x *and* y occur.”



**NOTE** Not all events can be sequenced together. For example, you cannot sequence a MAD pattern with an AETH packet.

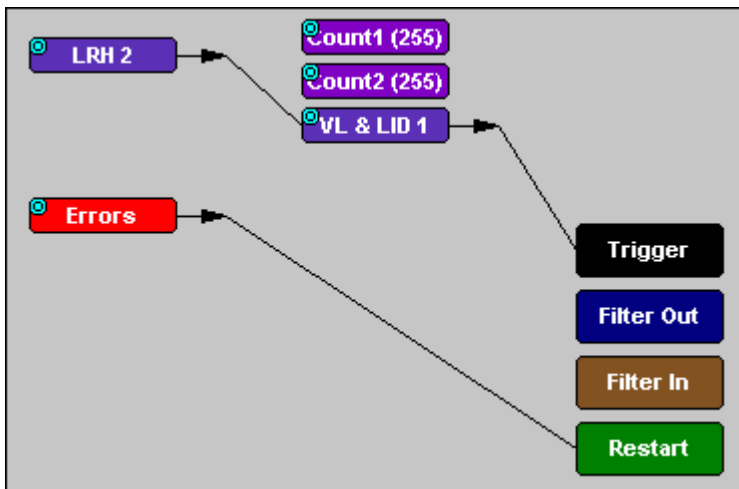


**OR sequences** If Events are connected to Actions by parallel lines, an *OR* sequence is created: “Perform an action when either x *or* y occurs.” The following graphic gives an example.



### Restarting a Sequence with the Restart Button

The *Restart* button provides you with a way to restart the sequencing process when a key event occurs, such as an error. The screenshot below gives an example. It shows the Analyzer looking for a sequence of LRH VL&LID packets but restarting the search if an error is encountered.

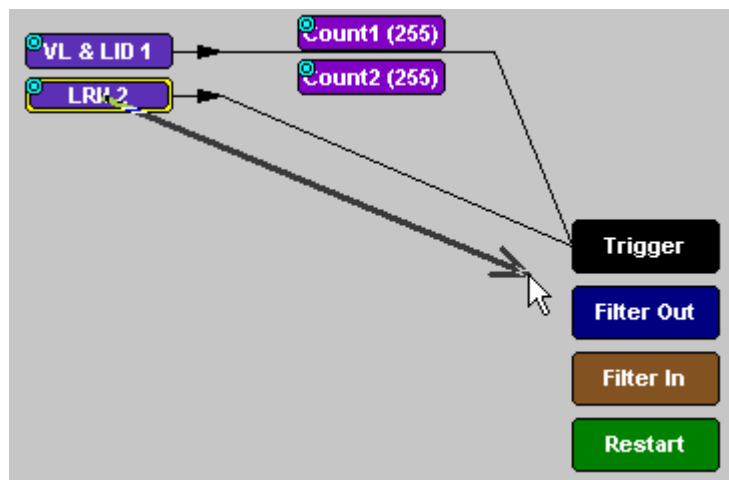


## Connecting Events to Actions

To change the current associations between Events and Actions, you click an *Event* button and then an *Action* button. When you click on the Event button, an elastic arrow will appear on the mouse pointer. When you click the *Action* button, the arrow will anchor itself to the *Action* button and change into a line.

The steps are as follows:

- 1 Click the left mouse button on an event button such as LRH. The elastic arrow appears:



- 2 Drag the arrow to the desired Action button.
- 3 With the pointer over an Action button, click again the left mouse button again.  
The arrow is replaced with a black line connecting the Event button to the Action button.

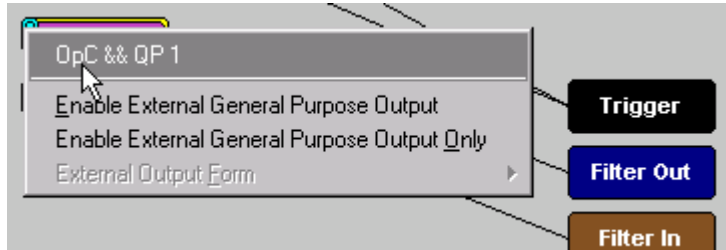
## Enabling External General Purpose Output

This option makes it possible to send an external output signal when a triggering event occurs. The following steps are outlined in order to explain the pop-up menu that occurs when you open a blue dot pop-up menu on an Event button.

To enable or disable external trigger output:

- 1 Click the blue dot on an Event button such as LRH.

A menu similar to the one below will open. Your menu may say Disable instead of Enable.



- 2 Select *Enable External Trigger Output* (or *Disable External Trigger Output* if that is the choice presented).

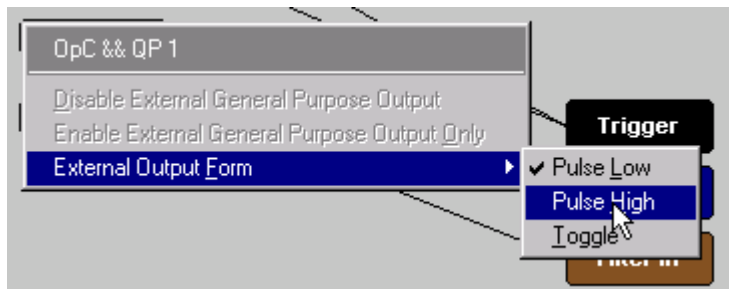
If you have chosen *Enable External Trigger Output*, a small arrow will appear on the right side of the button.



This arrow indicates that a condition has been set for creating an external output signal. Choosing *Disable External Trigger* will cause the arrow to disappear.

- 3 Choose *External Trigger Form*.

A menu will appear with choices for *Pulse Low*, *Pulse High* and *Toggle*.



- 4 Choose an option not currently selected.

The menu closes.

- 5 Reopen the menu.

Note that your new selection is now checked.

# Other Features

Here you find some features that help you to navigate through your data trace and to filter and sort it by events and data types.

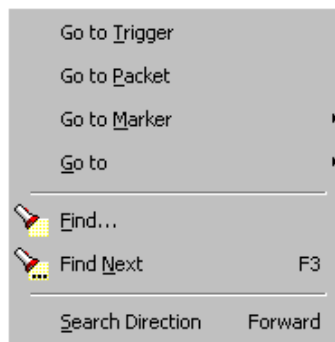
## Search

The Search feature provides several options for searching through recorded traffic, allowing you to find specific packets based on triggering status, packet number, marking, or content.

To view the Search options:

- ◆ Click *Search* in the menu bar.

You see the Search drop-down menu:



## Go to Trigger

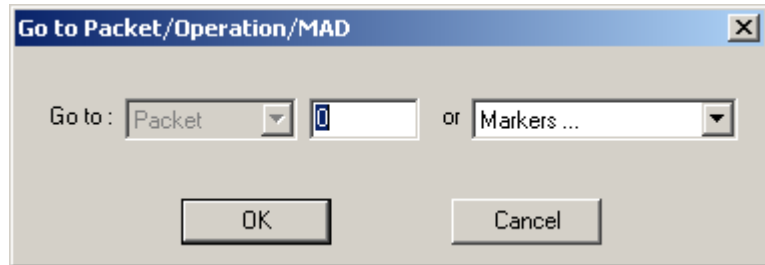
To display a triggering event, select *Go to Trigger* under *Search* on the menu bar. The Trace Viewer display will reposition the trace to show the triggering event at the top of the screen.

## Go to Packet/Operation/MAD...

To display a specific packet, operation or MAD:

- 1 Select *Go to Packet/Operation/MAD...* under *Search* on the menu bar.

You see the Go to Packet/Operation/MAD dialog box:



- 2 Select the type of element you want to display from the drop-down list.

- 3 Do one of the following:
  - Enter the number of the element you want to display.
  - Select a value from the drop-down list.

- 4 Click *OK*.

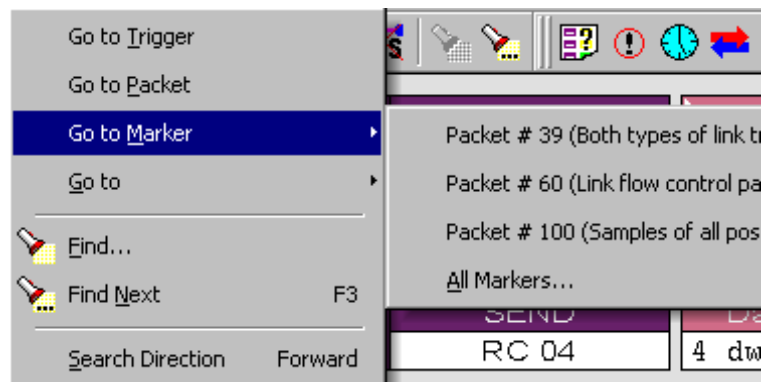
The trace is repositioned to show the packet at the top of your screen.

## Go to Marker

To instruct the E2951A/E2952A to display a marked packet:

- 1 Select *Go to Marker* under *Search* on the menu bar.

You see a menu listing the marked packets in that Trace View:



- 2 Select the desired packet from the displayed list.

The Trace repositions to show the packet at the top of your screen.

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

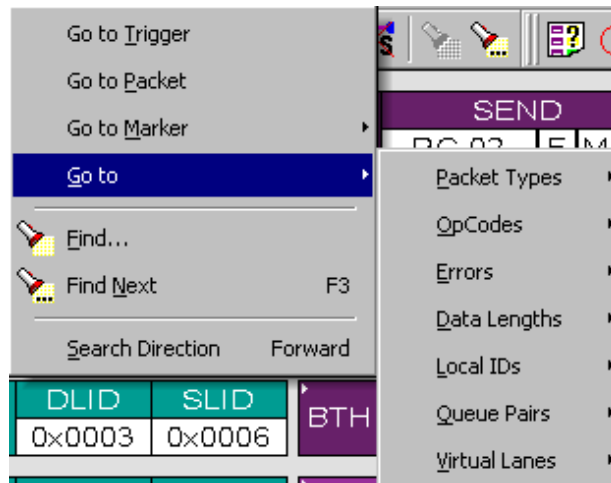
## Go To

The Go To feature takes you directly to an event in a trace.

To use the Go To feature:

- 1 Select *Go To* under *Search* on the menu bar.

You see the Go To drop-down menu:




- 2 Select the event you want to go to.

This opens up additional menus, where you can specify exactly the event you want to go to.

## Find

The Find feature allows searches to be conducted on an open trace using one or more criteria. You can search by packet, transactions, split transaction, transfer, by packet type and by fields within packets.

Find is run by selecting *Search > Find* or by clicking  on the toolbar.


Searches can combine criteria using the options *Intersection* and *Union*. *Intersection* creates AND statements such as “Find all packets with *x* and *y*.” *Union* creates OR statements such as “Find all packets with *x* OR *y*.”

You can also perform searches whereby packets or events are excluded from a trace. *Exclusion* allows searches to be conducted.

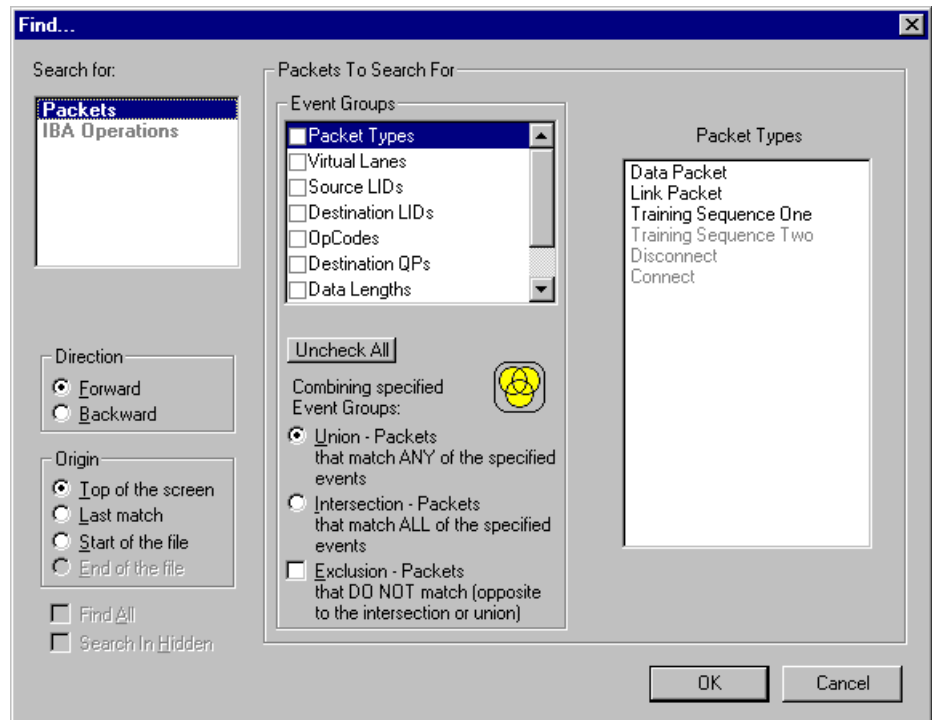
To perform a search:

- 1 Select *Find...* under *Search* on the menu bar.

- or -

Click  in the Tool Bar.

The *Find* dialog box opens:






- 2 Select *Packet*, *Transaction*, *Split Transaction*, or *Transfer* from the top left list box.

Your choice will affect options presented in the *Events Group* box.

- 3 Select one or more events from the *Events Group* list.

4 Select one of the following options:

Option	Icon	Description
<i>Union</i>		Find all packets matching ANY of the specified events.
<i>Intersection</i>		Find all packets matching ALL of the specified events.
<i>Exclusion</i>		Exclude packets matching any of the specified events.  <i>Exclusion</i> works with the other two options. You select <i>Union</i> AND <i>Exclusion</i> to exclude packets with ANY of the selected fields; or <i>Intersection</i> AND <i>Exclusion</i> to exclude packets with ALL of the selected fields.

5 If desired, select the following:

- *Direction* and *Origin* to determine where and in which direction the search starts
- *Find All* to find all instances of an event group
- *Search in Hidden* to also find hidden event groups

6 Click *OK*.


After the search finishes, the packets meeting the search criteria are displayed.

## Find Next

To apply the previous Find parameters to the next search:

- Select *Find Next* under *Search* on the menu bar.

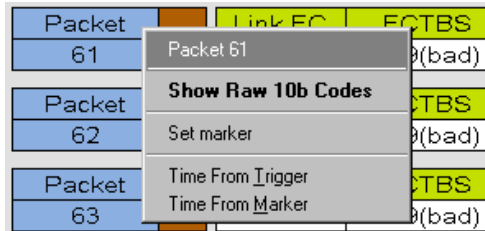
- or -

Click  on the Tool Bar.

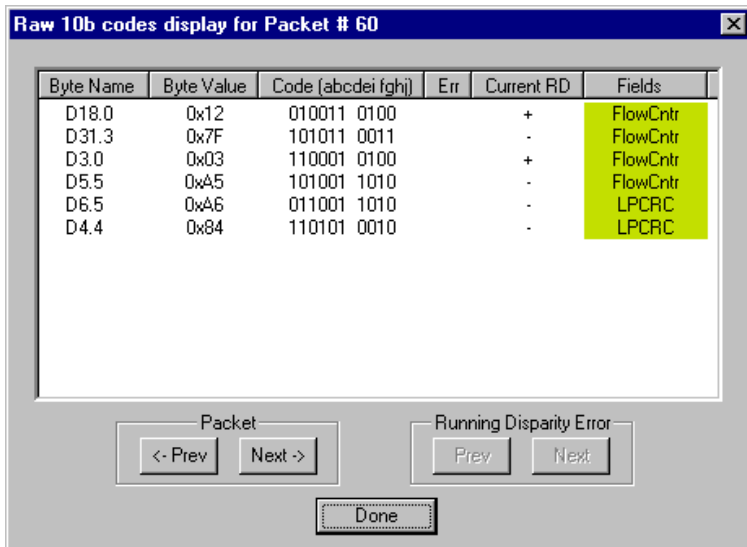


## Display Raw 10b Code

To view Raw 10b Codes, left-click on the first cell in a packet and select *Show Raw 10b Codes* from the pop-up menu shown on the right.



After you have made your selection, the following window opens:

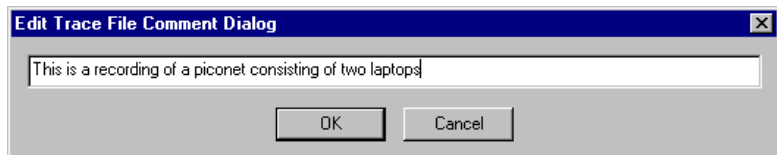


## Edit Comment

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

- 1 Select *Edit Comment* under *File* on the menu bar.

You see the Edit comment for trace file window:



- 2 Create, view, or edit the comment.
- 3 Click *OK*.



# Specifications

The following specifications describe the E2951A/E2952A Analyzer for InfiniBand.

## Operating Characteristics

### Probing Characteristics

Connection:	E2951A: HSSDC2 receptacles
	E2952A: MicroGigaCN receptacles
	Standard InfiniBand cables
	Host connection (USB 2.0, type "B")

### Recording Memory Size

E2951A: 512 M x 8-bit DRAM for traffic data capture, timing, state and other data.

E2952A: 2048 M x 8-bit DRAM for traffic data capture, timing, state and other data.

### Basic Trigger Events



The E2951A/E2952A Analyzer for InfiniBand can be triggered by errors, packet-oriented events, or other conditions. See *"Recording Options"* on page 91 for more information.

# Certification

## Environmental Conditions

Condition	Value Range
Overvoltage/Insulation	category II
Pollution	Degree 2
CTI	Index III
Altitude	up to 2000m
Manual Operating Temperature	0 to 40°

## Declaration of Conformity

<b>DECLARATION OF CONFORMITY</b> <small>According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014</small>		
<b>Manufacturer's Name:</b>	Agilent Technologies Deutschland GmbH	
<b>Manufacturer's Address:</b>	Boeblingen Verifications Solutions (BVS) Herrenberger Str. 130 D-71034 Boeblingen	
<b>Declares, that the product</b>		
<b>System Name:</b>	<b>InfiniBand Protocol Verification Tools</b>	
<b>System Number:</b>	<b>E2950</b>	
<b>Product Names:</b>	<b>E2951A</b> InfiniBand 1x Analyzer <b>E2952A</b> InfiniBand 4x Analyzer <b>E2953A</b> InfiniBand 1x Traffic Generator <b>E2954A</b> InfiniBand 4x Exerciser	
<b>Conforms with the following European Directives:</b>		
<small>The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC (including 93/68/EEC) and carries the CE Marking accordingly.</small>		
<b>Conforms with the following product standards:</b>		
<b>EMC (Technical Construction File)</b>	<small>The product herewith complies with the requirements of the EMC Directive 89/336/EEC (including 93/68/EEC) and carries the CE Marking accordingly (European Union).</small>	
Against:	<small>EMC test specification EN 55011:1998 (Group 1, Class A)</small>	
As detailed in	<small>Electromagnetic Compatibility (EMC) Certificate of Compliance No. 01-051</small>	
Assessed by:	<small>CETECCOM GmbH, D-45219 Essen</small>	
	<b>Standard</b>	<b>Limit</b>
<b>EMC</b>	IEC 61326-1:1997+A1:1998 / EN 61326-1:1997+A1:1998 CISPR 11:1997 / EN 55011:1998 IEC 61000-4-2:1995+A1:1998 / EN 61000-4-2:1995 IEC 61000-4-3:1995 / EN 61000-4-3:1995 IEC 61000-4-4:1995 / EN 61000-4-4:1995 IEC 61000-4-5:1995 / EN 61000-4-5:1995 IEC 61000-4-6:1996 / EN 61000-4-6:1996 IEC 61000-4-11:1994 / EN 61000-4-11:1994  Canada: ICES-001:1998 Australia/New Zealand: AS/NZS 2064.1	Group 1 Class A 4 kV CD, 8 kV AD 3 V/m, 80-1000 MHz 0.5 kV signal lines, 1 kV power lines 0.5 kV line-line, 1 kV line-ground 3 V, 0.15-80 MHz 1 cycle/100%
<b>Safety</b>	IEC 61010-1:1990+A1:1992+A2:1995 / EN 61010-1:1993+A2:1995 Canada: CSA C22.2 No. 1010.1:1992 USA: UL 3111-1:1994	
<b>Supplemental Information:</b>		
<small>The product was tested in a typical configuration with Agilent Technologies test systems.</small>		
2002-June-24	 _____ Name	
Date	Product Regulations Engineer _____ Title	
<small>For further information, please contact your local Agilent Technologies sales office, agent or distributor.                      Authorized EU-representative: Agilent Technologies Deutschland GmbH, Herrenberger Strasse 130, D-71034 Boeblingen, Germany</small>		
Revision: D	Issue Date: 2002-June-24	

# Power Requirements

## WARNING

Refer servicing to qualified service personnel only.

Power: 100 - 240 V ~ / 50 - 60 Hz / 100 VA max

Fuse of the ASTEC Adapter NTQ123:

- Ref. Des.: F1
- Type: F 4A 250V

## Power Cable

In accordance with international safety standards, this instrument is equipped with a three-wire power cable. The figure below shows the part numbers of the power cables available. When connected to an appropriate AC power receptacle, this cable grounds the instrument cabinet.

