Agilent
Protocol Analyzer

User Guide

Agilent Technologies

Notices

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Installation Guides

You can find the installation guides for different components of the product on the product CD. Agilent recommends you to do not switch on the instrument before you have understood all the applicable installation instructions and have met all the installation prerequisites.

Where to find more information

You can find more information about Protocol Analyzer from the following link:

http://www.agilent.com/find/spt

You can also look for search a local contact for assistance on the following link:

http://www.http/agilent/find/assist

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ISM 1-A
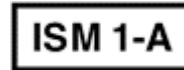
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Contents

1

Introduction

This chapter introduces you to the Protocol Analyzer application and provides information on accessing and exiting the Protocol Analyzer GUI.

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About Protocol Analyzer

Agilent Protocol Analyzer is an advanced verification system that allows you to capture data traffic generated by various protocols, such as PCI Express (PCIe), Advanced Switching Interconnect (ASI), and Fibre Channel (FC). This data, which you capture, you can view and analyze to identify problems, find their root cause, and troubleshoot them. This makes Protocol Analyzer a very effective tool to control as well as speed the development and testing of the PCIe, ASI, and FC protocols.

A brief list of features of Protocol Analyzer is given below:

- Enables you to perform root cause and performance analysis.
- Provides GUI for trigger setup, search, filter, and error detection.
- Provides a trigger sequencer with sophisticated trigger capabilities and storage qualifications.
- Provides 1 GB of trace memory.
- Provide x1, x2, x4, and x8 link widths with 2.5 Gbps.
- Provides non-intrusive traffic capturing.
- Provides easy visibility into a protocol transactions. For example, it displays the traffic activity, port link status, and trace content simultaneously. It also provides sophisticated and fast screen based traffic upload.
- Provides tabular traffic display that speeds the debug process.
- Provides multi-port display for better insight into your system.
- Captures training sequences, ordered sets, data link layer packets (DLLPs), and transaction-layer packets (TLPs) in both directions simultaneously.

NOTE   Protocol Analyzer has two interfaces: GUI and API. This guide covers only the GUI aspect of the Protocol Analyzer application. For information on API, please refer to the online help.

About Starting and Closing Protocol Analyzer

Before you get started with Protocol Analyzer, you need to know how to access it.

In this section, you will learn about:

- Understanding Protocol Analyzer Session
- Accessing Protocol Analyzer
- Exiting Protocol Analyzer

Understanding Protocol Analyzer Session

In the context of Protocol Analyzer, a *session* represents the components, such as Controller PC, serial I/O modules, and probe, involved in a test. Session forms the basis of communication between the controller PC and the Serial I/O Modules.

Figure 1 displays the components involved in a Protocol Analyzer session. It also displays that more than one client can be associated with one session.
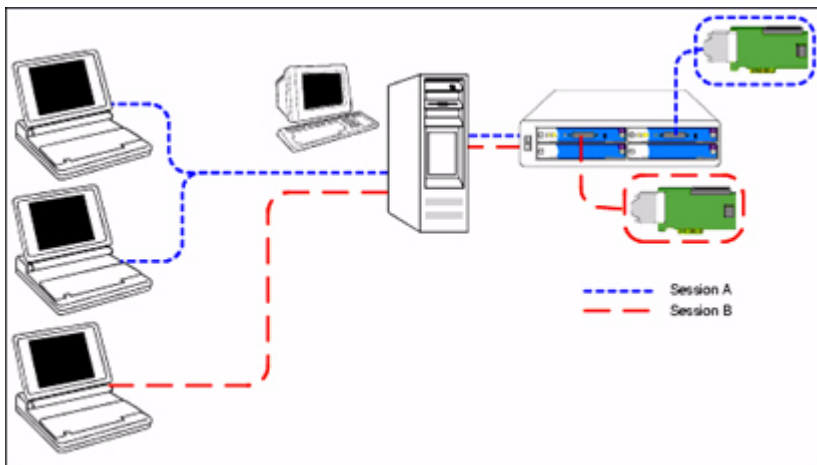
Figure 1   Protocol Analyzer Sessions and Components

Remember the following points while starting and using a new Protocol Analyzer instance:

- Starting a session establishes communication between the client and the controller PC, and also loads the necessary firmware on the desired serial I/O module.

- Ending a session clears the serial I/O module, thus enabling it to be used for a new session.

- Protocol Analyzer does not enable you to lock a session. Therefore, it is possible for multiple Protocol Analyzer instances to concurrently access one session.

| NOTE | The controller PC does not protect against meaningless, or even conflicting requests. Therefore, it is recommended that only one user should *own* a particular session at a time. |

Accessing Protocol Analyzer

Accessing Protocol Analyzer requires you to specify whether you want to connect to a new or an existing session, and the name of the server where you want to start the session. Accessing Protocol Analyzer also requires you to specify the port to use if you are trying to connect to a new session.

To specify all required inputs, Protocol Analyzer provides two dialog boxes: Select type of connection (Figure 2) and Port Selection (Figure 3).
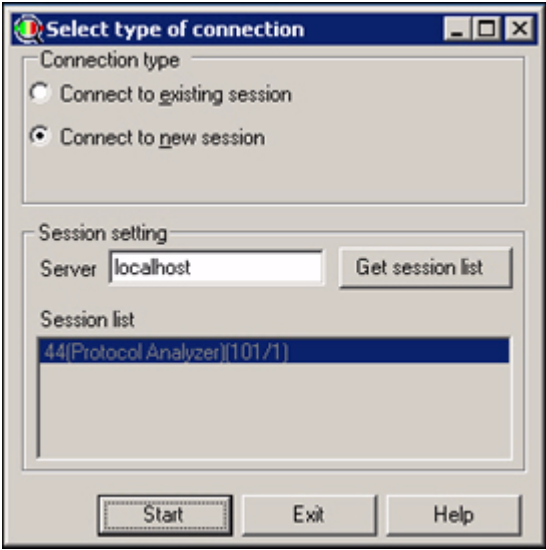
Figure 2　Select type of connection dialog box

Table 1 briefly describes the components of the Select type of connection dialog box.

Table 1   Components of the Select type of connection dialog box

Component	Description
Connect to existing session	Select **Connect to existing session** if you want to use an existing session of Protocol Analyzer on a known server.
Connect to new session	Select **Connect to new session** if you want to create a new Protocol Analyzer session on a known server.
Server	Specifies the name or IP address of the server, where you want to start a new or join an existing Protocol Analyzer session. Its default value is **localhost**.
Get session list	Click **Get session list** to retrieve a list of existing Protocol Analyzer sessions from the server you specified in the **Server** text field. This button works only if you have selected the **Connect to existing session** option.
Session list	Displays a list of sessions existing on the server you specified in the **Server** text field.
Start	Click **Start** to start a new Protocol Analyzer instance.
Exit	Click **Exit** to close the dialog box without starting the Protocol Analyzer application.
Help	Click **Help** to display the online help.

Figure 3 displays the Port Selection dialog box.
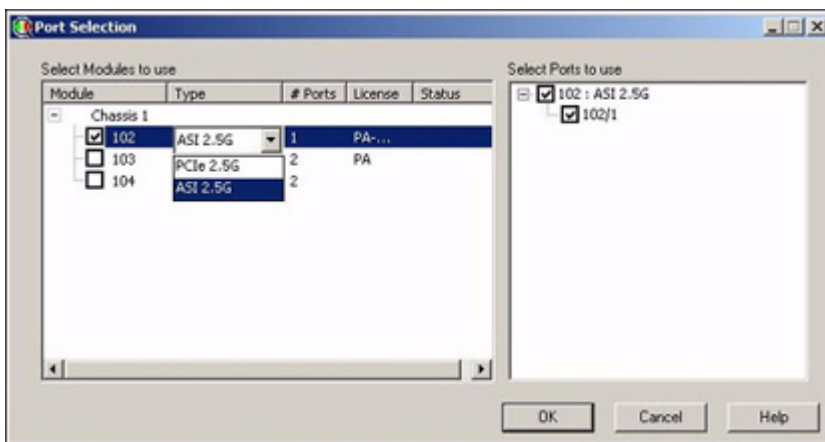
Figure 3   Port Selection dialog box

Table 2 briefly describes the components of the Port Selection dialog box.

Table 2 Components of the Port Selection dialog box

Component	Description
Module	The **Module** column provides a list of modules in the form of check boxes. These check boxes are organized under the expandable list of chassis to which they belong. Here, select a module on which you want to start a new session. A module, which is already associated with a session, appears disabled.
Type	The **Type** column enables you to select the type of port to use.
# Ports	The **# Ports** column displays the number of ports for each module.
License	The **License** column displays the license details of each module.
Status	The **Status** column displays the status of each module. This column displays the following messages: • **Rebooting**: This message indicates that the serial I/O module is restarting. • **Ready**: This message indicates that you can now add port to the session. • *Session_Name*: *Session_Name* is the name of the session, such as PCIEExerciser GUI. This message indicates that the *Session_Name* session is now connected with the port.
Select Ports to use	Select the port to use from the **Select Ports to use** list box.
OK	Click **OK** to start an instance of Protocol Analyzer on the selected port.

| NOTE | To find out more about the licensed software:
• Click **File > Software Packages**. This displays the Software Package Management dialog box. Here, you can view a list your current licensed software in the Installed Software Packages section. |

To access Protocol Analyzer

1 On the Windows task bar, click **Start > Programs > Agilent System Protocol Tester > Protocol Analyzer**.

The Select type of connection dialog box appears.

2   Do one of the followings:

   a   Click **Connect to existing session** to use an existing Protocol Analyzer session.

   b   Click **Connect to new session** to start a new Protocol Analyzer session.

3   Type in the name or IP address of the server, where you want to start a new or join an existing Protocol Analyzer session, in the **Server** text field.

4   If you are trying to use an existing Protocol Analyzer session, do the following:

   a   Click **Get session list**. A list of sessions that are currently running on the server specified in the Server text field is displayed in **Session list**.

   b   Select the required session from **Session list**.

   c   Click **Start**. The main Protocol Analyzer window appears.

5   If you are trying to create a new Protocol Analyzer session, do the following:

   a   Click **Start**. The Port Selection dialog box appears.

   b   Select a module check box from the **Module** column.

   c   Select an appropriate option from the **Type** drop-down list.

   d   Click **OK**. The main Protocol Analyzer window appears.

Exiting Protocol Analyzer

You can exit from the Protocol Analyzer application by closing the opened trace file and the Protocol Analyzer window.

In this section, you will learn:

- To close a trace file
- To exit Protocol Analyzer

To close a trace file

- Click **File > Close**.

To exit Protocol Analyzer

1   Click **File > Exit**.

   The Session still open message box appears.

2 Do one of the following:

   a Click **Yes**. This closes the Protocol Analyzer window and also removes the associated session.

   b Click **No**. This closes the Protocol Analyzer window without removing its associated session.

NOTE	Closing a session automatically makes all the GUI interfaces, which are connected to it, inaccessible.

2

Getting Started

This chapter briefly introduces you to the main screen components of the Protocol Analyzer application. This chapter also introduces you to loading and saving the Protocol Analyzer data.

About the Protocol Analyzer Components

Protocol Analyzer provides various components that you can use to access its various features.

Figure 4 displays the Protocol Analyzer application window with its main components.
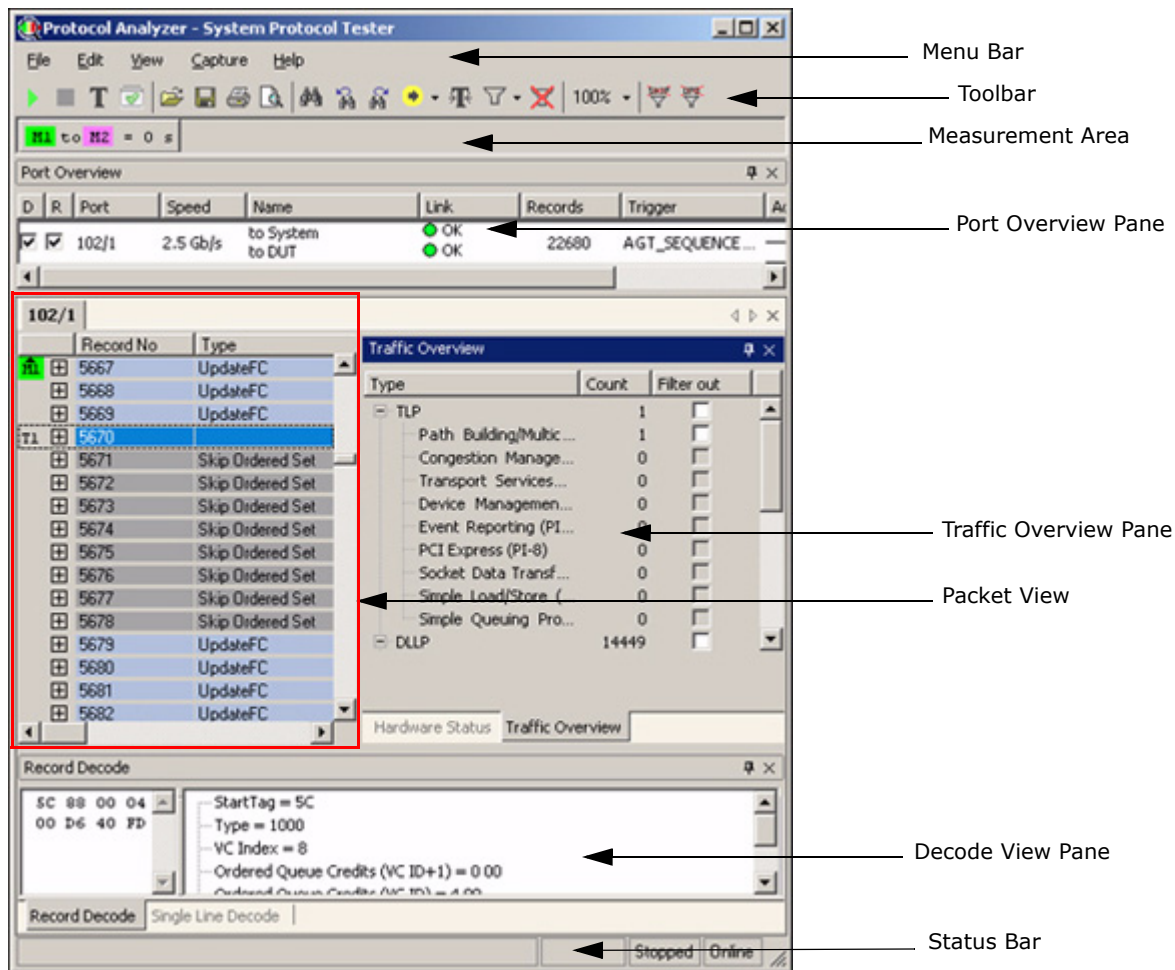
Figure 4   Protocol Analyzer window

This section covers the following topics:

- Protocol Analyzer Window
- Menu Bar
- Toolbar
- Panes

Protocol Analyzer Window

The main components of the Protocol Analyzer window are briefly described below:

- **Menu Bar and Toolbar**: They provide easy and quick access to the features of the Protocol Analyzer application.

- **Measurement Area**: It displays the time gap between two markers.

- **Packet View**: It displays detailed information about all the traced packets.

- **Panes**: They display information about traffic, hardware status, decoded form of the packet data, and the port on which Protocol Analyzer is running.

- **Status Bar**: It displays the current status of the various Protocol Analyzer activities, such as if it is online or offline, and if it is running or stopped.

NOTE	Menu bar, toolbar, and panes are described separately in the following sections. For more information on the Measurement area and the Packet view, refer to Customizing Protocol Analyzer on page 33.

Menu Bar

In Protocol Analyzer, menu bar provides the following menus:

- File menu
- Edit menu
- View menu
- Capture menu
- Help menu

File menu

Table 3 provides a brief description of the File menu commands.

Table 3 File menu commands

Menu command	Description
Open	Displays the Open dialog box that enables you to open the configuration (.xml) file and/or the binary (.pad) file.
Save As	Displays the Save As dialog box that enables you to save the trace to a file in XML and binary formats.
Text Export	Displays the Save As dialog box that enables you to save the trace to a file in text format.
Close	Closes the currently active tab in the Packet view.
Page Setup	Displays the Page Setup dialog box that enables you to specify the page settings for printing the trace.
Print	Displays the Print dialog box that enables you to print the traced data.
Software Packages	Displays the Software Package Management dialog box that shows you the already installed software and provides a list of new software to be installed. It not only displays licenses, but also allows you to add new licenses.
Exit	Closes the Protocol Analyzer application.

Edit menu

Table 4 provides a brief description of the Edit menu commands.

Table 4 Edit menu commands

Menu command	Description
Copy	Enables you to copy the Protocol Analyzer data to clipboard. For example, you can copy one or more data packet records and paste them in Protocol Exerciser to generate same or similar type of data packets.
Find	Displays the Find dialog box that enables you to specify the criteria to search data packets.
Find Previous	Searches the previous occurrence of the data packet using the search criteria specified in the Find dialog box.
Find Next	Searches the next occurrence of the data packet using the search criteria specified in the Find dialog box.
New Marker	Creates a new marker at the beginning of a selected data packet or frame.

Table 4   Edit menu commands

Menu command	Description
Delete Marker	Removes the selected marker.
Marker Properties	Displays the Properties of marker dialog box that you can use to view and modify the properties of a marker.

View menu

Table 5 provides a brief description of the View menu commands.

Table 5   View menu command

Menu command	Description
Filter	Provides sub-menu commands that enable you to create filters on data packets trace, as well as remove filters.
Goto	Provides sub-menu commands that enable you to move on to a trigger, marker, or a particular data packet record in the Packet view.
Zoom	Enables you to set the screen resolution of the data packet records shown in the Packet view.
Expand All Packets	Expands all the data packet records to show the details of their fields.
Collapse All Packets	Collapses all the data packets records to hide the details of their fields.
Record Decode View	Displays the Record Decode pane.
Single Line Decode View	Displays the Single Line Decode pane.
Port Overview	Displays the Port Overview pane.
Preferences	Displays the Preferences dialog box.
Port Management	Displays the Port Selection dialog box that enables you to select the ports of a module for your test application.
Default Window Arrangement	Resets the GUI settings of the Protocol Analyzer application to default.
Realtime Statistics	Displays the Realtime Statistics dialog box that shows the graphical representation of the data traffic.

Capture menu

Table 6 provides a brief description of the Capture menu commands.

Table 6   Capture menu commands

Menu commands	Description
Start	Starts capturing data packets.
Stop	Stops capturing data packets.
Trigger Setup	Displays the Trigger Setup dialog box.
Hardware Setup	Displays the Hardware Setup pane.

Help menu

Table 7 provides a brief description of the Help menu commands.

Table 7   Help menu commands

Menu command	Description
Help Topics	Displays the online help for Protocol Analyzer.
Session Information	Displays the Session Information message box with the current session information.
About	Displays the information about the System Protocol Tester system.

Toolbar

Toolbar provides a quick access to the features of the Protocol Analyzer application (Figure 5).

Figure 5   Toolbar

Table 8 specifies the names of all toolbar icons.

Table 8   Toolbar icons

Icon	Name
	Start hardware capturing
	Stop hardware capturing
	Show Trigger Setup
	Show port setup
	Open trace file
	Save trace to file
	Print
	Print preview
	Find packets
	Find previous occurrence
	Fine next occurrence
	Goto marker
	Goto trigger
	Filter packet display
	Disable all packet filters
	Zoom factor for packet views

Table 8   Toolbar icons

Icon	Name
SKIP	Filter all Skip Ordered Sets
UPD	Filter all Update Flow control Packets and Skip Ordered Sets

Panes

Protocol Analyzer provides the following panes:

- Port Overview
- Traffic Overview
- Hardware Status
- Decode View

Port Overview

To access the Port Overview pane:

- Click **View > Port Overview**.

  The Port Overview pane appears (Figure 6).
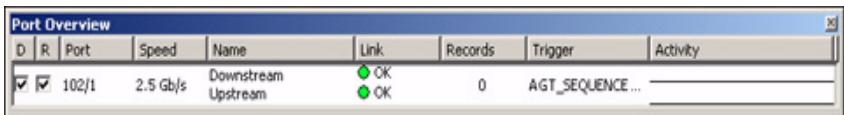
Figure 6   Port Overview pane

Port Overview displays the data of the ports that are connected with the current Protocol Analyzer session. A brief description of this data is given in Table 9.

Table 9   Port Overview pane

Column	Description
D	This column provides a check box for each port connected to the current Protocol Analyzer session. Selecting a check box displays the captured data of the port in the Packet view.

Table 9   Port Overview pane
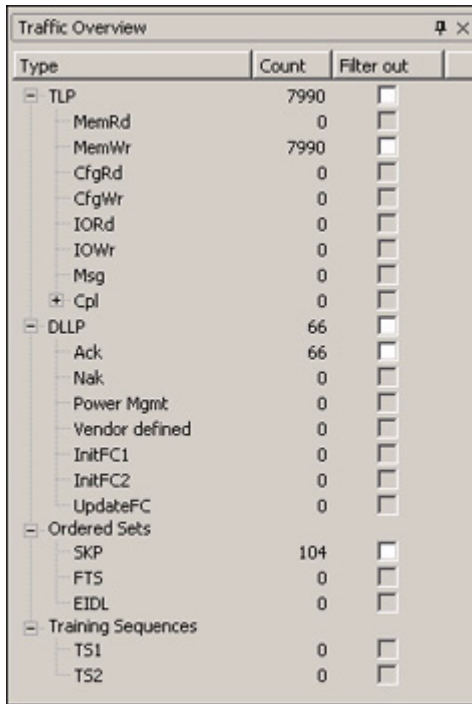
Column	Description
R	This column displays a list of one or more check boxes for those ports, which are connected with the current Protocol Analyzer session. Selecting a check box ensures that the data for its corresponding port will be captured whenever you will run Protocol Analyzer.
Port	This column displays the ID of those ports, which are connected with the current Protocol Analyzer session.
Speed	This column displays the speed at which the port will capture the data.
Name	This column displays the port name. This column also allows you to change port name by just clicking the existing name and then retyping the new name. This is useful if you are working with multiple ports, and each port is connected to a different DUT.
Link	This column displays the following messages to show the status of the link: • **No Laser**: This message means that laser is turned off and the port is not capturing data. This message is shown with a red colored bullet (●). This message applies to the Fibre Channel protocol only. • **LOS**: This message means loss of synchronization and the port is not capturing data. This message is shown with a red colored bullet (●) • **OK**: This message means that a connection has been established between a probe card and DUT. This message is shown with a green colored bullet (●).
Records	This column displays the number of records captured in the buffer.
Trigger	This column displays the most recently applied trigger.
Activity	This column shows the level of data rate using a straight line graph. In this method, a line is shown at the top of the column for the full level of date rate, and line is shown in the center of the column for the half level of data rate.

Traffic Overview

To access the Traffic Overview pane:

• Click **View > Traffic Overview**.

The Traffic Overview pane appears (Figure 7).

Figure 7   Traffic Overview pane

The Traffic Overview pane displays the following information:

- **Type**: This column displays the packets that belong to the underlying protocol, such as PCI Express, Advanced Switching Interconnect (ASI), or Fibre Channel. Also, these packets are arranged by their type, such as TLP and DLLP.

- **Count**: This column displays the number of occurrences of each packet in the trace.

- **Filter out**: This column displays check boxes for each packet. These check boxes are enabled only for those packets which were found in the trace. If you want to filter out any packet from the future traces, select its corresponding Filter out check box.

Hardware Status

To access the Hardware Status pane:

- Click **View > Hardware Status**.

  The Hardware Status pane appears (Figure 8).
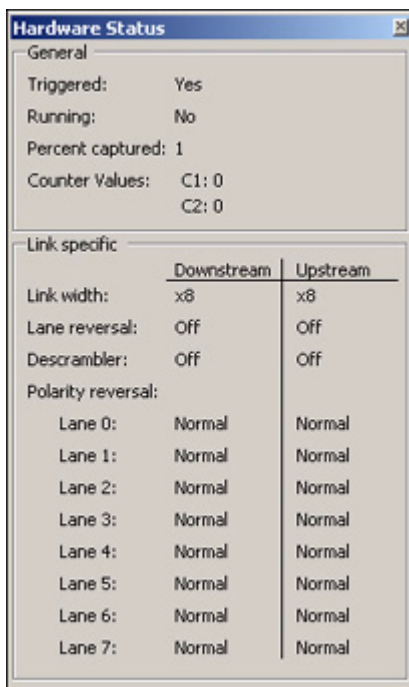
Figure 8   Hardware Status pane

The Hardware Status pane displays the following information:

- **General**: This section shows information about Protocol Analyzer, such as if it is triggered or not, and whether it is running or not. This section also shows the percentage of trace memory filled and the status of the counters (C1 and C2) that Protocol Analyzer provides for triggers.

- **Link specific**: This section shows the status information of the link width, lane reversal, descrambler, and polarity reversal.

Decode View

The Decode View pane displays the detailed data of the packet you selected in the Packet view. It is named as Decode View, because it displays the packet data in hexadecimal as well as in its decoded form.

Decode View has two nested panes:

- **Record Decode**: It displays the decoded data in a vertical record hierarchy format. You can access it by clicking the **Record Decode View** menu command in the **View** menu.

- **Single Line Decode**: It wraps the decoded data, for each row of hexadecimal data, in a single line. You can access it by clicking the **Single Line Decode** menu command in the **View** menu.

Figure 9 displays the Decode View panes.

      Record Decode   Single Line Decode
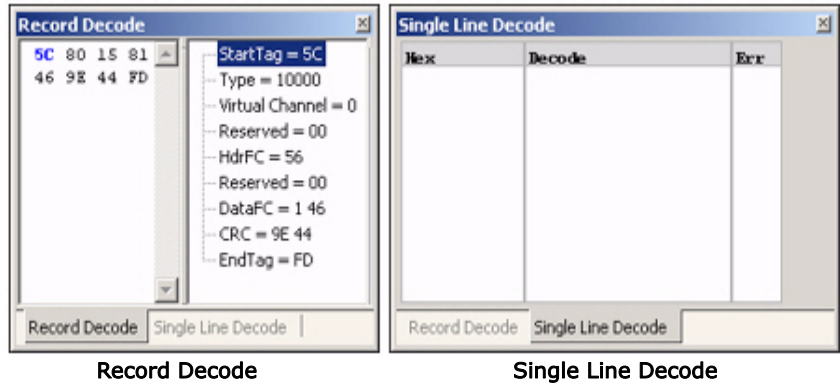
Figure 9   Decode View panes

About Loading and Saving the Protocol Analyzer Data

Before starting to use Protocol Analyzer, it is important to understand how to maintain the data that you have analyzed. Protocol Analyzer provides features that allow you to save the analyzed data to a file and load it back to the application.

In this section, you will learn about:

- Saving the Data
- Loading the Data

Saving the Data

There are two ways to save the Protocol Analyzer data. One way allows you to save the data in the XML and binary format, and the other way allows you to save the data in text format.

In this section, you will learn about:

- Saving the Data in XML and Binary Format
- Saving the Data in Text Format

Saving the Data in XML and Binary Format

When you try to save the data in XML and binary format, the GUI settings of the Protocol Analyzer application are saved in the `.xml` file, and the trace data is saved in the `.pad` (binary) file.

You do not have to create a `.pad` file separately. It is automatically created by Protocol Analyzer while creating the XML file.

For `.pad` files, Protocol Analyzer uses the following naming convention:

`<XML_FileName><Module_Number>_<Port_Number>.pad`

For example, you create an XML file named `TraceData.xml` to save the data of the module `102` and the port `1`. As a consequence, Protocol Analyzer creates the following `.pad` file:

`TraceData102_1.pad`

To save the data in XML and binary format:

1 Select **File > Save As**.

The Save As dialog box displays (Figure 10).
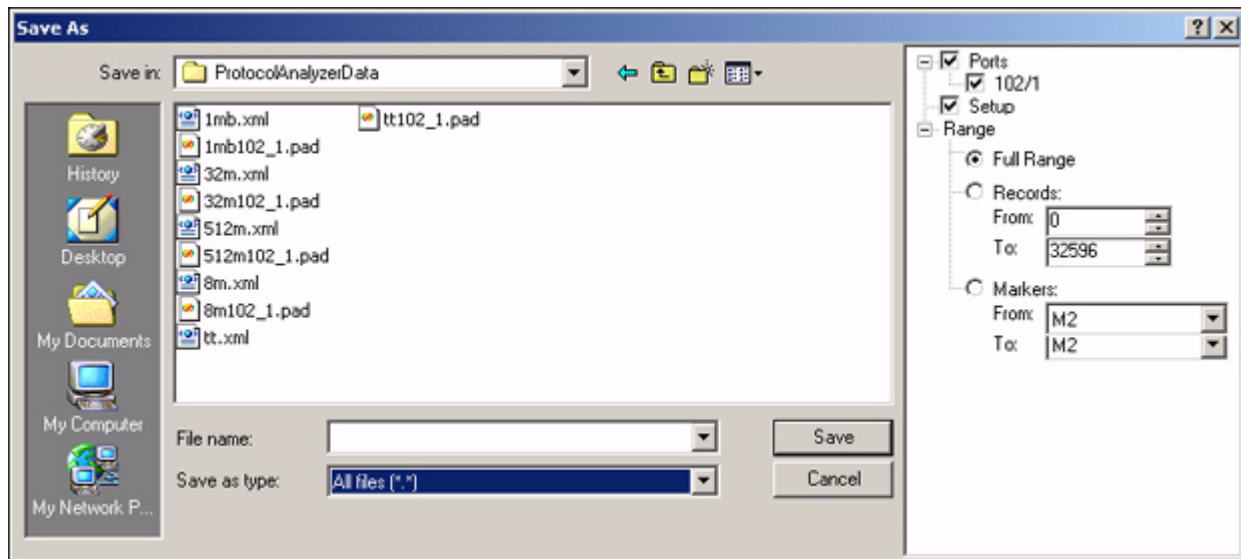
Figure 10   Save As dialog box - XML and Binary Format

2 Browse to the location where you want to save the data.

3 Type in the name of the file in the **File name** text field.

4 Select **Protocol Analyzer files (*.xml)** from the **Save as type** drop-down list.

5 Expand the **Port** check box list. A nested check box list of ports, to which the current Protocol Analyzer session is connected, is displayed.

6 Select the desired port.

7 Select the **Setup** check box if you want to save the setup information.

8 Expand **Range**. This displays a list of option buttons to specify the data range to be saved.

9 Do one of the following:

    a Select **Full Range** to save the complete traced data.

    b Select **Records** to save only a range of packet records. Here, you also need to specify the start range and end range of records in the **From** and **To** text boxes.

    c Select **Markers** to save a range of records between two markers. Here, you also need to specify the starting and ending markers in the **From** and **To** text boxes.

10 Click **Save** to save the Protocol Analyzer data.

Saving the Data in Text Format

Saving the data in text format creates a `.csv` file that contains the packet data in decoded form.

Some important points about the resulting text file are:

- All entries in this file are separated by semicolon.
- The first line lists field names, which are enclosed in double-quotes.
- All the following lines are the field values.
- Field names in the text file matches the collapsed view of the columns on screen.
- Second line onwards, each line represents a single packet data.
- All lines contain same number of semicolons. If there is an empty field, it is represented by an empty string followed by a semicolon.

An example of how data is saved in a text file is given below:

```
"Channel";"Rec Num";"Timestamp";"Type";"Address";"Data";
Upstream;15310;2512100;Memory Read;00 10 00 00;;
Downstream;15311;2512120;ACK;;;
```

The advantage of saving the data in text format is that you can edit the data using any text editor application. You can also load it into Microsoft Excel or any other application for further processing.

NOTE   Microsoft Excel has a restriction of 65536 lines. Therefore, you should split the files that are larger than this limit.

To save the data in text format:

1 Click **File > Text Export**.

The Save As dialog box appears (Figure 11).
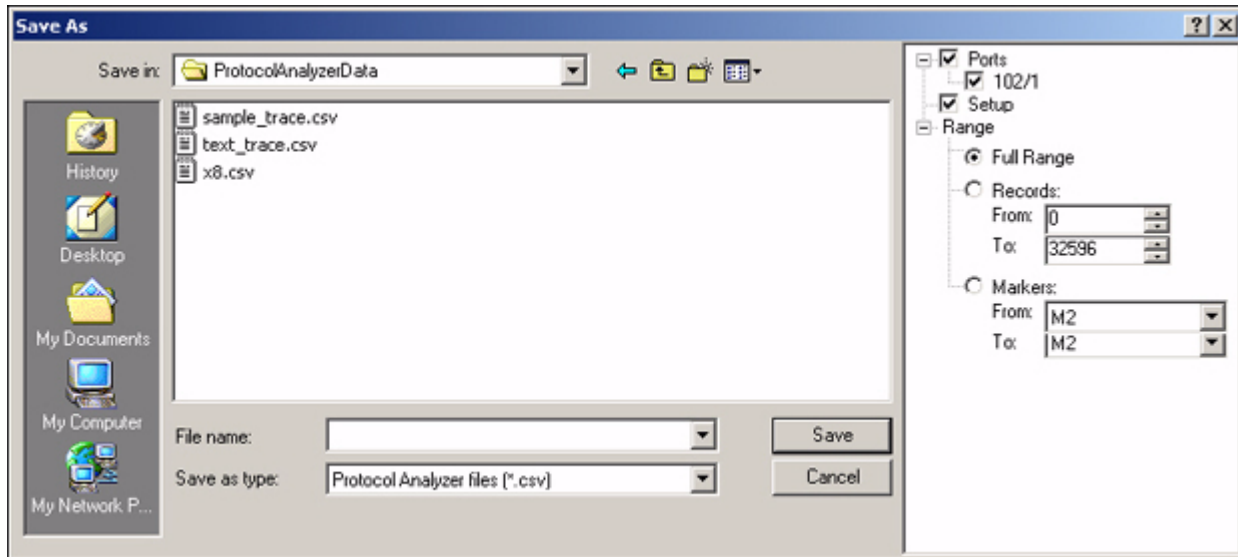
Figure 11   Save As dialog box - Text Format

2 Browse to the location where you want to save the data.

3 Type in the name of the file in the **File name** text field.

4 Select **Protocol Analyzer files (*.csv)** from the **Save as type** drop-down list.

5 Expand the **Port** check box list. A nested check box list of ports, to which the current Protocol Analyzer session is connected, is displayed.

6 Select the desired port.

7 Expand **Range**. This displays a list of option buttons to specify the data range to be saved.

8 Do one of the following:

    a Select **Full Range** to save the complete trace data.

    b Select **Records** to save only a range of packet records. Here, you also need to specify the start range and end range of records in the **From** and **To** text boxes.

    c Select **Markers** to save a range of records between two markers. Here, you also need to specify the starting and ending markers in the **From** and **To** text boxes.

9 Click **Save** to save the Protocol Analyzer data.

NOTE	The performance of the process, which saves data in text format, degrades with the increasing size of trace. For example, it takes more than 3 hrs to save the data in text format for 1 GB of trace.

Loading the Data

Once you have saved the trace data to a file, you can open it to load it again in Protocol Analyzer. You generally do this to compare the previously captured data with the data you have just captured. You can also load the already captured data to modify it and verify its behavior by comparing the resulting trace files.

Protocol Analyzer enables you to load the data only from the XML file and/or the binary file. It does not allow you to load the data from the text (.csv) file.

To Load the Data in Protocol Analyzer:

1 Click **File > Open**.

The Open dialog box appears (Figure 12).
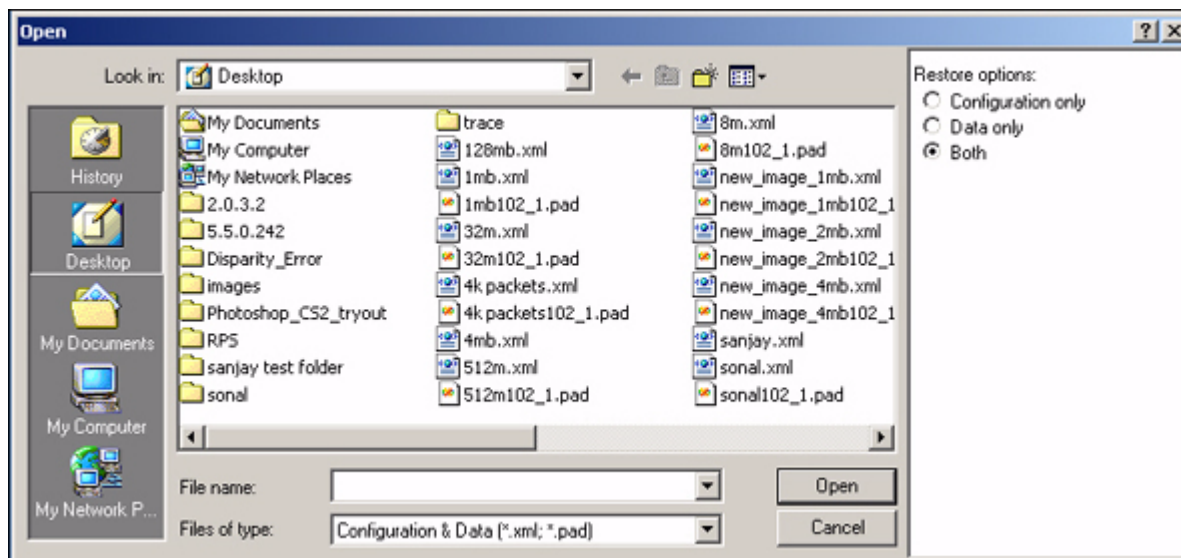
Figure 12   Open dialog box

2 Do one of the following:

a Click **Configuration only** if you want to load the contents of the XML file without loading the binary file (`.pad`) it references.

b Click **Data only** if you want to load the contents of the binary file without loading the contents of the XML file.

c Click **Both** if you want load the contents of the XML and binary files.

3 Browse to the target location and select the desired file.

4 Click **Open** to load the data from selected file.

3

Customizing Protocol Analyzer

This chapter provides information on how to manage floating windows and set the preferences for the Protocol Analyzer GUI. This chapter also provides information on how to create, edit, use, and delete markers.

Managing Windows

The main Protocol Analyzer window contains many floating windows. These windows can float anywhere on the desktop, or you can dock them together with other windows on the main Protocol Analyzer window. In the default window arrangement, all windows are properly docked on the main Protocol Analyzer window.

In this section, you will learn:

- To Display a Floating Window
- To Hide a Floating Window
- To Auto-Hide a Floating Window
- To Change a Docked Window to a Floating Window
- To Dock a Floating Window
- To Set the Default Windows Arrangement

To Display a Floating Window

- Click **View > *menu_command_for_floating_window***.

  Here, *menu_command_for_floating_window* represents the name of the menu command to access the floating window. For example, Port Overview is a floating window. To display it, click the **View > Port Overview** menu command.

To Hide a Floating Window

- Click the ⊠ icon on the title bar of the floating window.

  If a floating window is displaying, then you hide it also by again clicking its menu command in the View menu.

To Auto-Hide a Floating Window

- Click the 🖈 icon on the title bar of the floating window.

  Doing this automatically hides the floating window when you are not using it. This also displays a new 🖳 icon on the title bar of the floating window.

  To display the window again, place the cursor over the tab displayed for the hidden window, or click its menu command in the View menu.

To Change a Docked Window to a Floating Window

- Double-click the title bar of the docked window.

To Dock a Floating Window

- Double-click the title bar of the floating window.

To Set the Default Windows Arrangement

- Click **Window > Default Window Arrangement**.

Setting Preferences

By default, Protocol Analyzer displays packet data using predefined column, field, time format, and color settings. There may be a situation when you want to make some changes to these predefined settings to match your data display needs. To make such changes, Protocol Analyzer provides the Preferences dialog box (Figure 13). This dialog box allows you to make changes to the way data packets are displayed in the Packet view.

To access the Preferences dialog box:

• Click **View > Preferences**.

   The Preferences dialog box appears (Figure 13).
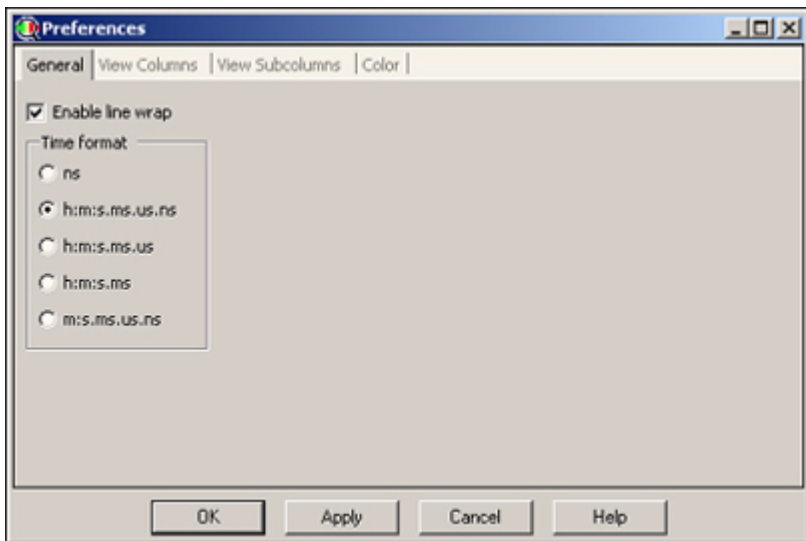
Figure 13   Preferences dialog box

Table 10 briefly describes the common components of the Preferences dialog box.

Table 10   Components of the Preferences dialog box

Component	Description
General	This tab enables you to apply line wrap to the content displayed, and specify the time format to be used to display the timestamp details in the Packet view.

Table 10 Components of the Preferences dialog box

Component	Description
View Columns	This tab enables you to select a protocol and then specify its columns and their order to be displayed in the Packet view.
View Subcolumns	This tab enables you to select a precool and then specify the fields and their order to be displayed in the Packet view.
Color	This tab enables you to select a protocol and then specify a color ID for each of its packets.
OK	Click **OK** to close the Preferences dialog box after saving the changes made in it.
Apply	Click **Apply** to implement the changes made in the Preferences dialog box.
Cancel	Click **Cancel** to close the Preferences dialog box without saving any changes.
Help	Click **Help** to display online help.

In this section, you will learn about:

- Setting Up Line Wrap and Time Format
- Setting Columns
- Setting Subcolumns
- Setting Colors

Setting Up Line Wrap and Time Format

To specify the line wrap and time format settings, use the General tab (Figure 13).

Table 11 briefly describes the components of the General tab.

Table 11 Components of the General tab

Component	Description
Enable line wrap	Select Enable line wrap limit the packet content to the display without extending the display to the right.
Time format	This section provides options to specify the time format to be used to display the timestamp details in the Packet view.

Setting Columns

There may be a situation when, instead of all columns, you want to view only a few columns in the Packet view. You may also want to organize them in a particular order. To do all this, use the View Columns tab (Figure 14).
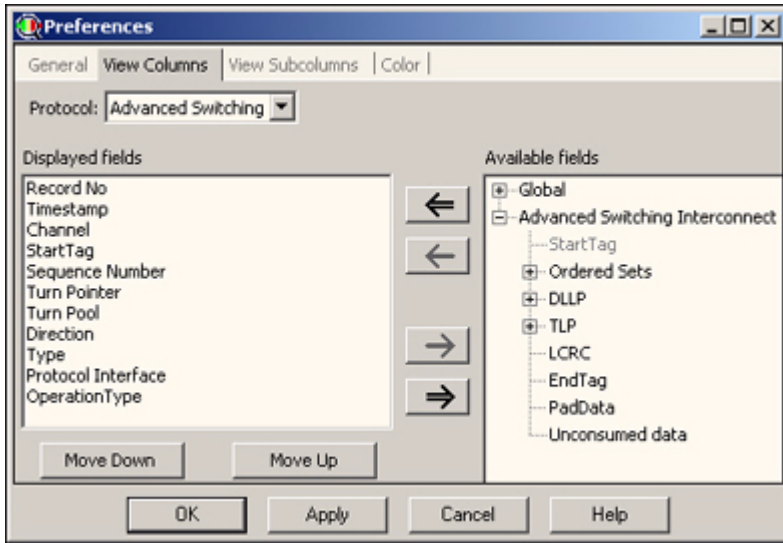
Figure 14   Preferences dialog box - View Columns tab

Table 12 briefly describes the components of the View Columns tab.

Table 12   Components of the View Columns tab

Component	Description
Protocol	Click the **Protocol** drop-down list to select a protocol whose Packet view display you want to change.
Displayed fields	The **Displayed fields** list box contains the columns that are displayed in the Packet view.
Available fields	The **Available fields** list box contains the columns that are not displayed in the Packet view.
Move Down	Click **Move Down** to move the selected column by one place down in the Displayed fields list box.
Move Up	Click **Move Up** to move the selected column by one place up in the Displayed fields list box.
Select All	Click **Select All** to move all the columns from the Available fields list box to the Displayed fields list box.

Table 12   Components of the View Columns tab

Component	Description
Select	Click **Select** to move the column you selected in the Available fields list box to the Displayed fields list box.
Deselect	Click **Deselect** to move the column selected in the Displayed fields list box to the Available fields list box.
Deselect All	Click **Deselect All** to move all the columns from the Available fields list box to the Displayed fields list box.

Setting Subcolumns

Like columns, you can also choose to display only required sub columns and organize them in a particular order in the Packet view. To do this, use the View Subcolumns tab (Figure 15).
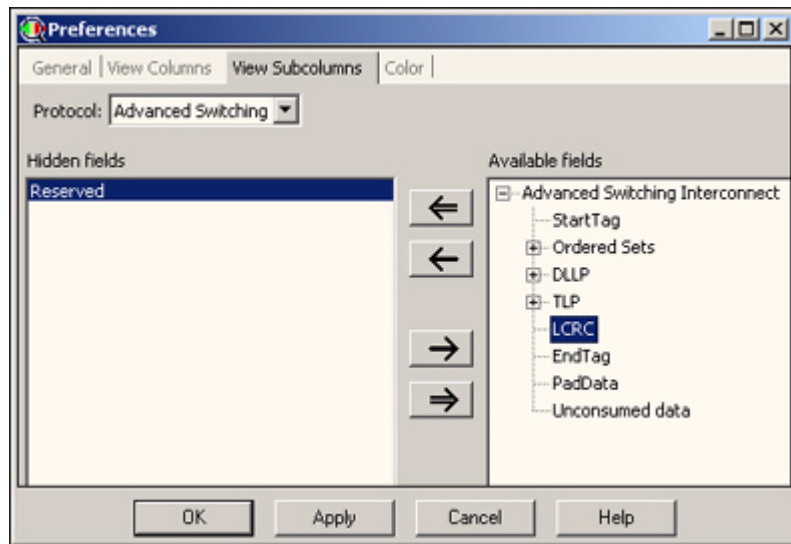
Figure 15   View Subcolumns tab

Table 13 briefly describes the components of the View Subcolumns tab.

Table 13   Components of the View Subcolumns tab

Component	Description
Protocol	Click the **Protocol** drop-down list to select a protocol whose Packet view display you want to change.

Table 13   Components of the View Subcolumns tab

Component	Description
Hidden fields	The **Hidden fields** list box contains the sub columns that are displayed in the Packet view
Available fields	The **Available fields** list box contains the sub columns that are not displayed in the Packet view.
Select All	Click **Select All** to move all the sub columns from the Available fields list box to the Hidden fields list box.
Select	Click **Select** to move the subcolony you selected in the Available fields list box to the Hidden fields list box.
Deselect	Click **Deselect** to move the subcolony selected in the Hidden fields list box to the Available fields list box.
Deselect All	Click **Deselect All** to move all the sub columns from the Hidden fields list box to the Available fields list box.

Setting Colors

The Preferences dialog box has the Color tab (Figure 16), which enables you to select a protocol and then specify a color ID for each of its packets. You generally do this to set separate colors for each packet to easily recognize them in the Packet view.
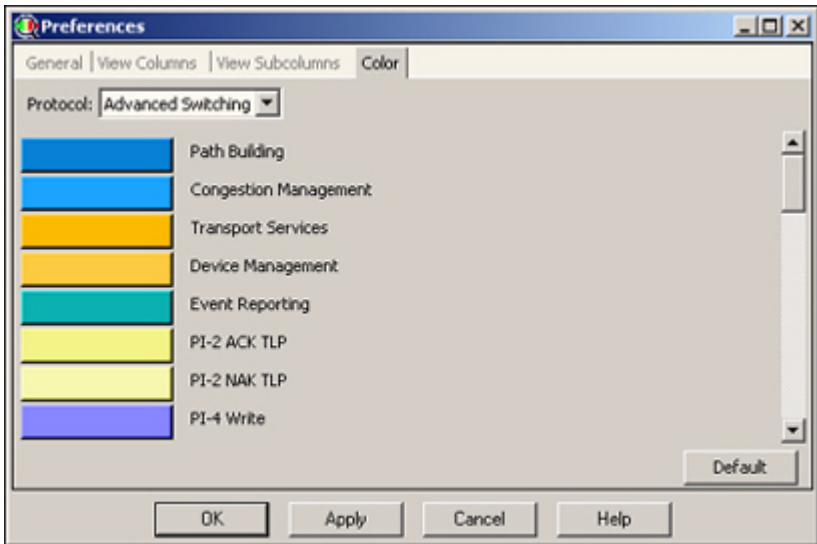
Figure 16   Color tab

Table 14 briefly describes the components of the Color tab.

Table 14 Components of the Color tab

Component	Description
Protocol	Click the **Protocol** drop-down list to select a protocol whose Packet view display you want to change.
Color	Click **Color** to display the Color dialog box. In this dialog box, you can select a basic color or define a custom color.
Default	Click **Default** to restore the default settings of the Color tab for the selected protocol.

Marking Data Packets

In Protocol Analyzer, you can create markers to bookmark data packets in the Packet view. Creating markers help you to easily jump to the marked data packets, and to measure the time behavior between the marked data packets.

In Protocol Analyzer, you can create, edit, and delete markers.

In this section, you will learn:

- To Create a Marker
- To Edit a Marker
- To Jump to a Marker
- To Measure Time between Markers
- To delete a Marker

To Create a Marker

1 Select the data packet, for which you want to create a marker, in the Packet view.

2 Click **Edit > New Marker**.

NOTE	You can also create a new marker: • By double-clicking on the left of a data packet's expand (or collapse) button. • By right-clicking on the left of a data packet's expand (or collapse) button, and then selecting the **New Marker** shortcut menu command.

To Edit a Marker

1 Select the marker that you want to edit.

2 Click **Edit > Marker Properties**.

The Properties of marker dialog box appears (Figure 17).
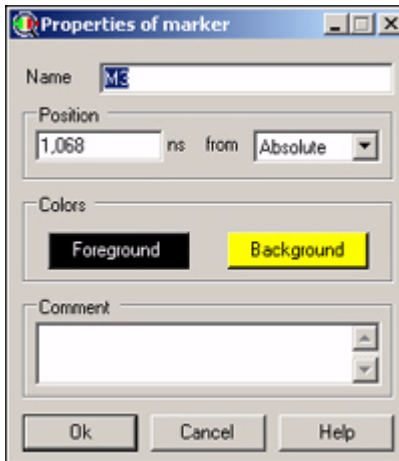
Figure 17   Marker dialog box

3   Do the followings as desired:

a   Type in the new name of the marker in the **Name** text box.

b   Specify the new position of the marker in the **Position** section. This section shows the position of the marker in nanoseconds (ns) from the Absolute, Trigger, Begin, or End points. Here, Absolute refers to zero (0), Trigger refers to the start of the trigger, Begin refers to the start of trace, and End refers to the end of trace.

c   Specify the new foreground and background colors of the marker in the **Colors** section. This section has two buttons: Foreground and Background. Clicking these buttons display the Color dialog box, from where you can choose the desired foreground or background color.

d   Type in a comment about the marker, if any, in the **Comment** text area.

e   Click **OK**.

To Jump to a Marker

- Click **Goto > Marker > *Marker_Name***.

  Here, *Marker_Name* is the name of the marker to which you want to jump.

  You can also click the icon on the toolbar and jump to the desired marker by selecting it from the drop-down list.

To Measure Time between Markers

1 Click anywhere on the Measurement area.

A shortcut menu appears.

2 Click the **New measurement** menu command.

The Properties of Measurement dialog box appears (Figure 18).
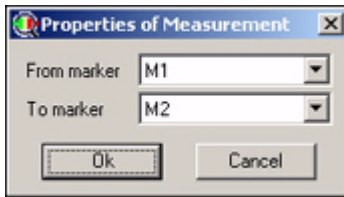
Figure 18 Properties of Measurement dialog box

3 Select the first maker from the **From maker** drop-down list.

4 Select the second marker from the **To marker** drop-down list.

5 Click **OK**.

The measurement time between the two specified markers is displayed in the Measurement area.

NOTE	You can delete an exiting measurement by just clicking it on the Measurement area, and then clicking the Delete shortcut menu command.

You can also delete all existing measurements by clicking anywhere on the Measurement area, and then clicking the Delete All menu command.

To delete a Marker

1 Select the marker, which you want to delete, in the Packet view.

2 Click **Edit > Delete Marker**.

NOTE	You can also delete a marker by right-clicking on the marker name, and then selecting the **Delete Marker** shortcut menu command.

Content below:

Agilent Protocol Analyzer

About Setting Up the Hardware

Once you have set up Protocol Analyzer, you can start using it to capture the data. At this stage, Protocol Analyzer captures the data using the default hardware settings, such as default **x1** link width.

There may be a situation when the default link width of Protocol Analyzer does not matches the negotiated link width of transmitter and receiver. This prevents Protocol Analyzer from properly decoding the data packets, which results in displaying the garbage data on the screen. To avoid this situation, always ensure that the link width of Protocol Analyzer is always same as the negotiated link width of transmitter and receiver. To do this, you can use the Hardware Setup dialog box (Figure 19). This dialog box also enables you to specify other hardware settings, such as trace memory size, clock source, and capture mode.

To access this dialog box:

• Click **Capture > Hardware Setup**.

The Hardware Setup dialog box appears (Figure 19).
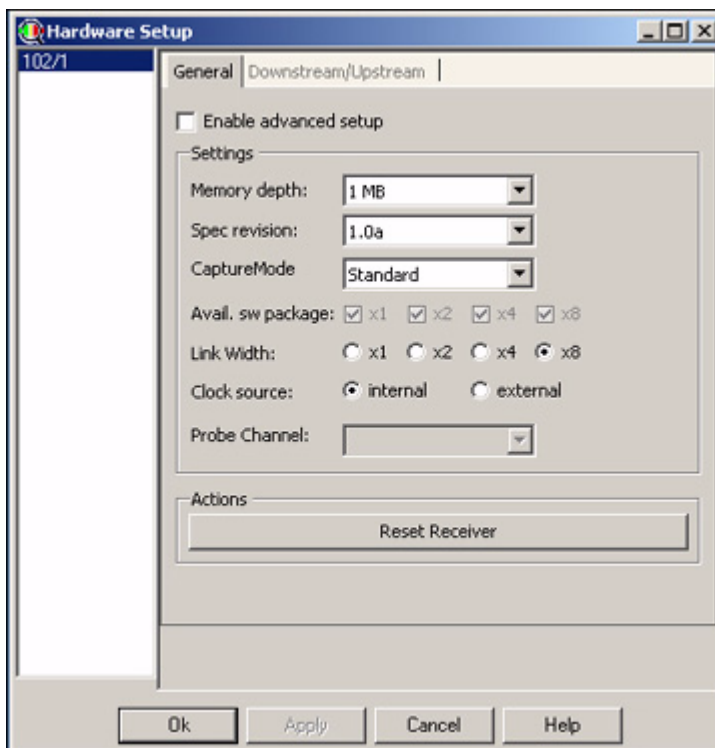
Figure 19   Hardware Setup dialog box

The Hardware Setup dialog box provides different set of options for different protocols.

In the following sections, you will learn about:

- Setting Up the Hardware for PCI Express
- Setting Up the Hardware for ASI
- Setting Up the Hardware for Fibre Channel

Setting Up the Hardware for PCI Express

Figure 20 displays the Hardware Setup dialog box for the PCI Express protocol.
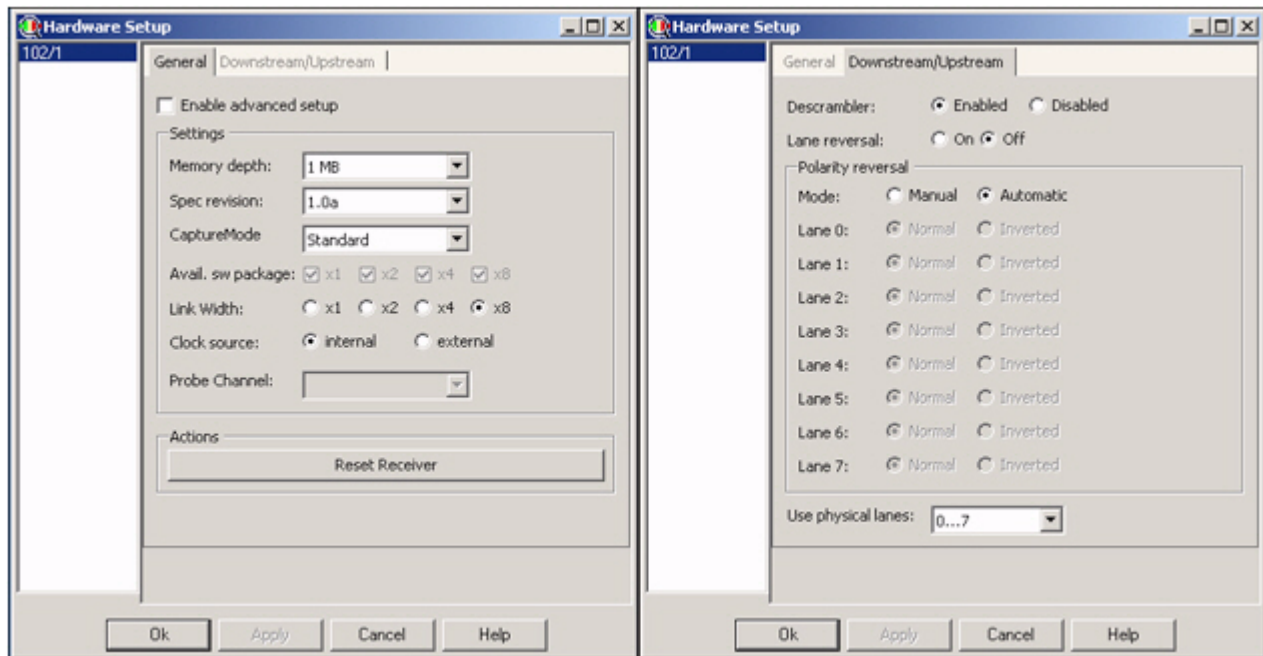
Figure 20   Hardware Setup dialog box for PCI Express

As shown in Figure 20, the Hardware Setup dialog box for PCI Express has two tabs: General and Upstream/Downstream.

Table 15 briefly describes the components of the General tab.

Table 15 Components of the General tab

Component	Description
Enable advanced setup	Select **Enable advanced setup** to display separate tabs for Upstream and Downstream. This enables you to apply different hardware settings for Upstream and Downstream.
Memory depth	Click the **Memory depth** drop-down list to select the trace memory size. This drop-down list allows you to choose between 1 KB and 1 GB of trace memory size. The default trace memory size is 1 MB. Data upload time is directly proportional to the memory depth. Therefore, it is very important to carefully decide upon the memory depth requirements.
Spec revision	Click the **Spec revision** drop-down list to select the revision number, 1.0 or 1.0a, of the PCI Express specification.
Capture Mode	The **Capture Mode** drop-down list enables you to specify how you want to capture the data traffic in Protocol Analyzer. This drop-down list provides the following options: • **Standard**: Analyzer can be used for all analysis purposes. If electrical idle is broken on a lane, the analyzer will resume capturing. This mode should be used in all cases except when debugging around electrical idle. • **Fast Sync**: This mode is optimized to analyze around power-up, link-training, or L0s states, where faster reaction times of Analyzer are needed, and less focus is placed on signal integrity. The Analyzer will take less time to resume capturing after break of electrical idle, but there is a probability to record false errors.
Avail. sw package	Displays the disabled check boxes of link width. A selected check box means the link width is available to you. A cleared check box means the link width is not available to you.
Link Width	Displays the option buttons for the available link width. Here, select the link width that matches the negotiated link width of transmitter and receiver.

Table 15   Components of the General tab

Component	Description
Clock source	Displays the following option buttons: • **internal**: Select **internal** to select an internal clock source. You should select this option button if the data rate is in the range of 2.5 GB/s +/- 300 ppm, no SSC is being used, and to capture power-on of power-off transitions of the system or device under test. • **external**: Select **external** to select an external clock source. You should select this option button if the system or device under test uses SSC or is otherwise outside the 2.5 GB/s +/- 300 ppm range.
Probe Channel	The **Probe Channel** drop-down list provides options for the available channels. Here, select a channel that matches the negotiated link width of transmitter and receiver. This drop-down list is available when you are using the ATCA probe board or the midbus footprint.
Reset Receiver	Click **Reset Receiver** to reset the receiver circuit of Protocol Analyzer to the default state. Clicking this button deletes all the changes you made to the default state of the receiver circuit.
OK	Click **OK** to close the Hardware Status dialog box after saving the changes made in it.
Apply	Click **Apply** to assign the changes made in this tab to the hardware.
Cancel	Click **Cancel** to close the Hardware Status dialog box without saving any changes.
Help	Click **Help** to display online help.

Table 16 briefly describes the components of the Upstream/Downstream tab.

Table 16   Components of the Upstream/Downstream tab

Component	Description
Descrambler	Displays the following option buttons: • **Enabled**: Selecting **Enabled** activates the de-scrambler algorithm. This algorithm is used to generate the de-scrambled packet stream from an incoming scrambled packet stream. • **Disabled**: Selecting **Disabled** deactivates the de-scrambler algorithm. You generally select this option when DUT is transmitting the non-scrambled data. This is because selecting Disabled, when DUT is transmitting scrambled data, displays the garbage data. • You generally select this option button when you do not want to de-scramble the scrambled packet stream.
Lane reversal	Displays the following option buttons: • **On**: Select **On** to activate lane reversal. • **Off**: Select **Off** to deactivate lane reversal.
Polarity Reversal	Displays the following option buttons: • **Manual**: Selecting **Manual** enables you to set the polarity of the individual lanes to the **Normal** or **Inverted** state. • **Automatic**: Selecting **Automatic** sets the polarity of the lanes automatically during the initial link training.
Use physical lanes	The **Use physical lane** drop-down list enables you to specify the number of physical lanes to use. This drop-down list provides the following options: • **0 ... 7**: Selecting **0 ... 7** maps 0 ... 7 physical lanes with 0 ... 7 channels of Protocol Analyzer. • **4 ... 7**: Selecting **4 ... 7** maps 4 ... 7 physical lanes with 4 ... 7 channels of Protocol Analyzer. If you select the x1, x2, or x4 lane width in the General tab, then selecting 4 ... 7 maps 0 ... 3 physical lanes with 0 ... 3 channels of Protocol Analyzer.
OK	Click **OK** to close the Hardware Status dialog box after saving the changes made in it.
Apply	Click **Apply** to assign the changes made in this tab to the hardware.
Cancel	Click **Cancel** to close the Hardware Status dialog box without saving any changes.
Help	Click **Help** to display online help.

Setting Up the Hardware for ASI

Figure 21 displays the Hardware Setup dialog box for the
ASI protocol.
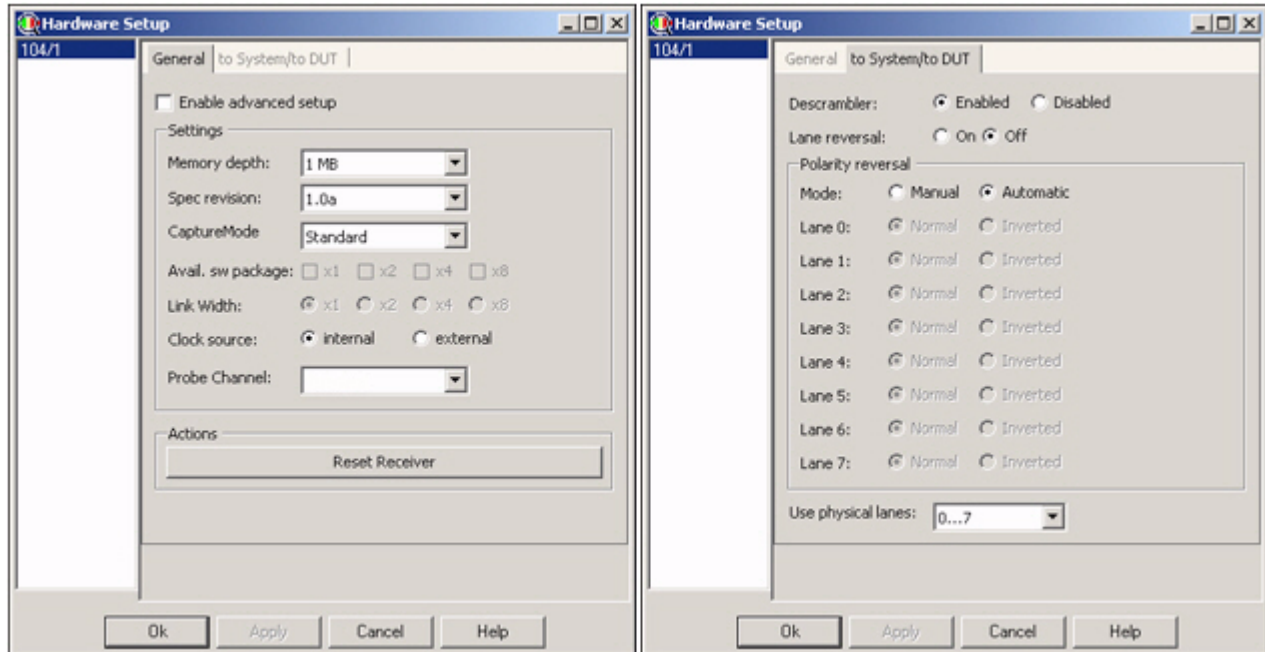
Figure 21   Hardware Setup dialog box for ASI

As shown in Figure 21, the Hardware Setup dialog box for
ASI has two tabs: General and to System/to DUT.

Table 17 briefly describes the components of the General
tab.

Table 17   Components of the General tab

Component	Description
Enable advanced setup	Select **Enable advanced setup** to display separate tabs for Upstream and Downstream. This enables you to apply different hardware settings for Upstream and Downstream.
Memory depth	Click the **Memory depth** drop-down list to select the trace memory size. This drop-down list allows you to choose between 1 KB and 1 GB of trace memory size. The default trace memory size is 1 MB. Data upload time is directly proportional to the memory depth. Therefore, it is very important to carefully decide upon the memory depth requirements.

Table 17   Components of the General tab

Component	Description
Spec revision	Click the **Spec revision** drop-down list to select the revision number, 1.0 or 1.0a, of the PCI Express specification.
Capture Mode	The **Capture Mode** drop-down list enables you to specify how you want to capture the data traffic in Protocol Analyzer. This drop-down list provides the following options: • **Standard**: Analyzer can be used for all analysis purposes. If electrical idle is broken on a lane, the analyzer will resume capturing. This mode should be used in all cases except when debugging around electrical idle. • **Fast Sync**: This mode is optimized to analyze around power-up, link-training, or L0s states, where faster reaction times of Analyzer are needed, and less focus is placed on signal integrity. The Analyzer will take less time to resume capturing after break of electrical idle, but there is a probability to record false errors.
Avail. sw package	Displays the disabled check boxes of link width. A selected check box means the link width is available to you. A cleared check box means the link width is not available to you.
Link Width	Displays the option buttons for the available link width. Here, select the link width that matches the negotiated link width of transmitter and receiver.
Clock source	Displays the following option buttons: • **internal**: Select **internal** to select an internal clock source. You should select this option button if the data rate is in the range of 2.5 GB/s +/- 300 ppm, no SSC is being used, and to capture power-on of power-off transitions of the system or device under test. • **external**: Select **external** to select an external clock source. You should select this option button if the system or device under test uses SSC or is otherwise outside the 2.5 GB/s +/- 300 ppm range.
Probe Channel	The **Probe Channel** drop-down list provides options for the available channels. Here, select a channel that matches the negotiated link width of transmitter and receiver. This drop-down list is available when you are using the ATCA probe board or the midbus footprint.

Table 17   Components of the General tab

Component	Description
Reset Receiver	Click **Reset Receiver** to reset the receiver circuit of Protocol Analyzer to the default state. Clicking this button deletes all the changes you made to the default state of the receiver circuit.
OK	Click **OK** to close the Hardware Status dialog box after saving the changes made in it.
Apply	Click **Apply** to assign the changes made in this tab to the hardware.
Cancel	Click **Cancel** to close the Hardware Status dialog box without saving any changes.
Help	Click **Help** to display online help.

Table 18 briefly describes the components of the to System/to DUT tab.

Table 18   Components of the to System/to DUT tab

Component	Description
Descrambler	Displays the following option buttons: • **Enabled**: Selecting **Enabled** activates the de-scrambler algorithm. This algorithm is used to generate the de-scrambled packet stream from an incoming scrambled packet stream. • **Disabled**: Selecting **Disabled** deactivates the de-scrambler algorithm. You generally select this option when DUT is transmitting the non-scrambled data. This is because selecting Disabled, when DUT is transmitting scrambled data, displays the garbage data.
Lane reversal	Displays the following option buttons: • **On**: Select **On** to activate lane reversal. • **Off**: Select **Off** to deactivate lane reversal.
Polarity reversal	Displays the following option buttons: • **Manual**: Selecting **Manual** enables you to set the polarity of the individual lanes to the **Normal** or **Inverted** state. • **Automatic**: Selecting **Automatic** sets the polarity of the lanes automatically during the initial link training.

Table 18   Components of the to System/to DUT tab

Component	Description
Use physical lane	The **Use physical lane** drop-down list enables you to specify the number of physical lanes to use. This drop-down list provides the following options: • **0 … 7**: Selecting **0 … 7** maps 0 … 7 physical lanes with 0 … 7 channels of Protocol Analyzer. • **4 … 7**: Selecting **4 … 7** maps 4 … 7 physical lanes with 4 … 7 channels of Protocol Analyzer. If you select the x1, x2, or x4 lane width in the General tab, then selecting 4 … 7 maps 0 … 3 physical lanes with 0 … 3 channels of Protocol Analyzer.
OK	Click **OK** to close the Hardware Status dialog box after saving the changes made in it.
Apply	Click **Apply** to assign the changes made in this tab to the hardware.
Cancel	Click **Cancel** to close the Hardware Status dialog box without saving any changes.
Help	Click **Help** to display online help.

Setting Up the Hardware for Fibre Channel

Figure 22 displays the Hardware Setup dialog box for the Fibre Channel protocol.
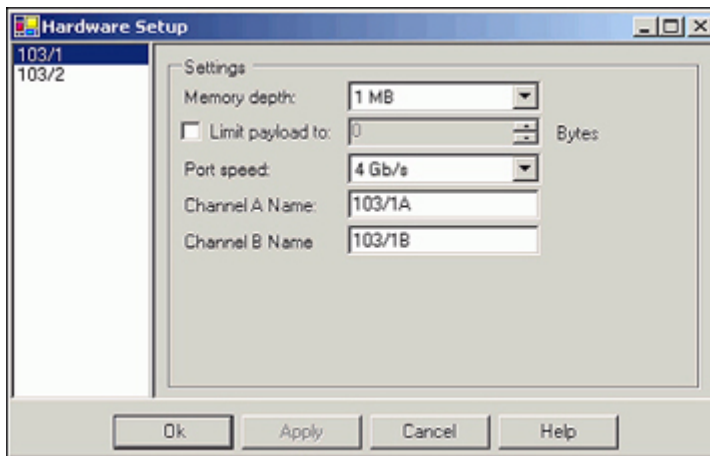
Figure 22   Hardware Setup dialog box for Fibre Channel

Table 19 briefly describes the components of the Hardware Setup dialog box for Fibre Channel.

Table 19 Components of the Fibre Channel dialog box

Component	Description
Memory depth	Click the **Memory depth** drop-down list to select the trace memory size. This drop-down list allows you to choose between 1 KB and 1 GB of trace memory size. The default trace memory size is 1 MB.
Limit payload to	Select the **Limit payload to** check box if you want to limit the payload to a particular number of bytes. Selecting this check box enables the adjacent text box. Here, type in the number of bytes to which you want to limit the payload.
Port speed	Click the **Port speed** drop-down list to select an appropriate speed for the port. If you have multiple ports within a single module, then you can select one of the following combinations of port speed: • **1 Gb/s** and **2 Gb/s** • **2 Gb/s** and **4 Gb/s** Note that a port speed combination of 1 Gb/s and 4 Gb/s in the same module is not possible. For this, you need to use two separate modules in your application.
Channel A Name	Specifies the name of Channel A.
Channel B Name	Specifies the name of Channel B.
OK	Click **OK** to close the Hardware Status dialog box after saving the changes made in it.
Apply	Click **Apply** to assign the changes made in the Hardware Status dialog box.
Cancel	Click **Cancel** to close the Hardware Status dialog box without saving any changes.
Help	Click **Help** to display online help.

About Capturing the Data

Once you have specified the desired hardware settings, you can start using Protocol Analyzer to capture the data.

Capturing the Data

To capture the data:

- Click **Capture > Start**.

  You can also start capturing the data by clicking the icon on the toolbar.

  Once the data of the size of trace memory is captured, Protocol Analyzer stops and the captured data is displayed in the Packet view.

  You can also stop Protocol Analyzer by clicking the **Capture > Stop** menu command or by clicking the icon on the toolbar.

About Filtering and Finding the Data

In this section, you will learn about:

- Filtering the Data
- Finding the Data

Filtering the Data

When you capture the data, it is first stored in the trace memory. From there, it is displayed in the Packet view. There are situations when, instead of viewing the complete data, you want to view and analyze only a specific portion of data. For this, you want to display only the required portion of the data from the trace memory. To deal with this situation, Protocol Analyzer enables you to apply filters to the captured data.

A *filter* is a set of one or more conditions that you apply on the data stored in the trace memory of Protocol Analyzer. You do this to display a specific portion of data in the Packet view to analyze. For example, if you want to analyze only TLPs, then you can create a filter that displays only TLPs in the Packet view.

In Protocol Analyzer, you can create and apply filters using the Filter dialog box (Figure 23).

To access the Filter dialog box:

- Click **View > Filter > Custom**.

  The Filter dialog box appears (Figure 23).

Add/Remove Condition menu

Condition text box

Boolean Operation drop-down list

Channel drop-down list

Figure 23   Filter dialog box

Table 20 briefly describes the components of the Filter dialog box.

Table 20   Components of the Filter dialog box

Component	Description
Conditions	The **Conditions** list box displays a hierarchical list of predefined and user patterns.
	All patterns under the TLP Patterns, DLLP Patterns, Ordered Sets, Training Sequences folders are predefined patterns. These patterns are protocol specific.
	All patterns under the User Patterns folder are user patterns. These patterns are created by copying the predefined patterns to this folder, and then modifying them to match your requirements.
Port Selection	The **Port Selection** list box displays a check box list of ports connected with the current instance of Protocol Analyzer.

Table 20 Components of the Filter dialog box

Component	Description
IF	The **IF** section provides the following components to specify the filter criteria: • **Add/Remove Condition**: This menu enables you to add a new condition criteria to the IF section, or remove an existing condition criteria from the IF section. Note that you can remove conditions only when the IF section has more than one condition criteria. • **NOT**: This check box enables you to apply the logical NOT function to the pattern in the Condition text box. • **Condition**: This text box contains a pattern that you drag and drop from the Conditions list box. • **Channel**: This drop-down list provides options to specify which channel to include in the filter criteria. This drop-down list is displayed when you add a pattern in the Condition text box. • **Boolean Operation**: This drop-down list provides options to apply the logical OR or AND functions to the filter criteria. This drop-down list is displayed for every new condition that you add using the Add/Remove Condition menu.
THEN	The **THEN** drop-down list provides options that you can choose as an action to be taken when the filter criteria is met. This drop-down list has the following options: • **Keep**: Selecting **Keep** displays all the packets, meeting the filter criteria, in the Packet view. • **Drop**: Selecting **Drop** removes all the packets, meeting the filter criteria, from the Packet view.
Copy	Click **Copy** to copy the selected predefined pattern in the User Pattern folder. You generally do this to further modify the copied pattern. The Copy command button is available only when you select a predefined pattern in the Conditions list box.
Show	Click **Show** to display the Show Condition dialog box for the selected predefined pattern. This dialog box displays the contents of the selected predefined pattern and also allows you to edit it.
Delete	Click **Delete** to delete the selected user pattern folder. The Delete command button appears only when you select a user pattern.
Edit	Click **Edit** to display the Edit Condition dialog box for the selected user pattern. Here, you can make any modifications to the selected user pattern, as desired.
Filter	Click **Filter** to apply the filter criteria on the data displayed in the Packet view.

Table 20   Components of the Filter dialog box

Component	Description
Reset Filter	Click **Reset Filter** to remove the applied filter criteria from the data displayed in the Packet view.
Close	Click **Close** to exit the Filter dialog box.
Help	Click **Help** to display the online help.

NOTE	The following procedure provides a step-by-step instructions to keep only TLPs and DLLPs, and filter out all other types of data packets from the Packet view. With little modification, you can use these steps to keep or filter out any type of packets in the Packet view.

To create and apply filter

1 Click **View > Filter > Custom**.

The Filter dialog box appears.

2 Expand **TLP Patterns** in the Conditions list box.

3 Drag **Any TLP** from the Conditions list box and drop it in the Condition text box.

4 Click the **Add AND/OR condition below** menu command from the Add/Remove Condition menu.

This adds a new condition criteria.

5 Select **OR** from the Boolean Operation drop-down list.

6 Expand **DLLP Patterns** in the Conditions list box.

7 Drag **Any DLLP** from the Conditions list box and drop in the newly added Condition text box.

8 Select **Keep** from the THEN drop-down list.

This creates the filter that will display the captured TLPs and DLLPs in the Packet view.

9 Click **Filter**.

This filters the data in the Packet view.

10 Click **Close**.

Finding the Data

Consider that you have captured and displayed all TLPs in the Packet view. Now, you want to look at the description of a particular type of TLP to analyze it. In this situation, you can search the desired data packet using the Find dialog box (Figure 24).

In Protocol Analyzer, the Find dialog box enables you to specify single or multiple conditions to find the required data packet in the Packet view.

To access the Find dialog box:

- Click **Edit > Find**.
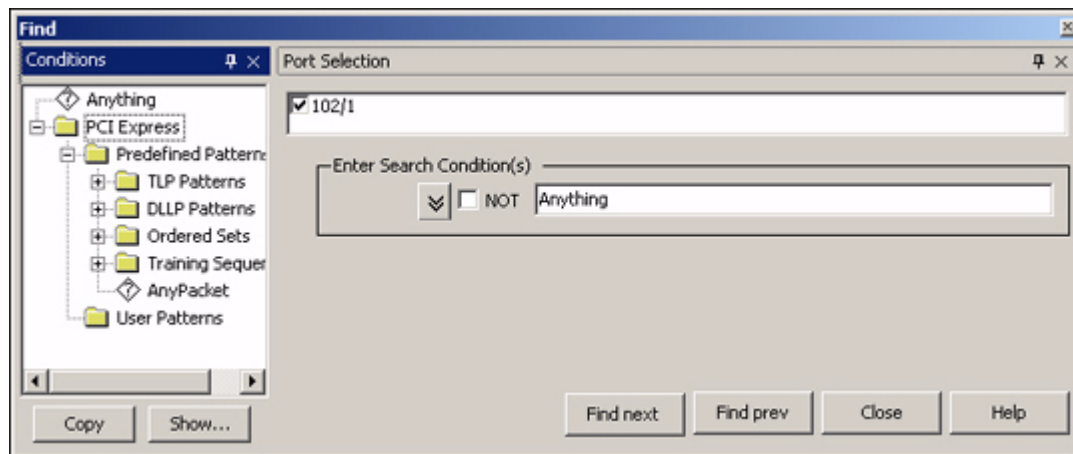
  The Find dialog box appears (Figure 24).

Figure 24   Find dialog box

Table 21 briefly describes the components of the Find dialog box.

Table 21   Components of the Find dialog box

Component	Description
Conditions	The **Conditions** list box displays a hierarchical list of predefined and user patterns. All patterns under the TLP Patterns, DLLP Patterns, Ordered Sets, Training Sequences folders are predefined patterns. These patterns are protocol specific. All patterns under the User Patterns folder are user patterns. These patterns are created by copying the predefined patterns to this folder, and then modifying them to match your requirements.
Copy	Click **Copy** to copy the selected predefined pattern in the User Pattern folder. You generally do this to further modify the copied pattern. The Copy command button is available only when you select a predefined pattern in the Conditions list box.
Delete	Click **Delete** to delete the selected user pattern folder. The Delete command button appears only when you select a user pattern.
Show	Click **Show** to display the Show Condition dialog box for the selected predefined pattern. This dialog box displays the contents of the selected predefined pattern and also allows you to edit it.
Port Selection	The **Port Selection** list box displays a check box list of ports connected with the current instance of Protocol Analyzer.

Table 21 Components of the Find dialog box

Component	Description
Enter Search Condition(s)	The **Enter Search Condition(s)** section provides the following components to specify the search criteria: • **Add/Remove Condition**: This menu enables you to add a new condition criteria to the Enter Search Condition(s) section, or remove an existing condition criteria from the Enter Search Condition(s) section. Note that you can remove conditions only when the IF section has more than one condition criteria. • **NOT**: This check box enables you to apply the logical NOT function to the pattern in the Condition text box. • **Condition**: This text box contains a pattern that you drag and drop from the Conditions list box. • **Channel**: This drop-down list provides options to specify which channel to include in the filter criteria. This drop-down list is displayed when you add a pattern in the Condition text box. • **Boolean Operation**: This drop-down list provides options to apply the logical OR or AND functions to the filter criteria. This drop-down list is displayed for every new condition that you add using the Add/Remove Condition menu.
Find next	Click **Find next** to find the next occurrence of the data packet that matches the search criteria.
Find prev	Click **Find prev** to find the previous Torrance of the data packet that matches the search criteria.
Close	Click **Close** to exit the Filter dialog box.
Help	Click **Help** to display the online help.

NOTE The following procedure provides a step-by-step instructions to find a particular type of TLP in the Packet view. With little modification, you can use these steps to find any other type of packets in the Packet view.

To find a data packet

1 Click the first data packet in the Packet view.

2 Click **Edit > Find**.

The Find dialog box appears (Figure 24).

3 Expand the **TLP Patterns** and **Memory Read** folders in the Conditions list box.

4   Drag **Any Memory Read** from the Conditions list box and drop it in the Condition text box.

5   Click **Find next**.

This highlights the first data packet in the Packet view, which matches the search criteria.

6   Repeat Step 5 until you find the required data packet.

7   Click **Close** to exit the Find dialog box.
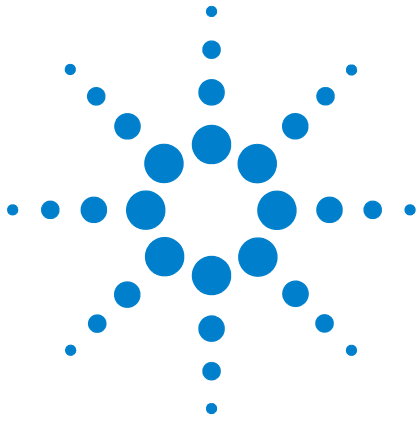
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Triggers

This chapter introduces you with the concept of triggers in Protocol Analyzer. This chapter also provides information on creating and editing triggers.

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About Triggers

When you run Protocol Analyzer, it by default captures all the data packets it encounters, and saves them in the trace memory. However, there may be a situation when you don't want to capture all the data in the trace memory. Rather, you want to perform one or more specific actions only when Protocol Analyzer encounters a particular type of data packets. To deal with this situation, Protocol Analyzer enables you to create triggers.

A *trigger* is a combined set of conditions and their associated actions. A *trigger condition* specifies Protocol Analyzer about the type of data it should locate in the traffic. A *trigger action* instructs Protocol Analyzer about the action to be taken when the trigger condition is met.

In Protocol Analyzer, you can create triggers using the Trigger Setup window (Figure 25).

In this section, you will learn about:

- Accessing the Trigger Setup Dialog Box
- Editing Trigger Conditions

Accessing the Trigger Setup Dialog Box

To access the Trigger Setup window:

- Click **Capture > Trigger Setup**.
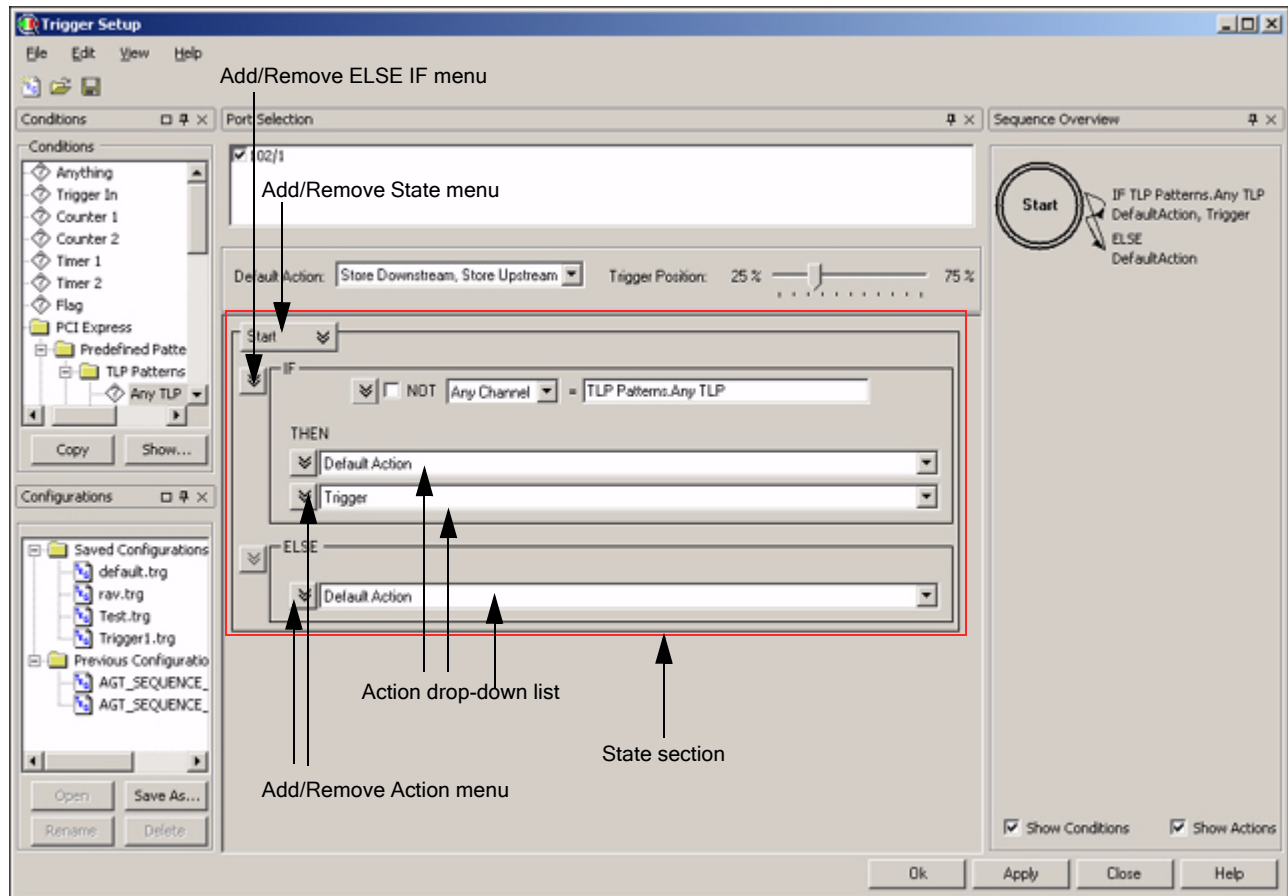
  The Trigger Setup window appears (Figure 25).

Figure 25   Trigger Setup window

Table 22 briefly describes the components of the Trigger Setup window.

Table 22 Components of the Trigger Setup window

Component	Description
Menu bar	Provides the following menus: • **File**: Provides the New, Open, and Save menu commands to create a new trigger configuration (*.trg) file, open an existing trigger configuration file, and save the current trigger configuration in a file. • **Edit**: Provides the Edit Condition, Show Condition, Copy Condition, and Delete Condition menu commands. You can use these menu commands to edit, display, copy, and delete the selected condition. • **View**: Provides the Sequence Overview, Conditions, Configurations, Port Selector, and Default Window Arrangement menu commands. You can use these menu commands to display or hide the Sequence Overview, Conditions, Configurations, and Port Selector panes.The View menu also provides the Default Window Arrangement menu command that you use to resort to the default arrangement of the Trigger Setup window. • **Help**: Provides the Help menu commands that you can click to display the online help.
Toolbar	Provides icons for the New, Open, and Save menu commands.
Conditions	The **Conditions** pane provides components to select one or more predefined and/or user patterns to specify the trigger criteria.
Configurations	The **Configurations** pane provides components to open, rename, or delete the trigger configuration file. This pane also enables you to save a selected trigger configuration file at a different location.
Port Selection	The **Port Selection** list box displays a check box list of ports connected with the current instance of Protocol Analyzer.

Table 22 Components of the Trigger Setup window

Component	Description
Default Action	The **Default Action** drop-down list provides options to specify the default action to be taken when a trigger is run. This drop-down list provides the following options: • **No Action**: Select this option to not take any action when the underlying trigger runs. • **Store Downstream**: Select this option to store downstream packets when the underlying trigger runs. • **Store Upstream**: Select this option to store the upstream packets when the underlying trigger runs. • **Store Downstream, Store Upstream**: Select this option to store both the upstream and downstream packets when the underlying trigger runs.
Trigger Position	The **Trigger Position** scroll bar enables you to specify what range of data you want to capture in the trace memory. Assume that trace memory size is 10 MB. Now, you want that 25%, i.e. 2.5 MB, of the trace memory is filled with the data that occurred immediately before the trigger condition is met, and rest of the trace memory is filled with the data that occurred after the trigger condition is met. To do this, move the Trigger Position scroll bar to the point, where its left-side is measured as 25% and its right-side is measured as 75%.
State	The **State** section provides components to specify the trigger criteria.
Sequence Overview	The **Sequence Overview** section displays the trigger conditions and the actions to be taken when the trigger conditions are met, in the form of the IF - ELSE IF - ELSE programming construct. This section has the following components: • **Show Conditions**: Select **Show Conditions** check box to display the trigger conditions. • **Show Actions**: Select **Show Actions** check box to display actions to be taken when trigger conditions are met.
OK	Click **OK** to close the Trigger Setup window after saving the changes made in it.
Apply	Click **Apply** to assign the changes made in the Trigger Setup window to the hardware.
Close	Click **Close** to exit the Trigger Setup window without saving any changes.
Help	Click **Help** to display online help.

Table 23 briefly describes the components of the Conditions pane.

Table 23   Components of the Conditions pane

Component	Description
Conditions	The **Conditions** list box displays a hierarchical list of predefined and user patterns.
Copy	Click **Copy** to copy the selected predefined pattern in the User Pattern folder.
Show	Click **Show** to display the Show Condition dialog box for the selected predefined pattern. This dialog box displays the contents of the selected predefined pattern, and also allows you to edit it.
Delete	Click **Delete** to delete the selected user pattern.
Edit	Click **Edit** to display the Edit Condition dialog box for the selected user pattern. Here, you can make any modifications to the selected user pattern, as desired.

Table 24 briefly describes the components of the Configurations pane.

Table 24   Components of the Configurations pane

Component	Description
Configurations	The **Configurations** list box contains a list of most recently used trigger configuration files and a default trigger configuration file.
Open	Click **Open** to open the trigger configuration file that you have selected in the Configurations list box.
Save As	Click **Save As** to save the selected trigger configuration file at a new location and/or with a new name.
Rename	Click **Rename** to convert the selected trigger configuration file name into an editable text. Then, type in the new filename, and press the <Enter> key to rename it.
Delete	Click **Delete** to delete the selected trigger configuration file.

Table 25 briefly describes the components of the State section.

Table 25 Components of the State section

Component	Description
Add/Remove State	The **Add/Remove State** menu enables you to add a new state or remove an existing state. Note that you can remove a state only when there are more than one state in the current trigger configuration file.
Add/Remove ELSE IF	This **Add/Remove ELSE IF** menu enables you to add a new or remove and existing ELSE IF section. This section is same as the IF section.
IF	The **IF** section provides the following components to enable you to specify the trigger conditions: • **Add/Remove Condition**: This menu enables you to add a new condition criteria to the IF section, or remove an existing condition criteria from the IF section. Note that you can remove conditions only when the IF section has more than one condition criteria. • **NOT**: This check box enables you to apply the logical NOT function to the pattern in the Condition text box. • **Condition**: This text box contains a pattern that you drag and drop from the Conditions list box. • **Channel**: This drop-down list provides options to specify which channel to include in the filter criteria. This drop-down list is displayed when you add a pattern in the Condition text box. • **Boolean Operation**: This drop-down list provides options to apply the logical OR or AND functions to the trigger criteria. This drop-down list is displayed for every new condition that you add using the Add/Remove Condition menu. • **THEN**: The **THEN** sub-section has Action and GOTO drop-down lists, and Add/Remove Action menu. The Action drop-down list provides a list of actions to be taken when the trigger condition is met. The Add/Remove Action menu provides options to add a new or remove an existing Action drop-down list from the THEN sub-section.
ELSE	The **ELSE** section has Action drop-down list and Add/Remove Action menu. The Action drop-down list provides a list of actions to be taken when the trigger condition is not met. The Add/Remove Action menu provides options to add a new or remove an existing Action drop-down list from the ELSE section.

Table 25   Components of the State section

Component	Description
GOTO	The **GOTO** drop-down list provides a list of states, e.g. Start, State2, and so on. By selecting a particular state, you specify where to jump once the action has been taken.
	The GOTO drop-down list is displayed in the THEN sub-section and in the ELSE section, below the Action drop-down list. Also, the GOTO drop-down list is displayed only when a trigger has more than one state.

Editing Trigger Conditions

There may be a situation when you want to include a predefined pattern in the trigger criteria. However, you want to make some modification to it before including it in the trigger criteria. To do this, copy the desired predefined pattern in the User Pattern folder, and then use the Edit condition dialog box (Figure 26) to make the desired modifications.

To access the Edit condition dialog box:

1 Select the desired user pattern in the conditions pane.

2 Click **Edit**.

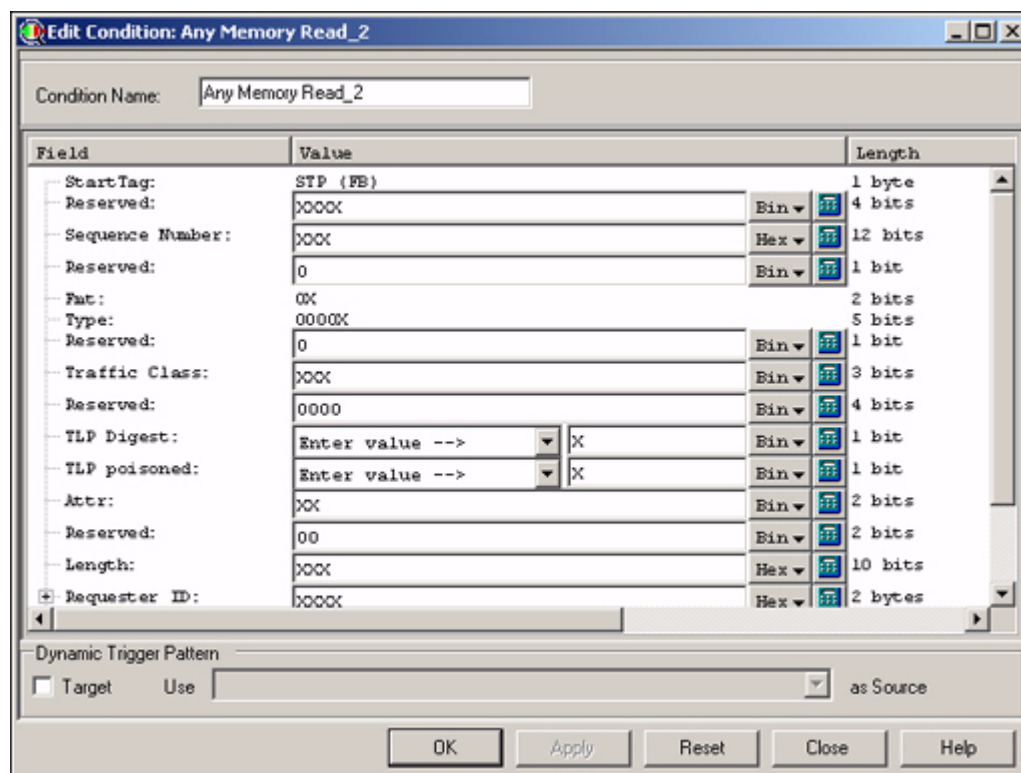The Edit condition dialog box displays (Figure 26).

Figure 26   Edit condition dialog box

Table 26 briefly describes the components of the Edit Condition dialog box.

Table 26   Components of the Edit Condition dialog box

Component	Description
Condition Name	The **Condition Name** text box displays the name of the user pattern to be edited.
Field	The **Field** column contains the names of the fields of a data packet. The number of fields displayed in this column may differ for different data packets.

Table 26 Components of the Edit Condition dialog box

Component	Description
Value	The **Value** column contains an input component for each data field. You can specify the desired inputs in these components to edit the selected data packet. This column also contains a drop-down list and a calculator for input assistance. The drop-down list enables you to specify your inputs in hexadecimal, binary, or decimal format. Clicking the calculator for input assistance displays the Input Assistant dialog box. Here, you can perform boolean operations over the hexadecimal, binary, and decimal values, and use the resulting value as the new value for the corresponding data packet field.
Length	The **Length** column displays the maximum length of a field in bits, bytes, or DWords.
Dynamic Trigger Pattern	The **Dynamic Trigger Pattern** section enables you to trigger on packets, which you otherwise cannot capture with static pattern terms because the parts of the packet content are determined dynamically during run time. To create a dynamic trigger pattern, you need to specify two conditions or pattern terms. The one pattern term (source) will match with a packet and provide some of the packet content as input to the second pattern term (Target).
OK	Click **OK** to close the Edit Condition dialog box and save the changes made to the user pattern.
Apply	Click **Apply** to assign the new settings to the user pattern.
Reset	Click **Reset** to ignore the changes made to the user pattern in the Edit Conditions dialog box.
Close	Click **Close** to close the Edit Condition dialog box.
Help	Click **Help** to display the online help.

About creating a Trigger

Consider that you want to create a trigger to capture all types of TLP memory read packets whose length is 4 DW. You also want that:

- It should by default store both upstream and downstream packets.

- It should also capture 20% of pre-triggered history and 80% of post-triggered history.

- It should not take any action when the trigger condition is not met.

Using the trigger condition requirement mentioned above, you will learn:

- To Edit a Trigger Condition

- To Create a Trigger

To Edit a Trigger Condition

1 Select **PCI Express > Predefined Patterns > TLP Patterns > Memory Read > Any Memory Read** in the Conditions pane.

2 Click **Copy**.

   This copies the Any Memory Read option to the User Patterns folder with a new name, e.g. Any Memory Read_2.

3 Select **Any Memory Read_2** in the User Patterns folder.

4 Click **Edit**.

   The Edit Condition dialog box for Any Memory Read_2 appears.

5 Type in **4** as the last digit in the text box for the **Length** field.

   Figure 27 shows how you can do this in the Edit Conditions dialog box.
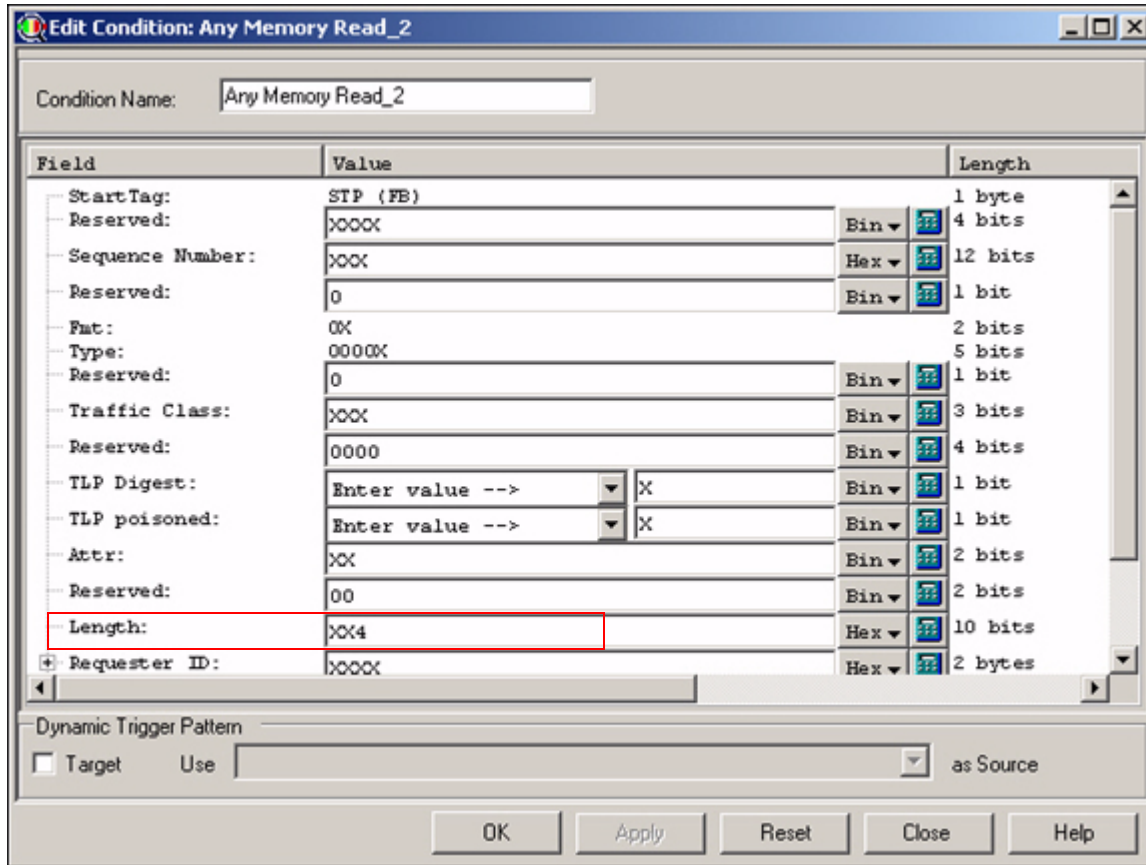
Figure 27   Edit Condition dialog box for Any Memory Read_2

6 Click **Apply**.

7 Click **OK**.

To Create a Trigger

1 Click **File > New** in the Trigger Setup window.

2 Select **Store Downstream, Store Upstream** from the Default Action drop-down list.

3 Move the Trigger Position scroll bar to the point, where its left and right sides are measured as 20% and 80%, respectively.

4 Expand the **User Patterns** folder in the Conditions text box.

5 Drag **Any Memory Read_2** from the Conditions list box and drop it in the Condition text box.

6 Select **Default Action** from the first Action drop-down list in the THEN sub-section.

7 Select **Trigger** from the second Action drop-down list in the THEN sub-section.

8 Select **No Action** from the Action drop-down list in the ELSE section.

9 Select Show Conditions and Show Actions check boxes in the Sequence Overview section.

This displays the trigger condition and the actions to be taken when the trigger condition is met, in the form of the IF ELSE programming construct.

10 Click **Apply**.

11 Click **OK**.

This completes your trigger creation activity. You can now run Protocol Analyzer to use this trigger. You can also choose to save this trigger in a trigger configuration file for later needs.

About Trigger Limitations

In Protocol Analyzer, a trigger has some limitation. These limitations are properly highlighted by appropriate notification messages in the Trigger Setup window.

While creating a trigger, remember the following constraints:

- You can add maximum of eight states in a trigger.
- You can add any number of IF ELSE IF conditions.
- You can add maximum of eight patterns in a trigger.
- You can add maximum of one Training Sequence and Ordered Set pattern term.
- Using a Training Sequence and Ordered Set pattern term reduces the number of remaining pattern terms by one.
- Using *Flag* as a condition reduces the number of available pattern terms by one.
- You can add either *Counter 1* or *Timer 1* as a condition in a trigger.
- You can add either *Counter 2* or *Timer 2* as a condition in a trigger.
- You can add either *Counter 1* or *Timer 1* with *Trigger In* as a condition in a trigger.

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