# **STX SERIES**

# **SATA Serial Bus Protocol Analyzer**



Compatible with software version 1.x



February

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# Introduction

### What's In this Manual

This manual describes the installation and operation of your Catalyst Enterprises SATA Analyzer: Models STX-460 (4-Port), STX-430/431 (4-Port), STX-430/431 IB\* (One x4 Wide Port SAS) or STX-230/231 (2-Port). Examples of some typical applications are included.

\* STX-430IB is functionally identical to STX-430 except that it provides an alternative Front Panel 4x Port connection.

**Note:** Unless stated otherwise references to STX-230 apply to STX-230 and STX-231 and references to STX-430 apply to STX-430, STX-430IB, STX-430-IBP, STX-431 and STX-431IB\*.

### Various Available Models

STX products are available in three models, STX-230/231, STX430/431, STX-430/431IBP & STX\_460 with major differences summarized below:

	STX-230/231	STX430/431	STX-430IB/430IBP/431IBP	STX-460
Ports	1 or 2	4	4	4
Interconnect	SAS	SAS	x4 SAS	Mini SAS
Analyzer	1 or 2	4	4	4
Initiator Emulation	1	2	2	-
Target Emulation	1	2	2	-

### Model Major Differences

### **Analyzer Overview**

The **SATA Analyzer** is a serial bus analyzer that is capable of analyzing Serial ATA data transfers. The analyzer is based on the STX hardware platform that performs serial bus analysis for SATA when controlled by the SATA analyzer software.

The analyzer supports the following:

- Capture and Trigger of Serial ATA packets
- Generation of bus traffic with the **Host Emulator** while monitoring and analyzing the result
- Run a Bus Performance Analysis
- Run a Pattern Generator
- TX Vout on transmitters for test and characterization

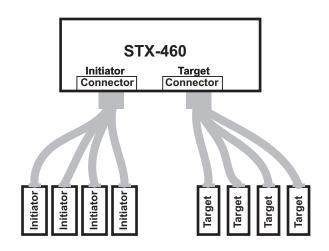


Figure 1 Typical SATA Test Setup of Analyzer

The analyzer provides for bi-directional trigger and capture of commands, primitives and all bus conditions.

# **STX Interface**

- Power In
- USB Port
- Ethernet Port
- SAS/SATA Ports (2 Ports for STX-230 and 4 Ports for STX-430 and STX-430IB)
- External trigger Input
- External trigger Output
- Stacking connections

### LEDs

Each link is supported by 5 LEDs with the following functionality:

Green This LED is illuminated during the OOB sequence before the link is established and after link is established it indicates traffic on the bus.

Orange This LED is illuminated as follows:

S	peed	Initiator	Target	
]	1.5G	Off	Off	
	3.0G	On	Off	
(	5.0G	On	On	
Yellow	This L	ED is illumi	nated when	a link is established.

Red This LED illuminates when an error occurs.

Blue This LED is illuminated when a trigger occurs.

# **Receiving Your Analyzer**

Your analyzer package includes the following components:

Carrying Case

STX unit identified in the packing list

SATA software on CD ROM

One USB 2.0 Cable 1.8 meter

x1 SATA Cable (2 for STX230, 4 for STX430), 1 Meter

Two SAS x4 Cable (Crossover) (for STX430IB and STX430IBP), 1 Meter

One Stacking cable (For STX-430 and STX-460 Units)

Two External trigger cables

Two iPass to iPass 1/2 meter cables (for STX-460)

Two iPass to IB 4X 1 meter cables (for STX-460)

One iPass to SATA 1 meter octopus cable (Straight) (for STX-460)

one iPass to SATA 1 meter octopus cable (Crossover) (for STX-460)

Ethernet Cable

User's Manual

### **Unpacking Your Analyzer**

Inspect the received shipping container for any damage. Unpack the container and account for each of the system components listed on the accompanying packing list. Visually inspect each component for absence of damage. In the event of damage notify the shipper and Catalyst Enterprises. Retain all shipping materials for shipper's inspection.

# **Installing Your Analyzer**

### **Software Installation**

On systems operating under Windows® 2000 and Windows® XP.

# **Do not connect STX** Do not connect the STX to your host system until the software installation is complete.

- 1. Insert the CD ROM with the SATA software in the CD ROM drive.
- 2. The installation will automatically start the setup, unless the Auto Run is turned off. In this case select the CD ROM from "My Computer" and click setup.exe.
- 3. After the warning to close all other programs and before starting the installation, the Install component selection will open as shown below.



- 4. Select the desired components for installation.
- 5. Click <u>Next</u> to complete the installation.

System restart	You must restart your computer before you can use your Analyzer software.
Error Message	If you get an error message during installation of the drivers for Windows 2000 or XP consult your system administrator. Your system may be setup to only allow an administrator level to copy such driver files.

### **Hardware Setup**

Separate Systems

When using the SATA analyzer, it is recommended to use a system to generate bus traffic and a second system to run the SATA software in order to avoid characterization of analyzer traffic.

**Connecting the STX** 

Connect the STX as shown in Figure 2.

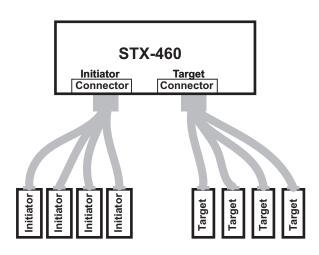


Figure 2 Analyzer Connections

# **Connecting the STX-430 IB**

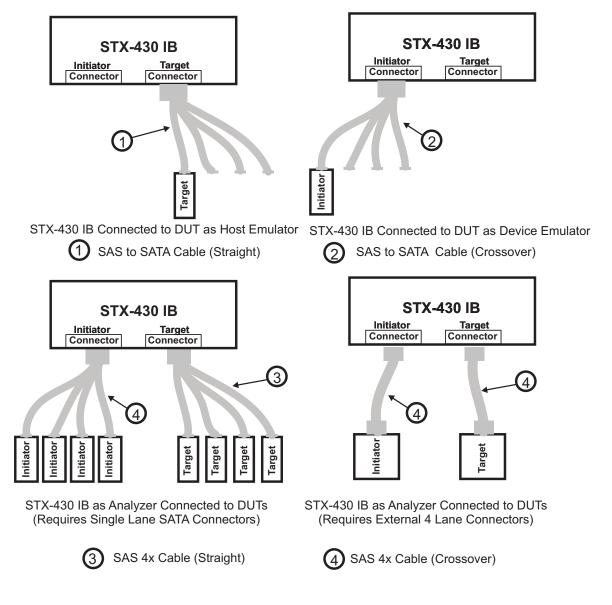
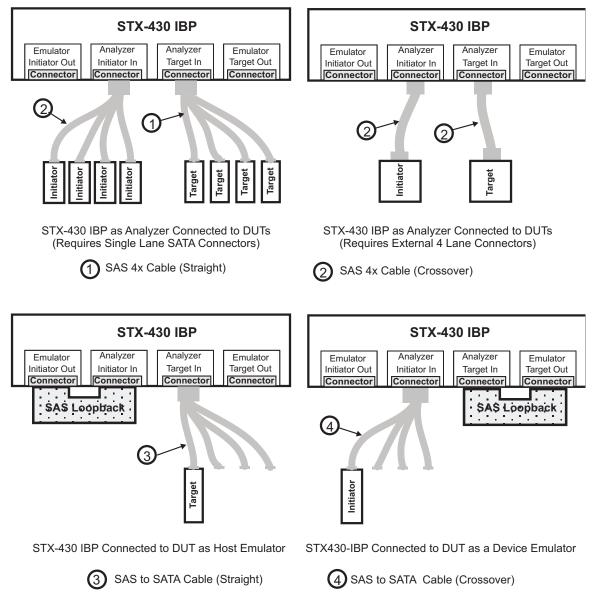


Figure 3 Connecting the STX-430 IB

## **Connecting the STX-430 IBP**



#### Figure 4 Connecting the STX-430 IBP

# Expandability

STX units may be expanded for wider lane analysis. This may be accomplished by daisy chaining the units through the provided interface in the back. The "Out" connectors should be connected to the "In" connectors of the next unit in the chain for both, the signal and the clock interfaces.

The user needs to provide external hubs for connecting the host USB or Ethernet to these units.

### Cascading STX-430's and STX-460's

Up to 8 STX-430 and STX-460 units may be cascaded and connected to a Host PC using USB or Ethernet cables.

To set up the STX units in a cascade:

- 1. Connect all of the units to be cascaded to the PC using either a USB cable or an Ethernet cable. You may use hubs (USB or Ethernet) to connect up to 8 units to a single PC.
- 2. Locate the Expansion ports on the back of each unit.

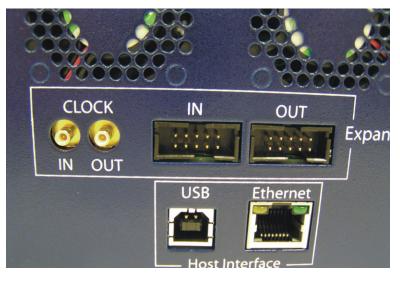
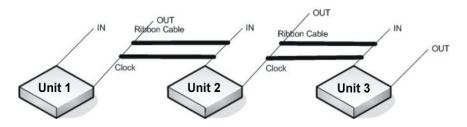


Figure 5 STX-430 Expansion Ports



#### Figure 6 STX-460 Expansion Ports

- 3. Connect the OUT clock connector of Unit 1 to the IN clock connector of Unit 2 using the supplied BNC Coax SMA to SMA cable.
- 4. Connect the OUT 10 pin connector of Unit 1 to the IN 10 pin connector of Unit 2 using the supplied 10 pin Ribbon Cable.
- 5. Similarly connect additional units up to a total of 8.
- 6. Arbitrarily designate one of the units as Unit 1.



7. Make a note of the last 4 digits of the MAC address of the unit designated as Unit 1 and the last 4 digits of the other units in the order of connection.



- 8. Make sure that all of the units are powered up and start the STX software.
- 9. The software will search for and display all of the connected units.

Note: Be sure to check the Multilink Analyzer check box.

-	Device ID	and the second	Connection Type		Order	
1	000E850001B9	No	USB	STX460	Unit 2	
1	000E85001569	No	USB	STX460	Unit 1	

- 10. Compare the MAC addresses, which are displayed in the field titled Device ID to those noted as they were connected, then click on the pull down tab under the heading "Order" on the right side of the menu and select the Unit numbers i.e. 1 for Unit 1, 2 for Unit 2 making sure your pre determined sequence for the Units matches with the MAC address for each Unit.
- 11. Click **OK** and let the STX software initialize so you can start capturing traces.

The units are now cascaded together.

### **Connecting via Ethernet**

You may use the ethernet connection using any one of the following 3 supported configurations:

- 1. The STX connected to a network via a hub, switch, or similar device.
- 2. The STX connected to the host computer (machine running the application software), via a hub, switch or similar device.
- 3. The STX connected directly to the host computer using a crossover cable.

### **Connecting to a Network**

When connected to a network the STX must communicate with the DHCP server to establish a connection. The DHCP server will continually send the next available IP address to the STX until the STX software is started.

When the user starts the software, the user may be prompted if they wish the software to automatically use the offered IP address or if they wish to assign a specific IP address (the assigned IP address needs to be on the same network segment as the host computer). The menu also allows the user to save the selected option (automatic or specific address). If the assigned IP address is not available, the OS will notify the user of an IP address conflict.

Internet Protocol (TCP/IP) Properties	X
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator fo the appropriate IP settings.	ır
Obtain an IP address automatically	
C Use the following IP address 0 . 0 . 0 . 0	
Use as default at next application run	
OK Cancel	

After the user clicks 'OK' the software will search for all STX units connected to the network, and will display a list of available STX units. After the user selects the desired STX unit, the software will assign the IP address to the selected unit, completing the connection and will launch the software.

	Device ID	In Use	<b>Connection Type</b>	Device Type	Order	
1	000E850001B9	No	Ethernet	ST×460	Unit 2	-
1	000E85001569	No	Ethernet	ST×460	Unit 1	-
1	000E850005EF	No	Ethernet	STX430M	No Select	

### Connecting via Hub, Switch or Similar device

When connected to the host machine via a hub, switch or other similar device or directly using a crossover cable the Catalyst board must communicate with the host computer to establish a connection. The host computer will continually broadcast the next available IP address to the Catalyst Board until the Catalyst software is started.

When the software starts, the user may be prompted if they wish the software to automatically use the offered IP address or if they wish to assign a specific IP address (the assigned IP address needs to be on the same network segment as the host computer). The menu also allows the user to save the selected option (automatic or specific address). If the assigned IP address is not available, the OS will notify the user of an IP address conflict.

After the user clicks 'OK' the software will search for all Catalyst boards connected to the network, and will display a list of available Catalyst boards, after the user selects the desired Catalyst board, the software will assign the IP address to the selected board, completing the connection and will launch the software.

### **Remote Operation**

In order to operate your STX remotely you must install the Remote WAN Feature as described in Appendix B.

- **Note 1.** When using the remote option, the software cannot detect the power cycle on the board.
- **Note 2.** In the event that the software cannot connect to the server with an error message, you must exit and re-run the software.

# **Launching Your Analyzer**

### SATA Analyzer



To launch the **SATA Analyzer** software, double-click the SATA Button on your Windows desktop. You can also launch the SATA Analyzer software from the start menu by choosing Programs and then the SATA folder.

The first time you run your software it will search for a default host interface and if it is found, the software will launch. If no interface is found the software will launch in simulation mode.

#### **Establish Interface**

If no interface is detected initially, then establish an available interface and relaunch the software.

Device Selection Dialog
Local devices
C All Ports USB / Ethernet
O LPT
O USB
C Ethernet
Remote devices
Hardware Not Installed [Simulation Mode]
Download the most recent software from our website: http://www.getcatalyst.com
OK Cancel

Click **OK** and the Analyzer will launch and display the Analyzer Tool bar for the Analyzer Software launched.

### Software Launched

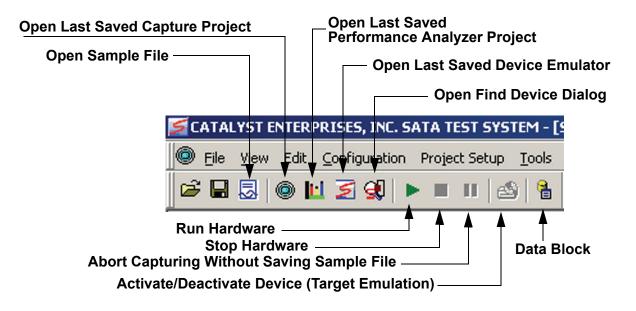


Figure 7 SATA Analyzer Toolbar

### **Operating in Simulation Mode**

Your system will operate in the Simulation Mode by default if the hardware is not detected, however, you may operate in Simulation Mode directly without installing the Analyzer hardware. To operate without hardware, select **Hardware Not Installed** (Simulation Mode) in the Port Setting dialog box and click OK.

The Analyzer software will launch and display the appropriate tool bar, but with the limitation that the Analyzer will operate only on static, previously captured, bus data.

Limitations The Simulation mode lets you try all of the available functions, but keep in mind that the system is not capturing any real data and is displaying only pre-captured results.

# **Protocol Analysis**

Protocol Analysis is performed by defining and running an analysis project. An analysis project definition includes: defining what will be captured, what the analyzer will trigger on and capture memory settings. Defined projects are saved as project \*.stc files for later use.

# Easy Mode (Pre-Defined Setups)

This mode allows you to operate the STX with a minimum of setup. In this mode you may perform a Trigger and Data capture only or program the Host Emulator to generate bus traffic for triggering and data capture.

# **Quick Start**

To get a comprehensive overview of your analyzer's capabilities:

- 1. Install the SATA Analyzer software. See "Software Installation" on page 5 for software installation instructions.
- 2. Set up your STX. See "Hardware Setup" on page 6
- 3. Launch your SATA Analyzer software. See "Launching Your Analyzer" on page 14 for launching instructions.
- 4. On the Analyzer Menu Bar click **File**, **New** and choose **Protocol Analyzer** to open an Analysis Project dialog.

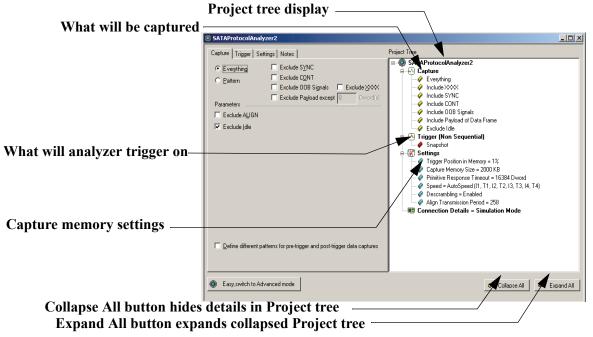


Figure 8. New Project Dialog

The New Project dialog opens with default settings to capture **Everything** on the bus and to **Trigger On Snapshot.** (Meaning that the analyzer captures everything immediately without triggering on anything in particular).

**Project Overview** 

A comprehensive tree structured overview of the project is displayed in the **Project Tree display**. The project tree shows what is to be captured, what the analyzer will trigger on and capture memory settings.

5. To get an immediate overview of the bus traffic to and from your SATA

Run Hardware button on the toolbar. After a Analyzer click the short time a Packet view display opens. Show/Hide Layers buttons -**Duration ID with different colors** a & M P P V + · # · 80 0 == 8 = 1 ... h ii 🔳 🖉 🕀 🕂 🚍 🏟 00 CQ 🐼 Laver ID with different colors X,Y,T **Relative time display** Cursors (Between 2 sequential packets) Link layer command interpretation **Data direction arrows** Time differences between cursors

#### Figure 9. Typical Packet View Results Display

The results display shows each transaction for every layer identified in a different color and the data direction identified with data direction arrows. Device to Host traffic is identified with the arrow from right to left. This arrow direction  $\Leftarrow$  indicates Device to Host traffic. Host to Device traffic is identified with the arrow left to right. This arrow direction  $\Rightarrow$  indicates Host to Device traffic.

You may hide any layer by clicking the corresponding **Show/Hide** button on the menu bar. All captured data is retained, but the display is limited to the layer data of interest for simpler viewing.

The New Project dialog offers you a comprehensive set of choices to create a trigger and capture project to satisfy a specific need. You may set the Analyzer to:

- Capture specific patterns.
- Capture different patterns pre and post trigger.
- Exclude parameters from capture.
- Trigger on a Pattern or a sequence of patterns. (see "Triggering Setup" on page 33)
- Configure trace capture memory.
- Select file to save trace capture in memory.
- Select Pattern Generator file to run.
- Capture at appropriate speed.

**Run a Sample Project** Before setting up your own custom project you may wish to run one or more of the sample projects included with your analyzer software.

### **Example Projects**

Your SATA Analyzer includes a number of pre-defined example projects that you may use to perform an immediate analysis without any setup.

The SATA Analyzer system software comes with a pre-defined folder (Directory) structure for storing all files. All pre-defined example files are stored in the following Folder:

c:\program files\catalyst\sata1.xx\examples

It is strongly recommended that you open some of these files to get an introduction to the types of projects that can be created for the SATA Analyzer.

#### **Project file type definition**

- \*.asl Decoding Script File
- \*.stc Data Capture file
- \*.sts Sample file
- \*.stp Performance Analyzer Project file
- \*.paf Performance Analyzer Output file
- \*.spg Pattern Generator Program file
- \*.cfg Viewer Configuration file
- \*.tfl Filter File
- \*.tsf Search File

### Run an Example Analysis Project

1. Click **File** on the main menu bar and then choose **Open.** 

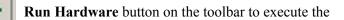
Open			<u>? ×</u>
Look in: 📔	) EasyCaptr	💌 🗢 🖻	
MultiPatte	rn.stc		
ReadDMA.			
CimerTrig.	stc		
File name:	ReadDMA.stc		Open
Files of type:	Destand Analyzes (* sta)		Cancel
Files or type:	Protocol Analyzer (*.stc)		

- 2. Locate available example analysis projects by looking in: c:\program files\catalyst\sata1.xx\examples.
- 3. Choose an example \*.stc file and click **Open** to display the example project dialog.

© ReadDMA.stc	
Host Emulator       Capture       Trigger       Host Setting       Settings       Notes         © Everything       Exclude SYNC       Exclude CDNT       Exclude CDNT         © Pattern       Exclude ODB Signals       Exclude XXXX         Parameters       Exclude Pagload except       0       Dword el         Exclude ALIGN       Exclude Ide       Exclude Ide       0	Project Tree  CaptureProject3  Capture  Capture  Capture  Capture  Control Everything  Control Everything
Basy,switch to Advance mode	Collapse All     Expand All

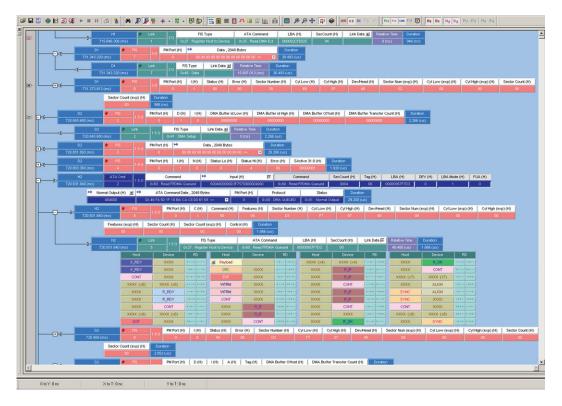
#### Figure 10. Example Protocol Analysis Project

4. Click the



pre-defined example.

5. Once the project runs you will see an analyzer trace capture display similar to the one shown in Figure 11..



#### Figure 11. Analyzer Trace Capture Display

See section "Display Manipulation" on page 99 and section "Display Configuration" on page 133 for details about the results display.

### Saving a Trace Capture

You may save a Trace Capture for review at a later time.

The **Save As** dialog offers you the ability to limit the range of the saved file.

You may save All Samples, a range between selected cursors or a range between selected commands.

Save As	<u>? ×</u>
Save in 📔	User 🔽 🗲 🛅 🕶
Sample.sts	
File name:	Devial Council
	Partial Sample Save
Save as type:	Sample File (*.sts)
Range	
<ul> <li>All Sample</li> </ul>	9
	Cursor 🔽 To T-Cursor 💌
	TA Cmd. 💌 No 1 To ATA Cmd. 💌 No 1

### **Analysis Project Setup**

You may define a new project starting with the default project definition, or modify the settings for the last project run.

**Last Project** Clicking the **Green** button opens the last project run. You may modify this project as required.



Click the **Green** button on the main menu bar to open the last project run dialog.

New Project

To start a **New** project, click **File** on the main menu bar, choose **New**, and select "Protocol Analyzer".

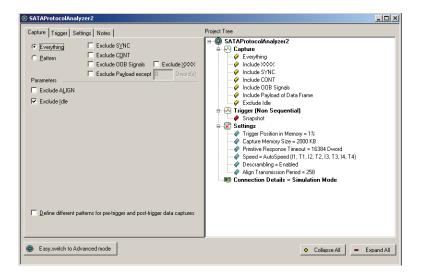


Figure 12. New Capture Project Dialog

### Data Capture Setup

### **Capture Everything**

The default Capture Tab opens with capture **Everything** selected and the corresponding default Trigger On tab with **Don't care (Snapshot)** selected. Clicking run with these default settings will immediately start a data capture to give the user a quick view of bus activity.

#### Figure 13. Capture Everything

Exclude SYNC	Check this to exclude SYNC from the data capture.
Exclude OOB Signals	Check this to exclude OOB Signals from the data capture.
Exclude CONT	Check this to exclude CONT from the data capture.
Exclude XXXX	Check this to exclude XXXX patterns from the data capture.
Exclude Payload	Check this to exclude Payload from the data capture. (You may set except the first # of Dword(s)).
Exclude Align	Check this to exclude Align Primitives from the data capture.
Exclude Idle	Check this to exclude idles from the data capture.
Exclude patterns	Check this box to allow for the capture of everything <b>except</b> the patterns that have been added to the Project Tree. When this box is checked, primitive category is added to the parameter window.
Pre and Post Trigger Cap	ture You may define one set of patterns for capture prior to the occurrence of a trigger and another set of patterns for capture after the occurrence of a trigger. The setup of capture procedure is identical for both captures. To define different patterns for pre-trigger and post-trigger data capture check the <b>Define different patterns for pre-trigger and post-trigger</b> <b>data captures</b> check box to enable the Pre-Trig Capture tab.

#### **Capture Patterns**

٠

FIS

\_ 🗆 🗵 SATAProtocolAnalyzer1 Project Tree Capture Trigger Settings Notes SATAProtocolAnalyzer1
Capture
Include SYNC
Include SYNC
Include CONT
Include CONT
Include CONT
Include CONT
Include CONT
Include CONT
Stringer Coston in Memory = 50%
Capture Memory Size = 2000 K
Capture Memory Size = 2000 K
Seed = 30 Gbps (H1, D1, H2, D2, H3, D3, H4, D4)
Align Transmission Period = 258
Connection Details = Simulation Mode Exclude SVNC Exclude CQNT Exclude COB Signals Exclude SVXX Exclude Pagload except 0 Dword(s) C Everything • Pattern Parameters Pattern FIS FIS Pattern Data Pattern <u>A</u>dd >> Protocol Errors Exclude patterns
Define different patterns for pre-trigger and post-trigger data captures Easy, switch to Advanced mode O Collapse All 😐 Expand All

To define specific patterns for capture, click the **Pattern** button.

#### Figure 14. Choosing Capture Patterns

The Parameters window displays the following pattern capture choice categories:

Data Pattern

• FIS	Pattern • Protocol Errors
Choose a parameter	To choose a parameter for capture from any of these categories, highlight the category in the parameter window and click the <u>A</u> dd>> button. This will open selection dialogs for each of the categories displaying all of the parameters for that category. All of the patterns added will appear in the project tree.
Exclude SYNC	Check this to exclude SYNC from the data capture.
Exclude OOB Signals	Check this to exclude OOB Signals from the data capture.
Exclude CONT	Check this to exclude CONT from the data capture.
Exclude XXXX	Check this to exclude XXXX patterns from the data capture.
Exclude Payload	Check this to exclude Payload from the data capture. (You may set except the first # of Dword(s))
Exclude patterns	Check this box to allow for the capture of everything <b>except</b> the patterns that have been added to the Project Tree. When this box is checked, primitive category is added to the parameter window and Exclude Idle choice is enabled.

٠

pture   Trigger   Settings   Notes   Everything   Exclude S2NC Pattern   Exclude CQNT   Exclude CQNT   Exclude CQNT   Exclude CQNT   Exclude CQNT   Exclude Payload except Pattern Primive PIS PIS PIS PIS PIS PIS Potocol Errors  Exclude patterns! Qefine different patterns for pre-trigger and post-trig	Dword(s) <ul> <li>Include CONT</li> <li>Include Cont</li></ul>
--	--

Figure 15. Exclude Patterns Checked

To remove an item from capture, highlight it in the Project tree and click the **<<Remove** button.

### Pre and Post Trigger Data Capture

You may define one set of patterns for capture prior to the occurrence of a trigger and another set of patterns for capture after the occurrence of a trigger. The selections and setup procedure is the same for both, the Pre-Trigger capture and the Post-Trigger capture. Check Define different patterns for pre-trigger and post-trigger data capture to enable the Post-Trigger tab.

Pre-Trigger Capture       Trigger       Post-Trigger Capture       Project Tree

Figure 16. Post-trigger Capture Dialog Enabled

#### **Defining Patterns**

To select an item for capture, either highlight the category and click the <u>A</u>dd>> button or double-click the category to open a corresponding definition dialog.

**Primitive** Double-click **Primitive** (Available only if Exclude Patterns is checked) to open the Primitive selection dialog.

Primitive	×
Primitive: CONT	OK Cancel
Image: H1         Image: H2         Image: H3         Image: H4           Image: D1         Image: D2         Image: D3         Image: D4	
Check All Uncheck All	

Select the desired primitive and click OK.

FIS (Frame Information Structure) Double-click FIS to open the FIS Type selection dialog.

FIS Type			<u>×</u>
FIS Type:	Any Type	×	Format O Binary OK
	Register Host to Device Register Device to Host	0x27 0x34	Hexadecimal     Cancel
🔲 Show F	Set Device Bits	0xA1	
	DMA Activate DMA Setup	0x39 0x41	Value
FIS Type		0x58	
PM Port	PIO Setup Data	0x5F 0x46	
	Any Type	X	
н1 Г D1	▼ H2 ▼ H3 ▼ ▼ D2 ▼ D3 ▼		
Check	All Uncheck All		

Click the down arrow next to the Type drop-down list box, choose a FIS type to capture and click OK. Repeat for additional types.

#### **Available FIS Types:**

- Register Host to Device • •
  - BIST **PIO Setup**

٠

- Register Device to Host ٠
- Set Device Bit •
- **DMA** Activate •
- Data •
- Any Type •
- DMA Setup ٠

#### **FIS Pattern**

Double-click FIS Pattern to open the FIS Pattern selection dialog.

Parameter	Value 🔄
FIS Type	0x27: Register Host to Device
PM Port	×
С	?
Command	**
Features	*
Sector Number	**
Cyl Low	*
Cyl High	**
Dev/Head	*
Sector Num (exp)	**
Cyl Low (exp)	*

The FIS Pattern dialog opens with the default FIS Type as **Register Host to device.** To choose another available FIS Type click the down arrow next to the FIS Type list box.

FI!	5 Pattern			
	FIS Type:	Register Host to Device	0x27	Format C Binar
		Register Host to Device	0x27	Hexa
		Register Device to Host	0x34	
	Show F	Set Device Bits	0xA1	-
	5110001	DMA Activate	0x39	
		DMA Setup	0x41	Value
	FIS Type	BIST	0x58	t to Device
	PM Port	PIO Setup	0x5F	
		Data	0x46	
	С	Vendor	Х	

Choose the desired FIS Type and complete the corresponding dialog.

#### **FIS Types**

**Register Device to Host** 

Parameter	Value	Ŀ
FIS Type	0x34: Register Device to Host	1
PM Port	×	
I	?	
Status	×	
Error	×	
Sector Number	×	
Cyl Low	×	
Cyl High	*	-
Dev/Head	×	
Sector Num (exp)	×	
Cyl Low (exp)	**	1

Set Device Bits

Parameter	Value
FIS Type	0xA1: Set Device Bits
PM Port	×
1	?
N	?
Status Lo	?
Status Hi	?
Error	*
H1 및 H2 H	

### **DMA Activate**

Show Reserved and I Parameter	Value	
FIS Type	0x39: DMA Activate	
PM Port	×	
<b>지</b> H1 지 H2	нз ГГ н4	

### DMA Setup

Parameter	Value
FIS Type	0x41: DMA Setup
PM Port	×
)	?
	?
4	?
DMA Buffer id Low	X0000000X
DMA Buffer id High	X000000X
DMA Buffer Offset	X0000000X
OMA Buffer Transfer Count	X0000000X
	₩ H4

### BIST

Parameter		Value	
PM Port	×		
V	?		
P	?		
F	?		
L	?		
S	?		
A	?		-
Т	?		
Data[7:0]	$\times$		
Data[15:8]	×		
Data[23:16]	∞		

0x5F  C Binary C Binary C an D C an D D D D D D D D D D D D D D D D D D
Value
0x5F: PIO Setup
×
?
?
**
**
××
*

Parameter	Value	
FIS Type	0x46: Data	
PM Port	×	
Data (DW0)	X000000X	
Data [DW1]	X000000X	
Data [DW2]	200000000	
Data [DW3]	XXXXXXXXX	_
Data [DW4]	XXXXXXXXX	
Data (DW5)	200000000	
Data [DW6]	200000000	
Data [DW7]	200000000	
Data [DW8]	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	-

Data

**PIO Setup** 

### Vendor

FIS Type: Vendor	×	Format     C Binary	ОК
Number of DWORDs: 1	<b>•</b>	Hexadecir	nal Cano
Show Reserved and C	)bsolete		
Parameter		Value	
FIS Type	×		
Data (24 bits)	******		
עד H1 א H2 עד H1 עד	H3 V H4		
지 H1 U H2 U 지 20 지 10 지			

### Data Pattern

Double-click Data Pattern to open the Data Pattern definition dialog.

Data Offset: 0 Dwords [0-2047]			
200000000	Dw1	X0000000K	Dw0
200000000	Dw3	X0000000X	Dw2
20000000	Dw5	>>>>>>>>	Dw4
20000000	Dw7	X0000000X	Dw6
200000000	Dw9	X0000000K	Dw8
200000000	Dw11	200000000	Dw10
X000000X	Dw13	X0000000K	Dw12
X000000X	Dw15	X0000000X	Dw14
******	Dw13	X0000000X	Dv

Enter the data pattern(s) for capture and click **OK**.

**Protocol Errors** 

Double-click Protocol Errors to open the Protocol Errors selection dialog.

Protocol Errors	×
Protocol Errors:	
Code Violation  Disparity Error  ALIGN Error  FIS Signaling Latency Error  FIS Invalid State Transition (Unexpected Primitive)  FIS Invalid State Transition (Primitive Timeout)  Frame Type Error Frame Length Error CRC Error CRC Error	OK Cancel
Check All Uncheck All Port: X	
I → H1       I → H2       I → H3       I → H4         I → D1       I → D2       I → D3       I → D4         Check All       Uncheck All	

Check the desired Protocol Error(s) for capture and click **OK**.

# **Triggering Setup**

The **Trigger** tab, in the analysis project dialog, allows the user to specify when the analyzer will complete a data capture. Three trigger modes are available. A default **Don't Care (Snapshot), Manual Trig** and **Pattern.** 

When a data capture is started with **Don't Care (Snapshot)** selected, the analyzer will trigger on the first data sample collected. Starting a data capture with **Pattern** selected the analyzer will trigger when specific pattern(s) are detected in the captured data stream. The following are three ways to trigger the analyzer with **Pattern** selected.

- Trigger on any pattern (Any Trigger Mode)
- External
- Trigger on a sequence of patterns (Sequential Trigger Mode)

### Snapshot Mode

To trigger immediately on any pattern, check the **Don't care (Snapshot)** button.

SATAProtocolAnalyzer1		_O×
Capture Trigger Settings   Notes   © Don't care (Snapshot) © Manual Ing © Patern Parameters	Project Tree	
Easy, switch to Advance mode	O Collapse All Exp	pand All

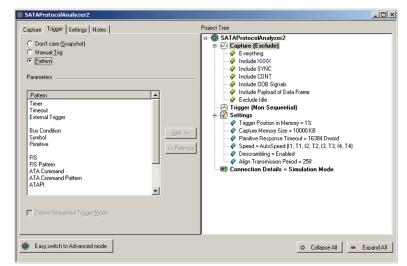
Figure 17. Default Trigger Selected

### Manual Trigger Mode

In the **Manual Trigger** mode the analyzer captures bus traffic continually until you click the **Stop Hardware** button on the analyzer toolbar which triggers the analyzer. To perform a manual trigger, check the **Manual Trig** option button.

### Any Trigger Mode

In the **Any Trigger** mode, triggering occurs whenever any of the patterns selected are detected. The procedure for selecting trigger parameters is identical to that for selecting capture parameters. Many of the pattern selections are also identical.



To define patterns for triggering check the Pattern button in the Trigger dialog.

### Figure 18. Select Patterns for Trigger

The **Parameters** window displays the following trigger pattern choice categories:

- Timer
- Timeout
- External Trigger
- Bus Condition
- Symbol
- Primitive
- FIS

- FIS Pattern
- ATA Command
- ATA Command Pattern
- ATAPI
- Soft Reset
- Data Pattern
- Protocol Errors

**Choose a parameter** Either highlight the category and click the <u>Add>></u> button or simply double-click the category to open a corresponding definition dialog.

To remove an item from trigger, highlight it in the Project tree and click the **<<Remove** button.

### Timer

Selecting a timer for a trigger in the **Any Trigger Mode** limits the time that the analyzer looks for selected triggering conditions before triggering. The timer is activated when the Project is run. If none of the other selected triggering conditions occurs during the timers active time the Analyzer will trigger at the end of the time set for the timer.

A timer may be set independent of any other trigger condition. This unconditionally triggers the analyzer when the set time expires.

To set the timer value, double-click **Timer** in the Patterns window of the Capture Project dialog to open the Timer dialog.

imer	2
Timer Value: 1 Milli Seconds	OK
- Time Unit	Cancel
<ul> <li>milliseconds</li> </ul>	
C microseconds	

Check the Time unit desired and enter a Timer Value and click OK.

### Timeout

Choosing timeout as a trigger condition allows you to define a timer with a timeout value that is reset to 0 and started by the occurrence of any events that you add to the Start Events list. You may then add one or more events to the End Events list and then choose a trigger to occur if an End event occurs before the timer expires or if the timer expires before the occurrence of an end event. The Start and End events are added and defined identically to the way the patterns to be captured are defined and added.

limeout Pattern		×
Pattern	]	Start Events
External Trigger	Add >>	
Bus Condition Symbol Primitive	Remove <<	
FIS FIS Pattern ATA Command ATA Command Pattern ATAPI	Add >> Remove <<	End Events
Soft Reset		
Note : Logical OR operator appllied on	n added events.	
Timeout value : 1	• milliseconds	C microseconds
Trigger mode		
Trigger if the 'End Event(s)' occur	r(s) before the timer expir	es
C Trigger if the timer expires before	the 'End Event(s)' occur	(\$)
Note : Start Event(s) reset(s) the t	timer uncoditionally.	
	OK Canc	el

### **External Trigger**

You may trigger on an external trigger which is available for both, the Combinational and Sequential triggering modes. To set up the trigger click the **External Trigger** category.

kternal Trigger	2
<ul> <li>Positive Edge</li> <li>Negative Edge</li> <li>Level 0</li> <li>Level 1</li> </ul>	OK Cancel

Check a desired triggering condition button and click **OK**.

.

### **Bus Condition**

Bus Conditions	
Conditions	ОК
Electrical Idle	
Electrical Burst	Cancel
COMRESET	
Host COMWAKE	
poneo commune	
Check All Uncheck All	
	-
▼ H1 ▼ H2 ▼ H3 ▼ H4	
🔽 D1 🔽 D2 🔽 D3 🔽 D4	
Check All Uncheck All	
- Count	
Expected number of occurrences on each link:	1

Double-click Bus Condition to open the Bus Conditions selection dialog.

Check the desired Conditions to trigger on and click OK.

### Symbol

Double-click Symbol to open the Symbol selection dialog.

Symbol	×
K Symbol     K28.3     K28.3     K28.3     K28.5     D Symbol	OK Cancel
H1 ▼ H2 ▼ H3 ▼ H4      D1 ▼ D2 ▼ D3 ▼ D4	
Check All Uncheck All	
Expected number of occurrences on each link:	1

Click the down arrow next to the K Symbol dropdown list, choose a symbol to trigger on and click **OK**. To choose a D symbol click the D symbol option button and enter a Hex value for the symbol.

### Primitive

Double-click **Primitive** in the Patterns window of the Trigger dialog to open the Primitive dialog.

Primitive			×
Primitive:	CONT PMREQ_S R_ERR	NOT	OK Cancel
H1 D1 Check	R_IP R_OK SYNC WTRM ALIGN R_RDY	₩ H4 ₩ D4	
Count Expected	I number of oc	currences on each link:	1

Click the down arrow next to the Primitive dropdown list, choose a primitive to trigger on and click **OK**. Note: Checking the box to the right of the Primitive Type allows use of the logical NOT function.

### FIS (Frame Information Structure)

Double-click FIS to open the FIS Type selection dialog.

Register Device to Host         0x34           Show F         Set Device Bits         0x41           DMA Activate         0x39         0MA Setup           DMA Setup         0x41         Value           FIS Type         BIST         0x56           PID Setup         0x45         0x58	FIS Type:	Any Type	X	Format C Binary OK
Register Device to Host         0x34           Show F         Set Device Bits         0x41           DMA Activate         0x39         0x41           FIS Type BIST         0x56         0x55		Register Host to Device	0x27	Hexadecimal     Cancel
Show         DMA Activate         0x39           DMA Setup         0x41         Value           BIST         0x58         PID Setup		Register Device to Host	0x34	
DMA Activate         0x39           DMA Setup         0x41         Value           BIST         0x58         PII Setup           PUI Setup         0x5F         PII Setup	Show	Set Device Bits	0xA1	
FIS Type BIST 0x58 PID Setup 0v5E		DMA Activate	0x39	
PIO Setup Ov5E		DMA Setup	0x41	Value
PIO Setup 0x5E	FIS Type	BIST	0x58	
	PM Port		0x5F	
Data 0x46	FM FOR	Data	0x46	
Any Type X		Any Type	X	
	🔽 H1	🗹 H2 🔽 H3 🔽	H4	
✓ H1 ✓ H2 ✓ H3 ✓ H4	☑ D1	▼ D2 ▼ D3 ▼	D4	
Image: H1         Image: H2         Image: H3         Image: H4           Image: D1         Image: D2         Image: D3         Image: D4				

Click the down arrow next to the Type drop-down list box, choose a FIS type to trigger on and click OK. Repeat for additional types.

### **Available FIS Types:**

- Register Host to Device DMA Setup
- Register Device to Host
- Set Device Bit
- DMA Activate
- BIST
- PIO Setup
- Data
- Any Type

### **FIS Pattern**

Double-click FIS Pattern to open the FIS Pattern selection dialog.

Parameter	Value	<b></b>
FIS Type	0x27: Register Host to Device	
PM Port	×	
С	?	
Command	**	
Features	**	
Sector Number	**	
Cyl Low	**	
Cyl High	**	
Dev/Head	**	
Sector Num (exp)	**	
Cyl Low (exp)	××	-

The FIS Pattern dialog opens with the default FIS Type as **Register Host to device.** To choose another available FIS Type click the down arrow next to the FIS Type list box.

FIS Pattern				
FIS Type:	Register Host to Device	0x27	•	Format C Binary
	Register Host to Device	0x27		Hexa
	Register Device to Host	0x34		
Show B	Set Device Bits	0xA1		
1 3110111	DMA Activate	0x39		
	DMA Setup	0x41		Value
FIS Type	BIST	0x58	t	to Device
PM Port	PIO Setup	0x5F		
	Data	0x46		
С	Vendor	X		

Choose the desired FIS Type and complete the corresponding dialog.

### **ATA Command**

Double-click **ATA Command** to open the ATA command selection dialog.

A Command	
Command: Any Command	Format OK C Binary C Hexadecimal Cancel
Parameter	Value
Command	X: Any Command
PM Port	×
H1         H2         H3         H           H1         H2         H3         H           H1         H2         H3         H           H1         H2         H3         H	
Check All Uncheck All	

Click the down arrow next to the Command list box, choose an ATA command and click **OK**. A powerful triggering choice is **Any Command** that will cause the analyzer to trigger on any ATA command.

**Note:** The command code and feature set are not the only parameters that describe an ATA command. If parameters such as LBA and sector count are required, you must use the **ATA Command Pattern** dialog.

### **ATA Command Pattern**

Double-click **ATA Command** Pattern to open the ATA command pattern selection dialog.

TA Comm	and Pattern				
Command:	Any Command		×	•	C Binary OK
	Check Power Mode		0xE5		Hexadecimal Cancel
	Configure Stream		0x51		
Show B	Device Configuration Freeze	Lock	0xB1,C1		
- onown	Device Configuration Identify		0xB1,C2		
	<b>Device Configuration Restore</b>		0xB1,C0		Value 🔺
Command	Device Configuration Set		0xB1,C3		
Features	Device Reset		0x 8		
	Download Microcode		0x92		
Sector Nu	Execute Device Diagnostic		0x90		
Cylinder Le	Flush Cache		0xE7		
Cylinder H	er H Flush Cache Ext		0xEA		
DEV/Hea	Get Media Status	~~~	0xDA	•	
Sector Nu		×			
Cylinder Lo	ow(exp)	××			
Cylinder H	igh(exp)	×			
Features(e	xp)	$\times$			
₩ H1 И D1	✓ H2    ✓ H3    ✓ H4     ✓ D2    ✓ D3    ✓ D4				
Check	All Uncheck All				
Count Expected	I number of occurrences on ea	ach link:	1		

Click the down arrow next to the Command list box, choose an ATA command and click **OK**.

### **ATAPI Pattern**

### Double-click ATAPI to open the ATAPI Pattern dialog.

Туре				Format	
	ommand 🔿 MMC-	4 O SPC-3	C SSC-2	C Binary Hexadecima	
Command Type:	Any Command		× •	• Hexadecima	al Cancel
CDB Type:	Any CDB Type		•		
Pa	Any CDB Type 6-Byte Command 10-Byte Command 12-Byte Command 16-Byte Command			Value	
Operation Code	Long LBA 16-Byte	Command		J	
PM Port		×			
H1 및 H2	2 V H3 V I	14			
	2 17 H3 17 1 2 17 13 17 1 2 17 13 17 1				

Select the pattern **Type** by checking the corresponding option button.

## Soft Reset

•

Double-click Soft Reset to open the Soft Reset dialog

Soft Reset					×
Port		]			OK
	✓ H2 ✓ D2				Cancel
Chec		Incheck A			
Expected I	number of	occurrence	es on each lir	nk: 0	

### **Data Pattern**

Data	Data Offset: 0 Dwords (0-2047)			
	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Dw1	X0000000X	Dw0
	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Dw3	X0000000X	Dw2
	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Dw5	X0000000X	Dw4
	X0000000X	Dw7	X0000000X	Dw6
	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Dw9	>00000000	Dw8
	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Dw11	>00000000	Dw10
	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Dw13	>00000000	Dw12
	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Dw15	X0000000X	Dw14
₩ H1	다 H2 다 H3 다 H4 다 D2 다 D3 다 D4			

### Double-click Data Pattern to open the Data Pattern dialog.

Enter the desired patterns and click OK.Protocol Errors

Double-click Protocol Errors to open the Protocol Errors dialog.

Protocol Errors	×
Protocol Errors:	
Code Violation  Disparity Error  ALIGN Error  FIS Signaling Latency Error  FIS Invalid State Transition (Unexpected Primitive)  FIS Invalid State Transition (Primitive Timeout)  Frame Type Error  Frame Length Error  Frame Direction Error  CRC Error	OK Cancel
Check All Uncheck All	
Port: X	
Image: H1       Image: H2       Image: H3       Image: H4         Image: D1       Image: D2       Image: D3       Image: D4         Check All       Uncheck All	

Check the protocol error(s) that you wish to trigger on and click **OK**.

Port and Direction

You may define the port and direction for each trigger by checking or unchecking the corresponding H and/or D check boxes.

### **Sequential Trigger Mode**

In the Sequential Trigger mode, triggering occurs whenever a specific sequence of patterns are detected. The sequence is established by the order in which the triggering patterns are defined.

**Note:** Patterns such as Primitives and Symbols or Frames occurring very close together on different ports will cause an error in triggering.

To define a triggering sequence, check the **Define Sequential Trigger Mode** and enter triggering patterns in the sequence that you would like to trigger.

SATAProtocolAnalyzer2         Capture       Trigger         Settings       Notes         Cont care (Snapshot)	Project Tree  SATAProtocolAnalyzer2  Capture  Comparison  Tingder Capture  Control Control  Settings  Sett
Easy,switch to Advance mode	Collapse All     Expand All

### Figure 19. Select Sequential Trigger Mode

The sequential triggering mode offers the option of triggering on a timer or inserting a timer in the triggering sequence to delay detection of the next pattern in the sequence. To insert a timer in the trigger list Doubleclick **Timer** to open the timer definition dialog.

imer	2
Timer Value: 1 Milli Seconds	OK
Time Unit	Cancel
• milliseconds	
C microseconds	

Enter the desired **Time Value**, choose the **Time Unit** and click **OK**.

**Defining Patterns** The definition of patterns for the sequential trigger mode is identical to the Any Trigger mode with the following exception: the definition dialogs for triggering patterns have an additional setting, to count the number of occurrences. This setting allows the user to specify the number of times that the pattern must occur before triggering or proceeding in the trigger sequence.

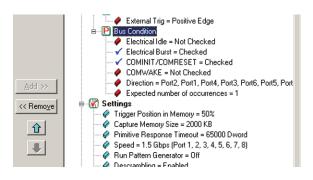
- Count	
Expected number of occurrences	s: 1

### Figure 20. Number of Occurrences

**Note:** The events on each link are counted independently causing a trigger whenever the number of occurrences on any link equals the specified value.

Triggering orderAs triggering patterns are defined and added they are displayed in the<br/>Project Tree sequentially in the order that they were entered under the<br/>Trigger On category. When the project is run, the analyzer will detect the<br/>occurrence of each pattern in order and trigger on the last one.

The sequence of triggering patterns can be re ordered if desired. To change the sequence order, highlight a trigger pattern and use the Up or Down arrow to move it to a new position.



# **Project Settings**

Host Emulator Advance Mode Host Setting Settings Notes	
Trigger Position In Memory	
C Entire Memory 1% 99%	
Eartial Memory 2000 KB (Up to 2048 MB)	
Sample Eile Name: C:\Program Files\Catalyst\SATA1.xx\U	
Auto Run Number of Run : 20	
Analyzer Settings	
Primitive Response Timeout: 16384 DWORD	
Disable desgrambling	
ALIGN Transmission Period:	
C 256 C 258 Protocol Error Mask	
Speed	
H1, D1: AutoSpeed V H3, D3: AutoSpeed V	
H2, D2: AutoSpeed V H4, D4: AutoSpeed V	

To set project options click the Settings tab.

### Figure 21. Setting Project Options

Memory Size	To reduce the capture memory size, check Partial Memory and enter the desired buffer size if you want to partition the trace memory for multiple captures or, check entire memory to allow capture for the entire memory if you want to capture the maximum amount of trace data.
projec	es where the size of a data packet exceeds the set buffer memory allocation, the t will run, but no capture will result. In such cases you must increase the buffer ry size to a value greater than the packet size.
Trigger Position	Pre-Trigger is set by default at 50% which defines the percentage of data to be captured before and after the triggering event. You may change this percentage by dragging the slider to the desired value.
	The capture of the specified percentage of the data prior to the triggering event cannot be guaranteed and may in some cases be 0. This can occur in cases where the triggering event occurs before the required number of pre-trigger event data can be stored. In these cases the data display will show fewer than the specified data points prior to the triggering event. For more detail see "Trigger Position" on page 47.
Sample File Name	Click the ellipses next to the Sample File Name text box and choose a file name and location for the results of your current project.
Align Transmission p	eriod Click the desired option button.
Auto Run	To repeat the current capture and trigger setup automatically, check the <b>Auto Run</b> checkbox and enter the number of times in the <b>Number to Run</b> text box. The capture and trigger will repeat automatically for the specified number of times and the results saved in consecutively numbered <b>Sample.sts</b> files.

Disable descra	<b>bling</b> Check this option to view scrambled data.
Primitive Resp	<b>nse Timeout</b> Specifies timeout value to detect a primitive response timeout error.
Choose Port Sp	click the down arrow next to the port speed box and choose a port speed The default is Autospeed.
Note:	If a Port check box is unchecked the analyzer will not capture any patterns for that Port. The trace memory for that port will be allocated to it's adjacent Port. e.g. H1, D1 <-> H2, D2 or H3, D3 <-> H4, D4.
<b>Protocol Error</b>	Click the Protocol Error Maskbutton and check any or all of the

protocol errors to be excluded from the capture.

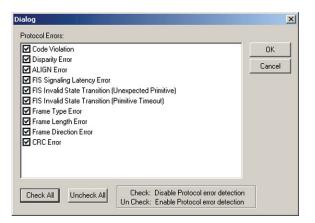


Figure 22. Protocol Error Mask

# Project Note

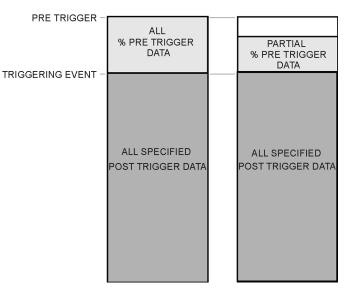
Click the **Notes** tab on the project dialog to open the Notes dialog. Enter any relevant information about the project in the Note area.

SATAProtocolAnalyzer2		- 🗆 ×
Capture       Trigger       Settings       Notes         Project Name:       SATAProtocolAnalyzer2         Note:       Description of the current project         Creation Date:       03:16:36 on Tuesday, Mar-01-05         Last Modified:       Not run yet.	Project Tree  Soft AProtocolAnalyzer2  Soft AprotocolAnalyzer3  Soft Ap	
Easy,switch to Advance mode	Collapse All     Ex	(pand All

# **Trigger Position**

The amount of data to be captured before and after the trigger point may be set as a percentage of pre-trigger in trace memory, between 1% and 99%. This may be done by positioning the pre-trigger slider to the desired percentage. This feature allows the evaluation of bus activity leading up to and after the triggering event. The operation of the pre-trigger in the trace memory is conceptually illustrated in Figure 23.

Pre-trigger Data is the capture of the specified percentage of the data prior to the triggering event. The amount of data captured cannot be guaranteed and may in some cases be 0. This can occur in cases where the triggering event occurs before the pre-trigger data can be stored. In these cases the data display will show fewer than the specified data points prior to the triggering event.



DATA MEMORY

Figure 23. Pre-Trigger Example, 20% Pre-Trigger

# **Advanced Mode (User Defined)**

This mode expands your Analysis capability by allowing you to program complex triggering and data capture projects.

The Advanced Mode is implemented as a state machine with up to 23 different states. Each state may be individually programmed to:

- Trigger on a different event or trigger unconditionally.
- Capture Everything, Nothing or a user defined pattern.
- Include up to 3 ELSE IF statements allowing a jump to any other state based on user definition.
- Use up to 3 timers that can be set to a maximum value of 42949 ms. A timer may be set in the state or continue the one set in the previous state.
- Output an external trigger High or Low.

# Working in the Advanced Mode

To start working in the Advanced Mode, click the **Easy**, **Switch to Advanced Mode** button in an open Analyzer window.

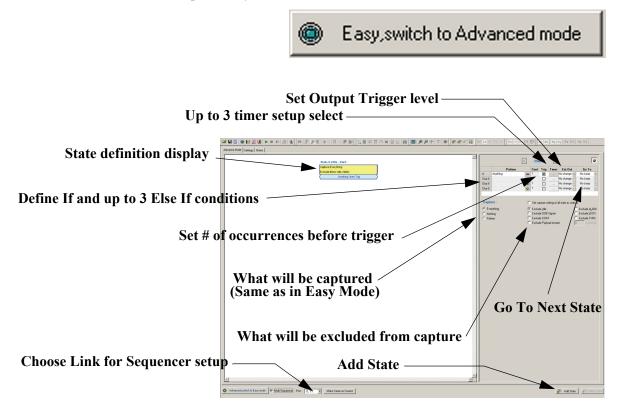
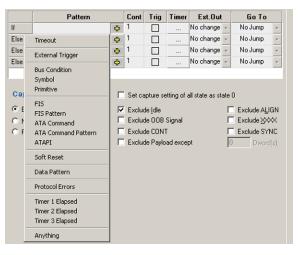


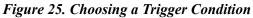
Figure 24. State Programming Dialog

### **Setting Trigger Conditions**

To set the If and Else If trigger condition:

1. Click in the corresponding Pattern Field and choose a trigger condition from the open drop down list.





- 2. Define each selected pattern in the same way as in the Easy Mode as described starting on page 17. You may set a timer for any if or elseif condition.
- 3. Choose a capture option: Everything, Nothing or Pattern.
- 4. If you choose Pattern, you may select patterns for inclusion or exclusion. Clicking the **Pattern** option enables a pattern definition dialog.



- Choose a pattern(s) and click the +>> button to add it for capture or exclusion. Each pattern selected is defined in the same way as in Easy mode. (see "Defining Patterns" on page 26.)
- 6. If an output trigger is required, click the Combo Box arrow in the **Ext. Out** field and select the desired output trigger level.
- 7. To go to another state, click the down arrow in the **Go To** field and select a state to go to next. If no other state has been defined choose **New State** to add a state to goto.

### Multi - Link Triggering

You may set up different triggering for each link. To set up different trigger conditions for a link, check the Multi Sequencer check box and select the link for setup from the Port drop down list.

🔽 Multi Sequencer	Port :	H3,D3 💌	I
		H1,D1 H2,D2	
		H3,D3 H4,D4	

Figure 26. Multi - Link Triggering Setup

### Set Timers

You may set and use up to 3 timers for triggering. Each timer may be set for each state or set to continue from one set in the previous state. You may set a timer for any IF or ELSE IF condition. To set up the timers, click the ellipses next to the IF or ELSE IF condition and define each of the timers in the Set Timers dialog.

Timer 1			- Timer unit
C Continue C Set Timer	0	Milli Seconds	⊙ mili ⊂ mic
Timer 2			- Timer unit
C Continue C Set Timer	0	Milli Seconds	€ mili € mic
Timer 3			Timerund
C Continue @ Set Timer	0	Milli Seconds	• milli • mic
C Continue C Set Timer	tate the timer is	s reset each time enteri	ng that state. By se
'Continue' the timer will contin Timer may be set at any state			

Figure 27. Set Timers Dialog

### **Useful Key Sequences**

The following key sequences are active to assist you in navigating a defined state machine:

Ctrl+a	Add State
Insert	Insert State
DEL	Delete State
Ctrl+c/Ctrl+Ins	Сору
Ctrl+v/Shift+Ins	Paste
Up/Down arrow keys	Moves selection between states
Page Up/Page Down	Page Up and Page Down states
Home	Go to first page
End	Go to end page

### **Project Settings**

Prior to running the Advanced mode project, click the **Settings** tab. The options in the Settings dialog are the same as for the Easy Mode and are described starting on page 45.

SATAProtocolAnalyzer1	
Advance Mode Settings Notes	
Trace Memory Status:	
Trigger Position In Memory	
C Entire Memory 1% 99%	
Eattial Memory 2000 KB (Up to 2048 MB)	
Sample Eile Name: C:\Program Files\Catalyst\SATA1.xx\U	
Auto Run Number of Run : 20	
Auto Run Number of Run : 20	
Analyzer Settings	
Primitive Response Timeout: 16384 DWORD	
Disable desgrambling	
ALIGN Transmission Period	
C 256 C 258 Protocol Error Mask	
Speed	
✓ H1, D1: AutoSpeed ▼      ✓ H3, D3: AutoSpeed ▼	
V H2, D2: AutoSpeed ▼ V H4, D4: AutoSpeed ▼	
Autospeed Autospeed	
Advanced,switch to Easy mode	
P. Contraction of the second s	

### Figure 28. Project Settings Page

- Memory SizeTo reduce the capture memory size, check Partial Memory and enter the<br/>desired buffer size if you want to partition the trace memory for multiple<br/>captures or, check entire memory to allow capture for the entire memory<br/>if you want to capture the maximum amount of trace data.
  - **Note:** In cases where the size of a data packet exceeds the set buffer memory allocation, the project will run, but no capture will result. In such cases you must increase the buffer memory size to a value greater than the packet size.

Trigger Position	Pre-Trigger is set by default at 50% which defines the percentage of data to be captured before and after the triggering event. You may change this percentage by dragging the slider to the desired value.
	The capture of the specified percentage of the data prior to the triggering event cannot be guaranteed and may in some cases be 0. This can occur in cases where the triggering event occurs before the required number of pre-trigger event data can be stored. In these cases the data display will show fewer than the specified data points prior to the triggering event. For more detail see "Trigger Position" on page 47.
Sample File Name	Click the ellipses next to the Sample File Name text box and choose a file name and location for the results of your current project.
Auto Run	To repeat the current capture and trigger setup automatically, check the <b>Auto Run</b> checkbox and enter the number of times in the <b>Number to Run</b> text box. The capture and trigger will repeat automatically for the specified number of times and the results saved in consecutively numbered <b>Out.sts</b> files.

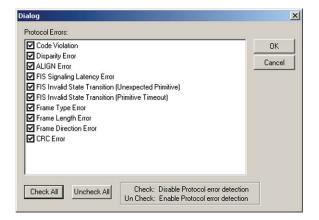
Primitive Response Timeout Specifies timeout value to detect a primitive response timeout error.

**Disable descrambling** Check this option to view scrambled data.

Align Transmission period Click the desired option button.

**Protocol Errors** 

Click the **Protocol Error Mask...**button and check any or all of the protocol errors to be excluded.



### Figure 29. Protocol Error Mask

**Choose Port Speed** Click the down arrow next to the port speed box and choose a port speed.

**Note:** If a Port check box is unchecked the analyzer will not capture any patterns for that Port. The trace memory for that port will be allocated to it's adjacent Port. e.g. H1, D1 <-> H2, D2 or H3, D3 <-> H4, D4.

**Project Note** 

To include some descriptive information about the project, click on the **Notes** tab and enter a brief descriptive note about the project.

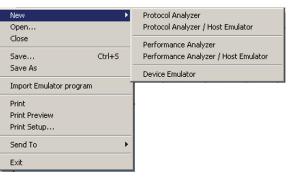
SATAProtocol	Analyzer1	_ 🗆
Advance Mode	Settings Notes	
Project <u>N</u> ame:	SATAProtocol4nalyzer1	
Note:		
14020.	Information about the current project.	
Creation Date:	09:58:45 on Monday, Mar-20-06	
Last Modified:	Not saved yet.	
Last Run:	Not run yet.	
Advanced,s	witch to Easy mode	

Figure 30. Project Note

# **Exercise and Capture**

#### Not in current version for STX-460.

To perform a capture with Host Emulator generated bus traffic, click **File**, **New** and choose **Protocol Analyzer/Host Emulator**. Program the Host Emulator and then set up a capture as described in "**Protocol Analysis**" on page 17.



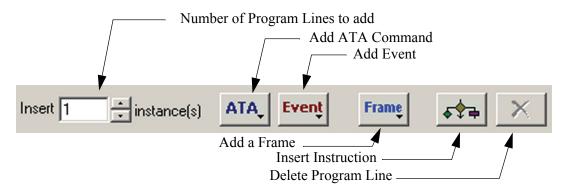
# **Programming the Host Emulator**

Click the Host Emulator tab to open the Host Emulator program dialog.

SATAProtocolAnalyzer2	
Host Emulator Capture Trigger Host Setting Settings Notes	
Inset 1instance(s) ATA Event Frame ATA Event Construction Constr	
	×
Easy.switch to Advance mode	

### Figure 31. Host Emulator Program Dialog

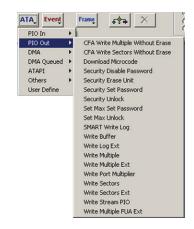
A Host Emulator program may be created using ATA commands and events. These commands may be executed in a program loop or subject to user specified conditions.



Add Program Lines To add program lines, enter the number of lines to be added and click the down arrow on the desired command button.

# **Adding Host Emulator Commands**

### Adding an ATA Command



Click the down arrow on the **ATA Command button**, click on one of the 6 command categories and choose a command or select the User define command.

**Note:** You may send a SCSI command over the SATA interface by choosing **ATAPI** and subsequent options.

### Adding an Event

Click the down arrow on the **Event** button and choose the event to be inserted.



### Adding a Frame

Click the down arrow on the **Frame** button and choose the frame to be inserted.

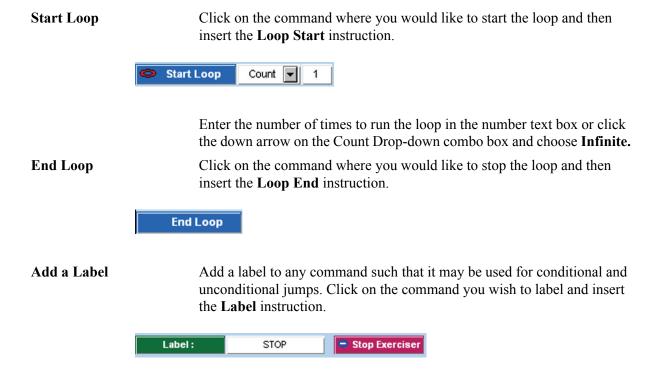


### **Inserting Instructions**

Instructions are logical program elements that allow the definition of how the Host Emulator program is executed. Using instructions you may define program loops, make conditional jumps, insert delays and stops.

To insert an instruction, click on a command in the Host Emulator program where you want the instruction inserted and then click the **Insert Instruction** button and choose the instruction to insert.





Labels are automatically labeled as Label# sequentially as they are added, however, you may assign them meaningful names such as STOP and START.

Add a GotoTo insert an unconditional jump to a previously labeled command, insert a<br/>Goto instruction. Then click the down arrow on the Drop-down combo<br/>box and choose the label to designate the destination command.



Add an If

To insert a conditional jump to a previously labeled command, insert an **If** instruction.



Then click the down arrow on the **If** Drop-down combo box in the inserted instruction and choose the condition for the jump and then the down arrow on the **Goto** Drop-down combo box and choose the label to designate the destination command.

💠 If On Last Frame	FIS Type	Register Device to Host 💌	FIS Content	⇒	Goto	
		Register Device to Host Set Device Bits DMA Activate DMA Setup BIST PIO Setup Data				

For commands with payloads you may specify patterns for a condition by clicking the options button on a payload instruction and defining the required pattern(s).

om 🚺	D	word Ler	ngth 1	D	word	Match	•	OK
~~~~~	Dw3		Dw2		Dw1	××××××××	Dw0	Cancel
******	Dw7	******	Dw6	******	Dw5	******	Dw4	
******	Dw11	××××××××	Dw10	******	Dw9	××××××××	Dw8	
******	Dw15	******	Dw14	*******	Dw13	******	Dw12	
******	Dw19	******	Dw18	******	Dw17	******	Dw16	
******	Dw23	******	Dw22	******	Dw21	******	Dw20	
******	Dw27	******	Dw26	******	Dw25	******	Dw24	
~~~~~	Dw31	******	Dw30	******	Dw29	******	Dw28	
******	Dw35	××××××××	Dw34	******	Dw33	******	Dw32	
******	Dw39	******	Dw38	******	Dw37	******	Dw36	
******	Dw43	xxxxxxxx	Dw42	00000000	Dw41	xxxxxxxx	Dw40	
~~~~~	Dw47	×××××××	Dw46		Dw45	×××××××	Dw44	
******	Dw51	××××××××	Dw50	00000000	Dw49	×××××××	Dw48	
******	Dw55	xxxxxxxx	Dw54	00000000	Dw53	*****	Dw52	
******	Dw59	******	Dw58	00000000	Dw57	XXXXXXXX	Dw56	
******	Dw63	×××××××	Dw62	××××××××	Dw61	XXXXXXXX	Dw60	

Wait for any Frame To wait for the occurrence of a frame in a specific time period, insert a Wait for any Frame command and enter an expiration time in the time text box and the next program line to go to. Wait For any frame 0 μs  $\rightarrow$ Goto • To delay program execution insert a **Delay** instruction. Enter the delay **Insert Delay** value (In milliseconds) in the number text box to define the desired delay. Delay 1 Mili Second **Add Stop** To define the end of the Host Emulator program, insert the Stop Host **Emulator** instruction. **Stop Exerciser** 

# Sample Host Emulator Program

Figure 32. shows a simple completed Host Emulator program.

Ho	t Emulator Capture	Trigger Host Setting	Sett	ings Notes												
Ir	sert 1 📩 inst	ance(s) ATA Ever	nţ	Frame 500	×	C is dor	equence le if required le in each run le manually									
	ATA Cmd.	Command	⇒	Input (H) 🔳	1	Command	SecCount (H)	LBA (H)	DEV (H)	LBA Mode (H)	PM Port (H)	Protocol	Optio	n		
	1	0xC8 : Read DMA		C800000000004000		0xC8 : Read DMA	00	0000000	0	1	0	0x07 : DMA				
⇔	ATA Cmd.	Command	⇒	Input (H)	= (	Command	SecCount (H)	LBA (H)	DEV (H)	LBA Mode (H)	⇒ ATA Co	mmand Data , 0 B	ytes	PM Port (H)	Protocol	Option
	2	0xCA : Write DMA		CA00000000004000		0xCA : Write DMA	00	0000000	0	1				0	0x07 : DMA	
																1
										O	ption	butto	n		/	A

### Figure 32. Sample Host Emulator Program

DataFor commands requiring data blocks, click the down arrow of the<br/>Payload Data Drop-down combo box and choose from a set of pre-<br/>defined data blocks. If you need a new data block, click the Data Block<br/>icon on the tool bar to open a data block definition dialog. See page 68 for<br/>instructions on creating data blocks.

**Phy reset sequence and initiation** Will be performed when required by default, but you may choose to perform it on each run or manually.

# **Record and Play**

This feature allows the selection of a range of commands in a trace and export them to a previously saved \*.stc file for execution by the Host Emulator. You may choose to export commands from all available samples, between X, Y cursors or between designated commands.

To perform this action:

- 1. Run a capture project or open a previously run and saved captured trace file.
- 2. Set X and Y cursors if export between cursors is to be chosen.

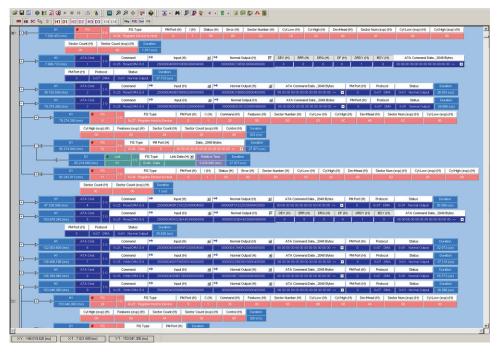


Figure 33. Captured Trace Display With Cursors Set

3. Click File and then choose Export to Host Emulator.



Extract sample file
Range C All Sample
Import Items
Command 🗖 FIS
Port H1,D1 V H2,D2 V H3,D3 H4,D4
Project Name : C:\Program Files\CATALYST\SATA1.xx\User\record_pla
Export Cancel

### Figure 34. Export Definition Dialog

- 4. Click the ellipses next to the Project Name address bar and select an existing \*.stc file.
- 5. Choose an export range and item, Command or FIS and click Export.
- 6. After the export action completes open the \*.stc file that you exported to.

iof	t 🚺 🗄 insta	nce(s) ATA Eveng	1	eta X	6	is done if required is done if required is done in each run is done manually											
Γ	ATA Ond.	Command	↔	Input (H)	E	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)	PM Port (H)	Protocol	Option				
ſ	- 1	0x25 : Read DMA Ext		25000004008910E9030000400	X0	0x25 : Read DMA Ext	4	000003E91089	0	1	0	0x07 : EMA					
ľ	Ø ATA Ond.	Command	₩	Input (H)	E	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)	PM Port (H)	Protocol	Option				
ľ	2	0x25 : Read DMA Ext		2500000400E01B0502000040	20	0x25 : Read DMA Ext	4	000002061BE0	0	1	0	0:07: DMA					
ľ	# ATA Ond.	Command	+	Input (H)	E	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)	PM Port (H)	Protocol	Option				
ſ	3	0x25 : Read DMA Ext		25000004000000000000040	00	0x25 : Read DMA Ext	4	000002000300	0	1	•	0x07 : DMA					
ľ	P ATA Ond.	Command	₩	Input (H)	F	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)	PM Port (H)	Protocol	Option				
	4	0x25 : Read DMA Ext		2500000400F21822030000400	X0	0x25 : Read DMA Ext	4	0000032218F2	0	1	0	0x07 : DMA					
l	Ø ATA Ond.	Command	₩	Input (H)	F	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)	PM Port (H)	Protocol	Option				
	5	0x25 : Read DMA Ext		2500000400323EA403000040	00	0x25 : Read DMA Eit	4	000003A43E32	0	1	0	0x07:0MA					
	Ø ATA Ond.	Command	₩	Input (H)	E	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)	PM Port (H)	Protocol	Option				
ľ	6	0x25 : Read DMA Ext		250000040049990F030000400	x0	0x25 : Read DMA Ext	4	0000030F9949	0	1	0	0x07 : DMA					
	# ATA Ond.	Command	₩	Input (H)	F	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)		mand Data , 2048		PM Port (H)	Protocol	Option	
ľ	7	0x35 : Write DMA Ext		35000004001F90D801000040	20	0x35 : White DMA Ext	4	000001D8901F	0	1	00 00 00 00 00 00	00 00 00 00 00 00 0	0 00 >> 💌	0	0x07 : DMA		
I	ATA Ond.	Command	+	Input (H)	E	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)		mand Data , 2048		PM Port (H)	Protocol	Option	
l	8	0x35 : Write DMA Ext		350000040098739500000040	30	0x35 : Write DMA Ext	4	000000987398	0	1	00 00 00 00 00 00	00 00 00 00 00 00 0	0 00 >> 💌	0	0x07 : DMA		
ľ	# ATA Ond.	Command	₩	Input (H)	E	Command	SecCount (D)	LBA (H)	DEV (H)	LBA (H)		mand Data , 2048		PM Port (H)	Protocol	Option	
	9	0x35 : Write DMA Ext			30	0x35 : Write DMA Ext		000000088995	0	1	00 00 00 00 00 00		0 00 >> 💌	0	0x07 : DMA		

### Figure 35. Host Emulator Program With the Exported Commands

7. You may run this set of commands immediately, or modify it by inserting instructions and/or additional commands.

# **Error and Command Settings**

Each command type offers the user the ability to set a variety of command settings and to introduce errors. Click the **Option** button on a command line to display the corresponding Error and command setting dialog.

### **ATA Error and Command Settings**

Trigger Source : Immediate External Trigger out : No change  On Command execution Retry : 0	Store Payload In Buffer Data Offset:  Data Length:  Dota L
Generate Error On	Auto Updete LBA  C Increament LBA C Decreament LBA C Random LBA Lower Limit: D hex LBA, Upper Limit: hex

Figure 36. Protocol Error and Command Settings for ATA Dialog

Choose Trigger Source	Click the down arrow on the <b>Trigger Source</b> combo box choose trigger type and click <b>OK</b> .
External Trigger Out	Click the down arrow on the <b>External Trigger out</b> combo box choose the external trigger level and click <b>OK</b> .
Retry	Enter a value for the number of command retries in the Retry text box.
Affiliation Setting	Check Clear Affiliation After Command Complete to release device to commands from other sources or check Leave Affiliation State Unchanged to retain control of device.
Store Payload in Buffer	Check the <b>Store Payload in Buffer</b> check box and enter values for <b>Data Offset</b> and <b>Data length</b> in the corresponding text box.
Auto Update LBA	Check the <b>Auto Update LBA</b> check box and check the desired auto update option button.

**Outgoing Frame Settings** Check **Outgoing Frame** in the **Generate Error On** area and then the enabled **Settings** button to display the Outgoing Frame Settings dialog.

Outgoing Frame Setting		X
Frame Name : Register	r Host to Device Frame Number : 1 move Frame from sequence Collegi in sending frame Collegi ms	
Frame Length Error     Over frame length     Under frame length     Set frame length     Set frame length to     2051 DWords	Code violation error     Disparity error     Disparity error     Disparity error     Disparity error     Disparity error on SATA primitive     Disparity error on SATA primitive     Disparity error on SATA primitive     I grone XRDY/RDY sequence     Number of error DWords:     Delay in HOLD response(in sending HOLDA)	
SOF Error         © Double         © Omit           EOF Error         © Double         © Omit           CRC Error         © Invalid         © Omit	Primitive CONT	(H)
Reset	More <<  OK Cancel	
Destroy C Fill Out	Insert Frame	
Field	Destroy  After current frame	
PM Port	Before current frame	
C Command	Type:	
Features		F
	UserDefine Frame Data : SOF	

Figure 37. Outgoing Frame Settings

Frame Type Error Check to introduce a Frame Type error.

**Delay in sending frame** Check this to remove the frame from the command sequence.

Additionally check as required:

	No WTRM Code Violation on SATA primitive Disparity error on SATA primitive Ignore XRDY/RRDY sequence
	Delay in HOLD response (in sending HOLDA)
Frame Length Error	Check <b>Frame Length Error</b> , choose the type of error to introduce and click <b>OK</b> .
Code violation and Dispan	rity error
	Check these if required and specify DWord offset and the number of error DWords.
SOF, EOF and CRC error	rs Check these as required and specify <b>Double</b> or <b>Omit</b> by checking the corresponding option button.
Insert Frame	Check <b>Insert Frame</b> and then click the down arrow on the <b>Type</b> combo box and choose the frame type. Make sure that you have clicked <b>More</b> .
	to the pre-defined frame types you may scroll down the list to <b>User</b> and enter your own frame data between SOF and EOF.
Insert Primitive	Check <b>Insert Primitive</b> and click the down arrow on the <b>Primitive</b> combo box, choose a primitive and click <b>OK</b> .
Destroy Field of Frame	Check <b>Destroy</b> in the <b>Field of Frame</b> area and check the fields to be destroyed.
Set Value of Field	Check <b>Fill Out</b> in the <b>Field of Frame</b> area and enter desired values for fields

**Incoming Frame Settings** Check **Incoming Frame** in the **Generate Error On** area and then the enabled **Settings** button to display the Incoming Frame Settings dialog.

coming Frame Se	atting
Frame	Name : Register Device to Host
	Frame Number : 1
- Handshake erro	
• R_ERR	
C No Handshake	
C Primitive	CONT
🖵 Terminate rece	eiving frame
Terminate after	receiving 1 Dwords by sending DMAT
C Terminate after	receiving 1 Dwords by sending SYNC
C Send HOLD af	ter 1 Dwords for 1 times
Defer Handsha	ske after 1000 μs
	OK Cancel

### Figure 38. Incoming Frame Setting Dialog ATI

Handshake Errors	Check Handshake Errors to enable selection of errors and primitives.			
	Check <b>Primitive</b> and click the down arrow on the <b>Primitive</b> combo box, choose a primitive and click <b>OK</b> .			
<b>Terminate Receiving Frame</b> Check <b>Terminate Receiving Frame</b> , choose the termination type and click <b>OK</b> .				
Defer Handshake	To defer sending handshake to received commands check the <b>Defer</b> <b>Handshake after</b> check box and enter a value for the delay.			

# **Host Emulator Settings**

The Host Emulator Settings dialog allows you to select the Port(s) for exercising, choose to use the Host Emulator or Pattern generator and specify Host Emulator characteristics. Click the **Host Settings** tab to display the Host Emulator setting dialog.

SATAProtocolAnalyzer2	
Host Emulator Advance Mode Host Setting Settings Notes	
Host Emulator Port	
© H1, D1 C H3, D3	
C H2,D2 C H4,D4	
C None C None	
Speed: 3.0Gbps V Speed: 3.0Gbps V	
C Run Pattern Generator	
Ele Name:	
Run Host Emulator	
Auto stop Exerciser when Analyzer stopped	
CONT Usage	
Delay between getting HOLD to Sending HOLDA 23 DW/ords	
Data Frame Payload Size: 512 Byte(s)	
ATA Command Execution Time out: 15000 ms	
Advanced Queue Settings	
Advanced,switch to Easy mode	
Wardhood, which to E day mode	

### Figure 39. Host Emulator Settings Dialog

Check **Autostop exerciser when Analyzer Stopped** to halt the Host Emulator whenever the Analyzer is stopped.

Check CONT Usage to enable the specification of Delay between getting HOLD to sending HOLDA, Data Frame Payload Size and ATA Command Execution Timeout.

Click the **Advanced** button to display all settable options.

Align Transmission Period: ESS Dword(s) Primitive Response Timeout: 16384 Dword(s) Await Align Timeout: 1310720 00BI	C Do Nothing C Send Soft Reset C Hard Reset
Speed Negotiation Failure Options	Speed Negotiation Failure Type
Speed Negotiation failed after LINK RESET	Not sending ron Align

Figure 40. Advanced Settings

**OOB Signal Settings** 

General

Settable options:

- Set Align Transmission Period, Primitive Response Timeout and Await Align Timeout.
- Choose **ATA Command timeout recovery action** by checking the corresponding option button.
- Specify Speed Negotiating Failure Option(s) and a Speed Negotiation Failure Type.

Click the **OOB Signal Setting** tab in the Advanced Host Setting dialog to specify OOB parameters in the enabled editable fields.

	Status		Idle Time (OOBI)	Negation Time (OOBI)	Burst Time (OOBI)	Count
COMINIT/RESET	Accept	-	480	800	160	6
COMWAKE	Accept	-	160	280	160	6
				COMWAKE Response Tir	neout 533 ns	

### Figure 41. OOB Signal Settings

Asynchronous signal recovery Set the OOB Retry Interval Time, check the Asynchronous signal recovery option check box and enter a value for the desired time.

Inter-reset Delay SettingsEnter a value for SATA port Selection T1 to specify the inter-reset-<br/>assertion delay for the first event of the selection sequence and SATA<br/>port Selection T2 to specify the inter-reset- assertion delay for the second<br/>event of the selection sequence.

**Power Management Settings** Click the **Power Management Setting** tab in the Advanced Host Setting dialog to specify the settings in the editable fields.

DLE state more than I <sup>1</sup> with pressual

#### Figure 42. Power Management Settings

Set the required parameters for Host and/or Device initiated power management.

#### **Queue Setting**

Return to the **Host Emulator Setting** dialog (Figure 39.) and click the **Queue Settings** button to display the Queue Settings dialog and specify:

- Queue Depth
- NCQ Error Recovery
- Queued/Non-Queued Items Status
- NCQ/Queue Command Timeout

or Recovery			
end Read Log Ext wh	hen NCQ com	mand aborted	
o not Send Read Log	g Ext automati	cally	
/Non-Queued Interr	nix Status		
event sending non-q	ueued comma	ands when queue exi	sts
nd commands freely			
ueue Command Tim	e out		
e ATA command ex	ecution time o	ut for Queued and N	CQ commands
o not time out queue	d commands		
epth: 32		ΠΚ	Cancel
, , , , , , , , , , , , , , , , , , ,	/ Non-Queued Interr revent sending non-o end commands freely Queue Command Tim se ATA command ex o not time out queue	/ Non-Queued Internix Status	revent sending non-queued commands when queue exi and commands freely lueue Command Time out se ATA command execution time out for Queued and N o not time out queued commands

Figure 43. Queue Settings Dialog

**Run Pattern Generator** 

To perform a capture with a Pattern Generator, check the Run Pattern Generator check box and enter a path to a pattern generator \*.spg file in the File Name dialog.

SATAProtocolAnalyzer2	
Host Emulator Advance Mode Host Setting Settings Notes	
Host Emulator Port	
© H1, D1 C H3, D3	
C H2, D2 C H4, D4 C None C None	
Speed: 3.0Gbps 💌 Speed: 3.0Gbps 💌	
Run Pattern Generator	
Eile Name:	
C Run Host Emulator	
Auto stop Exerciser when Analyzer stopped	
CONT Usage	
Delay between getting HOLD to Sending HOLDA 23 DWords	
Data Frame Payload Size: 512 Byte(s)	
ATA Command Execution Time out: 15000 ms	
Advanced Queue Settings	
Advanced,switch to Easy mode	

#### Figure 44. Run Pattern Generator Enabled

See Appendix A for instructions how to create a Pattern Generator file.

#### **Project Settings**

Click the Settings tab to display the Project settings dialog.

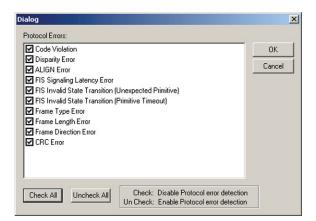
SATAProtocolAnalyzer2	
Host Emulator Advance Mode Host Setting Settings Notes	
Trace Memory Status:	
Trigger Position In Memory	
C Entire Memory 1% 99%	
Partial Memory 2000 KB (Up to 2048 MB)	
Sample Eile Name: C:\Program Files\Catalyst\SATA1.xx\U	
Auto Run Number of Bun : 20	
Analyzer Settings	
Primitive Response Timeout: 16384 DWORD	
Disable desgrambling	
ALIGN Transmission Period:	
C 256 C 258 Protocol Error Mask	
Speed	
I H1, D1: AutoSpeed ▼ I H3, D3: AutoSpeed ▼	
V H2, D2: AutoSpeed V H4, D4: AutoSpeed V	
Advanced,switch to Easy mode	

#### Figure 45. Project Settings Dialog

**Memory Size** 

To reduce the capture memory size, check Partial Memory and enter the desired buffer size if you want to partition the trace memory for multiple captures or, check entire memory to allow capture for the entire memory if you want to capture the maximum amount of trace data.

Trigger Position	Pre-Trigger is set by default at 50% which defines the percentage of data to be captured before and after the triggering event. You may change this percentage by dragging the slider to the desired value.
	The capture of the specified percentage of the data prior to the triggering event cannot be guaranteed and may in some cases be 0. This can occur in cases where the triggering event occurs before the required number of pre-trigger event data can be stored. In these cases the data display will show fewer than the specified data points prior to the triggering event. For more detail see "Trigger Position" on page 47.
Sample File Name	Click the ellipses next to the Sample File Name text box and choose a file name and location for the results of your current project.
Align Transmission period	Click the desired option button.
Auto Run	To repeat the current capture and trigger setup automatically, check the <b>Auto Run</b> checkbox and enter the number of times in the <b>Number to Run</b> text box. The capture and trigger will repeat automatically for the specified number of times and the results saved in consecutively numbered <b>Out.sts</b> files.
Disable descrambling	Check this option to view scrambled data.
Primitive Response Timeo	<b>ut</b> Specifies timeout value to detect a primitive response timeout error.
<b>Choose Port Speed</b>	Click the down arrow next to the port speed box and choose a port speed.
Protocol Errors	Click the <b>Protocol Error Mask</b> button and check any or all of the protocol errors to be excluded.



#### Figure 46. Protocol Error Mask

**Project Note** 

To include some descriptive information about the project, click on the **Notes** tab and enter a brief descriptive note.

#### **Creating a Data Block**

You may create the following four types of data blocks for use wherever data fields are used:

- 1. Random data pattern
- 2. Custom data pattern specifically for your application
- 3. Counter
- 4. Walking "1" or "0" pattern



To create a data block, click the **Default Data Block** Button on the Main toolbar to open the Data Block dialog box as shown in Figure 47.

Data Block		Data																	
Random Data	Address	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		New
Pattern	0	E4	E6	F9	EA	CF	8C	9A	E7	B7	CD	DF	A2	AA	EF	86	81		
Counter Data Walking Bit Data	16	FE	A2	95	8A	E8	EA	B6	9F	DC	9F	B6	DF	E2	E4	AF	AF		Delete
waiking bit bata	32	ED	A2	A3	BE	99	E0	B6	E3	E3	A8	BA	95	FE	F9	CA	CD		
	48	BF	EF	D4	A1	89	FE	87	8E	F9	B2	97	EA	FB	D9	E3	83		Delete All
	64	BC	DC	B5	9E	AD	96	CD	8F	EB	81	91	9D	C5	87	B5	E7		
	80	B3	B0	F5	BE	C4	94	A9	EE	FE	D5	DA	E0	81	8C	E0	AF		Random
	96	F1	DC	DF	98	E4	9E	B6	B2	C3	9F	F7	A4	95	D8	C4	C2		nariuum
	112	CD	F8	DO		E9	D7	94	AE	99	96	B3	AE	D4	9E	83	8D		Pattern
	128	8E	98	F9	ED	81	D5	AA	93	A6	88	80	CB	9F	9F	E7	8A		
	144	AC		CD		E6	9F	B4	E6	E2	D2	BO	ED	C9	9D	AA	B3		Counter
	160	DO	86	AO				83	EA	C7	80	BB	EC	8B	92	A8	9F		
	176	AO	9A	BB	B4	9B	87	81	EB	EA	A8	9D	FO	F1	BC	F6	A2	-	Walking Bi
	100	50	62	D0	50	D/	00	D/	cc	00	50	47	۰۸	00	$\sim$	50	E2		

#### Figure 47. Default Data Block Dialog Box

1. To add another data block, click the New button in the Data Block dialog box.

🚪 C:\Program Files\CAT#	ALYST\SAS\S	ystem\DataBlo	ock\DataBloc	k.dat		_ 🗆 ×
Number of Data Cells: 16	Column 💌	Cell Length: 1	Byte 🔻	€ LSB ⊂ MSB	O Binary 🖲 Hex O Ascii	
Data Block			D	ata		
Random Data Patern Counter Data Walking Bit Data DataBlock15	Address 0	1 2 3 4	567	8 9 10 11 12	13 14 15	New Delete Delete All Random Pattern Counter Walking Bit
					Save	Load

Figure 48. New Data Block Dialog Box

- 2. Choose the number of data columns (Up to 16 Data Cells/Row) and the Cell length (Up to 16 Bytes/Cell). This is a display function only.
- 3. Click either the Bin, Hex or Ascii option button to choose a desired number format.
- 4. Click either the LSB or MSB option button to choose a desired bit order.

#### Naming a Data Block

Each new data block is automatically assigned a sequential data block number as it is created. To assign a unique descriptive name to a data block, right click the data block name to open the data block edit menu.



Choose Rename.

Rename Data Bloc	k	×
New Name: Cust	tom 1	]
OK	Cancel	]

Enter a descriptive name in the New Name edit box and click OK.

C:\Program Files\CAT	C:\Program Files\CATALYST\SAS\System\DataBlock\DataBlock.dat																			
Number of Data Cells: 16	Number of Data Cells: 16 Column 💌 Cell Length: 1 Byte 💌 🤄 LSB C MSB C Binary 🏵 Hex C Ascii																			
Data Block		Data																		
Random Data	Address	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		11	New
Pattern Counter Data Walking Bit Data	0	C4	E0	EF	E6														lī	Delete
Custom 1																			lī	Delete All
																				Random
																				Pattern
																				Counter
																				Walking Bit
																		Save		Load

#### Figure 49. Sample Active Data Block Custom 1

You may enter data in the defined cell structure by choosing one of the four available methods. Define your own pattern, set a counter, choose a Random Pattern or choose a Walking Bit Pattern.

#### **Define Your Own Pattern**

- 1. Click **Pattern** to open the Define Pattern dialog box as shown in Figure 50.
- 2. Enter the desired data pattern in the Data Pattern edit box.
- 3. Choose the number of times that you would like that pattern to be repeated and click **OK**.

C:\Program Files\CATALYST\SAS\Sy	stem\DataBlock\DataBlock.dat	_0×
Number of Data Cells: 16 Column  Data Block Random Data Pattern Counter Data Walking Bit Data Eustom 1	Define Pattern     X       Address     Inary © Hex ©       Address     Inary © Hex ©       Address:     Image: Consent of the c	Ascii New Delete Delete All Random Pattern Counter Walking Bit
	Sav	re Load

#### Figure 50. Define Your Own Data Pattern

Address	The cell address starts at 0 for the first data entry and automatically increments to the next available address as data is written. You may set it back to a previously defined address to modify its content or insert additional data at that point.
Insert/Overwrite Data	To define if the data in a previously defined cell will be overwritten or new data inserted after that cell click the <b>Insert/Overwrite</b> button to toggle to the desired operation.
Counter	To use a counter as data click the <b>Counter</b> button, enter a Starting Number for the counter and the data address that you wish to count to and click <b>OK</b> .

C:\Program Files\CAT	ALYST\SA	5\System\DataBlock	\DataBloc	k.dat		_02
Number of Data Cells: 16	6 Column	Cell Length: 1 By	te 💌	€ LSB € MSB	🔿 Binary 🖲 Hex 🔿 Ascii	
Data Block		Counter	D	ala 🗴		
Random Data Pattern Counter Data Walking Bit Data Custom 1	Address 0	Address C Append C Address: 6	_	C Overwrite eat: 1 times	3 14 15	New Delete Delete All
		C Incrementa Initial Number:		ecremental		Random Pattern Counter
		ОК		ancel		Walking Bit
					Save	Load

#### Figure 51. Set Counter as Data

**Random Data Pattern** 

Walking Bit Pattern

To use a random data pattern, click the **Random** button and enter the number of times that you wish the pattern repeated and click **OK**.

🔒 C:\Program Files\CAT#	\LYST\Si	AS\S		em\		aBlock		taBlo	ck.d	at										
Number of Data Cells: 16	Column	-	] Ce	ell Le	ingth:	1 By	te	•	(	۰Ŀ	ав С	Dм	ISB	0	Bir	hary 🖲	Hex (	C Asc	cii	
Data Block									Data											
Random Data Pattern	Address	-	-	2		4 5	6	7	8	9	10	11	12	13	14	15				New
Counter Data Walking Bit Data	Counter Data			EF		CD CI	_	ern								×	1			Delete
Custom 1					Ľ	Addres				_	_									Delete All
							_	openo				_		_						Bandom
						Addres	s:  t	,		R	ереа	it ]⁴	•	tir	nes					Pattern
								C	K		(	Cano	cel							Counter
																				Walking Bit
																	S	ave		Load

#### Figure 52. Choose a Random Pattern

# To use a walking bit pattern, click the **Walking Bit** button and choose either a walking bit of "0" or "1", the walk direction, the start position and the number of times the pattern is to be repeated.

Number of Data Cells: 1	6 Column	- Ceil	Lengar.	i byte -	€ LSB € MSB	O Binary 📀 Hex O Ascii		
Data Block			w	alking Bit		×	L	
Random Data Pattern Counter Data Walking Bit Data	Address (	) 1 2 14 E0 E		Walking Bit :	©0 ©1		New Delete	
Warking Bit Data Custom 1				Direction : C Right->Left 11111110				
				Start Posi	ion at 0 ———	<u>)</u>	Random Pattern	
				Address	Append 🖲 Insert	C Overwrite	Counter Walking B	
				Addre	ss: 6 Repe	eat: 1 times		

#### Figure 53. Define a Walking Bit Pattern

When you have completed a data block definition click the **Save** button to save the newly created data block.

Save

#### **Creating and Editing Data Blocks as Text**

You may create and edit data blocks using a text editor such as Windows Notepad. To create a data block in Notepad. Launch notepad. Enter a header consisting of [Item1, Item2, Item3, Item4, Item5] where:

Item1 is the name of the Data Block'

Item2 is Size of the Data Block or the number of bytes in the format

Item3 is Format of the data (HEX, BIN, ASCII)

Item4 is the group of bytes defined (1, 2, 4, 8 or 16)'

Item5 is the direction (LSB or MSB)

Then enter the data in space delimited Hex format and save as a \*.txt text file.

Load data To import Text Editor created data click the Load button in the data block definition dialog to open the Load dialog.

Load			<u>? ×</u>
Look in [ 🚞	Datablock	- 🗧 🛨	
🗐 custom 1.t	xt		
File name:	custom 1.txt		Load
Files of type:	Text Files (*.txt)	•	Cancel

Choose the desired file and click Load.

#### Modify existing data

To create a new data block from an existing data block using a text editor: Select the data block to be edited from the Data Block Name list and click **Save As** to open the **Save As** dialog.

Save		<u>?</u> ×
Look in 🔀 Datablock	• <del>•</del> •	* 🎟 🕶
🗐 custom 1.txt		
File name: Custom2		Save
Save as type: Text Files (Sequentially) (*.txt)	•	Cancel

Assign a name to the new data block text file and click Save.

You may now edit the newly created text file using Notepad or any other text editor and then import it into the data block definition as described above.

# **Performance Analysis**

Your SATA analyzer incorporates a powerful real time Performance Analysis capability that allows you to quickly measure performance parameters such as:

### Link Usage

- Bus Utilization (Ratio of FIS/Update Interval<sup>1</sup>)
- Transmission Efficiency (Ratio of Payload Time/FIS Time)
- Throughput (Amount of data transferred during the update interval)
- Average Payload Size (Ratio of Overall Payload Size/Number of Data FIS)
- Completed Command Rate
- Data Efficiency (Ratio of Data Payload Time/Data FIS Time)

### **Event Counts**

- Number of Frame Events
- Number of Data Frame Events
- Number of Protocol Errors
- ATA Command Number
- Number of Completed Commands

### **Event Times**

- Total Frame Event time
- Total Data Frame time
- Total Data Payload time
- Total Idle time

The results are displayed in any of user selectable formats such as Area, Column and Bar, Line or Pie chart with 3D and Grid enhancement options for ease of interpretation.

<sup>1.</sup> The time during which parameters are measured.

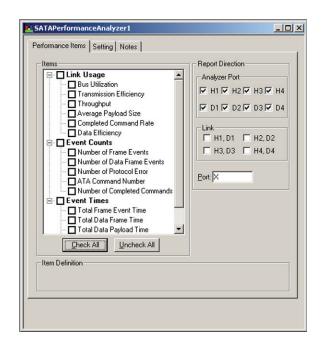
### Performance Analysis with Analyzer Only

New Performance Analysis Project To start a New project, click File on the main menu bar, choose New, and select "Performance Analyzer".

J	File	⊻iew	Edit	Configuration	Project Setup	<u>T</u> ools	Window	Help
Ī		New			Þ	Proto	col Analyz	er
H	Ê	Open				Proto	col Analyz	er / Host Emulator
		⊆lose				Perfo	rmance Ar	nalyzer
		Save			Ctrl+S	Perfo	rmance Ar	alyzer / Host Emulator
		Save A	s			Devic	e Emulato	r



Click the **Open Last Saved Performance Analyzer** button on the main menu bar to open the last saved performance analysis.



#### Figure 54. Performance Analysis Definition

Define PerformanceClick the corresponding Performance Item check box in the Items area.<br/>Performance may be measured in the following categories:

- 1. Link Usage including:
  - Bus Utilization (Ratio of payload time to update interval)
  - Transmission Efficiency (Ratio of payload time to frame time)
  - Throughput (Quantity of payload or useful data transferred during update interval)
  - Average Payload Size (Ratio of overall payload size to size of number of data frame)

- Completed Command Rate (Ratio of completed commands to total commands)
- Data Efficiency (Ratio of data payload time to data frame time)
- 2. Event Counts including:
  - Number of Frame Events
  - Number of Data Frame Events
  - Number of Protocol Errors
  - Number of Completed Commands
  - Number of Command Events
- 3. Event Times including:
  - Total Frame Event Time
  - Total Data Frame Time
  - Total Data Payload Time
  - Total Idle Time
- 4. Click the Setting tab to open the Setting dialog.

The settings dialog allows you to set the Analysis update interval and define the counter mode.

SATAPerformanceAnalyzer1	×
Performance Items Setting Notes	
Update Interval	
C Minute     Counter Mode     Analyzer Speed     Cumulative     Instantaneous     H1, D1: AutoSpeed ▼ H3, D3: AutoSpeed ▼     H2, D2: AutoSpeed ▼ H4, D4: AutoSpeed ▼	
Analyzer Setting Disable gescrambling Primitive Response Timegut: 16384 DWDRD ALIGN Transmission Period: C 256 C 258 Protocol Error Mask	
Save to file Sample Nor. 100 File Name: C:\Program Files\Catalyst\SATA1.xx\User\PerformanceAn	

#### Figure 55. Performance Analysis Settings

1. Choose the Update Interval in the range of 1ms to 245 minutes.

- 2. Set the **Counter Mode** to either Cumulative or Instantaneous (Cumulative causes the measurement counters to continually increment and Instantaneous causes the measurement counters to be reset for each Update interval).
- 3. Set the Analyzer Speed for each port used.
- 4. Check **Disable Scrambling** for the analysis as required and specify **Primitive Response Timeout**.
- 5. Choose ALIGN Transmission Period.
- 6. To select **Protocol Errors** for exclusion from the analysis, click the **Protocol Error Mask** button and check and or all of the protocol errors to be excluded.

D	ialog	×
	Protocol Errors:	
	Code Violation Cityparity Error ALIGN Error FIS Signaling Latency Error FIS Invalid State Transition (Unexpected Primitive) FIS Invalid State Transition (Primitive Timeout)	OK Cancel
	CRC Error  Check All Uncheck All Check: Disable Protocol error detection Un Check: Enable Protocol error detection	

**Save the Analysis result** To save the analysis result for later review. check **Save to file** and enter the path where you would like to save the result.

Add a note

To assist in interpreting the results at a later time you may include a descriptive note about the project by clicking the Notes tab to open the **Notes** dialog.

PAnalyzer2			<u>- 🗆 ×</u>
Performance Iten	ns Setting Notes		
Project <u>N</u> ame:	PAnalyzer2		
Noţe:	A description of the Performance Analysis project.	×	
Creation Date:	09:56:42 on Wednesday, Sep-08-04		
Last Modified:	Not saved yet.		
Last Run:	Not run yet.		

Figure 56. Performance Analysis Descriptive Note

7. To Perform the defined Analysis click the



Run Hardware button

and wait for the result to display.

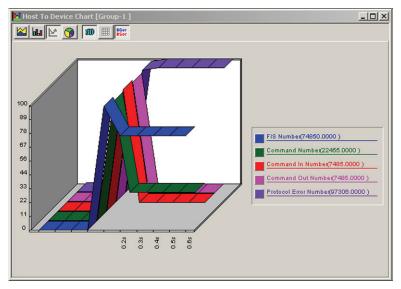
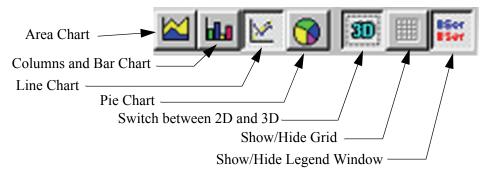


Figure 57. Typical Performance Analysis Results Display

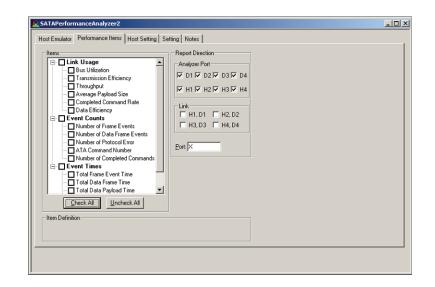
Alternate Display Format You may choose to display the result as 2D, 3D, etc. by clicking the corresponding "Graphics Setting" on the Performance Analysis display toolbar.



### **Performance Analysis with Host Emulator**

To perform a Performance Analysis with Host Emulator generated bus traffic, click **File, New** and choose **Performance Analyzer/Host Emulator**.





#### Figure 58. Performance Analysis Definition with Host Emulator

- 1. Click the Host Emulator tab and program the Host Emulator as described in "Programming the Host Emulator" on page 53.
- 2. Click the Performance Items tab and set up the Performance analysis as described starting on page 74.

#### **Host Settings**

- 1. Click the Host Setting tab and check the **Run Host Emulator** option button.
  - Chose the Emulator Port(s)
  - Enable **CONT** Usage and **Accepting Power Management** as required.
  - Specify Delay between getting HOLD and sending HOLDA, Data Frame Payload Size, and ATA Command Execution Time-out.

SATAPerformanceAnalyzer2	<u>_     ×</u>
Host Emulator Performance Items Host Setting Setting Notes	
Host Envlator Port           © H1, D1         C H3, D3           C H2, D2         C H4, D4           C None         © None	
C Run Pattern Generator	
Ele Name:	
C Run Host Emulator	
CONT Usage	
Accepting Power Management	
Delay between getting HOLD to Sending HOLDA 23 DWords	
Data Frame Payload Size: 512 Byte(s)	
ATA Command Execution Time out: 15000 ms	
Advanced Queue Settings	

#### Figure 59. Host Setting Dialog

- 2. Click the Advanced button in the Setting dialog to:
  - Set Align Transmission Period, Primitive Response Timeout and Await Align Timeout.
  - Choose **ATA Command timeout recovery action** by checking the corresponding option button.
  - Specify Speed Negotiating Failure Option(s) and a Speed Negotiation Failure Type.

Align Transmission Period: Primitive Response Timeout:	Dword(s)	ATA Command timeout recovery action C Do Nothing C Send Soft Reset
Await Align Timeout:	1310720 OOBI	C Hard Reset
Speed Negotiation Failure Opt	ions	Speed Negotiation Failure Type
Speed Negotiation failed	after POWER ON	Not sending Align
Speed Negotiation failed	after LINK RESET	C Not sending non Align

#### Figure 60. General Settings Dialog

3. Click the **OOB Signal Setting** tab in the Advanced Host Setting dialog to specify OOB parameters in the enabled editable fields.

OOB Type	Status	:	Idle Time (OOBI)	Negation Time (OOBI)	Burst Time (OOBI)	Count
COMINIT/RESET	Accept	-	480	800	160	6
COMWAKE	Accept	-	160	280	160	6
			me and Burst Time are 2	0 00Bl 00B Retry Interval Time:	10000 us	
Resolution of Idle T					10000 us	
Asynchronous	Signal Reco	very				
	Signal Reco	overy	0081	00B Retry Interval Time:		

#### Figure 61. OOB Signal Setting Dialog

Asynchronous signal recovery To set the OOB Retry Interval Time, check the Asynchronous signal recovery option check box and enter a value for the desired time.

Inter-reset Delay Settings Enter a value for SATA port Selection T1 to specify the inter-resetassertion delay for the first event of the selection sequence and SATA port Selection T2 to specify the inter-reset- assertion delay for the second event of the selection sequence.

**Power Management Settings** Click the **Power Management Setting** tab in the Advanced Host Setting dialog to specify the settings in the editable fields.

Advanced Host Setting	×
Advanced Host Setting General 00B Signal Setting Power Managment Setting Device initiated power management For PMREQ_P : Response type : PMACK * 100 us Minimum number of response primitives: 4	Host initiated power management  Start when link layer remained in  Start when link layer remained in  Abandon request after  Abandon request after  Mathematical Start
For PMREQ_S : Response type : PMACK Response delay : 1 * 100 us Minimum number of response primitives: 4	
	OK Cancel

#### Figure 62. Power Management Settings

Set the required parameters for Host and/or Device initiated power management.

- 4. Return to the **Host Setting** dialog (Figure 59.) and click the **Queue Settings** button to display the Settings dialog and specify:
  - Depth
  - NCQ Error Recovery
  - Queued/Non-Queued Items Status
  - NCQ Command Timeout.

NCQ Error Recovery	
Send Read Log Ext when NC	
O Do not Send Read Log Ext a	utomatically
Queued / Non-Queued Intermix Sta	tus
Prevent sending non-queued	commands when queue exists
Send commands freely	
NCQ / Queue Command Time out- © Use ATA command execution © Do not time out queued comm	n time out for Queued and NCQ command nands
Queue Depth : 32	
	OK Cance

#### Figure 63. Settings Dialog

To perform an analysis with a Pattern Generator check the **Run Pattern Generator** option button and choose a pattern generator \*.spg file. See Appendix A for instructions for creating a Pattern Generator file.

#### **Performance Analysis Project Settings**

Click the **Setting** tab in the Performance Analysis definition dialog (Figure 58.) to display the Performance Analyzer Project Setting dialog.

st Emulator Performance Items Host Setting Setting Notes	
Update Interval	
Milisecond     Second     (1ms to 245 minutes)	
C Minute	
Counter Mode Analyzer Speed	
C Cumulative H1, D1: AutoSpeed V H3, D3: AutoSpeed V	
● Instantaneous H2, D2: AutoSpeed ▼ H4, D4: AutoSpeed ▼	
Analyzer Setting	
Disable descrambling Primitive Response Timeout: 16384 DWORD	
Bisable gescrambing Thinkive response timegac Treese Dworld	
ALIGN Transmission Period:	
C 256 © 258 Protocol Error Mask	
Save To File Setting	
C Save to file	
Sample No: 100	
Fille Name: C:\Program Files\Catalyst\SATA1.xx\User\PerformanceAn	
nile maine. L. mogram niles watays to ATAT.XX/USEN/PerformanceAn	

#### Figure 64. Performance Analysis Project Setting Dialog

- 1. Choose the Update Interval in the range of 1ms to 245 minutes.
- 2. Set the **Counter Mode** to either Cumulative or Instantaneous (Cumulative causes the measurement counters to continually increment and Instantaneous causes the measurement counters to be reset for each Update interval).
- 3. Set the Analyzer Speed for each port used.
- 4. Check Disable Scrambling for the analysis as required and specify Primitive Response Timeout.
- 5. Choose ALIGN Transmission Period.
- 6. To select **Protocol Errors** for exclusion from the analysis, click the **Protocol Error Mask** button and check any or all of the protocol errors to be excluded.

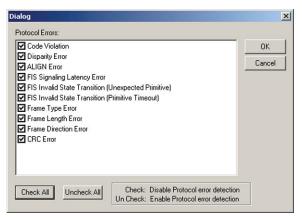


Figure 65. Protocol Error Mask

Save the Analysis resultTo save the analysis result for later review. check Save to file and enter<br/>the path where you would like to save the result.Add a noteTo assist in interpreting the results at a later time you may include a

To assist in interpreting the results at a later time you may include a descriptive note about the project by clicking the Notes tab to open the **Notes** dialog.

SATAPerformanceAnalyzer1	<u>_0×</u>
Host Emulator Performance Items Host Setting Setting Notes	
Project Name: SATAPerformanceAnalyzer1	
Note: PA with Host Emulator 1	
<u>v</u>	
Creation Date: 08:06:39 on Tuesday, Aug-23-05	
Last Modified: Not saved yet.	
Last Rum: Not run yet.	

Figure 66. Performance Analysis Descriptive Note

7. To Perform the defined Analysis click the



Run Hardware button

and wait for the result to display.

## **Device Emulation**

#### Not in current version for STX-460.

To set up a Device Emulation, click File, New and choose Device Emulator.

New Open	Ctrl+N ► Ctrl+O	Protocol Analyzer Protocol Analyzer / Host Emulator
Close		Performance Analyzer
Save	Ctrl+5	Performance Analyzer / Host Emulator
Save As		Device Emulator

The Device Emulation project opens with the Identify Page tab selected

STIUW	Na , Reserved and Obsolete	
₩ord	Description	
0	General configuration bi-tignificant information.           15         0 = ATA device           14-8 Retired         7           7         0 = not removable media device           6         Disolete           5-3 Retired         2           2         Response incomplete           1         Retired           1         Retired	0000
2	Specific configuration	C837
10-19	Serial number	1.10
23-26	Firmware revision	X000000X
27-46	Model number	Catalyst Device Emu
47	15_8 80h 01h-FFh = Maximum number of sectors that shall be transferred per interrupt on READ/WRITE MULTIPLE commands	8010
49	Capabilities 15-14 Reserved for the IDENTIFY PACKET DEVICE command. 13 1 - Standby timer values as specified in this standard are supported 12 Reserved for the IDENTIFY PACKET DEVICE command.	2F00

Figure 67. Device Emulation Project Pages Tab

The Device Emulator pages open with default settings for each page. To change settings for your application:

- 1. Set the Device Type of either ATA or ATAPI
- 2. Set required values for each of the enabled (White) Value fields on the Identify page.
- 3. To reset the pages to the default settings, click the **Default Settings** button.
- 4. To use a previously defined emulation, click the **Import** button and select the desired emulation.

### **Error Injection**

Clicking the Error Injection tab opens the **General Errors** dialog. In addition to specifying general errors you may also set errors for **ATA Commands** by clicking the corresponding Icon in the Errors window.

	SeviceEmulator1	_ 🗆 🗙
Errors window	Identity:       Error Injection       User Defined Commands       Settings       Notes         Errors       Image: Setting Seconds       Seconds       Seconds         General       Image: Seconds       Seconds       Seconds         Seconds       Image: Seconds       Seconds       Seconds         Seconds       Image: Seconds       Image: Seconds       Secting         Image: Seconds       Image: Seconds       Secting       Secting         Image: Seconds       Image: Seconds       Image: Seconds       Secting         Image: Seconds       Image: Seconds       Image: Seconds       Secting         Image: Seconds       Image: Seconds       Image: Seconds       Seconds         Image: Seconds       Image: Seconds       Image: Seconds       Seconds	
	Device Type: ATA Device 💌 LBA 28 Capacity : 4 GB , LBA 48 Capacity : 4 GB Import Default S	ettings

#### Figure 68. Setting General Errors

#### **Setting General Errors**

Device Type	Click the down arrow on the Device Type drop down combo box and choose a device type.
Generate Periodi	<b>Error</b> Check Generate Periodic error and choose an error rate.
	ecking Generate Periodic Error enables specific error selection in this category the the exception of Reset Link which is independently selectable.
Stand-alone Prin	itive Check Send stand-alone primitive, click the down arrow on the <b>Primitive</b> list box, choose a primitive type and enter a value for the number to be sent.
Stand-alone FIS	Check <b>Send stand-alone FIS</b> , click the down arrow <b>FIS type</b> list box and choose an FIS type.
	addition to the pre-defined FIS categories you may define your own by scrolling wn the list and choosing User Defined and enter the desired FIS data.
Reset Link	Check Reset Enable after link enable after and specify time.
Generate Error o	n Outgoing FIS Check Generate Error on Outgoing FIS of commands and then click the Settings button.
Retain Error inje	ction counters after link reset Check this to retain error count.

Frame Length Error     Over frame length     Ounder frame length     C Under frame length     C Set frame length 2051 DW/ords		151 DWords	Code violation error     Disparity error     Value of Reserved fields     Ignore XRDY/RRDY se     DWord Offset     Delay in HOLD Respon     Number of error DWords:     No VTRM	
SOF Error EOF Error	C Double C Double C Invalid	C Omit C Omit C Omit	Insert Primitive at I th DWords Primitive type: CONT Number Of Primitive 1	

#### Figure 69. Outgoing FIS Error Setting

SOF, EOF and CRC Errors Check any or all as required and check the criteria for introduction.

**Code Violation and Disparity errors** Check as required and specify **DWord** offset and Number of DWord errors for Disparity error.

Additional Settings S

Set and check as required:

- Value for Reserved fields
- Ignore XRDY/RRDY Sequence
- Delay in HOLD Response
- No WTRM

#### **Insert Primitive**

Check **Insert Primitive**, click the down arrow on the **Primitive** list box, choose a primitive type and enter a value for the Number of Primitive.

#### **ATA Commands Errors**

Click the **ATA Commands** icon in the Errors window to display the ATA Commands Error Setting Dialog.

	S DeviceEmulator1	×
Status Indication	Identify Error Injection User Defined Commands Settings Notes	
	Errors       Status: Command         Image: Command Command Command Research       Image: Command Research         Image: Command Command Research       Image: Command Research         Image: Command Research       Read DMA Queued <t< th=""><th></th></t<>	
	Device Type: ATA Device 💌 LBA 28 Capacity : 4 GB , LBA 48 Capacity : 4 GB Import Default Settings	]

Figure 70. SAS Commands Error Setting Dialog

To set errors for ATA commands:

- 1. Click on a command for which you wish to set an error and then check the **Generate Error when** check box and chose **LBA or Command number** with a value in the corresponding text box.
- 2. Set the number of times the error should be repeated by entering a value in the **Number of Error Commands** text box.
- **Note:** Once you check the **Generate Error when:** check box for a command, a red status indication appears next to the command selected indicating an error condition.
  - 3. You may force a defined response frame to be sent to the host by checking the **Command fail on Response** check box and then choose a pre-defined response.
  - 4. Repeat for every command for which you wish to set an error.

#### **Outgoing Frame Settings**

Check **Outgoing Frame** in the **Generate Error On** area and then the enabled **Settings** button to display the Outgoing Frame Setting dialog.

tgoing Frame Setting	
Frame Name	Data Frame Number : 1
Frame Length Error     Over frame length     C Under frame length     Set frame length 2051     DWords	Code violation error     Disparity error     Disparity error     Disparity error on SATA primitive     Disparity error on SATA primitive
SOFError         © Double         © Omit           EOFError         © Double         © Omit           CRCError         © Invalid         © Omit	Insert Primitive at:     1     th     DWord       Primitive:     CONT     Image: Cont mark     Image: Cont mark       Number Of Primitive     1     More <<
Reset Field of Frame © Destroy O Fill Dut	OK Cancel
Field C	C Before current frame
	Type: Register Host to Device 💌 UserDefine Frame Data: SOF

#### Figure 71. Outgoing Frame Setting Dialog

**Frame Type Error** Check this to introduce a frame type error.

**Remove Frame from sequence** Check this to remove frame from sequence.

**Delay in sending frame** Check this to delay sending frame and enter a value for the desired delay. **Additionally check as required:** 

- No WTRM
- Code Violation on SATA primitive
- Disparity error on SATA primitive
- Ignore XRDY/RRDY sequence
- Delay in HOLD response (in sending HOLDA)

Frame Length Error

**Error** Check **Frame Length Error**, choose the type of error to introduce and click **OK**.

**Code violation and Disparity error:** 

Check these if required and specify DWord offset and the number of error DWords.

**SOF, EOF and CRC errors**Check these as required and specify **Double** or **Omit** by checking the corresponding option button.

- Insert Primitive Check this and then click the down arrow on the Primitive drop down combo box and choose a primitive type to insert.
- **Destroy Field of Frame** Check **Destroy** in the **Field of Frame** area and check the fields to be destroyed.
- Set Value of Field Check Fill Out in the Field of Frame area and enter desired values for fields

### **Insert Frame** Check **Insert Frame** and then click the down arrow on the **Type** combo box and choose the frame type. Make sure that you have clicked **More.**

Note: In addition to the pre-defined frame types you may scroll down the list to User Defined and enter your own frame data between SOF and EOF.

#### **Incoming Frame Settings**

Check **Incoming Frame** in the **Generate Error On** area and then the enabled **Settings** button to display the Incoming Frame Settings dialog.

Incoming Frame Setting	×
Frame Name : Register Host to Device	
Frame Number : 1	
- I Handshake errors	
O B_ERB	
🔿 No Handshake	
Primitive     CONT	-
<ul> <li>Terminate receiving frame</li> <li>Terminate after receiving</li> <li>49 Dwords by sending DMAT</li> <li>Terminate after receiving</li> <li>49 Dwords by sending SYNC</li> <li>Send HOLD after</li> <li>Defer Handshake after</li> <li>0K</li> <li>Cancel</li> </ul>	

#### Figure 72. Incoming Frame Setting Dialog

Insert ErrorCheck Handshake Errors to enable selection of errors and primitives.Insert PrimitiveCheck Insert Primitive then click the down arrow on the Primitive drop<br/>down combo box and choose a primitive.

**Terminate receiving frame** Check **Terminate receiving frame** and choose the termination condition.

#### **SATA Signature**

Click the **SATA Signature** icon in the Errors window to display the SATA Signature Dialog.

Seneral	SATA Signature Co	C SAT/		User defined				
	Sector Count	Dev / Head	Cyl High	Cyl Low	Sector Number	Error	Status	
ATA ommands	01	00	00	00	01	01	50	
	C Don't Send Si C Send Signatur		clare device is	ready with BSY	= 0 and DRDY = 1			
	-	e twice ,first wi alization delay :		i DRDY = 0 and μs	second with BSY = I	D and DRDY	′ = 1	

#### Figure 73. SATA Signature Dialog

**Choose SATA Signature Content** Choose either the pre-defined **Standard** or **SATA** or you may define your own by checking the **User Defined** option button and entering values in the enabled fields.

- Specify when to send Signature You may choose from Don't Send Signature, Send Signature once and declare device is ready with BSY=0 and DRDY=1 or Send Signature twice, first with BSY=1 and DRDY=0 and second with BSY=0 and DRDY=1 by checking the corresponding option button.
  - Note Choosing Send Signature twice, first with BSY=1 and DRDY=0 and second with BSY=0 and DRDY=1 the Hardware initialization delay text box is enabled allowing you to set the hardware initialization delay.User Defined Commands

#### SATA Signature Errors

You may define errors to be introduced when sending a SATA Signature. To define the errors click the **Error Setting** button to open the SATA Signature Error Setting dialog.

<ul> <li>Frame Lengt</li> <li>Over frame</li> <li>Under frame</li> <li>Set frame</li> </ul>	e length ne length	151 DW/ords	✓ Code violation error     Value of Reserved fields     0 [H]       Disparity error     Ignore XRDY/RRDY sequence       DWord Offset:     1       Number of error DWords:     1
	C Double	C Omit	✓ Insert Primitive at: 1 th DWords
CRC Error	Oouble	C Omit C Omit	Primitive type: CONT   Number Of Primitives 1

**Frame Length Error** Choose the Frame Length Error type to introduce.

SOF, EOF and CRC Errors Check any or all as required and check the criteria for introduction.

**Code Violation and Disparity errors** Check as required and specify **DWord** offset and Number of DWord errors for Disparity error.

 Additional Settings
 Set and check as required:

 • Value for Reserved fields

 • Ignore XRDY/RRDY Sequence

 • Delay in HOLD Response

 • No WTRM

 Insert Primitive

 Check Insert Primitive, click the down arrow on the Primitive list box, choose a primitive type and enter a value for the Number of Primitive.

#### **User Defined Commands**

Op Code 0x44	Command Name Test	Command Type PIO_IN	Operation Code: Name:	44 Test	(H)	New	
			Type: Config Data:	PIO_IN Pattern LFPT	•	Apply Remove	

To create a command(s) specifically for your application Click the **User Defined Commands** tab to display the command definition dialog.

#### Figure 74. Command Definition Dialog

To define a command:

- 1. Click the down arrow on the Device Type combo box and choose the device type for which you wish to create a command.
- 2. Enter an **OP Code** and a **Name** in the corresponding text box.
- 3. Click the down arrow on the **Type combo box** and choose a command type.
- 4. For command types requiring configuration data click the down arrow on the enabled **Config data:** combo box and choose appropriate configuration data.
- **Note:** When the device type is set to ATAPI the command types are totally different from ATA and enable you to set CDB length.
  - 5. When done click the **New** button.
  - 6. The defined command appears in the command name window.
  - 7. To make changes to a previously defined command, highlight the command, make necessary changes and click **Apply**.

#### **Device Emulator Settings**

.

Click the Settings tab to display the Device emulator settings dialog.

The Settings page opens with a default set of values which you may modify for your specific application as required. To return to these values at any time click the **Default Settings** button.

PHY / Link layer settings ALIGNTransmission Period : EEE Dword(s) Primitive Response Time out : 16384 Dword(s)	Media Setting Average Access Time : 0 (ms) Number Of Areas: 1
Device send ALIGN Time : 110 µs	Start Address         End Address         Area Type           0         7fffff         Circular Writable •
Delay between getting HOLD to Sending HOLDA 23 DWA	
Data Frame Payload Size : 512 Byte(s)	C H1,D1     C H3,D3     C H2,D2     C H4,D4
Activate emulator with old settings     Advanced	C None Speed: Both ▼ Speed: Both ▼

PHY/Link layer settings	Enter values for Align Transmission Period, Primitive Response Timeout, and Standby Timeout, Device send Align Time and Delay between getting HOLD to Sending HOLDA and specify desired delay. Check CONT usage if required.
Media Settings	Enter a value for Average Access time and Number of Area. Define a Start and an End address, click the down arrow under the Area Type and choose Normal Writable, Circular Writable or Non Writable.
Payload size	Enter a value for Data Frame Payload Size in the General area.
Choose Target Emulator	<b>Port</b> Click a desired port option button and click the down arrow next to the <b>Speed</b> list box and choose a port speed.
2	e made some changes to a defined emulation and would like to return to the finition check the <b>Activate the emulator with old settings</b> .
Advanced Options	Click the <b>Advanced</b> button to display the OOB Signal Setting, Power Management setting, Speed Negotiation, NCQ Command setting and Miscellaneous additional setting dialogs.

#### **OOB** Signal Setting

OOB Type COMINIT/RESET	Statu	5 -	Idle Time (OOBI) 480	Negation Time (OOBI) 800	Burst Time (OOBI) 160	6
COMWAKE	Accept	-		280	160	6
<ul> <li>Asynchronous</li> </ul>	Signal Rec	overy		00B Retry Interval Time:	10000 us	
<ul> <li>Asynchionous</li> </ul>					· · · · ·	
<ul> <li>Asynchionous</li> </ul>						

#### Figure 75. OOB Signal Setting Dialog

Make the necessary edits to the default values displayed in the white editable fields.

### **Speed Negotiation** Click the **Speed Negotiation** tab to display the Speed Negotiation dialog.

Specify **Speed Negotiating Failure Option(s)** and a **Speed Negotiation Failure Type** 

B Signal Setting	Speed Negotiation	Power Management Set	ing NCQ Command Set	tings   Miscellaneous F	eatures
- Speed Negotia	tion Failure Options –				
	gotiation failed after F	POWER ON			
Speed Ne	gotiation failed after L	INK BESET			
i opodanie	golddor raiod artor c				
	tion Failure Type				
Not sendi	ng Align				
O Not sendi	ng non Align				

Figure 76. Speed Negotiation Dialog

#### **Power Management Settings Tab**

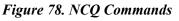
Advance Target Setting ODB Signal Setting Speed Negoliation Power Manage Host initiated power management Report in Identify page Supported For PMREQ_P : Response type : PMACK Minimum number of response primitives: 4 For PMREQ_S : Response type : PMACK Response delay : 1 * 100 us Minimum number of response primitives: 4	Interface initiated power management. Host shall issue a SET     To enable Device Initiated Power Management. Host shall issue a SET     FEATURE command with "Enable use of SATA feature" and sub command     spec = 3     Report in Identify page     Supported     Standby time expires     STANDBY command is executed     Init layer remained in IDLE state more than     To     Make up after     To     s
Minimum number of response primitives: 4	0

Figure 77. Power Management

- 1. In the **Host Initialized Power Management** area choose if the Report in the Identify page is supported or not.
- 2. Specify the response type for PMREQ\_P and PMREQ\_S, the delay and Minimum Number of Response Primitives.
- 3. In the **Device Initiated Power Management** area choose if the Report in the Identify page is supported or not.
- 4. Define start event by choosing Standby timer expires, STANDBY command is executed or Link layer remained in IDLE state more than [XXX] ms.
- 5. Specify time for Abandon request and Wake up after times as required and the Standby timer interval.

#### NCQ Command Settings Tab

Q	ueue depth 32
	Allow multiple command completion
	Max time before sending SDB   U ms Max number of command completions reported by one SDB 32
- 6	mmand execution algorithm
	Random order, using simulated media access time
	C FIFO order with constant delay for each command equal to 0 ms
	C LIFO order with maximum latency equal toms
L	



1. To enable NCQ commands, check Support NCQ and specify Queue depth.

2. If required, check Allow multiple command completion and enter values for Max time before sending SDP and Max number of command completions reported by one SDB.

#### **Miscellaneous Features Tab**

ommand spec = 5		
end Asynchronous notification eve		
aximum number of transmitted Asy	nchronous notifications [Inifinite]	
Send BIST frame		
elay before sending BIST FIS	100 ms	
IST flag options :		
T: BIST transmitting DWOR	os 🖸 👘 🗖	P 🗖 A 🗖 S
🔲 L: BIST test pattern 🔲 F	V	
Γv		

#### Figure 79. Miscellaneous Features

- 1. To enable Asynchronous notification, check the **Support Asynchronous notification feature** and specify the Asynchronous notification interval and the Maximum number of transmitted Asynchronous notifications.
- 2. To send a BIST frame, check **Send BIST frame** and enter a value for the required **Delay before sending BIST FIS**.
- 3. Choose **BIST flag options**.

#### **Project Note**

Click the **Notes** tab and enter a **Project Name** and a brief description of the Device Emulation project.

≶ DeviceEmulat	or1	_ 🗆 🗡
Identify Error Inj	jection User Define Commands Settings Notes	
Project <u>N</u> ame:	DeviceEmulator1	
No <u>t</u> e:	Information about current project	
	<b>v</b>	
Creation Date:	14:08:01 on Tuesday, Aug-23:05	
Last Modified:	Not saved yet.	
Last Run:	Not run yet.	
Device Type: A	TAPI Device	ettings

Figure 80. Project Note

**Run Device Emulation** 



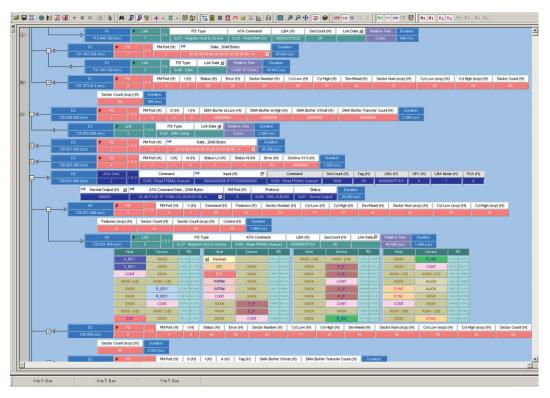
Activate Device button to start emulation.

Note: You may run the analyzer while the device emulation is active to monitor bus traffic.

# **Display Manipulation**

### **Viewer Display**

The data viewer display may be configured to meet your individual test and viewing preference needs. Toolbars are available for quick access to data viewer display features. The following sections present a quick reference about the toolbars and details about the data viewer features.

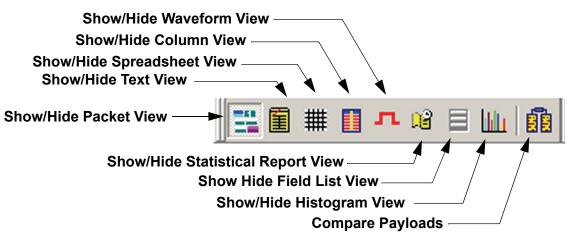


#### Figure 81 Viewer Data Display

Whenever a data capture is made it is displayed, by default, as a Packet View. You may, however display the same data in a Column View with transactions grouped for each active Port, a Text View similarly grouped for each active Port, a Spreadsheet view and a Histogram view.

### **Switching Views**

To display the capture in any of the other available views you can make the selection on the View Type toolbar.



#### Figure 82. View Type Toolbar

Whenever you make a View selection, the selected view appears in a split window view with the packet view. To maximize the selected view display area click the **Show/Hide Packet View** button.

When scrolling through either display using the scroll bar, the corresponding display in the other view scrolls with it.

You may rearrange the tiling by clicking Window and choosing the tiling as Vertical or Horizontal according to your preference.

### **Text View**

Text View displays the captured data interpreted as transaction frames grouped in columns by Port.

To display Text View of the current capture click View on the main tool bar and

choose Text View or click the



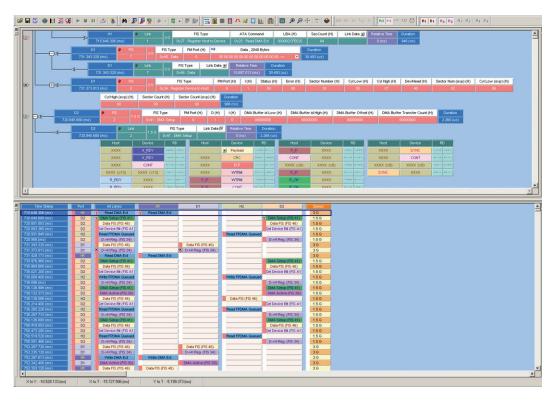


Figure 83. Simultaneous Packet View and Text View

### **Field List View**

Whenever an additional view in addition to the packet view such as Text View is displayed you may also display a Field List View that displays field information in a list format.

To open a Field List View of the current capture click View on the main tool bar and

choose Field List View or click the



 Image: Source in the source internet the provide
 Image: Source internet the sour

Figure 84 Field List View

## **Column View**

Column View displays the captured data interpreted as **TBD** grouped in columns by Port.

To display Column View of the current capture click View on the main tool bar and

choose Column View or click the



	H1 715.646.306 (ms)	9 Link 1	3 G 0:27 : R	FIS Type legister Host to Dev		ommand ad DMA Ext	LBA (H) 00002CFE025	SecCount (H) 04	Link Data 🔳	Relative Time 0 (ns)	Duration 946 (ns)			
	D1 👂	FIS 30	FIS Type PI	M Port (H) 🏓	Data .	2048 Bytes		uration						
	731.343.320 (ms)		x46 : Data		0 00 00 00 00 00 00			493 (us)						
	731.343.320 (ms)	Link  7	3 G FIS Typ 0x46 : D		Relative									
	D1	FIS	FIS Typ		I Port (H) I (H			Sector Number (F	1) CylLow (H)	Cyl High (H)	Dev/Head (H)	Sector Num (e)	p)(H) CylLow	(exp) (H)
<u> </u>	731.373.813 (ms)	8 30 0	x34 : Register De		0 1	50	00	28	EO	CF	40	02		00
	Cyl High (exp	(H) Sector Count	(H) Sector	Count (exp) (H)	Duration									
		00		00	986 (ns)									
	D2 PIS	1.5 G FIS Ty		Port (H) D (H)	T(H) DM	A Buffer id Low (			DMA Buffer Offset	(H) DMA But	er Transfer Count (			
7201	845.680 (ms) 2	0x41 : DM		0 1	0	00000000	00000	000	00000000		00000800	2.266 (us)		
	D2 Ø	Link 1.50	FIS Type 0x41 : DMA Setu	Link Data F	Relative Tim 0 (ns)	e Duration 2.266 (us)								
	Host	Device	RO	Host	Device	RD	Host	Device	RO	Host	Device	RD		
	XXXXX	X_RDY	**** -***		Payload		R_IP	XXXXX		XXXXX	SYNC			
	XXXXX	X_RDY	-+++ ++	XXXXX	CRC		CONT	XXXXX		XXXX	CONT			
	XXXXX	CONT	**	XXXXX	EOF		XXXX (x5)	XXXXX (x6)		XXXXX (x8)	XXXXX (x8)			
	X000X (x13)		-+	XXXXX	WTRM	+	R_IP	XXXXX	+	SYNC	XXXXX			
	R_RDY	XXXXX		RJP	WTRM	-+++ ++	R_OK	XXXXX						
	R RhV	****	[sees]eese]	RP	CONT	+ · · · + [ - · · · · ]	R OK	XXXX	1					
Time Stamp	н	D1		H2	0	2								
646.306 (ms)	🔁 X_RDY 🔮	XXXX (SYNC)		H2	0	12								
646.306 (ms) 646.320 (ms) 646.333 (ms)				H2		12								
546.306 (ms) 546.320 (ms) 546.333 (ms) 546.346 (ms)	X_R0Y     X_R0Y     CONT     XXXX(X_R0Y)	XXXX (SYNC) XXXX (SYNC) XXXX (SYNC) XXXX (SYNC)		H2		2								
546.306 (ms) 546.320 (ms) 546.333 (ms) 546.346 (ms) 546.360 (ms) 546.373 (ms)	X_RDY X_RDY CONT	XXXXX (SYNC) XXXXX (SYNC) XXXXX (SYNC)		H2		12								
546.306 (ms) 546.320 (ms) 546.333 (ms) 546.346 (ms) 546.360 (ms) 546.373 (ms) 546.306 (ms)	X_RDV         ▼           X_RDV         €           CONT         XXXX (X_RDV)           XXXX (X_RDV)         XXXX (X_RDV)           XXXX (X_RDV)         XXXX (X_RDV)	X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC)		H2		12								
546 306 (ms) 546 320 (ms) 546 333 (ms) 546 346 (ms) 546 346 (ms) 546 373 (ms) 546 373 (ms) 546 300 (ms) 546 400 (ms)	X_RDV         ●           X_RDV         ●           CONT         ■           XXXX (X, RDV)         ■           XXXX (X, RDV)         ■           XXXX (X, RDV)         ■	XXXX (SYNC) XXXX (SYNC) XXXX (SYNC) XXXX (SYNC) XXXX (SYNC) XXXX (SYNC)		H2		2								
646 306 (ms) 646 320 (ms) 646 333 (ms) 646 346 (ms) 646 346 (ms) 646 373 (ms) 646 300 (ms) 646 300 (ms) 646 400 (ms) 646 410 (ms) 646 426 (ms)		X00K (SYNC) X00K (SYNC) X00K (SYNC) X00K (SYNC) X00K (SYNC) X00K (SYNC) X00K (SYNC) X00K (SYNC)		H2		2								
546,306 (ms) 546,320 (ms) 546,333 (ms) 546,343 (ms) 546,340 (ms) 546,340 (ms) 546,400 (ms) 546,413 (ms) 546,442 (ms) 546,440 (ms)		X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC) X00X (SYNC)		H2		2								
846 306 (ms) 546 330 (ms) 546 333 (ms) 546 346 (ms) 546 346 (ms) 546 373 (ms) 546 373 (ms) 546 373 (ms) 546 413 (ms) 546 413 (ms) 546 440 (ms) 546 440 (ms) 546 445 (ms) 546 455 (ms) 546 555 (ms) 54	X_E0V     X007	X000K (SYNC) X000K (SYNC) X000K (SYNC) X000K (SYNC) X000K (SYNC) X000K (SYNC) X000K (SYNC) X000K (SYNC) X000K (SYNC) X000K (SYNC)		H2										
646 306 (ms) 646 320 (ms) 646 333 (ms) 646 346 (ms) 646 346 (ms) 646 346 (ms) 646 340 (ms) 646 413 (ms) 646 443 (ms) 646 445 (ms) 646 455 (ms) 646 456 (ms) 646 450 (ms)	Y _ EPV     Y _ EPV     CONT	X000K (SYNC) X000K (SYNC)		H2		X2								
646         336 (ms)           646         320 (ms)           646         333 (ms)           646         346 (ms)           646         445 (ms)           646         446 (ms)           646         445 (ms)           646         443 (ms)           646         546 (ms)           646         546 (ms)	1 9,95% x,95% 2000 (X,877) 2000 (X,877)	2000 (SYNC) 2000 (		H2		X2								
646         550 (m)           646         320 (m)           646         330 (m)           646         346 (m)           646         346 (m)           646         352 (m)           646         352 (m)           646         352 (m)           646         351 (m)           646         351 (m)           646         351 (m)           646         452 (m)           546         464 (m)           646         452 (m)           546         464 (m)           646         452 (m)           546         465 (m)           646         452 (m)           546         452 (m)	Y, (P)//         Y, (P)//           X, (P)//         CON           CON         CON           DODC (Y, (P)/)         CONC (Y, (P)/)	2000 (SYNE) 2000 (SYNE)		H2										
546 355 (ms) 546 353 (ms) 546 433 (ms) 546 441 (ms) 646 441 (ms) 646 441 (ms) 646 445 (ms) 646 445 (ms) 646 453 (ms) 646 550 (ms) 546 550 (ms) 546 546 (ms) 54	Y, (P)//         Y           X, (P)//         CONT           CONT         CONT           DODC (X, (P)/)         CONT (X, (P)/)	2000 (SYNE) 2000 (		H2										
546 356 (m) 546 353 (m) 546 353 (m) 546 353 (m) 546 350 (m) 546 350 (m) 546 350 (m) 546 350 (m) 546 450 (m) 546 451 (m) 546 451 (m) 546 451 (m) 546 450 (m) 546 450 (m) 546 550 (m) 546 553 (m) 546 550 (m)	Y, (P)/Y           Y, (P)/Y           CONT           CONT </td <td>2000 (SYNE) 2000 (S,SYNE) 2000 (S,SYNE)</td> <td></td> <td>H2</td> <td></td>	2000 (SYNE) 2000 (S,SYNE) 2000 (S,SYNE)		H2										
546 356 (m) 546 353 (m) 546 353 (m) 546 353 (m) 546 350 (m) 646 350 (m) 646 350 (m) 646 350 (m) 646 450 (m) 646 451 (m) 646 451 (m) 646 450 (m) 646 450 (m) 646 450 (m) 646 450 (m) 646 550 (m) 646 5	Y     S, UDV     S, UDV     CONT	2000 (SYNE) 2000 (		H2										
546 356 (m) 546 353 (m) 546 353 (m) 546 353 (m) 546 350 (m) 546 350 (m) 546 350 (m) 546 350 (m) 546 350 (m) 546 410 (m) 546 410 (m) 546 410 (m) 546 410 (m) 546 450 (m) 546 450 (m) 546 550 (m) 546 5		XXXXX (SYNE)           XXXXX (F,RXY)		H2										
546 352 (m) 546 353 (m) 546 353 (m) 546 353 (m) 546 353 (m) 546 350 (m) 546 350 (m) 546 350 (m) 546 350 (m) 546 350 (m) 546 450 (m) 546 550 (m) 546 5	K, (D)//           S, (D)//           S, (D)//           CONT           CO	XXXXX (SYNE)           XXXXX (CYNE)           XXXXX (F,NEX)		H2										
646 356 (m) 646 353 (m) 646 333 (m) 646 333 (m) 646 346 (m) 646 346 (m) 646 346 (m) 646 346 (m) 646 347 (m) 646 446 (m) 646 447 (m) 646 446 (m) 646 646 (m) 646 640 (m) 646 6	Y         UPD           S         CONT           CONT	XXXXX (SYNE)           XXXXX (SYNE) </td <td></td> <td>H2</td> <td></td>		H2										
546,550 (m) 546,537 (m) 546,537 (m) 546,537 (m) 546,357 (m) 546,357 (m) 546,357 (m) 546,357 (m) 546,457 (m) 546,557 (m) 546,5	I         I         I           I         I         I           I         I         I           CONT         CONT         I           CONT         CONT         I           CONT         CONT         I           CONT         I         I	XXXXX (\$\SYNE)		H2										
446 356 (mp) 446 353 (m) 446 353 (m) 446 353 (m) 446 346 (m) 446 346 (m) 446 346 (m) 446 346 (m) 446 347 (m) 446 347 (m) 446 347 (m) 446 447 (m) 446 448 (m) 446 448 (m) 446 448 (m) 446 450 (m) 446 450 (m) 446 540 (m) 446	Y         UPD           S         CONT           CONT	XXXXX (SYNE)           XXXXX (SYNE) </td <td></td> <td>H2</td> <td></td>		H2										

Figure 85. Simultaneous Packet View and Column View

## **Spreadsheet View**

Spreadsheet View displays all of the Packet View fields in a time sequential spreadsheet format.

To display the Spreadsheet View of the current capture click View on the main tool

bar and choose Spreadsheet View or click the

the button.

		н	P Link 30	FIS Type	ATA Command		ecCount (H)	Link Data 🔳	Relative Time	Duration		
	715	.646.306 (ms)		Register Host to Device	and the second se	00002CFE025	04		0 (ns)	946 (ns)		
		•	36	PM Port (H)	Data , 2048 Bytes		ation					
	731.343.320 (		7 0x45 : Data		00 00 00 00 00 00 00 00 00 00 00		(US)					
	<──		Link 30 FIST									
		.343.320 (ms)	7 0x46 :		15.697.013 (ms) 30.493							
		•	15 30 FIS Ty				ctor Number (H)		0 Cyl High (H)	Dev/Head (H)	Sector Num (exp) (H	) Cyl Low (exp) (H)
_	731.373.813 (		8 0x34 : Register E		1 50					40		00
		Cyl High (exp) (	H) Sector Count (H) Sector		ration							
					ŝ (ns)							
	D2	PIS PIS		M Port (H) D (H)	(H) DMA Buffer id Low (H	) DMA Buffer id	High (H) Dh	MA Buffer Offset	t (H) DMA Buff	er Transfer Count (I		
720.8	145.680 (ms)		0x41 : DMA Setup	0 1		00000		00000000		00000800	2.266 (us)	
		0 L			Relative Time Duration							
	720.845.680 (		2 0x41 : DMA Se		0 (ns) 2.266 (us)			_				
		Host	Device RD	Host	Device RD	Host	Device	RD	Host	Device	RD	
		XXXXX	X_RDY	XXXX	Payload	CONT	XXXXX		XXXXX	SYNC		
		XXXXX	CONT   ++++	XOOX	EOE	XXXX (xf)	XXXX (x6)		XXXX XXXX (x8)	XXXX (x8)	++ ++	
		XXXX XXXX (x13)	X00X (x13)	XXXX	WTRM +++-	AAAA (305)	XXXX (X6) XXXX		SYNC	XXXX (X8)		
		R_RDY	XXXX -+ ++		WTRM -+++ ++	P. (W	XXXX		31140			
		R BOY	XXXX -++-+		CONT   test   TROO	n_on	XXXX					
Time Starrp	Relative Time	Port	Frame	Command	LBA/Sector#	XFER Length		peed	Status	1	E	irror Output
5.646.306 (ms)	0 (ns)	He Hi	T) FIS 27: H->D Reg.	Command 0:25 : Read DMA 8		XFER Length 2048		30 0	Status x1 : Normal Output		t	irror Output
		-0 H1 0- D2							010100		ť	irror Oulpul
5 646.306 (ms) 0 845.680 (ms) 0 851.893 (ms) 0 883.380 (ms)	0 (ns) 0 (ns) 6.213 (us) 31.468 (us	+0 H1 + D2 + D2 + D2	FIS 27: H->D Reg.     YTS 41: DMA Setup (2048 bytes)     FIS 46: Data FIS (2048 bytes)     FIS A1: Set Device Bt	0:25 : Read DMA E	5.t 0x2CFE025	2048		3G 0: 1.5G 1.5G 1.5G	x1 : Normal Output		E	irror Oufput
5 646.306 (ms) 0 845.680 (ms) 0 851.893 (ms) 0 883.360 (ms) 0 931.840 (ms)	0 (ns) 0 (ns) 6.213 (us) 31.468 (us) 48.480 (us)	+9 H1 9+ D2 9+ D2 9+ D2 •+ D2	T)         FIS 27: H->D Reg.           Y TS 41: DMA_Strue (2048 bytes)         FIS 46: Date FIS (2048 bytes)           FIS 46: Date FIS (2048 bytes)         FIS A1: Set Device Bt           FIS 27: H->D Reg.         FIS 27: H->D Reg.	0x25 : Read DMA E 0x60 : Read FFOMA G	0x20FE025		0x0	3G 0: 150 150 150 150 150 0:	x1 : Normal Output		E	irror Oulput
5 546.306 (ms) 0 845.680 (ms) 0 851.893 (ms) 0 851.893 (ms) 0 831.840 (ms) 0 958 (ms) 1 343.320 (ms)	0 (ns) 0 (ns) 8.213 (us) 31.488 (us) 48.480 (us) 26.160 (us) 15.697.013 (n		T)         FIS 27: H→D Reg.           Y 35: 41. Data. Setue (2014) bytes)         FIS 46: Data FIS (2014) bytes)           FIS 46: Data FIS (2014) bytes)         FIS 31: Set Device Bit           FIS 27: H→D Reg.         FIS 34: D→H Reg.           FIS 34: D→H Reg.         FIS 34: D→H Reg.           FIS 34: D→H Reg.         FIS 34: D→H Reg.	0x25 : Read DMA E 0x60 : Read FPDMA G 0x60 : Read FPDMA G 0x60 : Read FPDMA G 0x25 : Read DMA E	0x20FE025	2048	0x0	36 0: 150 156 156 156 156 0: 156 0: 30	x1 : Normal Output		Ê	irror Oulput
5 546 306 (ms) 0 845 580 (ms) 0 851 893 (ms) 0 893 380 (ms) 0 931 840 (ms) 0 958 (ms) 1 343 320 (ms) 1 373 813 (ms)	0 (ns) 0 (ns) 8.213 (us) 31.465 (us) 48.460 (us) 26.160 (us) 15.697.013 (n 30.493 (us)	← 02 ← 02 ← 02 ← 02 ← 02 ← 02 ← 02 ← 02 ← 02 ← 01 ← 01	T)         FIS 27: H->D Reg.           Y15 441         DMA: Seles (DMA bytes)           PIS 46: Data PIS (2048 bytes)           PIS 47: Set Device Bit           PIS 27: H->D Reg.           PIS 34: D->H Reg.           PIS 46: Data PIS (2048 bytes)           PIS 46: Data PIS (2048 bytes)           PIS 34: D->H Reg.	0:25 : Read DMA 8 0x60 : Read FPOMA G 0x60 : Read FPOMA G 0x65 : Read FPOMA G 0x25 : Read DMA 8 0x25 : Read DMA 8	0x2CFE025	2048	0.0	3G 0: 15G 15G 15G 15G 15G 15G 0: 3G 3G 0:	x1 : Normal Output x1 : Normal Output x1 : Normal Output x1 : Normal Output		Ĕ	irror Oulput
5 546.305 (ms) 0 845 580 (ms) 0 851 893 (ms) 0 883 380 (ms) 0 931 .440 (ms) 0 958 (ms) 1 343.320 (ms) 1 343.320 (ms) 1 373.813 (ms)	0 (ns) 0 (ns) 8.213 (us) 31.488 (us) 48.480 (us) 26.160 (us) 15.697.013 (n	← D2 ← D2	T)         FIS 27: H→D Reg.           Y 35: 41. Data. Setue (2014) bytes)         FIS 46: Data FIS (2014) bytes)           FIS 46: Data FIS (2014) bytes)         FIS 31: Set Device Bit           FIS 27: H→D Reg.         FIS 34: D→H Reg.           FIS 34: D→H Reg.         FIS 34: D→H Reg.           FIS 34: D→H Reg.         FIS 34: D→H Reg.	0x25 : Read DMA E 0x60 : Read FPDMA G 0x60 : Read FPDMA G 0x60 : Read FPDMA G 0x25 : Read DMA E	extend 0x957F7D3 extend bit bit bit 0x1C25E09	2048	0.0	3G 0: 15G 15G 15G 15G 15G 15G 0: 3G 3G 0:	x1 : Normal Output		e	irrer Odiput
5 646.306 (ms) 0 845 680 (ms) 0 851.893 (ms) 0 883.380 (ms) 0 833.840 (ms) 0 431.840 (ms) 0 458 (ms) 1 443.320 (ms) 1 428.173 (ms) 5 476.960 (ms) 5 848.400 (ms)	0 (ne) 0 (ns) 6.213 (us) 31.468 (us) 48.460 (us) 26.160 (us) 15.697.013 (n 30.493 (us) 54.360 (us) 15.018.560 (us) 7.840 (us)	+ 02 + 02 + 02 + 02 + 02 + 12 + 12 + 02 + 01 + 01 + 01 + 01 + 01 + 01 + 01 + 02 + 02	T PIS 27: H>D Reg. Y D. 41: DAA. State (2 DMB hyte) PIS 45: Data PIS (2048 byte) PIS 47: Set Device Bit PIS 27: H>D Reg. PIS 45: Data PIS (2048 byte) PIS 45: Data PIS (2048 byte) PIS 45: Data PIS (2048 byte) PIS 47: Data PIS (2048 byte) PIS 46: Data PIS (2048 byte)	0:25 - Read DMA B 0:60 - Read FFCMA G 0:50 - Read FFCMA G 0:25 - Read DMA B 0:25 - Read DMA B 0:25 - Read DMA B 0:50 - Read FFCMA G	Ext 0x207E025	2048		30 00 150 150 150 150 150 00 30 30 150 150 150 150	c1 : Normal Output c1 : Normal Output c1 : Normal Output c1 : Normal Output c1 : Normal Output		e	irrer Oulput
5 546 306 (ms) 0 845 569 (ms) 0 551 833 (ms) 0 833 360 (ms) 0 833 360 (ms) 0 583 680 (ms) 1 343 320 (ms) 1 343 320 (ms) 1 343 320 (ms) 5 876 960 (ms) 5 864 800 (ms) 5 864 800 (ms)	0 (ne) 0 (ne) 6.213 (ue) 31.486 (us 48.480 (us 15.697.013 (n 30.483 (us 15.018.580 (us 15.018.580 (us 7.840 (ue) 38.400 (us)	→6         H1           4=         02           4=         02           4=         02           4=         02           4=         02           4=         01           4=         01           4=         01           4=         01           4=         01           4=         02           4=         01           4=         02           4=         02           4=         02           4=         02           4=         02	T         FIS 27: H->D Reg.           Y         FIS 40: Use TS (2046 bytes) FIS 40: Use TS (2046 bytes) FIS 37: H->D Reg.           FIS 34: D-H-H Reg.         FIS 34: D-H-H Reg.           FIS 45: D-H FIS (2046 bytes) FIS 45: D-H FIS (2046 bytes)	0:25 : Read FFCMA G 0:50 : Read FFCMA G 0:50 : Read FFCMA G 0:25 : Read FFCMA G 0:25 : Read FFCMA G 0:25 : Read FFCMA G 0:50 : Read FFCMA G 0:50 : Read FFCMA G	Ext 0x207E025	2048	0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1	36         0:           150         150           150         150           150         0:           30         30           30         0:           150         150           150         0:           30         0:           150         150           150         150           150         150	xt :: Normal Output xt :: Normal Output		E	ine Odpå
5 545 306 (ms) 0 845 690 (ms) 0 551 893 (ms) 0 893 980 (ms) 0 531 840 (ms) 0 533 780 (ms) 1 343 320 (ms) 1 343 320 (ms) 1 343 320 (ms) 5 375 980 (ms) 5 345 890 (ms) 6 621 200 (ms) 6 .089 (ms) 5 608 (ms)	0 (n8) 0 (n8) 8 213 (u8) 31 466 (us 248 460 (us 25 160 (us 25 160 (us) 30 433 (us 54 360 (us) 15 018 960 (n 7, 940 (us) 36 400 (us 47 200 (us 28 000 (us) 29 000 (us)	+8 H1 + 02 + 02 + 02 + 02 + 02 + 12 + 02 + 02 + 02 + 01 + 01 + 01 + 01 + 01 + 01 + 01 + 02 + 02	T PIS 27: H>D Reg. Y D. 41: DAA. State (2 DMB hyte) PIS 45: Data PIS (2048 byte) PIS 47: Set Device Bit PIS 27: H>D Reg. PIS 45: Data PIS (2048 byte) PIS 45: Data PIS (2048 byte) PIS 45: Data PIS (2048 byte) PIS 47: Data PIS (2048 byte) PIS 46: Data PIS (2048 byte)	0:25 : Read IFEMA Q 0:50 : Read IFEMA Q 0:50 : Read IFEMA Q 0:25 : Read IMA B 0:25 : Read IMA B 0:50 : Read IFEMA Q 0:50 : Read IFEMA Q 0:51 : WHE FEMA Q	Ext. 0./2CFE025	2048	0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1	36         0           150         150           150         150           150         0           30         0           30         0           150         150           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0	c1 : Normal Output c1 : Normal Output c1 : Normal Output c1 : Normal Output c1 : Normal Output			iner (hdipat
5 846 306 (ms) 0 845 800 (ms) 0 851 893 (ms) 0 853 990 (ms) 0 959 (840 (ms)) 0 559 (ms) 1 343 320 (ms) 1 343 320 (ms) 1 343 320 (ms) 1 343 320 (ms) 1 420 173 (ms) 5 954 800 (ms) 5 956 980 (ms) 6 055 400 (ms) 6 056 400 (ms) 6 125 980 (ms)	0 (ns) 0 (ns) 8 213 (us) 31.466 (us 46.460 (us 15.697 013 (r 30.463 (us 54.360 (us 15.018 960 (r 7.460 (us) 36.400 (us 24.960 (us 28.966 (us) 28.966 (us) 29.966	+8 H1 + 02 + 02 + 02 + 02 + 02 + 02 + 02 + 02 + 01 + 01 + 01 + 01 + 02 + 02	T         52.27         H-30 Reg.           V         T         52.62         Call III 52         Call IIII 52         Call IIIII 52         Call IIII 52         Call IIII 52         Call IIII 52         Call IIII 52	0:25 - Read IPCMA (2) 0:80 - Read IPCMA (2) 0:80 - Read IPCMA (2) 0:25 - Read IPCMA (2) 0:25 - Read IPCMA (2) 0:25 - Read IPCMA (2) 0:50 - Read IPCMA (2) 0:50 - Read IPCMA (2) 0:50 - Read IPCMA (2) 0:50 - Read IPCMA (2) 0:51 - Web FPCMA (2) 0:51 - Web FPCMA (2) 0:51 - Web FPCMA (2)	Ext 0.42CFE025	2048	0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1 0x0 1	36         0:           150         1.50           1.50         0:           1.50         0:           30         30           30         0:           30         0:           1.50         0:           1.50         0:           1.50         0:           1.50         0:           1.50         0:           1.50         0:           1.50         0:           1.50         0:           1.50         0:	ct : Normal Output ct : Normal Output		ţ	ine Odpi
5 545 306 (ms) 0 845 690 (ms) 0 551 893 (ms) 0 893 980 (ms) 0 531 840 (ms) 0 533 780 (ms) 1 343 320 (ms) 1 343 320 (ms) 1 343 320 (ms) 5 375 980 (ms) 5 345 890 (ms) 6 621 200 (ms) 6 .089 (ms) 5 608 (ms)	0 (n8) 0 (n8) 8 213 (u8) 31 466 (us 248 460 (us 25 160 (us 25 160 (us) 30 433 (us 54 360 (us) 15 018 960 (n 7, 940 (us) 36 400 (us 47 200 (us 28 000 (us) 29 000 (us)	+8 H1 + 02 + 01 + 01 + 01 + 02 + 02	TFS 42: H+-D Reg.           Y           YS 45: Data FS (2048 bytes)           PS 45: Data FS (2048 bytes)           PS 32: H+-D Reg.           PS 34: D-H Reg.           PS 45: Data FS (2048 bytes)           PS 45: Data FS (2048 bytes)           PS 45: Data FS (2048 bytes)           PS 34: D-H Reg.           PS 34: D-H Reg.           PS 34: D-H Reg.           PS 34: D-H Reg.           PS 45: Data FS (2048 bytes)	0:25 : Read IFEMA Q 0:50 : Read IFEMA Q 0:50 : Read IFEMA Q 0:25 : Read IMA B 0:25 : Read IMA B 0:50 : Read IFEMA Q 0:50 : Read IFEMA Q 0:51 : WHE FEMA Q	Dit         Ox/CCFE025           Aread         Ox/S577703           Aread         Ox/S577703           Aread         Ox/C25609           Aread <t< td=""><td>2048</td><td>0x0 1 0x0 1</td><td>36         0           150         150           150         150           150         0           30         0           30         0           150         150           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0</td><td>ct : Normal Output ct : Normal Output</td><td></td><td>C C C C C C C C C C C C C C C C C C C</td><td>mer Gulput</td></t<>	2048	0x0 1 0x0 1	36         0           150         150           150         150           150         0           30         0           30         0           150         150           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0	ct : Normal Output ct : Normal Output		C C C C C C C C C C C C C C C C C C C	mer Gulput
\$ 545.306 (ms) 0.515 (50 (ms) 0.515 (50 (ms) 0.613 300 (ms) 0.613 300 (ms) 0.913 400 (ms) 0.938 (ms) 1.933 310 (ms) 1.933 310 (ms) 5.976 400 (ms) 6.021 200 (ms) 6.021 200 (ms) 6.123 200 (ms) 6.	0 (n8) 0 (n8) 6 213 (u8) 31 486 (u8 28 160 (u8 28 160 (u8 15 0897 013 (u7) 30 483 (u8 15 018 980 (u7) 36 400 (u8) 36 400 (u8) 28 980 (u8) 28 980 (u8) 28 986 (u8) 26 213 (u8) 75 813 (u8) 75 813 (u8)	+8 H1 + 02 + 02 + 02 + 02 + 02 + 02 + 02 + 01 + 01 + 01 + 01 + 01 + 01 + 02 + 01 + 02 + 02 + 02 + 02 + 02 + 01 + 02 + 02	FE 32: H-H-O Reg.           VEX.011: DORALING proceedings of the proceedings o	0.25 Read DMA 1 0.40 Read FPCMA 2 0.40 Read FPCMA 2 0.25 Read FPCMA 2 0.25 Read FPCMA 2 0.25 Read FPCMA 2 0.25 Read FPCMA 2 0.45 Rea	Dit         Or.2CFE025           Aread         Or.3577703           Aread         Or.4577703           Aread         Or.1025699           Aread         Or.1025699           Aread         Or.2025454           Aread         Or.1025699           Aread         Or.2025454	2048 2048 2048 2048		30         0:           150         150           150         150           150         0:           150         0:           30         0:           30         0:           30         0:           150         1:50           150         1:50           150         0:           150         0:           150         0:           150         0:           150         0:           150         1:50           150         1:50	ct : Normal Output ct : Normal Output		ţ	Star CAQA
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Read PMM 2 0-29.</td><td>4.1 0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90</td><td>2048 2048 2048 2048 2048</td><td>0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0</td><td>30         0           150         150           150         150           150         0           150         0           30         0           30         0           150         150           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0</td><td>thermal Output     thermal Output</td><td></td><td>(</td><td>ner Odea</td></t<>	1         75         27         H-O Reg.           75         10         000         000         100         000           76         10         000         000         100         000         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100	0-25. Read DMA 1 0-25. Read DMA 1 0-26. Read FMM 2 0-27. Read DMA 1 0-28. Read PMM 2 0-28. Read PMM 2 0-29.	4.1 0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/903     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90     0.02/90	2048 2048 2048 2048 2048	0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0	30         0           150         150           150         150           150         0           150         0           30         0           30         0           150         150           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0	thermal Output		(	ner Odea
5 464 300 (m) 0 455 800 (m) 0 455 800 (m) 0 455 800 (m) 0 455 800 (m) 0 453 800 (m) 0 453 800 (m) 0 453 800 (m) 1 543 300 (m) 1 543 500 (m) 5 576 800 (m) 5 400	6 (co) 6 (co) 6 215 (uo) 6 215 (uo) 6 215 (uo) 6 215 (uo) 7 25 (uo)	Hill	FE 327 H→0 Reg.           FE 42 CMar FS (2040 bres)           FE 45 CMar FS (2040 bres)           FE 45 CMar FS (2040 bres)           FE 34 D→H Reg.           FE 45 CMar FS (2040 bres)           FE 37 H=0 Freg           FE 37 H=	0-25 Read DMA 1 0-26 Read FFCMA 3 0-260 Read FFCMA 3 0-267 Read FFCMA 3 0-27 Read FFCMA 3 0-27 Read FFCMA 3 0-267 READ 3 0-267 READ 3 0-267 READ 3 0-267 READ 3 0-267	41         0.027803           0.027803         0.027703           0.027703         0.0377703           0.01         0.0177703           0.01         0.0177703           0.01         0.0177703           0.01         0.0177703           0.01         0.0177703           0.01         0.0172609           0.0172         0.0172609           0.0017         0.01716000           0.0017         0.01178600           0.0017         0.01178600           0.0017         0.01178600           0.0017         0.0101714           0.0017         0.0407714	2048 2049 2049 2049 2049 2049 2049	0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0	30         0           150         150           150         150           150         0           150         0           150         0           36         0           37         0           150         150           150         150           150         150           150         150           150         150           150         150           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150<	11         Normal Output           11 <t>Normal Output           11         Normal Output</t>		ť	ner Odost
5 463 306 (m) 0 651 809 (m) 0 651 809 (m) 0 651 809 (m) 0 651 809 (m) 0 653 306 (m) 1 553 306 (m) 1 553 350 (m) 1 553 350 (m) 1 553 350 (m) 1 553 550 (m) 5 456 360 (m) 5 456 360 (m) 5 455 350 (m) 5 455 360 (m) 5 455	0 (ce) 0 (ce) 0 243 (ne) 400 6 243 (ne) 400 6 243 (ne) 400 15 4660 (ne) 4600 (ne)	4         111           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02           4         02	TFS 27 H→0 Reg.           TFS 27 H→0 Reg.           TFS 46 Dear TS (2040 b)(ex).           TFS 45 Dear TS (2040 b)(ex).	0-25. Read DMA 1 0-25. Read DMA 1 0-26. Read FMM 2 0-27. Read DMA 1 0-28. Read PMM 2 0-28. Read PMM 2 0-29.	Control 0.02/90/5	2048 2048 2048 2048 2048	0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0	30         0           150         150           150         150           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150         0           150	thermal Output		(	ner Odea

Figure 86. Simultaneous Packet View and Spreadsheet View

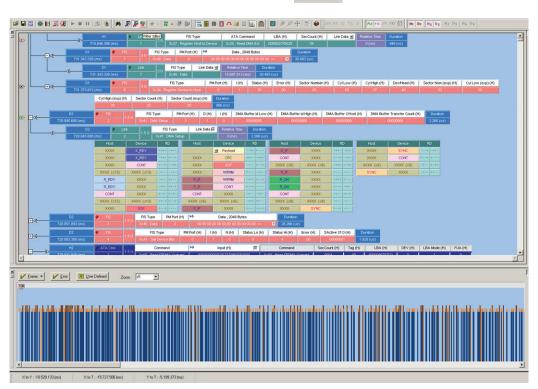
### **Histogram View**

The Histogram View displays a histogram of Frame type transfers.

To display the Histogram View of the current capture click View on the main tool bar

and choose Histogram View or click the





### Figure 87. Simultaneous Packet View and Histogram View

You may customize the histogram by including only the frame types of interest.

To choose the frame types to be included in the display, click the down arrow on the Frame button on the Histogram toolbar and check the frame types to be included in the histogram.



**Hide Error Frames** 

**Hide Frames** 

Frames with errors are displayed as red. To hide error frames from the

histogram click the



User Defined

You may define additional items for inclusion in the Histogram by

.

clicking the	🔀 User Defined	button to open the User Defined dialog.
--------------	----------------	-----------------------------------------

User Defined	×
Primitive	
Error	
Frame	
Outside Connections	
OK Cancel	

You may choose to include Primitives and/or outside connections Frames.

To include Primitives check the **Primitive check** box click the down arrow on the Primitive list box and choose a Primitive.

Jse	Defined	×
Г	Primitive	
	Error	
	Error 🔼	
Г		
	EOF	
	HOLD	
	HOLDA	

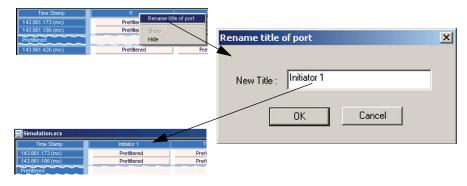
Figure 88. Choosing a Primitive

Then check the desired Connection Type option button and click **OK**.

### **Customize Display**

**Rename Port** 

You may rename each port for easy identification. To rename a port, right click the port ID in Text View or Column View and choose Rename title of port to open the Rename Port dialog.



### Figure 89. Rename Port

You may simplify the Viewer display by hiding the captures of Ports that are not of current interest. All active ports are highlighted on the Show/ Hide Ports toolbar. Click the desired port button to hide the capture for that port.

### Figure 90 Show/Hide Ports Toolbar

You may also show/hide a port by right clicking the Port name in column view and choosing Hide.

D1	- un
Prefiltered	Rename title of port
Prefiltered	Show
Prefiltered	Hide
Prefiltered	

To show the port, right click in the column view port title area and choose a port to unhide.

Primary Host	l i	Rename title of port	D2
Prefittered	a xxx	rionano dao or porc	
Prefittered	• XXX	Show 🕨	D1
Prefittered	XXX	Hide	X RDV
D (71 )	XXXi		X_RUY

#### **Resize Columns** You may resize the columns in column view by clicking in the column boundary and dragging the boundary to a new position.

**Rearrange Columns** You may rearrange columns by left clicking in the column title and then

dragging the drag and drop icon to a new position.

## **Show/Hide Port**

Show/Hide FieldYou may simplify the Viewer display by hiding some of the fields that are<br/>of no current interest. You may hide the Duration, Relative Time,<br/>External Signals and Packet number fields by right clicking on the<br/>corresponding field title and choosing Hide Field.

Bookmark	
Show Field	۲
Hide Field	
Expand All	
Set Time Stamp Origin	۲
Color	
Goto	۲

To restore a field to the display, right click in the Port number title field and choose the hidden field to be restored.

Bookmark			
Show Field		•	External Signals
Hide Field			State
Copy Frame		-1	Date
Copy Frame			FIS Type
Goto Response			Reserved
Goto Next Tag	F5	1	
Goto Previous Tag	Shift+F5		
Set Time Stamp Origin	n	۲	
Color			isfer Count (H)
Goto			800

Note: Only the fields previously hidden will appear in the restore list.

Related FramesRight click on a Command frame for SSP Frames or Register Device to<br/>Host for STP frames to open a short-cut menu and choose Goto Response<br/>to jump to the corresponding Response frame in the viewer.

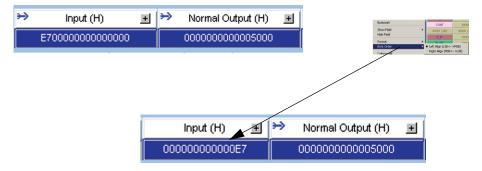
Bookmark	
Show Field	۲
Hide Field	
Format	۲
Byte Order	۲
Copy Data	
Copy Frame	
Goto Response	
Set Time Stamp Origin	۲
Color	

Similarly right click on a Response frame SSP Frames or Register Device to Host for STP frames to open a short-cut menu and choose **Goto Command** to jump to the corresponding Command frame in the viewer.

Bookmark	
Show Field	۲
Hide Field	
Format	۲
Byte Order	۲
Copy Data	
Goto Command	
Set Time Stamp Origin	۲
Color	

## Byte Order

For reviewing enhancement you may change the byte order in fields marked by an arrow. Right click in the field Select **Byte Order** and choose the ordering.



**Note:** A blue arrow in the byte order field indicates that it has been changed.

## **Data View**

To display data transactions in a data view, double click in the data area or right click in the data area and choose **Open as Data View**.

HI & ATA Crist. Command (>>	Input (H) I I Normal Cutput (H) I I	ATA Command Data , 2048 Bytes	PM Port (H) Protocol Status
		00 00 00 00 00 00 00 00 Bookmark	0x07 : DMA 0x01 : Normal Output
Duration		Show Field	,
29.333 (us)		Hide Field	
H2 # ATA Cind. 15.0 Command → 736.068.400 (ms) 4 15.0 0x61: Write FFDMA Queued		ATA Command Data Format	Protocol Status
Z36U664U0 (ms) 4 Uxb1 - Write PPDMA Cueued	61040000005A548C0C00004000 004000 00 00	Expand All	Ox08 : DMA GUEUED 0x01 : Normal Output
29.653 (us)		Open as data view	
H2 PS PM Port (H) C (H)	Command (H) Features (H) Sector Number (H) Cyl Low (H)	Cyl High (H) Set as Refrence Data Pa	tyload Cyl Low (exp) (H) Cyl High (exp) (H)
	Data Payload		X
	Layer : ATA Cmd.	Eul ou	
	Packet No. : 3	Find © He	x C ASCII Byte count in data : 4 💌
	Hexadecimal		ASCII
	0000 :0000000 0000000 0000000 0000000		
	0018 :00000000 00000000 00000000 00000000		
	0030 :0000000 0000000 0000000 0000000		
	0048 :00000000 00000000 00000000 00000000	00000000 00000000 🗖	
	0060 :0000000 0000000 0000000 0000000		
	0078 :0000000 0000000 0000000 0000000		
	0000000 0000000 0000000 00000000 000000		
	000A8 :00000000 00000000 00000000 00000000		
	00000 :00000000 00000000 00000000 000000		
	00008 :0000000 00000000 00000000 00000000	00000000 00000000	
	0070 :0000000 0000000 0000000 0000000	00000000 00000000 🗆	
	0108 :00000000 00000000 00000000 00000000	00000000 00000000	
	0120 :00000000 00000000 00000000 00000000	00000000 00000000 🗆	
	0138 :00000000 00000000 00000000 00000000		
	0150 :00000000 00000000 00000000 00000000	00000000 00000000 🖂	
	0168 :00000000 00000000 00000000 00000000		
	0180 :00000000 00000000 00000000 00000000	0000000 00000000 🗆	
	0198 :00000000 00000000 00000000 00000000	0000000 00000000	
	01B0 :00000000 00000000 00000000 00000000	0000000 00000000 🗆	
	01C8 :00000000 00000000 00000000 00000000	0000000 00000000	

### Figure 91. Selecting Open as Data View

**Find Data Pattern**To quickly locate a data pattern in the current frame enter the pattern in the Text Box and click the **Find** button.

Figure 92.

## **Compare Payloads**

To compare two payloads, locate the first transaction with a payload and right click in the data field and choose **Set as Reference Data Payload**.

Bookmark	
Show Field	•
Hide Field	
Format	•
Expand All	
Open as data view	
Set as Refrence Data Payload	
Set as Second Data Payload	
Copy Data	
Set Time Stamp Origin	•
Color	

Then scroll to the transaction with a payload that you wish to compare and right click in the data field and choose **Set as Second Data Payload**.



Click the **Compare Payloads** button on the Viewer Toolbar to perform the comparison.

			_
Layer: ATA Cmd. Packet No: 2	Ref	Layer: ATA Cmd. Packet No: 3	
00000 : 00000000 00000000	00000000	0000 :0000000 0000000 0000000	1
00000 : 00000000 00000000	00000000	00000000 00000000 00000000 : 0000	]-
0018 :0000000 00000000	00000000	0018 :00000000 0000000 00000000	1
0024 :00000000 00000000	00000000	0024 :00000000 00000000 00000000	1
0030 :00000000 00000000	00000000	0030 :0000000 0000000 0000000	
003C :00000000 00000000	00000000	003C :00000000 0000000 00000000	]
0048 :00000000 00000000	00000000	0048 :0000000 0000000 00000000	1
0054 :00000000 00000000	00000000	0054 :00000000 00000000 00000000	1
0060 :0000000 0000000	00000000	0060 :0000000 0000000 0000000	1
00000 : 00000000 00000000	00000000	0060 :0000000 0000000 0000000	1
0078 :00000000 00000000	00000000	0078 :0000000 0000000 0000000	
0084 :00000000 00000000	00000000	0084 :00000000 00000000 00000000	
00900 : 00000000 00000000	00000000	00000000 00000000 00000000 00000000	1
009C :0000000 00000000	00000000	00000000 00000000 00000000 00000000	1
00000000 00000000 : 8A00	00000000	00000000 00000000 00000000 00000000	1
00B4 :00000000 00000000	00000000	00B4 :00000000 00000000 00000000	1
00000 :00000000 00000000	00000000	0000 :0000000 0000000 0000000	1
000CC :00000000 00000000	00000000	0000000 0000000 0000000 00000000	١.

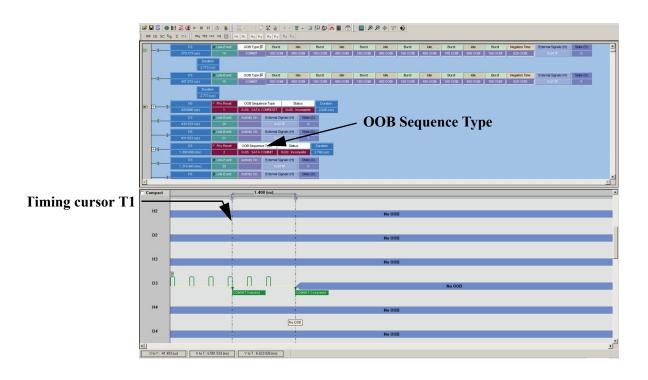
Figure 93 Payloads Compared

## **Waveform Display**

You may enable a waveform display for all active ports and perform timing measurements by positioning timing cursors within the waveform display.



Click the Show/Hide Waveform button to enable the waveform display.



### Figure 94 Waveform Display with Timing Cursors

Making a timing measurement Timing measurements are made with two timing cursors T1 and T2. Click the left mouse button in the gray bar on the top of the waveform display at a point where you wish to put the T1 cursor and the right mouse button where you wish to place the T2 cursor. The time difference between the cursors is displayed on a line connecting the two cursors.



Figure 95 Timing Cursors Enabled

**Compact Waveform View** To see the OOB Sequence with speed negotiation (Hardware version 4 or later) and to see a 10x time scale expansion of the Waveform, check the **Compact View** checkbox in the Waveform View window.

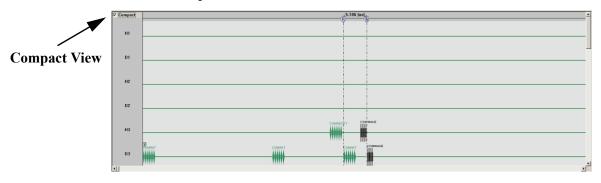


Figure 96 Compact Waveform View

## **Port Status**

You may get an overview of the active Ports by clicking the Port Status button at the bottom of the screen.



	Port	Speed	Function	OOB	Link	Frame	Error
	H1	1.5 G	Analyzer				
	D1	1.5 G	Analyzer				
3	H2	1.5 G	Analyzer				
	D2	1.5 G	Analyzer				
	HЗ	1.5 G	Analyzer				
	D3	1.5 G	Analyzer				
	H4	1.5 G	Analyzer				
	D4	1.5 G	Analyzer				

### Figure 97 Port Status Display

In addition to displaying OOB, Link Frame or Error a display showing the % buffer full will open whenever a trigger occurs.

**Note:** If samples are taken with more than one unit active, additional Port status windows will display.

## Toolbars

**Enabling Tool Bars** 

To customize your Viewer Display workspace, you can enable and reposition the available toolbars. To display or hide toolbars from the **View** menu, select **Toolbars** and check or uncheck the appropriate toolbar.



Once enabled, the toolbars can be docked to the Viewer Display window or allowed to float on the windows desktop.

## **Viewer Setting Toolbar**





The **Full Screen** button on the Viewer Setting Toolbar increases the data display area to full on the screen.



The **Zoom In** button on the Viewer Setting Toolbar magnifies the data display area of interest on the screen. Clicking this button in column or text frame view increases the column width only.



The **Zoom Out** button on the Viewer Setting Toolbar scales the data display area to display more data lines on the screen. Clicking this button in column or text frame view decreases the column width only.



The **Normal Zoom** button on the Viewer Setting Toolbar resets the zoom to default normal on the screen. Clicking this button in column or text view resets the column width only.



The **Wrap Packets** button on the Viewer Toolbar wraps the packet data in the display to eliminate the need for horizontal scrolling.



The **View Setting** button on the Viewer Setting Toolbar opens the Sample Viewer Configuration dialog.

### **Viewer Toolbar**





The Search button opens the search dialog.



The **Filtering Setup** button opens the Filter dialog that allows you to specify the criteria for filtering the result.



The **Enable Disable Filtering** button toggles the result between a filtered and unfiltered view.



The Filter Idle button toggles the display to show/hide idle packets.



The **Expand/Collapse all Layers** button expands or collapses layers to simplify results display.



The down arrow on the **Go To** button allows the location of the cursors or specific packets.



The Data Report button displays the data report.



The **SCSI Spec Assignment** button displays the ATAPI to SCSI assignment dialog.

ATAPI Assignment	×
ATAPI Assignment	-
C MMC-4	
C 55C-2	
There is no ATAPI packet in sample.	

## Layers Toolbar



The **Show/Hide Waveform View** button to display or hide the waveform display.



The **Show/Hide Physical Packet** button toggles the display of physical layer packets.



The **Show/Hide CMD packet** button on toggles the display of the CMD packets. When "ON", only the command layer is displayed.



The **Show/Hide FIS packet** button toggles the display of FIS layer packets. When "OFF" the FIS layer and its links are hidden.



The Show/Hide Command Queue button displays queued commands.



The Order/Reorder toggles the time order of packets.

## Decode Toolbar



The **Decode Toolbar** allows the control of the following encoding and scrambling features.



8B

Clicking the **10B** button displays the payload data as 10 bit encoded data.

Clicking the **8B** button displays the payload as 8 bit scrambled or unscrambled data depending on the Scrambled setting.

sc

Clicking the SC button selects scramble/unscramble for the 8 bit payload data.

To view corresponding Unscrambled and Scrambled payload data values instantaneously, position the mouse pointer over a data field.

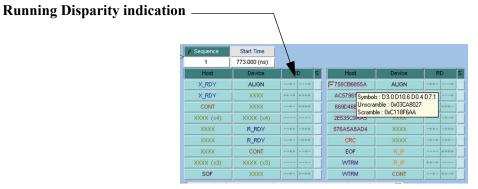


Figure 98 Payload Data Display



The **Symbol Notation** button decodes the 8 bit or 10 bit encoded data in List View.



The Show Data button displays the payload data values in Column View.

## Filter

The Filtering patterns option allows you to modify data in the Viewer display to exclude Packets with a set of user defined patterns and save the result in a file.

\*.sts sample file

In order to set up filtering, you must have a viewer display open.

## **Filter Setup**



To display the Filter setup dialog, click the **Filter** button on the Viewer toolbar or, choose Filtering from the Filtering menu.

Bus Condition	Register Host to Device
]Incomplete Frames	Register Device to Host
FIS	Set Device Bits
ATA Command	DMA Activate
Protocol Error	DMA Setup
Port	✓PIO Setup
]ATAPI SCSI Command	✓Data
Miscellaneous	
Ports	Ide
🗹 H1 🔽 H2 🗹 H3 🗹 H4	
<ul> <li>✓ H1 ✓ H2 ✓ H3 ✓ H4</li> <li>✓ D1 ✓ D2 ✓ D3 ✓ D4</li> </ul>	

### Figure 99 Filter Setup Dialog

Each of the items shown in the Filter Options window can be selected or deselected for filtering by checking or unchecking a corresponding check box. Items not in the current Sample are shaded.

Note 1. When a group is selected, all of its child items are also selected.

Note 2. Only packets captured at run time are available to be selected for filtering.

### Filter Type

You may choose to show or hide the items selected for filtering by checking the **Show** or **Hide** option buttons as appropriate.

### **Filtering Direction**

Items may be selected for filtering in a single direction or both directions by checking the corresponding Port. By default, all of the ports are enabled. Uncheck the port checkboxes for ports that you do not wish to include in the filter.

#### **Filter Idle**

When selected on the Filter Type, depending on Hide/Show selection Idle packets in the Sample Viewer will be shown or hidden.



You may quickly filter idles by clicking the **Filter Idle** button. Note that this button toggles between Show and Hide Items.



Click the **Filter Enable** button on the display menu bar to toggle between a Filtered and unfiltered display.

## **Selectable Filter Options**

•	Bus Condition • Port			
•	Incomplete Frames • ATAPI SCSI Command			
•	FIS • Miscellaneous			
•	ATA Command • Filter Idle			
•	Protocol Error			
Bus Condition	When selected, depending on the Filter Type, the Hide/Show selection will show or hide captured Bus Conditions in the Sample Viewer.			
Incomplete Frames	When selected, depending on the Filter Type, the Hide/Show selection will show or hide Incomplete Frames in the Sample Viewer.			
FIS	When selected, depending on the Filter Type, the Hide/Show selection will show or hide captured FIS items in the Sample Viewer.			
ATA Command	When selected, depending on the Filter Type, the Hide/Show selection will show or hide captured ATA commands in the Sample Viewer.			
Protocol Error	When selected, depending on the Filter Type, the Hide/Show selection will show or hide captured packets with the specified Protocol Errors in the Sample Viewer.			
Port	When selected, depending on the Filter Type, the Show/Hide selection, will show or hide packet traffic for the selected port.			

 ATAPI SCSI Command
 When selected, depending on the Filter Type, the Show/Hide selection will show or hide ATAPI SCSI commands.

MiscellaneousWhen you choose Miscellaneous an additional dialog is displayed<br/>allowing you to specify the filtering of State Range and/or External Signal<br/>In.

lter	×
Filter Options         Bus Condition         □Incomplete Frames         ♥FIS         ▲TA Command         Protocol Error         Pott         ▲TAPI SCSI Command         ♥Miscellaneous         Filter Type         ♥ Hide ℃ Show         Ports         ♥ H1 ♥ H2 ♥ H3 ♥ H4         ♥ D1 ♥ D2 ♥ D3 ♥ D4         Reset All       Check All	Misc Items I♥ State Range From State: 0 To State: 0 I♥ External Signal In Ext. Signal In: ₩₩₩
Save Load	OK Cancel

Save Filter SetupOnce you have set up a Filter configuration you may save it as a Filter file<br/>(\*tfl) by clicking Save. You may then use it on a different capture by<br/>clicking Load in the Filter dialog.

Y Position Packet No Time Stamp Bookmark Begin End

## **Using the Cursors and Bookmarks**

Cursors	The data viewer display incorporates three cursors labeled <b>X</b> , <b>Y</b> and <b>T</b> . All of the cursors are initially overlaid and positioned at location 0, which is the trigger position of the display. The Trigger, or <b>T</b> , cursor is the measurement reference and is always locked at location 0 in the display.
Positioning the X Cursor	To position the X-Cursor within the viewer data display, click the left mouse button in the gray bar on the left side of the sample viewer next to the line where you wish to see the cursor.
Positioning the Y Cursor	To position the Y-cursor within the viewer data display, click the right mouse button in the gray bar on the left side of the sample viewer next to the line where you wish to see the cursor.
Note:	You may also left click to set the X-cursor and right click to set the Y cursor in the frame and the column view by clicking in the narrow strip on the very left side of a cell. Similarly you may set the cursors in the Waveform view by left and right clicking at the beginning of a waveform.

Time differences between the cursors are displayed in the cursor position toolbar. To display the cursor position toolbar, select Toolbar from the view menu and choose Cursor Position.

	X to Y: 0 ns		X to T: 0 ns	Y to T: 0 ns
Locate Cu	rsors	the Go To b	utton and choose the curs	within the data viewer display, click or to locate. You may also locate the Edit menu and choosing the cursor to
				90       Image: Position         V       Trigger Position         X Position       Y Position         Packet No       Time Stamp         Bookmark       Bookmark
Go to time	stamp	To locate a t	imestamp click the Go T	button and choose Timestamp.
	······F			Image: Second state       Image: Second stat   <

Enter a time stamp value in the Go To Timestamp dialog and click OK.



Bookmarks

Bookmarks is a convenient way to mark a point in the data viewer display by name, such that you can rapidly return to that point. To create a bookmark, right click the mouse in the data viewer area on a packet where you wish to place the bookmark.



Click **Bookmark** from the fly out menu to open the Bookmark Comment Dialog.

ookmark						2
Bookmark Name:	ATA Command					
Bookmark Description:						
1						
Sort bookmarks by	start time					
Start Time	Port	Layer	Packet No.	Bookmark	Description	
736.265.226 (ms)	H2	ATA Cmd.	5	ATA Command		
Add D	elete (	ао То   1	Time Difference	9:0		
Save as text	Print					
			Close			

Enter a description for the bookmark and click the **Add** button. Repeat for additional bookmarks.

**Finding a Bookmark** To find a bookmark in the data viewer display, right click the mouse in the sample viewer and select **Bookmark**.

Bookmark						2
Bookmark Name:	ATA Command	1				
Bookmark Descriptio	n:					
Sort bookmarks	by start time					
Start Time	Port	Layer	Packet No.	Bookmark	Description	[
736.265.226 (ms)	H2	ATA Cmd.	5	ATA Command		
	• · · · 1	1:	Time Difference	0		
Add	Delete	Go To	I me Dirrerence	e:U		
Save as text	Print					
			Close			

### Figure 100 Go To Bookmark Dialog Box

Highlight the bookmark that you wish to go to and click the **Go To** button, or double-click on the selection.



### Figure 101 Bookmark Found Example in Data Viewer Display

To get a quick description of a displayed bookmark, position the tool tip over a bookmark. The name and description of the bookmark will display.

Set Time Stamp Origin

**Bookmark description** 

Right click in the sample viewer to open the fly out menu:

Copy Command Goto Next Tag F5 Goto Previous Tag Shift+F		X000X X000X	-++- ++
Set as Refrence Data Payload     Set as Second Data Payload     Copy Data		Device	RD
Open as data view		ATA Con 50 : Read FP	DMA Gueued
Format Byte Order Expand All	•	) Durat 1.866	
Show Field Hide Field	•	satures (H) 04	Sector Num

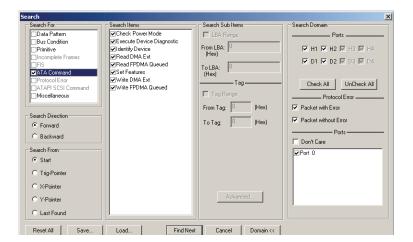
Highlight **Set Time Stamp Origin** and choose either Absolute, Trigger, Current Position or Based on system time.

## Search

The search option permits you to examine any data capture file to quickly locate the desired packet/data pattern.

To perform an initial search, click the **Search** button to open the search setup dialog as shown in Figure 102. You may also perform the search by selecting Search from the Edit menu.

Note: Only items captured in the sample file are enabled for search.



#### Figure 102 Search Parameter Definition Dialog Box

**Search For** Choose a category to search in the Search For window. Each of the search categories offers additional choices in the Search Items window to refine the search. Check the desired items for the selected category. **Advanced** options Some of the Search Categories offer Advanced options for search. To set

these options, highlight the search item in a category and click the Advanced button to open the Advanced options dialog.

	Length	Value
] PM Port	4	×
] I	1	?
N	1	?
] Status Lo	3	?
] Status Hi	3	?
] Error	8	**
SActive 31:0	32	X0000000X

Set the desired options and click **OK**.

Search direction	Choose either Forward or Backward direction in which to perform the search.			
Search From	Choose a starting point to begin or continue a search.			
	• Start of the sample file			
	Trigger Pointer			
	• X Pointer			
	• Y Pointer			
	Last Found			
Packets With or Without	Error You may refine the search to locate packets with an error or without an error.			
Data Pattern	Search for Data Pattern allows you to search for a specific Data Type, Pattern and Length.			
	Data Pattern Only			

- Data Pattern Only
- Data Payload Length Only
- Data Pattern and Data Payload Length

### Figure 103 Search for Data Pattern

Search domain Click the Domain button and choose a search domain from All ports or a specific port.

Protocol Error Choose Packet with error or Packet without error

Click the **Find Next** button to perform the specified search.

**Note:** When searching for Protocol Errors in column view, you cannot search for a specific Protocol Error type. Search will return any protocol error.

You may continue to search the output file using **Next Search** or **Previous Search** for the same pattern until you redefine the data capture search parameters.

Save Search SetupOnce you have set up a Search configuration you may save it as a Search<br/>file (\*tsh) by clicking Save. You may then use it on a different capture by<br/>clicking Load in the Search dialog.

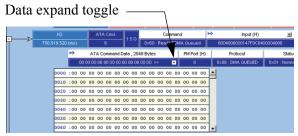
## **Interpretation Aids**

**Choose Data Format** You may display data values either in hexadecimal (default) or binary. To choose data format right click the mouse over a data field, choose **Format** and then the format.



Show all Data

To display all captured data, click the data expand toggle arrow in a data field where you wish to examine the data in detail.



You may expand or collapse all data fields globally. To expand all data fields, right click the mouse in a data field and choose **Expand All**.



To collapse all fields right click the mouse in a data field and choose **Collapse All.** 

## **Set Port Alias**

Port Alias allows you to assign a meaningful name to each port to assist in interpreting the results displayed in the sample view.

To assign port names in an open sample view, click **Configuration** on the tool bar and choose **Set Port alias**.

Ports	_	New port name
D1		Device 1
H1		Host
D2		D2
H2	chng	H2
D3		D3
H3		НЗ
D4		D4
H4		H4

Figure 104 Assign Port Name

Assign a meaningful name to each port in use and click **OK**. The assigned names replace the port numbers in the sample view.

1	Host	Ø	Link	
~	33.426.666 (us)		306	
	Device 1	Ø	Link	
2	33.453.333 (us)		307	

If you elect to save the capture sample file, the assigned port names will be saved together with the result so that when you open the sample file later, the assigned names will be retained.

## **Software Settings**

Software settings allows you to define template files for new Analyzer projects, to specify how sample files will appear when opened and to set ATAPI Spec Assignment.

To perform software settings in an open sample view, click **Configuration** on the tool bar and choose **Software Settings**.

oftware Settings	X
Ver Paths C:\Program Files\Catalyst\SATA_460\	User\
Template Files  Protocol Analyzer :  New Protocol Analyzer Project in Advanced Mode  Default Workspace :  C\Program Files\Catalyst\SATA_460	System/PreDefined/Workspace/Default/VS.wst
Sample view Cample	NCQ Commands Time out Threshold : 1000 us Maximum Number of Uploader Threads: 8 ATAPI Spec Assignment : MMC4 SPC3 ▼ Field list settings Payload field length _20 Bytes Show Field List as etmodded in frame/spreadsheet views Show Field List as etmodded in frame/spreadsheet views Update Field List based on "C Text View C Spread Sheet View Anchor the Selection bat Set the Anchor row as sync. pont.
	Set as factory DK Cancel

Figure 105. Software Settings Dialog

Set the desired options and click **OK**.

### **User Defined Decoding**

User defined decoding allows you to create a definition file to interpret commands and frames that are not in the standard set recognized by the software.

Click **Configuration** and choose **User Defined Decoding** to open the User Defined Decoding dialog.

User Define Decoding		×
ATA Command(s)		
STP Frame(s)		
Set As Default	OK Cancel	

Check **ATA Commands** and/or **STP frames.** Click the ellipses next to a command type text box to display the **Open** dialog. Choose an appropriate script file and click **Open**.



Figure 106 Choosing a Script File

# **Display Configuration**

The Analyzer ships with a default display configuration of field and viewer settings. You may, however, define your own field and viewer settings for a particular testing scenario.

The Sample Viewer Configuration dialog allows the user to change the following display settings:

- Field settings
  - Data format
  - Field header text color
  - Hide/Show field
- Viewer Settings
  - Change fonts
  - Wrap packets
  - Time Stamp Origin
  - Enable/Disable tool tip
- Save Display Configurations in a file
- Load Display Configuration settings from a file
- Factory Setting (Restores Default Settings)



To customize your display, click the **Configuration** button on the Viewer toolbar, or select **Sample Viewer Configuration** from the Configuration menu to open the Sample Viewer Configuration dialog.

mple Viewer Configuration		>
<ul> <li>Link Fields</li> <li>Idle Fields</li> <li>FIS Fields</li> <li>FIS Fields</li> <li>SCSI Cmd. Fields</li> <li>Data Fields</li> <li>Phy Reset Fields</li> <li>Additional Fields</li> <li>Frame List/Spread Sheet View</li> <li>Histogram</li> </ul>	Field Setting         Format       Hexadecimal         Image: Setting       Image: Setting         Field Header Setting       Image: Setting         Idle Data       Image: Abbrivation         Foreground       Foreground         Viewer Setting       Image: Setting         Image: Wrap Packet       16         Long Field Byte Count       Image: Setting         Image: Setting       Image: Setting         Image:	]
Save Load	Factory Setting OK Cancel	

Figure 107 Display Configuration Dialog Box

#### **Field Settings**

To view a packet field, select a field from the packet field tree and check the Visible box. Uncheck it to hide the field. To change the data format of a packet field, select the field and choose a data format from the Format drop-down list.

Sample Viewer Configuration		×
	_	Field Setting
SCSI Cmd. Fields		Format
Mode		
Mode		
Beserved		
Buffer ID		
Buffer Offset		Field Header Setting
Parameter List Length		
Allocation Length		C Name
Control		C Abbrivation
Prevent		Foreground
Service Action		Foreground
Service Action		
Service Action		Viewer Setting
Service Action		✓ Wrap Packet 16 Long Field Byte Count
Service Action		
Service Action		Enable Tooltip Font
Service Action		
Restricted		Time Stamp Origin
Volume Number		Absolute     O Trigger
🗝 🛷 Partition Number		C User Define C Based On System Time
First Attribute Identifier		So user benne So Based on System Time
	▶	Same color for start time and port
Save Load		Factory Setting OK Cancel

To change the color of the text in a packet field header, select a field from the packet field tree and click the **Foreground** button.

Color ?X
Basic colors:
Custom colors:
Define Custom Colors >>
OK Cancel

Choose an appropriate color and click **OK** 

To change display fonts, click the **<u>Font</u>** button to open the Font dialog box.

Font style: Regular Regular Italic	Size:	ОК
Bold Bold Italic	8 9 10 11 12 14 16	Cancel
Sample AaBbYyZz Script: Western	]	
	Sample	Sample AaBbYyZz

	Choose the desired font, font style, size and click OK.
Viewer Settings	Check the Wrap Packet box to enable the wrapping of packets in the display.
	Check the Enable Tooltip box to enable tool tips for packet fields.
	To change the length of long byte fields displayed, enter a number of bytes to display in the Long Field Byte Count size box.
	Check <b>Absolute Trig</b> to display trigger in real time. If left unchecked the trigger position is t=0 with samples before trigger shown as a (-) number and after trigger as a (+) number.
	When finished, click <b>OK</b> to save changes and close the Display Configuration dialog.
Save/Load Settings	You may save the customized configuration settings in a *.cfg file by clicking the <b>Save</b> button and completing the Save As procedure. To load a previously saved configuration file click <b>Load</b> and choose an appropriate file.

# **Statistical Report**

Whenever a captured sample is displayed in the sample viewer, a **Statistical Report** selection in the **Report** menu and a **Statistical Report Button** on the viewer toolbar are enabled. You may create a Statistical Report for the entire capture or a select portion of it as desired.



To display a Statistical Report, click the **Statistical Report** button on the viewer toolbar, or select **Statistical Report** from the **Report** menu.

Select Statistical Report Range				
All Samples				
C From	T-Cursor	▼ To T-Cursor	<b>•</b>	
C From	Sequence	▼ No 1	To Sequence 💌 No 1	
		OK	Cancel	

#### Figure 108 Statistical Report Range Dialog

The default statistical report is generated using all samples. You may, however, set a specific Statistic report range between defined cursor positions or events.

**Report Between Cursors** Click the option button next to the **From** cursor selection drop down list. Then click the **From** down arrow and choose the 1st. cursor, click the **To** down arrow to choose the 2nd cursor and click **OK**. The resulting report is limited to the capture between the cursors.



**Report Between Events** Click the option button next to the **From** the event selection dropdown list. Then click the **From** down arrow to choose the 1st event and enter the number of its occurrence. Next click the **To** down arrow to choose the 2nd event, and enter the number of its occurrence.



Click **OK**. The resulting report will be limited to the capture between the defined events.

## **Statistical Report Content**

A complete statistical report consists of the following reports a that are accessed by clicking on the corresponding tab in the dialog:

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- General
- Primitive

Read/Write Command

Protocol Error

Performance

- nitive
- Bus Condition
- FIS

•

- Others
- ATA Command
- Queued Commands
- ATAPI

Note: Results are displayed only for items that have been captured in the sample.

### **Report Options**

Some report categories offer options to display only items of interest. These report categories incorporate drop-down list boxes offering pre-defined and custom options. For details see "Formatting the Statistical Report View" on page 146

### **General Report**

To display the General report, click the General tab.

📽 🔡 🎒 🖪	🍪   🕇 🦊	↓   → 1				Mo
General Primitive	Bus Condition	FIS ATA Command	Read/Write (	Command P	erformance	Others
Туре	Direction	Duration	Count	%		
All 👻	All 👻	All	All 👻			
FIS	H->D	9.191 893 58 ms	1748	29.70		
FIS	D->H	122.484 352 11 ms	4054	68.88		
Bus Condition	H->D	62.213 333 13 us	32	0.54		
Bus Condition	D->H	93.506 668 09 us	52	0.88		
		0.13183196	5886	100.00		

#### Figure 109 Sample Statistical Report

The General report displays the report data in columns with the following information:

- Type
- Direction

- Count (Number of occurrences)
- % of total count

Duration

### **Primitive Report View**

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To display the Primitive Report, click the **Primitive** tab. The Primitive report displays information in the following columns:

- Primitive Count (Number of occurrences)
- Direction % of total count

Ī	🖹 🖹 🖉	ð 🖪   🌺	<b>↑↓</b>  →	1	Мо
ĺ	General Prin	nitive Bus Co	ndition FIS	ATA Com	mand Read/Write Command Performance Others
	Primitive	Direction	Count	%	
	All 👻	All 👻	All 👻		
	CONT	H->D	1748	2.99	
	CONT	D->H	4054	6.95	
	EOF	H->D	1748	2.99	
	EOF	D->H	4054	6.95	
	HOLD	H->D	415	0.71	
	HOLD	D->H	887	1.52	
	HOLDA	H->D	415	0.71	

### **Bus Condition Report View**

To display the Bus Condition Report, click the **Bus Condition** tab. The Primitive report displays information in the following columns.

- Bus Condition
- Count (Number of occurrences)

• Direction

• % of total count

🛛 🕾 😫 😂 🗟 💝 🛛	<b>↑ ↓   →</b>	1		Мс
General Primitive Bus Co	ndition FIS	ATA Comm	and Read/W	/rite Command   Performance   Others
Bus Condition	Direction	Count	%	
All 👻	All 👻	All 👻		
Keep Alive Activity	H->D	1	1.19	
Activity On	H->D	12	14.29	
Activity On	D->H	12	14.29	
COMINIT/COMRESET	H->D	1	1.19	
COMINIT/COMRESET	D->H	28	33.33	
COMWAKE	H->D	12	14.29	
COMWAKE	D->H	12	14.29	
COMSAS	H->D	6	7.14	
		84	100.00	

### **FIS Report View**

To display the FIS Report, click the FIS tab. The FIS Report view displays information in the following columns:

- FIS Type •
- Duration time (Accumulative) ٠
- PM Port •
- Count (Number of occurrences) ٠

- Direction
- % of total count •

🖹 😫 😂 🗟 🗳 🕇	<b>†   →</b>	1			Move 🖡
General Primitive Bus Conditio	n FIS	ATA Command	d Read/Write Command	Performance	Others
FIS Type	PM Port	Direction	Duration	Count	%
All		All 👻	All 💌	All 👻	
Register Host to Device	0	H->D	695.826 660 16 us	1333	22.97
Register Device to Host	0	D->H	761.133 361 82 us	1332	22.96
Set Device Bits	0	D->H	487.066 680 91 us	706	12.17
DMA Activate	0	D->H	214.080 001 83 us	415	7.15
DMA Setup	0	D->H	574.346 679 69 us	706	12.17
PIO Setup	0	D->H	8.426 667 21 us	5	0.09
Data	0	H->D	2.350 293 40 ms	415	7.15
Data	0	D->H	50.023 921 97 ms	890	15.34
			0.05511509	5802	100.00

### **ATA Command Report View**

To display the Command Report view, click the Command tab. The Command Report view displays information in the following columns:

- Command •
- PM Port •
- Direction .

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- ٠
- Number of FIS

Payload Size (Dwords)

- Status •
- Duration ٠
- Count (Number of occurrences)
- % of total count •
- Timeout ٠

🖹 🔛 😂 🕹 🕇 ·	Move X-Cursor							
General   Primitive   Bus Condition	FIS A	TA Command	Read/Write Comma	and Performance	Others			
Command	PM Port	Direction	Number of FIS	Payload Size	Status	Duration	Count	%
All			Al 👻	Al 👻	Al 👻	Al	Al 👻	
Read DMA Ext	0	H->D	3	2048	Normal Output	37.733 333 59 us	415	31.13
Write DMA Ext	0	H->D	4	2048	Normal Output	17.133 333 21 us	179	13.43
Write FPDMA Queued	0	H->D	6	2048	Normal Output	26.133 333 21 us	236	17.70
Read FPDMA Queued	0	H->D	5	2048	Normal Output	32.106 666 56 us	470	35.26
Identify Device	0	H->D	3	512	Normal Output	30.746 667 86 us	3	0.23
Check Power Mode	0	H->D	2	0	Normal Output	6.826 666 83 us	3	0.23
Execute Device Diagnostic	0	H->D	2	0	Normal Output	6.693 333 63 us	3	0.23
Flush Cache	0	H->D	2	0	Normal Output	6,746 666 91 us	10	0.75

### **Read Write Command Report View**

To display the Read/Write Command Report view, click the **Read/Write Command** tab. The creation of this page can be enabled or disabled under Software Settings, see page 131. The Read/Write Command Report view displays information in the following columns:

- Time Stamp
- OpCode/Command
- LBA
- Sector Count

- Payload size
- Status
- Completion Time
- Count

		L Road Auto	ite Command Peri		ove X-Cursor 💌		
General Primitive Bus							
Time Stamp	OpCode / Command	LBA	Sector Count	Payload size	Status	Completion Time	Count
All 💌	All 👻	All 👻	All 💌	All 💌	All 👻	All 💌	
7.086 733 ms	Read DMA Ext	0x3e91089	0x4	2048	Normal Output	23.616 920 47 ms	1
36.192 829 ms	Read DMA Ext	0x2061be0	0x4	2048	Normal Output	24.622 480 39 ms	1
79.374 199 ms	Read DMA Ext	0x20c03dd	0x4	2048	Normal Output	5.868 813 51 ms	1
87.538 506 ms	Read DMA Ext	0x32218f2	0x4	2048	Normal Output	16.218 040 47 ms	1
103.870 239 ms	Read DMA Ext	0x3a43e32	0x4	2048	Normal Output	18.062 200 55 ms	1
122.003 601 ms	Read DMA Ext	0x30f9949	0x4	2048	Normal Output	16.309 919 36 ms	1
138.406 189 ms	Write DMA Ext	0×1d8901f	0x4	2048	Normal Output	6.931 439 88 ms	1
145.384 949 ms	Write DMA Ext	0x98739b	0x4	2048	Normal Output	7.563 373 57 ms	1

### **Performance Report View**

To display the Performance Report view, click the **Performance** tab. The Performance Report view displays information in the following columns:

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- Minimum Completion time
- Average Completion time
- Maximum Completion time
- Host Bus Utilization
  - Device Bus Utilization
- Efficiency (%)
- Average Byte Per FIS

Total Read (DWords)

**Total Read Duration** 

Total Write DWords

Total Write Duration (time)

 Image: Construct Total Product State State
 Operation
 Operation

### **Others Report View**

To display the Others Report view, click the **Others** tab. The Others Report view displays information in the following columns:

• Items • Reports

]	🖹 😫 🎒 🖓		Мо
l	General   Primitive   Bus	Condition   FIS   ATA Co	mmand Read/Write Command Performance Others
	Items	Report	
	Idle No	0	
	Payload Size	5327872	
	Sample Time	14.621 841 43 s	
	Idle Time(Host)	0.000 000 00 s	
	Idle Time(Device)	0.000 000 00 s	
	Reserved	0.000 000 00 s	

# **Statistical Report Toolbar**



The Statistical report toolbar provides the following functions accessible by buttons on the toolbar:

- Export to Excel
- Save as Text
- Print Report
- Print Preview
- Report Display Settings

### Export as Microsoft® Excel file



Click the **Export to Excel** Button on the Statistical Report Toolbar to open the Export to Excel dialog.

Choose a folder to save the Excel file in and an appropriate file name and click **Save.** 

### Save as Text file



Click the **Save as Text** Button on the Statistical Report Toolbar to open the Export to Text dialog.

Choose a folder to save the Text file in and an appropriate file name and click Save.

### **Print Statistical Report**



Click the **Print** Button on the Statistical Report Toolbar to open the select printer dialog. Choose an available printer and click **OK**.

### **Print Preview**



Click the **Print Preview** Button on the Statistical Report Toolbar to display a preview of the report to be printed.

Cataly	st Enter	rprises li	10.		Serial AT	A		Apr	14,20
Gene	ral:								
	Direct	ion	Duration		Count 9				
FIS	H->D		633.186 706	54 us	1000 €				
FIS	D->H		399.720.001		999 4				
			0.00103291	LL 00	1999 /				
Primit	tive:								
Primi	tive	Direct	ion Count	c.					
CON	Т	H->D	1000	Ę					
CON	Т	D->H	999	4/					
EOF		H->D	1000	£.					
EOF		D->H	999	47 47					
HOL		H->D	1000	£					
HOLD	DA	H->D	500	2					
R_IP		H->D	1000	£					
R_IP		D->H	999	4					
RO	-	H->D	1000						
R_R		H->D	1000	47					
R_R	DY	D->H	999	ť					
SOF		H->D	1000	£					
SOF		D->H	999	4/					
SYNC		H->D	1000	£.					
SYNC		D->H	999	ť.					
WTR		H->D	1000	47					
WTR		D->H	999						
X_R		H->D	1000	4/					
XR		D->H	999	1					
ALIG	N	H->D	500	2					
			18993	2 1					
FIS:									
FIST	ime			PM Port	Direction	Durati	00	Count 4	
	10.0	st to Der	ico	0	H->D	-	6 662 60 us	500 2	
		vice to H		0	D->H		33 328 86 us	749 3	
	Device I		10.05	0	D->H		3 5 2 5 6 0 us 3 6 6 4 7 3 us	250 1	
Data		511.0		0	H->D	_	20 013 43 us	500 2	
Jaid						0.001		1999 1	
L				- 1	1	10.001		1000	
ATA	Commi	and							
	mand		PM Port	Direction	Number o	f FIS	Payload Size	Status	Ti
_		Queued	0	H->D	2		0	Normal Output	N
Cani			0	11.50	-		0	Marmal Output	N.1

Figure 110 Sample Print Preview of Report

### **Report Display Settings**

You may set up the report columns for display to suit a particular analysis need eliminating the need to show hide columns individually. Use the **Setting** dialog to configure the display for each page.



Click the **Setting** Button on the Statistical Report Toolbar to open the Setting dialog.

Setting Pages General Primitive Bus Condition FIS ATA Command Read/Write Command Performance Others	Show\Hide Columns Items: Type Direction
Check All Reset All OK	Reports: ♥Duration ♥Count ♥% Cancel

#### Figure 111 Statistical Report Column Setting

### Link With Sample View

Whenever a Type is selected on any page of the statistical report, a set of navigation buttons is enabled allowing you to examine each instance of that type in the sample viewer.





Click the **Jump to Previous** Button on the Statistical Report Toolbar to go to the previous instance of the selected type in the Sample Viewer.



Click the **Jump to Next** Button on the Statistical Report Toolbar to go to the next instance of the selected type in the Sample Viewer.



Click the **Jump to Specific** Button on the Statistical Report Toolbar to go to the instance specified as N of M items on the Statistical Report Toolbar.

### Formatting the Statistical Report View

Initially the Statistical Report View contains all of the information in columns, but you may customize the display for your needs by:

- Sorting items by column
- Filtering Columns by item
- Hiding any column on the display

### **Filtering Column Content**

To filter column content click the down arrow in the heading for that column and choose the items that you wish to be displayed. The default is All. By checking a specific item you exclude everything but that item for display.

FIS Type	
All	-
All	
Custom	
Register Host to Device	
Register Device to Host	
Set Device Bits	
DMA Activate	-

Choosing Custom allows you to specify more than one item for display.



Check the items you wish to display and click **OK**.

### **Hiding Columns**

To hide a column, right click in the column and choose Hide. To unhide a column, right click on any column and choose Unhide.

### **Sorting Column Content**

To sort column content, click the heading for that column. Repeated clicking of the column heading will sort the column in ascending or descending order.

Туре 🔺	Direction	Duration	Count	%	Туре 🔻	Direction	Duration	Count	%
Al	Al 👻	All 💌	Al 👻		All 💌	Al 👻	All 💌	Al 👻	
Open Address Frame	I->T	18.39999962 us	69	28.51	STP Frame	I->T	7.03999996 us	17	7.02
SMP Frame	T->I	4.53333330 us	17	7.02	STP Frame	T->I	85.89333344 us	34	14.05
SMP Frame	I->T	1.81333339 us	17	7.02	SSP Frame	I->T	14.48000050 us	35	14.46
SSP Frame	T->I	23.12000084 us	53	21.90	SSP Frame	T->I	23.12000084 us	53	21.90
SSP Frame	I->T	14.48000050 us	35	14.46	SMP Frame	I->T	1.81333339 us	17	7.02
STP Frame	T->I	85.89333344 us	34	14.05	SMP Frame	T->I	4.53333330 us	17	7.02
STP Frame	I->T	7.03999996 us	17	7.02					
		0.00015528	242	100.00	Open Address Frame	I->T	18.39999962 us	69	28.51
							0.00015528	242	100.0

Figure 112 Toggling Type Sort Order

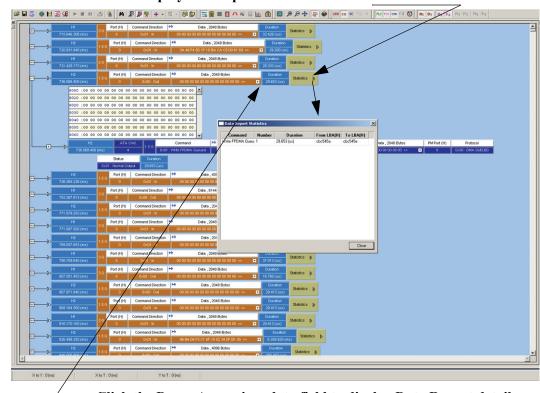
# **Data Report**

Whenever a captured sample is displayed in the Sample Viewer, the Data Report Button is enabled on the Viewer toolbar and the Data Report selection is enabled in the Report menu.

The data report displays all of the data that is sent from the host to the device and from the device to the host. All PIO In =>In commands are grouped as a data packet until the occurrence of a PIO Out =>Out command creating a new data packet.



To display a **Data Report,** click the Data Report Button on the Viewer toolbar or choose Data Report from the Report menu.



#### Click the Statistics button to display data report statistics

Click the Down Arrow in a data field to display Data Report details

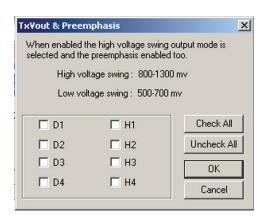
Figure 113 Data Report

# **Display Utilities**

## Tx Vout

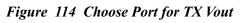
Your analyzer incorporates the ability to select TX Vout for the transmitter on each port. Selecting TX Vout increases the output voltage swing above the nominal value for test and characterization purposes. This feature is also useful to compensate for line loss when driving long cables. The output range without TX Vout is 500 - 700 mv, nominally 600 mv (see Figure 115) and 800 - 1300 mv, nominally 1100 mv (see Figure 116) with TX Vout selected.

To select TX Vout click Configuration and then choose



Configuration Project Se Authorization Features Status...

Tx Vout



Check the Port(s) for which you wish to apply TX Vout and click OK.

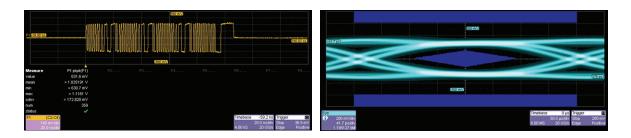


Figure 115 Waveform and Eye Diagram with no TX Vout

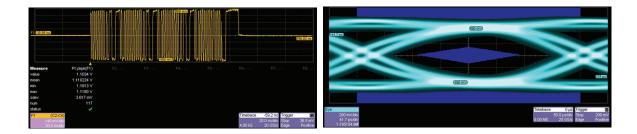


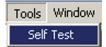
Figure 116 Waveform and Eye Diagram with Tx Vout

### **Memory Check**

The STX230/STX430 has a built-in RAM self test utility.

**Note:** To be enabled in software version 2.x

5



Click Tools on the main menu bar and choose **Self Test** to open the Self Test dialog.

Memory		- Memo
SDRAM 🔽 Exerciser R	AM	₽ SD
Memory Type	Test Result	Memo
SDRAM 0		🥥 SDI
SDRAM 1		💌 SDI
SDRAM 2		💿 SDI
SDRAM 3		🥑 SDI
SDRAM 4		. 🙋 SDI
SDRAM 5		🥑 SDI
🕏 SDRAM 6		💿 SDI
😨 SDRAM 7		🥑 SDI
🕏 SDRAM 8		. 💿 SDI
🗐 SDRAM 9		👩 SDI
•	• • • • • • • • • • • • • • • • • • •	
Save error details		□ Sa
Save error details		I Sa
Save in: C:\Program Files\CATALY	ST\SATA1.xx\User\Er	Save in
1		
	_	

Memory SDRAM VExerciser RAM		
Memory Type	Test Result	
SDRAM 0	OK	
SDRAM 1	OK	
SDRAM 2	OK	
SDRAM 3	OK	
SDRAM 4	OK	-
SDRAM 5	OK	
SDRAM 6	OK	
🕑 SDRAM 7	OK	
🕑 SDRAM 8	OK	
SDRAM 9	UK	۰Ĉ
Save error details Save in: CVProgram Files\CATALYST\S/ Start Memory		_

To perform a Memory check, choose the memory to be tested and click the **Start Memory Check** button. After a short time the Test result status will appear.

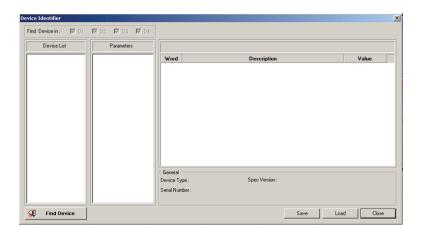
You may save the memory check result by checking the **Save error details** check box and specifying a destination file name.

# **Find Device**

You may use this utility to obtain all of the vendor specific information and detailed device parameters.



Click Tools on the main menu bar and choose **Find Device** to open the Device Identifier dialog.



#### Figure 117 Device Identifier Dialog

Click the **Find Device** button to search for connected devices. After a brief period the dialog will display all of the device information.

Device Identifier					×		
Find Device in: 🕅 D1	🗹 D2 🔽 D3 🕅 D4						
Device List Parameters		Identily Device					
D1 :SATA Device	Identify Device	Word	Description	Value			
D2:SATA Device D3:No Device D4:No Device D4:No Device		0	General configuration bit-lignificant information: 15 0 = ATA device 14-8 Related 7 0 = not removable media device 6 Obroate 53 Related 2 Response incomplete 1 Response incomplete 1 Response 0 Reserved	0C54			
		1	Obsolete	3FFF	- 1		
		2	Specific configuration	C837	_		
		3	Obsolete	0010			
		4-5	Retired	00000000			
		c	Ohenlata	0000			
Ge Find Device		Serial Nur	upe : ATA Device Spec Version : Support ATA-6 hber : VDSTV33) apacity : 74 GB , LBA 48 Capacity : 74 GB	Load Cic	50		

### Figure 118 Identified Devices

Click on a device in the Device List to display information about that device.

## **Compliance Test**

The Compliance Test consists of a set of selectable tests to verify compliance with the SATA specification.

To run a Compliance Test click **Tools** on the main toolbar and choose **Compliance Test**.

Compliance Test				×
Digital text group     Gened Device Requirements     Approchannous Span Recovery     Approchannous Span Recovery     Software Setting: Precevery     Directace Efforts Management     Phy text group	Compliance type C Device C Host Device type C Atta C Atta C Atta C AttaPi Add >> 			Capture TimeOut 12 Second
Compliance Report life C1/Program Files/Cataly	AddAl>> < <removeal< td=""><td></td><td>Browse</td><td>Device name : Device1</td></removeal<>		Browse	Device name : Device1
Saved Traces C:\Program Files\Cataly:			Browse	Save only failed test traces
No Test Name	Description	Result		Detail
				-

#### Figure 119 Compliance Test Selection

- 1. Choose the desired tests in the left pane of the dialog and click the Add>> button.
- 2. Enter a value for Capture Timeout.

Note: If a test running time exceeds the Capture Timeout value the test will be terminated.

- 3. To view failed test traces in sample viewer check, the **Automatically load** failed test traces check box.
- 4. To save the failed test traces only, check the **Save only failed test traces** check box.
- 5. When all of the desired tests have been selected click **Start**.
- 6. The test will run and after a brief period of time display the result.

	Digital te	est aroun	Compliance type GDF	2.01		
-	Gener	al Device Requirements	C Device GDF	3-02		Load Start
		Command Queuing hronous Signal Recovery	GDF			
		are Settings Preservation	C Host			Save Stop
	Phy test	ce Power Management	Device type	105		Close
±1"	Phy test	group	( ATA			
						Options
			C ATAPI			Capture TimeOut 12 Second
			Add >>			
			<< Remove			
						Device name : Device1
		real areas and the second second second	<< Remove All			Device name . [Contrast
н						
-	_					_
		<u> </u>				Automatically load failed test traces
		<u> </u>				Automatically load failed test traces into STX trace viewer
		t Ne C:\Program Files\Catalyst\SATA_460\User\Co	mpliance_Device1.rtf		Browse.	
	bliance Repor	t Ne C:\Program Files\Catalyst\SATA_460\User\Co	mpliance_Device1.nf			. View
	bliance Repor		mpliance_Device1.nf		Browse	
m	bliance Repor	t Ne C:\Program Files\Catalyst\SATA_460\User\Co	mpliance_Device1.tf	Result		. View
m	bliance Repor	Be C\Program Files\Catalyut\SATA_460\User\Coc     Coc     C\Program Files\Catalyut\SATA_460\User\Coc	n received and successfully	Result Error	Browse	View View View View View View View View
m	bliance Repor Saved Tra Test Name	(Ne CVProgram Files/Catalyst/SATA_460/User/Co CVProgram Files/Catalyst/SATA_460/User/ CVProgram Files/Catalyst/SATA_460/User/ Description Once the initial Register device for hort FIS has bee advocwided with no entry, a device that uses advocwided with no entry, a device that uses the SRS bit in the Device Control result at any in	n received and successfully stuly respond to the setting of ne and perform the software and 93 in IDENTIFY DEVICE		Browse.	View View View View View View View View
m	Saved Tra Saved Tra Test Name GDR-01	CuProgram Files/Catalyur(SATA_450UJser/Company Files/Catalyur(SATA_450UJser/Company Files/Catalyur(SATA_450UJser/Company)     Description     Once the nailed Register device to-host FIS has been been been been been been been bee	n received and successfully stuly respond to the setting of ne and perform the software and 93 in IDENTIFY DEVICE	Error	Browse.	View View View View View View View View
m	Saved Tra Saved Tra Test Name GDR-01	CuProgram Files/Catalyur(SATA_450UJser/Company Files/Catalyur(SATA_450UJser/Company Files/Catalyur(SATA_450UJser/Company)     Description     Once the nailed Register device to-host FIS has been been been been been been been bee	n received and successfully stuly respond to the setting of ne and perform the software and 93 in IDENTIFY DEVICE	Error	Browse.	View View View View View View View View
m	Saved Tra Saved Tra Test Name GDR-01	CuProgram Files/Catalyur(SATA_450UJser/Company Files/Catalyur(SATA_450UJser/Company Files/Catalyur(SATA_450UJser/Company)     Description     Once the nailed Register device to-host FIS has been been been been been been been bee	n received and successfully stuly respond to the setting of ne and perform the software and 93 in IDENTIFY DEVICE	Error	Browse.	View View View View View View View View
m	Saved Tra Saved Tra Test Name GDR-01	CuProgram Files/Catalyur(SATA_450UJser/Company Files/Catalyur(SATA_450UJser/Company Files/Catalyur(SATA_450UJser/Company)     Description     Once the nailed Register device to-host FIS has been been been been been been been bee	n received and successfully stuly respond to the setting of ne and perform the software and 93 in IDENTIFY DEVICE	Error	Browse.	View View View View View View View View

#### Figure 120 Compliance Test Result

- 7. You may save the current compliance setup for later use by clicking the **Save** button to open the Save As dialog. Assign a meaningful name to the setup and save it as an \*cst compliance file.
- 8. You may also run a previously defined setup by clicking the **Load** button and choosing a previously defined setup to run.

## **Configuration Features Status**

To get a comprehensive overview of the current configuration feature status, click **Configuration** and choose **Features status.** 

Features Status		×			
SATA Protocol Analyzer. Catalyst Enterprise Inc.					
Enable Features: SATA 1.5/3.0/6.0 gbps, X4 Analyzer Pattern Generator Analyzer CAPI Exerciser CAPI Host Emulator Device Emulator Compliance Test	Disable Features:				
Close					

Figure 121 Configuration Feature Status

# Appendix A

## **Creating a Pattern Generator File**

You may use any text editor or word processor to create a pattern generator file (\*.spg) using the following conventions:

### Key words

ALIGN, CONT, DMAT, EOF, HOLD, HOLDA, PMACK, PMNAK, PMREQ\_P, PMREQ\_S, R\_ERR, R\_IP, R\_OK, R\_RDY, SOF, SYNC, WTRM, X\_RDY, XXXX, LOOP, Enable, Disable, Host, Device, Scramble, Role, END\_OF\_FILE.

### **Comment format**

/\*Comment text\*/

### **Primitive definition format**

To add an ALIGN primitive, use ALIGN or 27.3 10.2 10.2 K28.5 To add a CONT primitive, use CONT or 25.4 25.4 10.5 K28.3

### Loop definition format

You may write a defined pattern into memory repeatedly by enabling a loop. Loop definition allows either "Enable" or Disable". To enable looping use: Loop=Enable

### Scramble definition format

Scramble definition allows either "Enable" or Disable". To enable scramble use: Scramble=Enable

### **Role definition format**

To specify SATA hardware role: Role=Host or Role=Device

### **END\_OF\_FILE definition**

A pattern generator file must include END\_OF\_FILE as the last statement in the file.

Figure 122 illustrates a typical Pattern Generator file.

	ice Bits*/	
/*Device*/ 23.2 23.2.21.5 23.2 23.2.21.5 25.4 25.4.10.5 XXXX XXXX	к28.3	/*X_RDY*/ /*X_RDY*/ /*CONT*/
XXXX XXXX XXXX XXXX 23.1 23.1 21.5 00 50 40 A1	к28.3	/*SOF*/
E0 00 00 00 21.6 21.6 21.5 24.2 24.2 21.5 24.2 24.2 21.5 25.4 25.4 10.5	к28.3 к28.3	/*EOF*/ /*WTRM*/ /*WTRM*/ /*CONT*/
XXXX XXXX 21.5 21.5 21.4 21.5 21.5 21.4 25.4 25.4 10.5 XXXX	к28.3	/*SYNC*/ /*SYNC*/ /*CONT*/
XXXX XXXX Role=Device Loop=Enable Scramble=Disab END_OF_FILE	le 	

Figure 122 Sample Pattern Generator File \*spg

# Appendix B

# **WAN Operation**

WAN connected operation is supported. Contact factory for details of operation.

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