

XGIG EXPERT

Quick Identification and resolution of SAN Problems with Xgig Expert

BENEFITS

- Troubleshoot SAN problems without expert level protocol knowledge.
- Simplify and shorten the process of trace analysis.

Finisar's Xgig Expert software is a unique solution that enables engineers to quickly troubleshoot and resolve SAN related problems and issues without having expert level SAN protocol knowledge. Expert supports the Fibre Channel, Ethernet, iSCSI and FCIP protocols.

Expert works in conjunction with Finisar's award-winning Xgig Analyzer platform. Once SAN communication traffic has been captured by Xgig, Expert systematically examines the data and reviews it, frame by frame. Problems uncovered are reported and recommendations are offered on what corrective actions to take to resolve the problems. This feature benefits even the most experienced SAN engineers. Everyone would agree that raw traces are very difficult to interpret. Expert allows engineers to view trace data and identify problems in a visual and user-friendly way.

The popularity of the Xgig system is growing and the SAN industry is taking notice. Frost & Sullivan awarded Finisar its 2004 Award for Market Leadership in the Fibre Channel Test Equipment market. Most SAN devices shipped today by storage and switch vendors are developed, tested and verified with Finisar equipment.

The rest of this document reviews the commonly used functions found in Expert. Also see how one leading company is using Xgig with Expert to dramatically cut development time and get products to market quicker.

EXPERT IN DEPTH—TRACE ANALYSIS MADE SIMPLE

Expert is an important component of the Xgig Software Suite. Used in conjunction with TraceView (figure 1), the application used to review trace data, Expert provides a unique, robust set of debugging and analysis tools that seamlessly interact with and expand the functionality of the Analyzer.

Expert augments the original traces captured by Xgig automatically. For example, if a trace contains valid SCSI exchanges, the trace is augmented with a single line event that represents the completion of the entire SCSI exchange. This event includes vital exchange statistics and metrics, some of the user data, the SCSI status and the SCSI Sense Data where applicable.

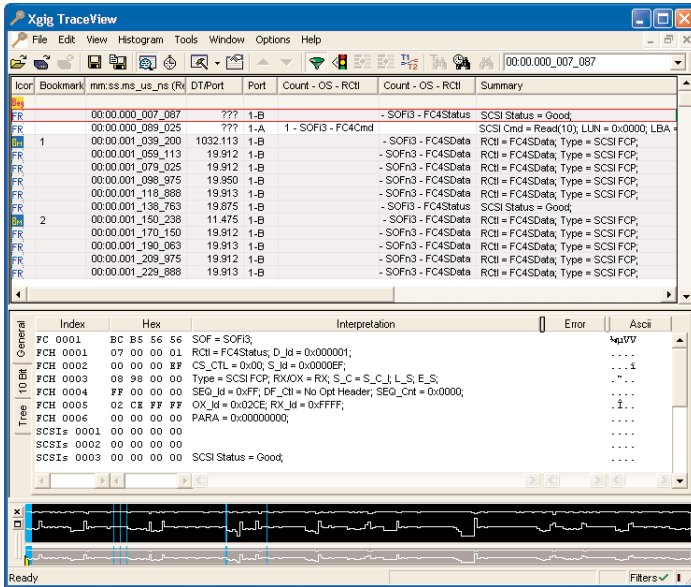


Figure 1

Expert also automatically detects symptoms of network problems, provides the user with graphical views of the problems and recommends corrective actions all within the flow of TraceView traffic information. It is a threshold-based system so it can be tailored and fine-tuned to any SAN network environment.

FEATURES & BENEFITS OF EXPERT

- Performance analysis
- Detection, organization and presentation of symptoms
- User customizable probable causes allow for environment-specific knowledge and speedier problem solving
- Improved insight into overall network behavior resulting from Application Response Time Test

Expert can also be customized to user specific environments by inputting environment specific information such as naming conventions.

DEBUGGING, TRACE REPORTING, AND PERFORMANCE ANALYSIS

At the core of the Expert tool set are debugging, reporting, and performance analysis tools. These tools are primarily designed for SCSI (FCP-SCSI and iSCSI) analysis and the layers that transport SCSI data on Fibre Channel and Gigabit Ethernet links.

Expert processes collected trace data, rebuilding the embedded Upper Layer Protocols to allow for detailed analysis of all protocols present within the trace. Expert then presents two main views of the data: Debug View and Report View. Each view allows for detailed error, behavioral, and statistical analysis of occurrences within the trace to facilitate analysis.

DEBUG VIEW

The Debug View is the main data display. It provides a topological layout of the network and a list of expert errors and warnings found in the trace. There are over 680 implemented error, warning and informational events covering everything from protocol violations to signaling issues to flow control warnings to timing errors. Expert can also identify the offending initiator and target associated with each error or warning.

Debug also has a time-based graphical view of the trace. Nearly 800 different metrics can be added to the graph to permit for analysis of behaviors and performance of a device or devices across time. Additionally, the user can drill down and zoom into specific areas of the trace.

Expert's Debug view can take you quickly to the root of performance issues. Critical performance metrics are continually collected and shown in easy to understand graphs. For example, I/O's per second is just one of the metrics collected. The information retrieved permits granular identification of performance issues all the way down to an individual LUN.

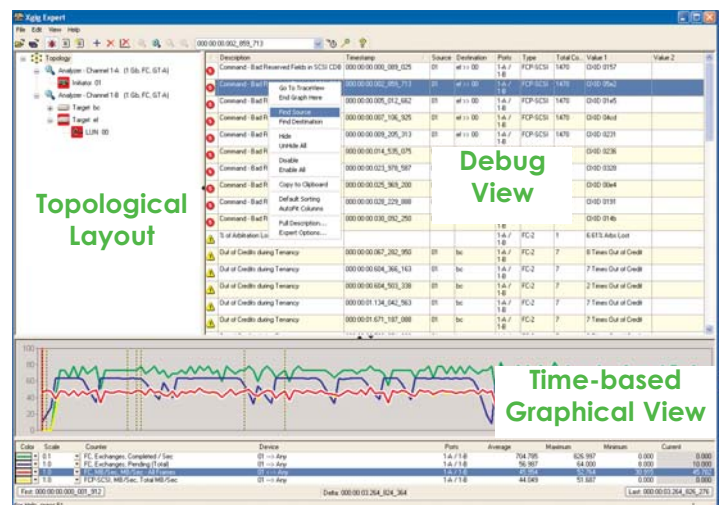


Figure 2: Expert's Debug View

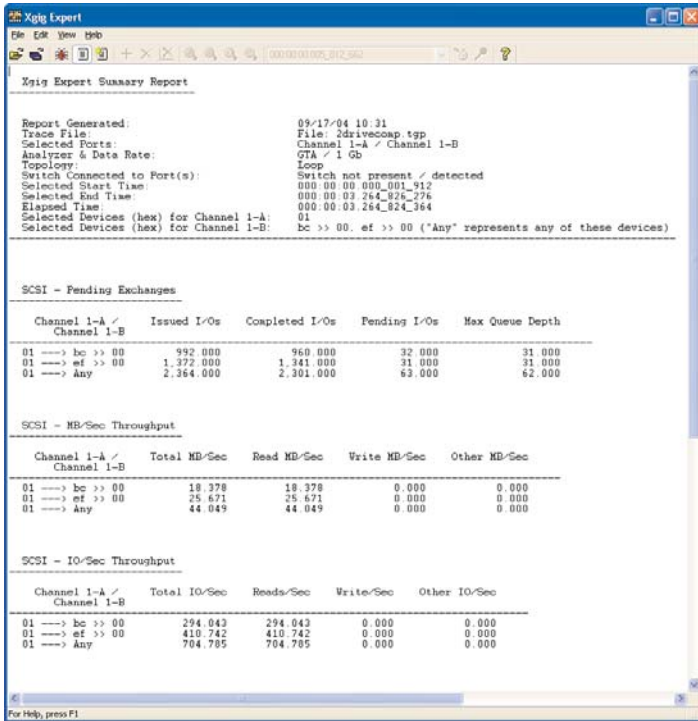


Figure 3: Expert's Report View

REPORT VIEW

The Report View (see figure 3) presents a text-based report detailing performance metrics or pending exchanges in the trace. The information is collected as an entire analysis of the whole trace without the sample breakdown; values reported in Report View better represent the entire trace (or current zoom).

You can use the Report View values and counters to obtain a quick overview of the entire system. They can also be used to check the current level of performance and health, compare performance among Initiators or Targets to find poorly performing components and obtain lists of pending exchanges for powerful debugging capabilities. Reports can be exported to text files and selected sections of reports can also be copied and pasted into applications.

A simple technique for finding hidden behaviors and failures involves the creative use of Report View. Creating two reports and comparing them can be useful. The first report details the time before the error or trigger occurred and the second report details the time after the error or trigger. Another use for Report View is to simply take a trace as a baseline reference and compare it to subsequent traces to identify

anomalous or odd behaviors. This works well for testing and regression of firmware, microcode, drivers, etc.

There are four types of reports that can be generated including a summary report which contains a set of basic statistics for characterization of I/O activity in the trace for ANY Protocol.

XGIG PROTOCOL ANALYZER—NETWORK TRACE HARDWARE

The Xgig Protocol Analyzer captures network traffic between SAN storage devices, servers, switches and users at wirespeeds. The data is then time-stamped, ordered and loaded into the Xgig buffer. Version 2.5 also supports blade servers, high port counts, and other advanced features of high-bandwidth speed networks.

FEATURES AND BENEFITS OF THE XGIG ANALYZER SUITE

- Multi-Protocol Support: 1, 2, 4 and 10 Gbps Fibre Channel and Gigabit Ethernet
- Supports up to 8 Users Concurrently
- Real-time, Easy-to-Read, User Definable GUI with Unified Views
- Automatic Visualization of the Network Layout
- 4 or 2 Port SFP-based Analyzer Blade Options to Fit Unique User Needs

XGIG INTEGRATED SOFTWARE SUITE

In addition to Expert, Xgig hosts other software programs that help the user analyze and repair errors or failures occurring in their network: Xgig Trace Control sets up and runs the protocol analyzer to allow the data capture. Xgig Performance Monitor displays the real time performance and error parameters passing through the analyzer. And Xgig TraceView allows users to view and analyze captured traces. Users can display captured data and view it as histograms, traffic flow, or by single frame content. Users can view current data, or data saved in previous sessions. Other tools help users sort, manage, and store traffic snapshots.

Xgig software can also analyze data from Fibre Channel, FCP-SCSI, Gigabit Ethernet, IP, TCP, iFCP, FCIP and iSCSI traffic captured with Finisar GT, GTX, and Xgig Protocol Analyzers. Traces from many Gigabit Ethernet topology or Fibre Channel topology are supported.

EXPERT IN ACTION: QLOGIC USES XGIG AND EXPERT TO DELIVER PRODUCTS TO MARKET FASTER

Qlogic is a leading manufacturer of host bus adapters (HBAs) for SANs. The company was recently ranked number 25 on Forbes' Best 200 Small Companies and number 20 on Fortune's 100 Fastest Growing Companies.

For the Qlogic's firmware team working on iSCSI-based HBAs design and development, one of the tools of choice for analysis work is Finisar's Xgig Analyzer with Expert software. As an acknowledged leader in the SAN Test field, Finisar provides a variety of products that offer greater visibility into network traffic such.

At its firmware test lab, Qlogic has implemented more than 10 Xgig analyzers in their iSCSI development and test network. The network consists of initiators connected to iSCSI targets through a collection of switches and hubs. It models a real-world Ethernet based SAN with many segments.

Hugo Oregel, a firmware engineer, explains the benefits of using Xgig. "When we are developing firmware code for our HBAs we have a need to quickly check that a protocol or a feature has been implemented correctly. Without the proper tools, this can be a terribly laborious and difficult task. But with Xgig, once we introduce the code changes we can immediately check to see if these changes resulted in any network problems. The GUI is easy to use and understand and if there are problems, Xgig/Expert will immediately tell us what and where the problem is on its informative GUI displays."

"Even when we suspect problems between a target device and our HBA, the first thing I do is to run a trace on Xgig and then open Expert," continues Hugo. "When we look at the trace in Expert, we know exactly what is going on. If there are errors, such as an iSCSI violation, it will show up in red on the GUI and its exact location is highlighted. We can also retrieve the IPs address to identify the offending device or devices. We know what the packets our HBAs send out should look like, so we can go in and compare based on the Expert views."

Before Xgig, several software based analyzers were tried. Quickly Hugo and his team realized that such tools did not offer them important features such as wire-speed capture and monitor capabilities; they would dropped packets or were unable to reassemble captured ones properly. This simply was not acceptable. Since switching to Xgig, Hugo and his team has never looked back.

In addition to offering world class products, Finisar also provides first rate support. "Whenever we have technical issues, Finisar is there to assist us. We have been using Xgig for nearly two years and it is a comfort to know that we have a responsive partner in Finisar."

The benefits of using Xgig for Qlogic are many. But most importantly it reduces development time allowing them to get products to market quicker; giving them a competitive edge.

CONCLUSION

Xgig's expert-level analysis and debugging facilities are unsurpassed and unrivaled in the SAN analysis industry. Instead of spending hours sorting through bit and byte-level data, Xgig Protocol Analyzer's high-level views take engineers to the root-cause of performance and network issues allowing them to focus on problems and their resolutions.

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