VIAVI

Xgig® 40G Ethernet Protocol Analyzer

The Viavi Solutions™ Xgig 40 G Ethernet analyzer is a versatile, state-of-the-art solution for monitoring and analyzing live traffic of a wide range of Ethernet protocols including FCoE, FIP, data center bridging (DCB), IEEE802.1Qx, TCP/IP, iSCSI, RPC/NFS, SMB/CIFs, AoE, iWARP, and RoCE.

The hardware is based on the Viavi high-end Xgig 5000 platform and the 8-port 10 G Ethernet blade that can be configured as 2-port for 40 G Ethernet. The chassis hosts up to four such blades and the analyzer uses a comprehensive suite of analysis software applications to provide a unique platform—a platform that offers the advanced multi-protocol, multi-application, and multi-channel capabilities users need to troubleshoot high-speed storage and networking applications.

Xgig speeds the resolution of network impairments and includes an extensive range of capabilities to proactively prevent performance impairments and maintain access to mission-critical applications and data. With the ability to capture 100 percent of traffic at full line rate, triggering enabled across all protocol layers and anywhere within layered frames, and extensive automated post-capture expert analysis, Xgig gives users the deep visibility they need to design and verify new technologies and applications, monitor network performance, and ensure system reliability.

Data centers are accelerating the adoption of FCoE technology. Most applications today are based on 10 G Ethernet. However, network equipment manufacturers have seen rising bandwidth demand, first in uplinks and then quickly pushing to the edge, both of which are the key driving factors of next-generation FCoE products that are based on 40 G Ethernet. The Viavi Xgig 40 G Ethernet protocol analyzer is the key tool for enabling next-generation FCoE networks.

Viavi endeavors to be first-to-market and provide bulletproof solutions for early adoption of 40 G Ethernet technology. The analyzer is specifically designed to simplify the identification, location, and resolution of difficult protocol issues on 40 G Ethernet networks, helping customers dramatically reduce the design and test cycle and the time-to-market for the next-generation products. Our deep knowledge and experience with protocols guarantees the highest-quality products.

Key Benefits

- Enables capital expense sharing with 10 G test platform
- Provides industry's most powerful trace capabilities and most trusted FCoE, DCB and iSCSI protocol analysis
- Accelerates development with patented search and filtering capabilities
- Provides the capabilities of large-scale network analysis: multi-nodes, multi-hops and inter-switch-link (ISL) trunk
- Supports Wireshark trace format

Key Features

- Accelerates design and manufacture through accurate, fast, and comprehensive analysis of next-generation 40G FCoE storage and networking equipment
- Validates crucial development, integration, and interoperability between mixed protocol and legacy SAN environments

FCoE Support

The powerful capabilities of the Xgig analyzer are available for the most recent standard proposals for FCoE. The Xgig multi-protocol platform provides a unique mechanism to monitor and analyze the same traffic passing through different transportation protocols by uniting the different analyzer port identities under the same time sync domain. For FCoE networks where the Fibre Channel (FC) network connects to the Ethernet network and merges with other types of traffic, Xgig is the ideal tool for analyzing the migration process from FC to Ethernet.

Xgig lets users measure the impact on performance of native FC networks in a converged environment and is the unique tool able to address FCoE protocol issues such as real-time monitoring and flagging CRC errors on both the Ethernet packet and embedded FC frame. In addition, Xgig Expert software provides extensive network architecture and performance information about the converged network environment including comparison of FCoE network to native FC in order to assist the evaluation of the effectiveness of adopting new technologies. Abundant Expert metrics let developers gain a complete visibility of network behavior and quickly resolve FCoE-related issues.

Xgig Hardware

Xgig enables multi-speed support on its 10 G 8-port blade. Using a QSFP+ to SFP+ fan-out cable, the 40GBase-SR4 QSFP+ interface can be fanned out to 8 SFP+ simplex interfaces. The 8-port 10 G blade is therefore converted to a 2-port 40 G Ethernet interface. With the new addition, the blade now supports 10 G and 40 G Ethernet.

Figure 1. QSFP+ to SFP+ fan-out cable

Other hardware features include:

- multimode optical interfaces with a transmission wavelength of 850 nm.

- analog pass-through data tapping methods up to 8 GB per port trace buffer.

- maximum time-sync grouping with time synchronization of up to 32 ports under one domain.

- high time stamp resolution for unparalleled accuracy.

- a reference clock in/out connection to synchronize with other testing systems such as oscilloscopes for analog tests including eye diagrams and jitter measurements.

The Xgig Integrated Suite

The Xgig analyzer platform streamlines resolution of events that impair network performance, thus enabling users to design, implement, test, and evaluate 40 G Ethernet components and subsystems with a high degree of visibility and control. The Xgig integrated suite is composed of four applications:

1. **TraceView** — to view the frames, idles, ordered sets, and any other transmission word captured

2. **TraceControl** — to capture trace files and trigger on specific conditions

3. **Expert software** — to highlight and diagnose problems and performance

4. **Performance Monitor** — to monitor the traffic on each link and provide statistics

TraceView

TraceView captures the viewing application. While most Ethernet analyzers are only able to capture good frames and drop badly formed frames or any inter-frame transmission words, the Xgig analyzer captures every word on the wire, good or bad. TraceView displays frames, ordered sets, idles, and any other transmission words and lets an engineer/technician debug behaviors that other analyzers hide.

Figure 2. TraceView Exchange View

Figure 3. TraceView detailed view links to protocol standards

TraceView decodes over 300 protocols over Ethernet with an unmatched depth and focus on SAN-related protocols like FCoE, iSCSI, and DCB. Viavi is always the first to implement SAN protocol decodes from draft specifications, helping network-equipment designers debug and release their equipment at different stages. TraceView also detects and decodes multiple versions of the same protocol to help debug issues between network devices implemented at different stages of the specification.

TraceView uses the most advanced and patented decode engine in the industry. It displays the full description and a protocol specification hyperlink for every field decoded. All the protocol specifications are available through a single click which makes the Xgig analyzer the best tool to learn about protocols or verify protocol behaviors against specifications. Protocol definitions are stored in a file that can be fully customized by any user with the help of the Graphical Protocol Decode Kit. This way, users can implement definitions for their own proprietary protocols when needed.

TraceView includes a powerful search and filter engine that lets you highlight specific conversations, exchanges, protocols, and network anomalies. TraceView also allows you to quickly toggle between different views of the same trace:

• all frames, ordered sets, idles, and transmission words captured on all ports
• just frames
• just one port or any combination of ports
• just exchanges with frames underneath each exchange
• just frames for one of the protocols
• frames between a specific source/destination pair
• frames matching user-defined filters.
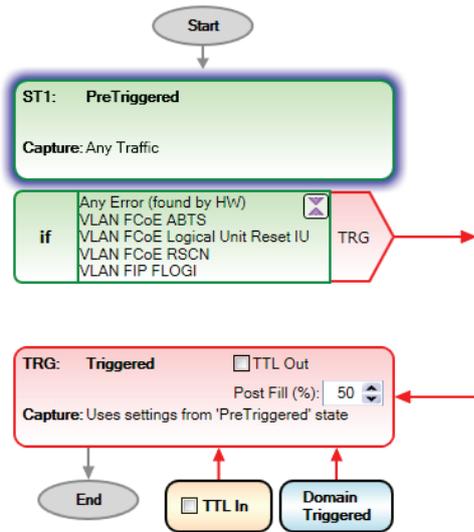
TraceControl

Figure 4. TraceControl trigger/filter configuration

TraceControl controls Xgig hardware and captures trace files. It allows the use of complex filter and trigger conditions. It provides a comprehensive library of frames, ordered sets, and error conditions to choose from while defining filter and trigger criterions. The library includes patterns for a wide range of protocols including FCoE, FIP, PFC, ETS, LLDP, DCBX, ARP, iFCP, FCIP, IP, IPv6, VLAN, iSCSI, TCP, UDP, and RDMA.

TraceControl also offers:

• extensive live traffic monitoring capabilities providing extensive data statistics, link status, and frame and link error counts. Acting as a performance monitor, the real-time data is displayed in graphic and list formats.
• internal and external cross triggering for complete trace-capture flexibility.
• arm-sharing across all ports in a link to enable multi-protocol test scenarios.

Expert

Expert is a sophisticated analysis and troubleshooting software tool for storage-centric protocols. Expert provides a unique and robust set of debugging and analysis capabilities, including automatic sorting through millions of events to identify performance, upper-layer protocol, and logical and physical-layer issues. In addition, 40 G Ethernet protocol violations, interoperability problems, performance issues, and errant behaviors are flagged and reported.
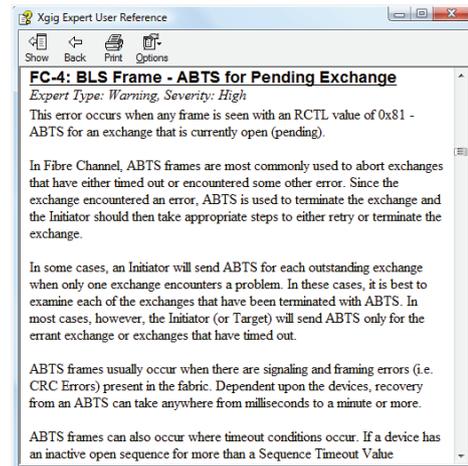

Figure 5. Symptoms detected by Expert

Figure 6. Expert contextual help

Viavi Expert analysis supports more than 1800 metrics/symptoms and 1200 analysis functions across protocols. Expert's ability to display symptoms and provide help on those symptoms is your way to get insights based on 20 years of experience at testing network equipments at the Viavi Medusa Labs facility.

The protocols supported by Expert include SCSI, iSCSI, FC/FCoE, FIP, DCBX, Ethernet, IP, IPv6, UDP, TCP, FCIP, iFCP, RPC/NFS, and SMB/CIFs. Expert provides extensive capabilities of analyzing network architecture and performance information of FCoE network environments. Abundant expert metrics help developers test and debug new FCoE networks faster and more efficiently.

In addition, Expert is a unique intelligent solution for analyzing sophisticated network scenarios:

- cross-port analysis that lets Expert track frames as they traverse the network when captured across multiple analyzers. With this feature enabled by default, Expert provides critical latency timing statistics through network hopping and identifies several network behavioral errors, including out-of-order frame delivery and potential frame losses, modified end of frame (EOF) values, latency thresholds, and thresholds for pending, queued frames within the network.

- analysis of ISL and trunk lanes between switches. Expert is capable of analyzing trunks of up to 16 lanes. Expert enables grouping of any set of ports into a trunk link even after the capture is taken, so trunk ports need not be identified ahead of time.

- Expert's report comparison feature provides a distinctive method for comparing the performance between networks such as native FC networks and FCoE networks to enable developers to verify and validate the effectiveness and performance of various technologies.

Xgig Decoding Protocol List

FCoE/ Fibre Channel
FC-FS-2, FC-LS, FC-GS-6, FC-SW-5, FC-VI, FCP-4, FICON, VSAN, FC-AE, FC-AE-ASM, FC-AE-FCLP, FC-AE-RDMA, FC-AE-1553, FC-AE-VI, FC-SATA, FC-AV

Ethernet
FIP, IEEE 802.1AB: LLDP, IEEE 802.1Q: GVRP, MSTP, VLAN, PFC, ETS, DCBX, DLC, ISL, LLC, SNAP, ARP, IPX, NCP, SAP, IPXRIP, NETBIOS, IBMNB, MPLS Label, PPPoE Discovery, PPPoE Session, LCP, CHAP, MPCP, IP, IPv6, AoE, IEEE 802.1D: BPDU, GARP, GMRP, RSTP, IEEE 802.2, IEEE 802.3, IEEE 802.3x, IEEE 802.5, IEEE SNAP, Loopback, SNAP & LACP, IEEE 802.1D, IEEE 802.11, iWARP, RoCE

IP
ICMP, ICMPv6, IGMP, ESP, TCP, UDP, AH, OSPF, DVMRP, MOSPF, PIM-DM, PIM-SM, RSVP

TCP/UDP
iSCSI, FCIP, iFCP, iSNS, LDP, HTTP, SSH, NFS, RPC, RPCBIND, NBSS, Mount, DHCP, PORTMAP, MPA, DDP, RDMAP, iSER, SMB2

TCP/IP Suite
ARP, BGP (Version 4), BOOTP, CharGen, Discard, DNS, Echo, EGP, Finger, FTP, GGP, Gopher, HTTPS, ICMP, Ident, IMAP, LDAP, MIME, Mobile IP (A11), MOUNT, MPLS (v1), NetBIOS, NETCP, NIS, NNTP, NTP, OSPF, PH, POP3, RARP, RIP (Version 2), RMCP, SLP (v2), SMTP, SNMP (v1, v2, v3), TELNET, TFTP, Unix Remote Services, VRRP, WebNFS, WhoIs, XDMCP, XDR, Xwindows RPC/NFS, SMB/CIFS

SCSI
SPC-4, SPC-2, SAM-4, SSC-3, SBC-3, SMC-3, SCC-2, ADC-2, SES-2, TCG

IPV6
DHCPng, ICMPng, IDRng, IPng, OSPFng, RIPng, RSVPng

Specifications

Mechanical	
Dimensions (Blade)	
Length	420 mm (16.5 inches)
Width	162 mm (6.4 inches)
Weight	1.36 kg(3.0 lbs)
Indicators (Green, Yellow, Off)	
In Use, Link, LED x (application-specific), LED y (application-specific)	
Connectors	
8 SFP+ connectors (optics only)	
SMA	
Reference Clock Out/In	
Accessories	
10GE/FC SFP+ transceivers (SR)	
Multimode MPO-LC simplex fan-out cable	
Minimum System Requirements	
Windows 2000, Windows 2003, Windows XP, or Windows Vista operating systems	
Small Configuration (sync group of up to 8 ports): Pentium III, 800 MHz, 512 MB RAM min/1 GB preferred, 40 GB disk space, 100/1000 Mb/s Ethernet	
Large Configuration (sync group of over 8 ports): Pentium 4 with 2 GHz or faster processor, 1 GB RAM min/2GB RAM supported, 80 GB disk space, 1000 Mb/s Ethernet	
Trace Buffer Size	
Maximum	
16 GB per blade	
Software Features	
TraceControl	
Most complete trigger library	
Multi-level triggering	
Arm/Trigger from any layer of data	
Trigger on either CRC in FCoE frames	
Real-time monitoring	
Automation support	
TraceView	
100% configurable spreadsheet	
Powerful trace filter/search tools	
Customizable decode support	
Exchange view and layered view	
PerformanceMonitor	
Live traffic monitoring and statistics	
Extensive views	
Real-time monitoring dual CRCs in FCoE frames	
Expert	
>1800 metrics library and error conditions	
Specialized functionality for FCP-SCSI, FCIP, iFCP, FCoE, FIP, IP, IPv6, TCP, UDP, iSCSI, RPC/NFS, SMB/CIFS	
Performance report and comparison	
Cross-port analysis	
Trunk link analysis	
RPC/NFS, SMB/CIFS	