

# Unleash the Full Potential of Bus Doctor™ with Xgig® Expert Analysis Software for Serial Attached SCSI (SAS) and Serial ATA (SATA)

The Bus Doctor RX from JDSU is a flexible and scalable modular bus protocol Analyzer providing cost-effective troubleshooting across a wide range of protocols, including ATA, SCSI, SAS and SATA. Many of our customers are already familiar with the Bus Doctor's advanced debugging capabilities such as large trace buffers, 4 nanosecond capture resolution, and patented hardware searching features capable of locating data and events in just seconds. However, some of Bus Doctor's most powerful features remain unutilized because users aren't aware they are available.

This short whitepaper will describe how users of Bus Doctor can significantly increase their productivity by taking advantage of Xgig Expert software. Simply put, Xgig Expert will revolutionize the way you design, verify, and troubleshoot SANs with your Bus Doctor Analyzer. Instead of spending hours sorting through bit- and byte-level data, Xgig Expert allows you to focus on root causes of performance and network problems and quickly resolve them. Not only does Xgig Expert automate many time-consuming troubleshooting tasks while performing comprehensive analysis of network traffic, it is free to existing customers.

## Xgig Expert Software for Bus Doctor

Xgig Expert is the JDSU premier and unique analysis software designed to exploit the extensive capabilities of the Xgig testing platform. JDSU realized that Xgig Expert would be of tremendous value to Bus Doctor users as well, and has made this valuable analysis software available for use with the Bus Doctor platform for accelerating troubleshooting of SAS and SATA applications. There are other products that claim similar capabilities but only the JDSU Expert analysis software is used by virtually every single storage equipment manufacturer – from HBA vendors to disk drive companies to storage array developers. The software is available at no additional cost to Bus Doctor users.

Xgig Expert enables technicians to troubleshoot a myriad of SAN problems without having to first acquire an expert level of knowledge about network protocols. Once SAN communication traffic has been captured by Bus Doctor, users can launch Xgig Expert (see figure 1) locally within the Bus Doctor testing environment to systematically examine trace data and analyze it, frame by frame. Expert uncovers problems and offers recommendations on corrective actions to take to resolve them.

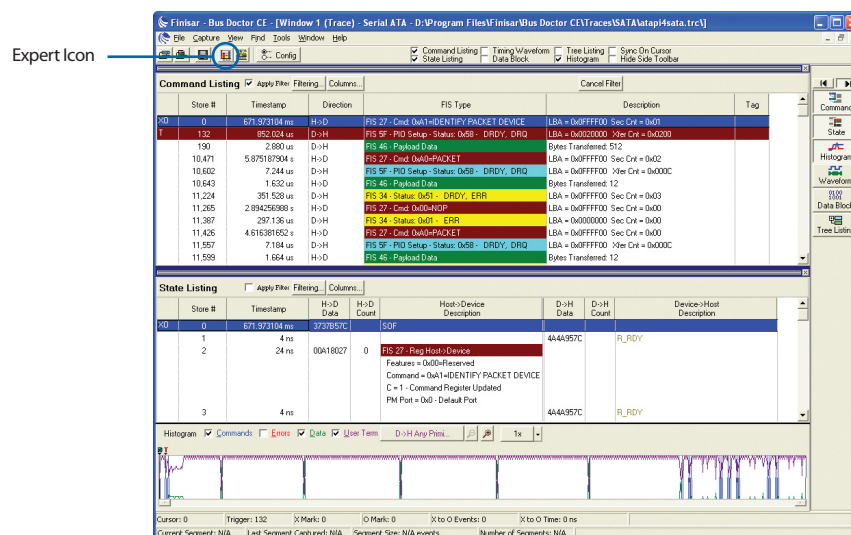


Figure 1: Expert Analyzer Capable Bus Doctor GUI

*Expert:*

- Simplifies and shortens trace analysis, troubleshooting, and problem resolution by taking raw trace files and presenting them in a visual and user-friendly manner that facilitates faster problem identification and resolution
- Calculates and reports on more than 1800 metrics
- Automatically checks against and reports on more than 1200 Expert symptoms
- Provides extensive Help files with detailed explanations of the issues identified by Expert, complete with suggested solutions for achieving problem resolution
- Offers vivid case studies summarizing extensive field experiences of JDSU professionals. These case studies can serve as a useful tutorial, providing guidance to users in understanding real problem scenarios and describing ways to improve debugging proficiency

### **Trace Analysis Made Simple**

Troubleshooting SANs can be a complex process that requires intimate knowledge of communication protocols. Xgig Expert simplifies trace analysis by automating detection of typical symptoms of common network problems as well as calculation of key performance metrics so users don't have to become familiar with many of a protocol's intricate details.

Xgig Expert also augments the traces captured by Bus Doctor and provides a unique, robust set of debugging and analysis tools that seamlessly interact with and expand the functionality of the Analyzer. 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 SAS exchange. Users are also provided with vital exchange statistics and metrics, as well as the appropriate user data.

*Expert provides:*

- Extensive performance analysis capabilities
- Detection, organization, and presentation of potential problem symptoms
- Threshold-based problem detection that can be tailored and fine-tuned to any SAN network environment
- User-customizable probable causes enabling environment-specific knowledge to be applied to problem analysis, resulting in faster problem resolution
- Improved insight into overall network behavior resulting from Application Response Time Testing
- Easy-to-understand results based on user-specific information such as naming conventions

### **It's All in How You Look at the Data**

Xgig Expert offers several views which assist users in identifying problems (Debug View), locating problem sources (Topology View), tracking potential performance issues and other problems (Graph View), and encapsulating results utilizing a comprehensive set of ready-made reports (Report View).

#### ***A – Debug View***

The primary data display mode, Debug View highlights Xgig Expert errors and warnings found in the trace. Debug View provides access to more than 1200 errors, warnings, and informational events covering everything from protocol violations to signaling issues to flow control warnings to timing errors.

#### ***B – Topology View***

Topology View provides a graphical layout of the drives and hosts that make up the SAN and where they are located in relation to each other. From this view, Expert is able to quickly identify the offending Initiator and Target associated with each error or warning.

### C – Graph View

Xgig Expert Graph View exposes the root of performance issues quickly, efficiently, and accurately. Critical performance metrics are collected and calculated continuously, then displayed in easy-to-understand time-based graphs. More than 800 different metrics are available, permitting deep analysis of performance and behaviors of a device or devices over time. Additionally, users can zoom into specific areas of the trace to drill down and speed identification of specific performance problems. For example, Graph View can provide up-to-date measurements of I/Os per second. The availability of such information permits granular identification of performance issues all the way down to the individual LUN (Logical Unit Number). Users are also able to quickly identify problems such as imbalances when load-balancing as well as highlight inefficiencies such as links that are underutilized.

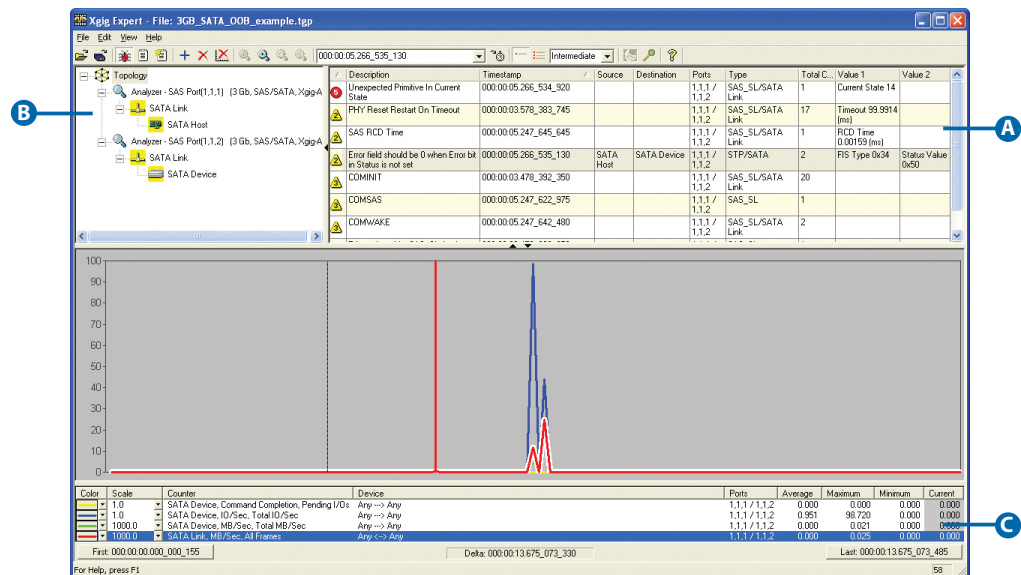


Figure 2: Debug View showing Debug, Topology, and Graph views

### Report View

Xgig Expert Report View creates extensive reports detailing performance metrics or pending exchanges in the trace. The information presented is based on an analysis of the entire trace without sample breakdown. Reports can be exported to text files and selected sections of reports can also be copied and pasted into applications.

Through Report View, users have access to a comprehensive set of reports providing critical information for optimizing network performance and even developing firmware. For example, users can make changes to the network and quickly evaluate any changes in overall performance. Report View values and counters can also be used to compare performance among Initiators or Targets to locate poorly performing components and create lists of pending exchanges.

Users can also locate hidden behaviors and failures by creating multiple reports both before errors or triggers occur as well as after and comparing the results. Alternatively, Report View can compare a base-line referenced trace to subsequent traces to identify anomalous or odd behaviors. This technique is particularly useful for testing and regression of firmware, microcode, drivers, etc.

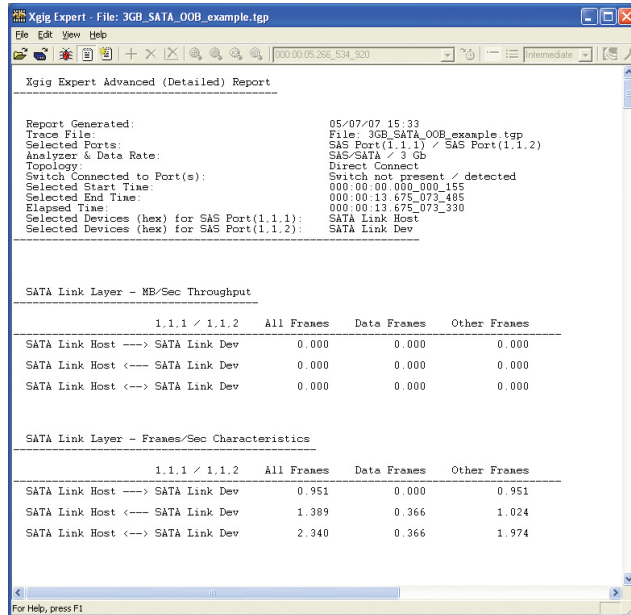


Figure 3: Report View

### Unleashing the Full Potential of Bus Doctor

Xgig Expert Analysis Software, built upon a foundation of over 100 man-years of SAN troubleshooting experience, provides expert-level analysis and debugging capabilities that are unsurpassed and unrivaled in the SAN analysis industry. Engineers no longer need to possess expert level SAN protocol knowledge or spend hours tediously sifting through protocol bits and bytes. With Xgig Expert, they can quickly identify, locate, evaluate, and resolve performance and network problems, reducing troubleshooting complexity and increasing productivity.

Troubleshooting with the Bus Doctor Analyzer without using the JDSU Xgig Expert Analysis Software is like debugging with your eyes blindfolded. If you haven't tried Xgig Expert, you can download it today from our website. You can also download the Bus Doctor trace viewer software from our website. Alternatively, you can contract your local JDSU representative for more information.

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