

## Xgig High-Density 10 G Ethernet/FCoE Load Tester



### Key Features

- Offers industry's highest port density (32 ports in a 3U chassis) and low per-port cost
- Accelerates development and benchmarking of network devices with the most comprehensive suite of protocol test tools in the industry
- Flexible traffic-pattern generation at and above full line rate with thousands of streams, pending exchanges, and error-generation capabilities
- Extensive statistical reporting with error counters
- Complete test automation assisted with TCL and C APIs
- Accelerated benchmarking verification with automation test applications according to RFC industry standards
- Custom frame generation and analysis
- Capable of frame captures

### Applications

- Verify performance, reliability, and interoperability of network adapters, switches, and routers
- Perform complete protocol-specific testing for converged networks including storage applications, DCB networks, and LAN Ethernet
- Configure a variety of FCoE topologies in combination with FC SAN
- Verify DCB implementations include PFC test, ETS test, and DCBX verification
- Emulate VN\_Port, VE\_Port, and FCF functionalities

With the versatile Xgig High-Density 10 G Ethernet/FCoE Load Tester, JDSU brings its industry-leading SAN testing expertise to LAN and converged LAN/SAN network environments. As link speeds increase, switch density increases as well and developers need the tester's high port density to simplify performance verification and benchmarking. Using the most comprehensive suite of protocol test tools available today to stress-test the network with traffic at and above the maximum legal data rate, developers can quickly verify the reliability and performance of 10 G converged Ethernet network equipment. In addition, the tester's dramatic flexibility eliminates complex test setups comprised of expensive servers and storage arrays. It enables constructing fully-meshed data communications topologies, generating configurable traffic loads, and monitoring both transmitted and received data streams. With its extensive traffic-generation capabilities, high port density, and intuitive GUI interface, the tester simplifies testing of even the most complex network topologies as well as reduces total cost of ownership. It is the ideal tool for 10 G Ethernet and unified fabric and switch performance, data integrity, robustness, flexibility, scalability, and interoperability testing.

## Overview

The Xgig High-Density 10 G Ethernet/FCoE Load Tester is a flexible, modular test solution offering from 8 to 32 ports in a single 3U chassis. With eight powerful traffic profile engines generating up to 1024 streams per port, developers can transmit configurable traffic patterns to emulate extreme traffic conditions and test system robustness. Each port has a buffer for capturing control and data frames, and the tester alerts users immediately to any data-stream errors. Protocol-aware support for emerging data center bridging (DCB) and Fibre Channel over Ethernet (FCoE) technologies lets the tester verify the performance and reliability of converged Ethernet networks. An intuitive GUI interface simplifies test configurations, and users can view comprehensive traffic statistics either per stream or per physical or virtual port using an intuitive spreadsheet format that facilitates the fast identification and resolution of network issues. In addition, users can automate complex testing processes through scripts using the tester's application programming interfaces (APIs).

## Complete Functional and Performance Testing

The tester's wide range of capabilities lets developers test both the control (functional) and data (performance) planes of network applications. Supported control features include DCBX interoperability testing, flexible FCoE initialization protocol (FIP) compliance testing to T11 and pre-T11 standards, complete VLAN discovery and tagging capabilities, FCoE virtual port emulations of VN\_port, VE\_port, and VF\_port, configurable IP addresses and TCP sessions, and special tests such as fiber-pull recovery, failover, and Flogi.

The tester's performance capabilities encompass Layer 2-3 Ethernet protocol testing, enabling complete functional verification to test network switching, routing, and virtualization using advanced FCoE, TCP, and IP generation. Features include line-rate traffic blasting, mixed traffic classes, error generation, variable frame sizes, and traffic bursting. The tester also automatically captures and calculates a variety of key performance metrics including switch throughput, latency, dropped packets, and frame errors.

## Comprehensive Statistics

Traffic statistics provide developers with key insights into switch performance and whether any system impairments or issues are pending. The tester monitors both received (RX) and transmitted (TX) traffic (see Figure 1), automatically making comprehensive statistical information available through a variety of spreadsheet pane views. On the TX side, port-based and traffic-pattern-based views display TX data frames (byte, frame), actual/average bandwidth (MB/s), actual/average data rate, and login frame count. On the RX side, port-based and stream-based views show min/average/max latency, RX data frames (byte, frame), and max/actual data rate. Error counters track both FCoE CRCs, loss of alignment, unaccounted frames, out-of-order frames, misdirected frames, and sequence errors.

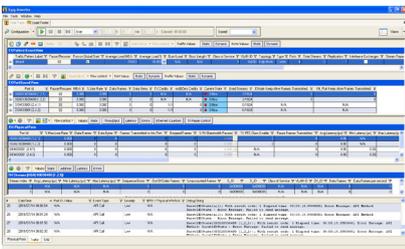


Figure 1. Statistics View

### Custom Frame Generation

The Frame Editor lets users generate proprietary frames with complete control of frame configuration including headers and payload. The tester will verify the generation of custom frames on the transmitting port while capturing and verifying frames on the receiving port.

### Full FCoE and DCB Support

The new DCB standard is considered by many to be the most promising technology for I/O consolidation at 10 Gbps. DCB serves as the foundation for FCoE to make Ethernet lossless and reliable enough to carry encapsulated Fibre Channel frames. In order to comprehensively test and verify evolving FCoE technology, developers need a hardware-based test platform that is protocol-aware for both Fibre Channel and Ethernet.

The tester forms the cornerstone for testing the design of converged Ethernet and FCoE equipment, enabling developers to verify performance, data integrity, scalability, network robustness, and equipment interoperability. Users are also able to test the compliance and interoperability of all protocol-specific features for these emerging technologies:

- priority flow control (PFC) pause time; bandwidth per traffic group to verify enhanced transmission selection (ETS); switch ingress buffer testing to verify lossless performance
- FCoE encapsulation efficiency; tracking of both Ethernet and FCoE CRC errors; FIP keep-live testing

### Reduced Setup Cost and Complexity

A key benefit of the tester is a substantial reduction in the cost and complexity of test setups for LAN, SAN, and LAN/SAN converged networks. For example, the tester's traffic-generation capabilities eliminate the need for expensive servers and extensive storage arrays, thus providing significant savings in terms of rack space, power, cabling, and equipment cost.

Simplified test setup is also critical for accelerated troubleshooting, especially with complex switch topologies. Configuring the tester, even for the most complex topologies and traffic patterns, is a simple, three-step process (see Figure 2). A wizard is also available to set up each traffic profile.

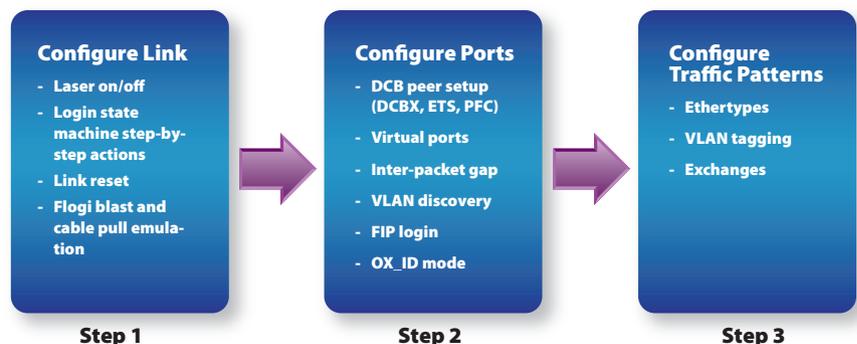


Figure 2. Configure Xgig Load Tester with a simple three-step process

### Accelerated Analysis through Automated Testing

Extensive automation capabilities eliminate time-consuming test configuration and management, letting developers quickly create, set up, and repeat complex test benches that provide comprehensive protocol and error-recovery coverage. Developers also need to be able to automate regression testing, an especially critical capability for manufacturing test setups. JDSU facilitates the automation of testing processes by enabling access to all tester functions and configurations through APIs using scripts written in C and TCL. Sample scripts and timesaving suggestions offered by the auto log simplify script creation.

JDSU also provides automated benchmarking testing packages based on benchmarking standards established by the Internet Engineering Task Force (IETF) to accelerate equipment qualification and time-to-market:

- RFC 2544: Evaluates frame rate performance of network devices using throughput, back-to-back, frame loss, and latency tests.
- RFC 2889: Evaluates Layer 2 switching performance to measure factors such as fully/partial meshed throughput, frame loss, forwarding rates, forward pressure, and address learning rate.

### Intuitive, Protocol-Aware Interface

Today's storage and converged networks are comprised of different protocols running at a variety of data rates. Troubleshooting these converged networks with multiple tools, each with their own unique interface, unnecessarily complicates testing. The Xgig High-Density 10 G Ethernet/FCoE Load Tester is managed by the JDSU Maestro control application, the same tool used with other JDSU load testers, protocol-based Fibre Channel and Gigabit Ethernet BERT (Bit Error Rate Test), SAS/SATA Jammer (error injection), and SAS/SATA Generator. With the protocol-aware capabilities of Maestro, users are able to stress-test converged LAN/SAN networks and correlate results without needing to switch between different control applications. Maestro operates under Windows XP, Windows Server 2003, and Window Vista (Business and Ultimate version).

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