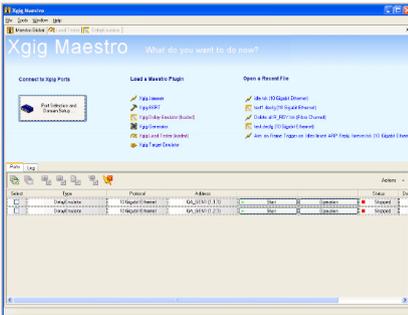


Xgig 10 Gigabit Ethernet Delay Emulator



Key Features

- Dynamic delay control from 30 μ s to 1.5 s (6 to 300,000 km of emulated fiber) with 10 ns delay resolution
- Supports up to 8 different delay profiles with two-level triggering
- Multiple delay modes, including fixed, incremental, random, and jitter-based (deterministic and random)
- Frame reordering up to 8 packets/frames
- Real-time delay value statistics
- Fully integrated with the Xgig Analyzer, Jammer, and Load Tester

Applications

- Stress test network connections over a wide range of emulated distances for applications such as collocated data center storage, remote backup, and disaster recovery
- Significantly reduce test costs and complexity by eliminating spools of fiber used to introduce distance between network nodes
- Accurately measure the impact of latency jitter on Ethernet and distributed application performance and reliability
- Verify congestion management performance as well as system error recovery and link failover from conditions such as out-of-order packet delivery and session time-outs
- Dynamically adjust connection distance/delay to optimize system software and hardware configurations
- Test performance degradation over satellite and very long distance communication links

Distance is a vital aspect of storage networks because as the length of fiber over which a packet travels increases, latency that can degrade session performance and reliability also increases. To introduce distance-based latency during testing and verification, developers often rely upon spools of fiber that are expensive and difficult to work with.

The Xgig 10 GbE Delay Emulator eliminates the need for fiber spools at the test bench by emulating the many types of transmission delay that can occur in 10 GbE networks. Developers can define various distances/delays between each network node making it possible to evaluate the latency and performance impact on Ethernet, Fibre Channel over Ethernet (FCoE), and distributed application performance. The Delay Emulator also supports packet reordering to emulate network conditions such as packets arriving out of order. The ability to both delay and reorder packets enables developers to perform crucial testing that verifies system performance, reliability, and resiliency to network impairments or errors. Developers can also optimize system software and hardware configurations, including TCP Sliding Window Size, buffer size allocation, and time-out thresholds.

The Xgig 10 GbE Delay Emulator is an enhanced test function that can be licensed on Xgig 10 GbE multifunctional blades and is placed in line between source and destination devices. In addition to evaluating whether to delay incoming traffic before transmitting it back out to the target, the Delay Emulator guarantees:

- line-rate throughput
- zero packet drops on delayed packets
- unchanged packet order (unless specified)

Ease of Use

The Delay Emulator simplifies test setup and configuration and provides developers with a suite of powerful yet flexible capabilities to accurately emulate a variety of real-world operating conditions. Configuring a typical test case takes three simple steps:

1. Define classifiers: Developers can define up to 8 independent delay queues/buffer segments using flexible classifiers that can identify packets using characteristics such as IP address, MAC, or VLAN anywhere in the header or payload. The Delay Emulator passes packets not categorized under any of the defined buffer segments through to the target without delay.
2. Select triggering conditions: The Delay Emulator uses a powerful two-level triggering mechanism known as Arm and Trigger that lets developers control delay or reordering based on multi-packet triggering conditions. For example, a developer testing an FCoE link can configure the Delay Emulator to trigger on priority flow control (PFC) frames that follow a data frame to delay specific FCoE traffic flows or frames.
3. Configure delay and reordering: Once triggered, the Delay Emulator can reorder packets as well as apply a variety of delay types, including fixed time, incremental (start delay, end delay, step), jitter (fixed average value), and random (delay varied within a set range).

The Xgig 10 GbE Delay Emulator simplifies and accelerates the testing and verification of a wide range of delay-based transmissions issues, including propagation delay, packet stream delay due to the multipath routing of protocols, queue delay, delay jitter, and packet/frame reordering arising from fabric processing delay errors. Built upon the extensive development, testing, and engineering experience of JDSU, the Delay Emulator offers its industry-leading capabilities in an easy-to-use tool.

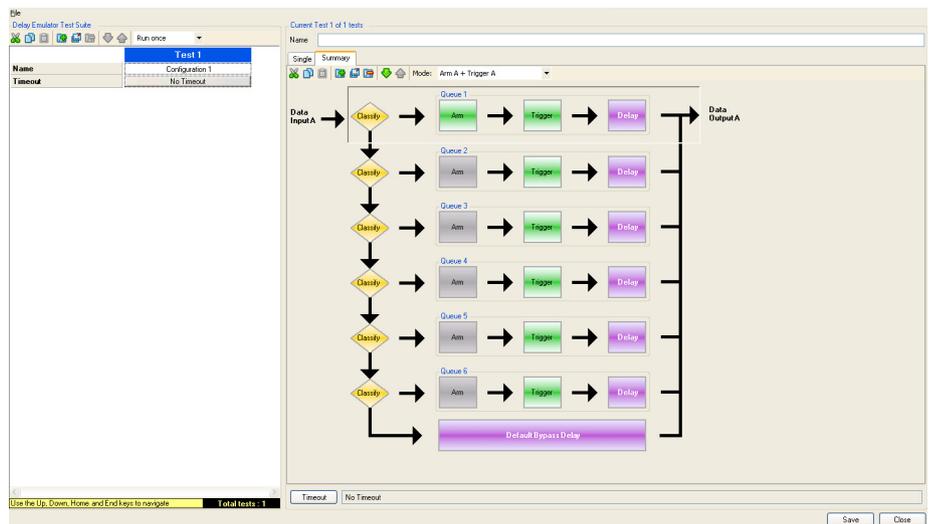


Figure 1. Configuring Up to 8 different delay profiles with various arm and trigger conditions

Physical Distance Delay Generation

Fiber connections over long distances increase end-to-end latency and can adversely affect network performance such as causing an iSCSI session to time out. Placing long loops of fiber between devices on a test bench to emulate long distances is both costly and difficult to set up. The Delay Emulator offers flexible control of delays and can be dynamically reconfigured from 30 μ s to 1.5 s (6 to 300,000 km of fiber) with 10 ns resolution to emulate both short and very long distances.

Queue-based Delay

The Delay Emulator supports 8 queues/buffer segments, each with its own independent delay, enabling emulation of up to 8 different routing distances through a network all from the same source on the test bench. This capability allows developers to use a simple test bench to evaluate performance for even the most complex test network topologies. For example, a single Delay Emulator can emulate the different distances between two servers communicating with four clients at the edge of a network.

Delay Jitter Control

Jitter is the variation in delay over time, and jitter can induce a variety of network impairments that severely impact network performance and availability. With jitter control, the Delay Emulator can emulate the varying delay between two servers communicating via satellite and other real-world applications.

Packet/Frame Reordering

Packets arriving out of order presents a serious error for many storage applications. Every packet must be received in sequence or the session may require resetting. The Delay Emulator can reorder up to 8 consecutive consequence packets within a classifier group so that developers can measure and verify network responses to out-of-order error conditions.

Simple and Cost-effective Installation

The Delay Emulator is an enhanced feature available on Xgig 10 GbE multifunctional blades that can be activated with the purchase of a software key. Flexible licensing allows developers to purchase Delay Emulator functionality incrementally over time and across only the number of ports they need, resulting in substantial CAPEX savings.

Unparalleled System Visibility

The Delay Emulator operates seamlessly with the powerful JDSU Xgig family of inline protocol analyzers, load testers, and traffic jammers to detect a variety of errors, impairments, and anomalies. The Delay Emulator operates with the Xgig Maestro framework and supports use with other Xgig functions (except Analyzer) all from a single client application.

Specifications

System Features	Minimum Requirements
OS (32-bit)	Windows XP Professional: Service Pack 3 Windows 2003 Server: Service Pack 2 Windows Vista Ultimate or Business with Service Pack2 Windows 2008 Server Standard or Enterprise with Service Pack2
Browser	Internet Explorer v6.0+ Firefox v1.5+
Network Interface Card	Suitable for communication with remote chassis
Ethernet	100 Mbps on the host network (1000 Mbps recommended) Xgig Chassis supports 10, 100, and 1000 Mbps data rates.
Subnet	All chassis within a sync group must be in the same subnet
Media	DVD/CD-ROM Drive
Other	1024x768 SVGA display. We recommend a resolution setting to 1280 X 1024 for better view. Serial Port
Pre-requisite Software for Xgig Maestro client (included on product CD)	Microsoft Windows Installer v3.1 Microsoft .NET Framework v3.5 SP1 Microsoft Visual C++ Redistributable 2008: Service Pack 1

Test & Measurement Regional Sales

NORTH AMERICA TEL: 1 888 746 6484 sales-snt@jdsu.com	ASIA PACIFIC apacsales-snt@jdsu.com	EMEA emeasales-snt@jdsu.com	WEBSITE: www.jdsu.com/snt
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