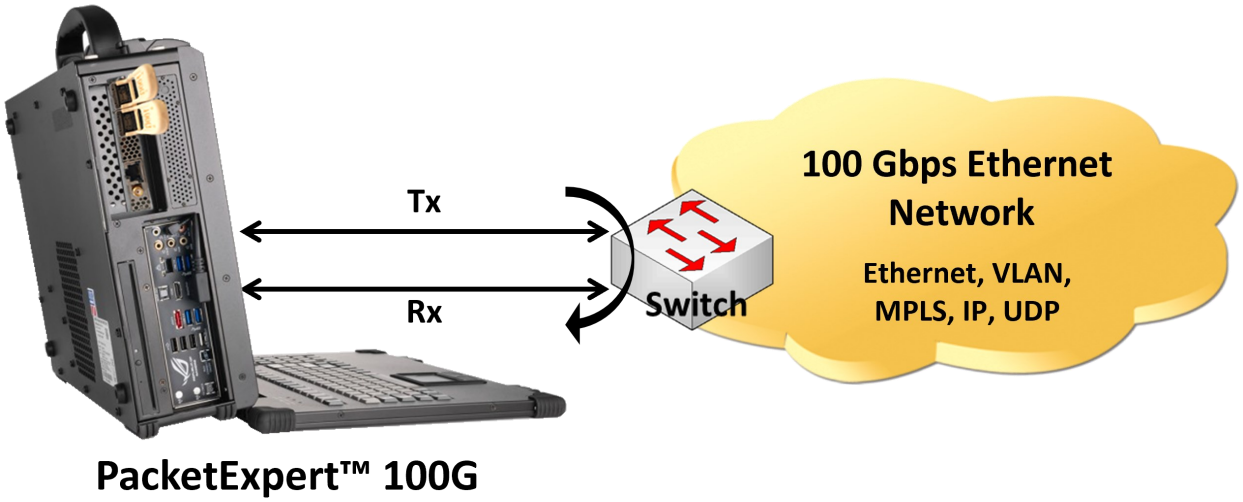
RFC 2544 Network Testing on PacketExpert™100G

(Ethernet Throughput, Latency, Frame Loss, and Back-to-Back Performance Tests)



Overview

RFC 2544 is an industry standard testing methodology designed to measure essential packet statistics such as throughput, packet loss and latency. The PacketExpert™ 100G offers RFC 2544 testing by default over a wide range of data rates and traffic types. It supports various protocols such as Framed Ethernet (Layer 2), Stacked VLAN (Q-in-Q), Stacked MPLS, IP, and UDP. This ensures a thorough evaluation of network capabilities across different network layers and configurations.

User access is provided through an easy-to-use web interface and all parameters of the test are configurable including data rate (1G/10G/25G/40/50G/100G), frame sizes, trial duration, protocol headers and more.

In the Dual Port RFC 2544 test, both ports of the PacketExpert™ 100G are connected to the device under test (i.e. a switch). Both Ports can simultaneously transmit and receive traffic and therefore conduct the RFC 2544 test in both directions simultaneously.

In the Single Port RFC 2544 test, two PacketExpert™ 100G devices are used at both ends of the network under test. Test traffic is sent from the PacketExpert™ 100G at the near-end to the far-end PacketExpert™ 100G where it is then looped back to the source. As the packets arrive back at the source PacketExpert™ 100G, the measurements are performed such as round-trip delay, packet loss, throughput, etc.

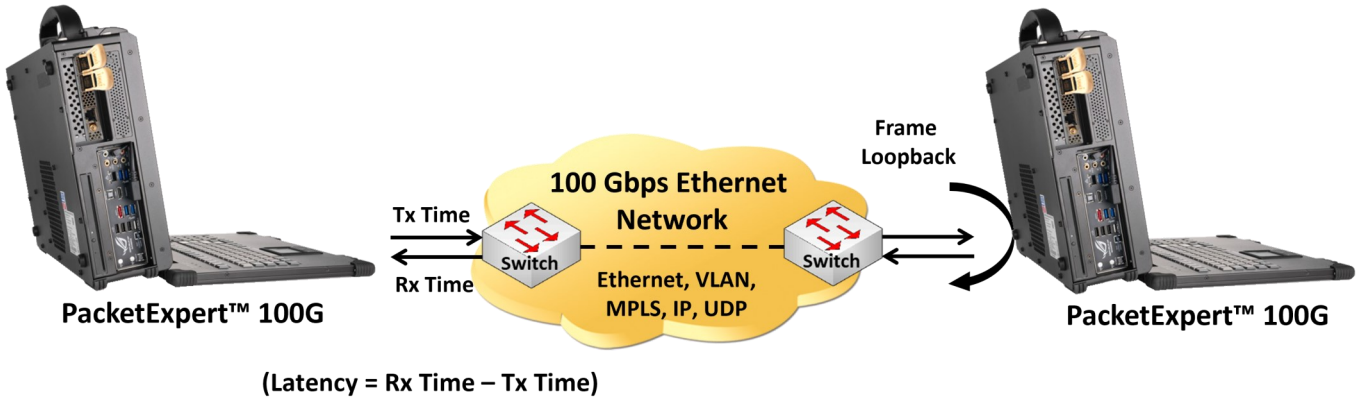


Figure: Single Port RFC 2544 Test

For more information, visit RFC 2544 Network Testing on PacketExpert™ 100G webpage.

GL Communications Inc.

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Main Features

- Throughput, back-to-back, latency and frame loss testing supporting uni-directional and bi-directional traffic between ports
- Supports RFC 2544 on Optical 1G/10G/25G/40G/50G/100G ports
- Support for frame lengths from 68 bytes to Jumbo frames (up to 16000 bytes)
- Includes various parameter configurations such as Test Selection, Frame Size selection, Unidirectional/Bidirectional, Number of trials, Trial Duration, and many more
- User-defined options to configure various packet header parameters, like MAC addresses, IP addresses, UDP ports, VLAN ID, MPLS Labels, and more
- Results are displayed in both tabular as well as graphical format
- Supports synchronization based on Precision Time Protocol (PTP), enabling accurate delay measurements
- Test automation and regression testing via Python and REST APIs

RFC 2544 Application on PacketExpert™ 100G

The software is designed to offer a seamless user experience through its intuitive web interface. Accessible from any standard web browser, this convenient feature allows you to control the hardware from multiple locations and various devices such as PCs, laptops, and tablets. Moreover, the software is compatible with different operating systems like Windows, Linux, Android, and more, as long as they support a web browser.

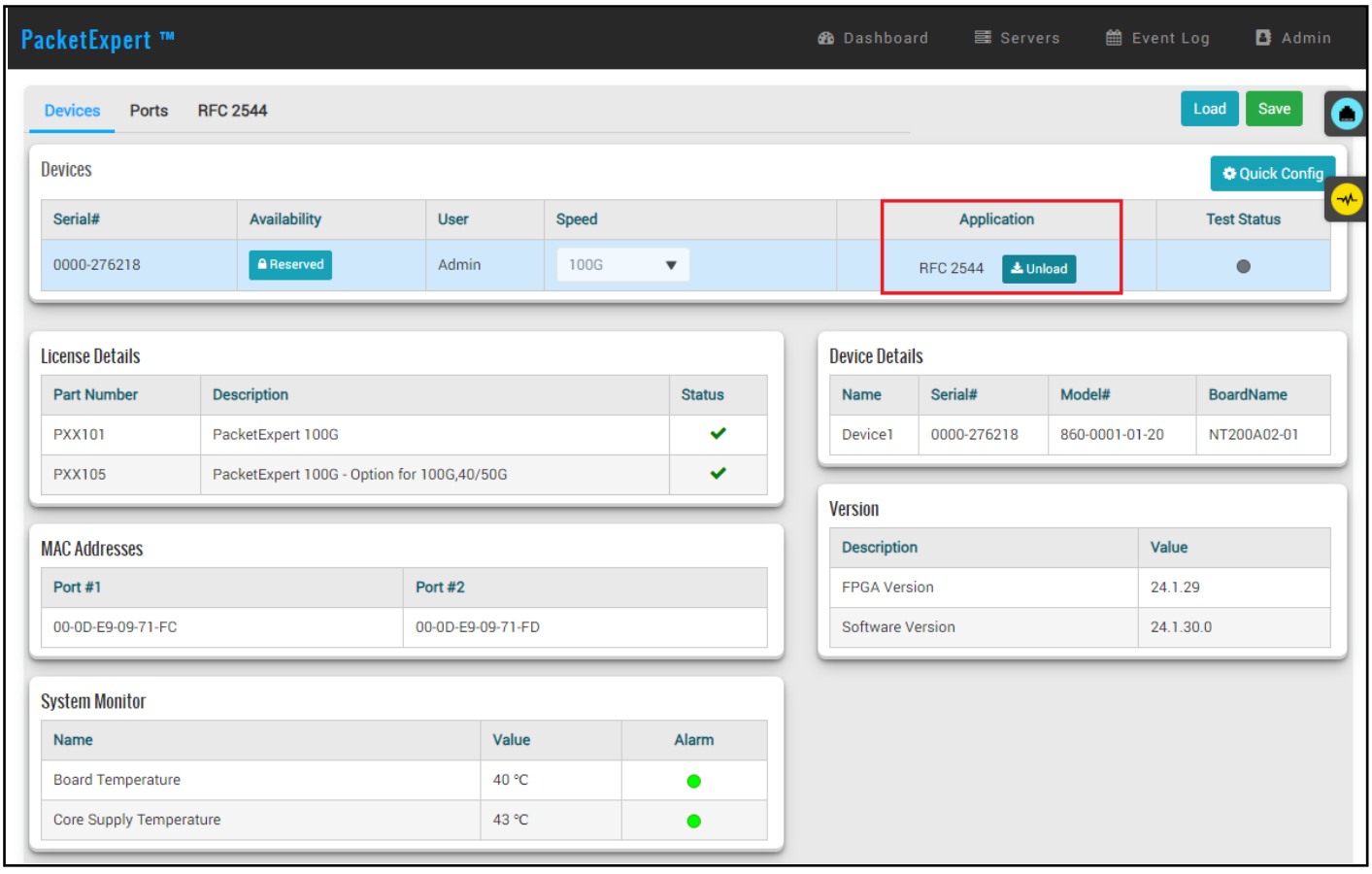

Figure: Loading RFC 2544 Application on PacketExpert™ 100G

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Global Configurations

Global configuration includes various parameter configurations that are common to all the 4 tests - Throughput, Latency, Back-to-Back, Frame Loss. option to configure with the minimum frame length required. By default, RFC 2544 supports 7 Frame Sizes. It can support up to 20 different Frame Sizes for Ethernet.

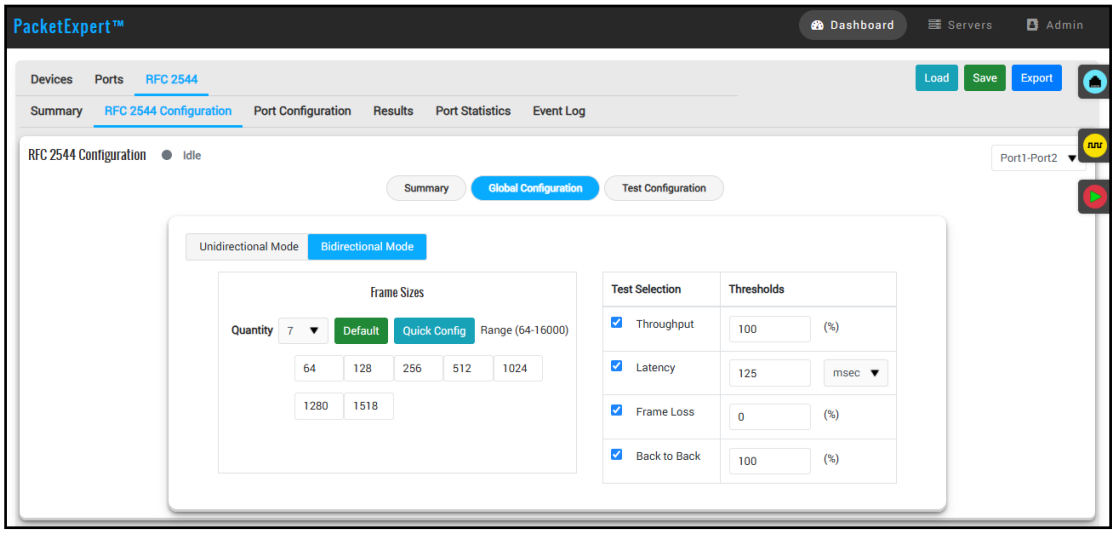


Figure: Global Configurations

Test Configurations

Test configurations includes Minimum and Maximum Bandwidth parameter settings for Throughput/Latency/Frameloss tests, and Burst size and no. of bursts settings for Back-to-back test for both the directions.

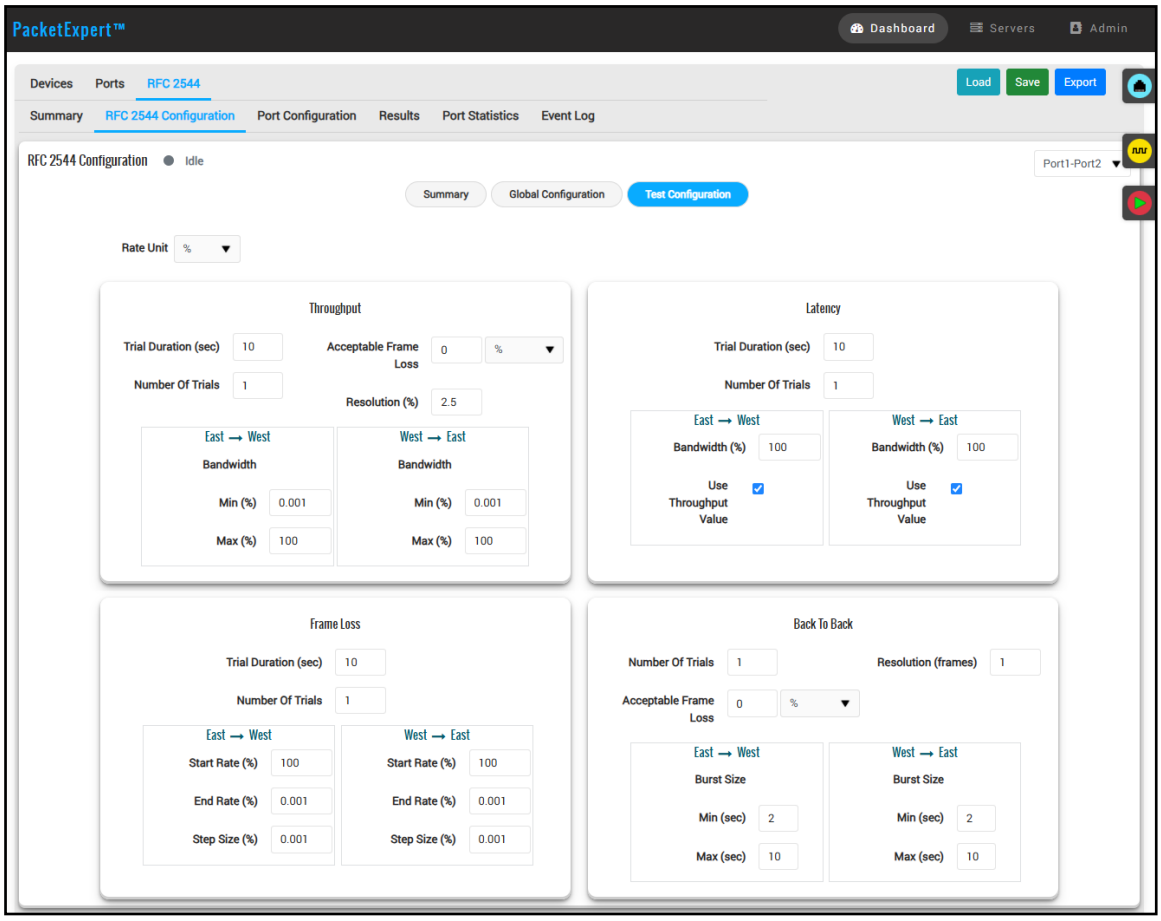


Figure: Test Configurations

Port Level Statistics

Detailed statistics per port are provided. In addition to statistics like Frame Count, Frame Rate, Link Utilization, others are provided based on various categories like Frame Type (Unicast/Broadcast/Multicast, VLAN), Frame Lengths (64, 65-127, 1024-1518, Oversized, Undersized), Protocol Type (IPv4, IPv6, UDP, TCP, ICMP, IGRP, etc). VLAN Statistics (per Stack position), MPLS Statistics (per stack position) are also displayed for the configured stacks.

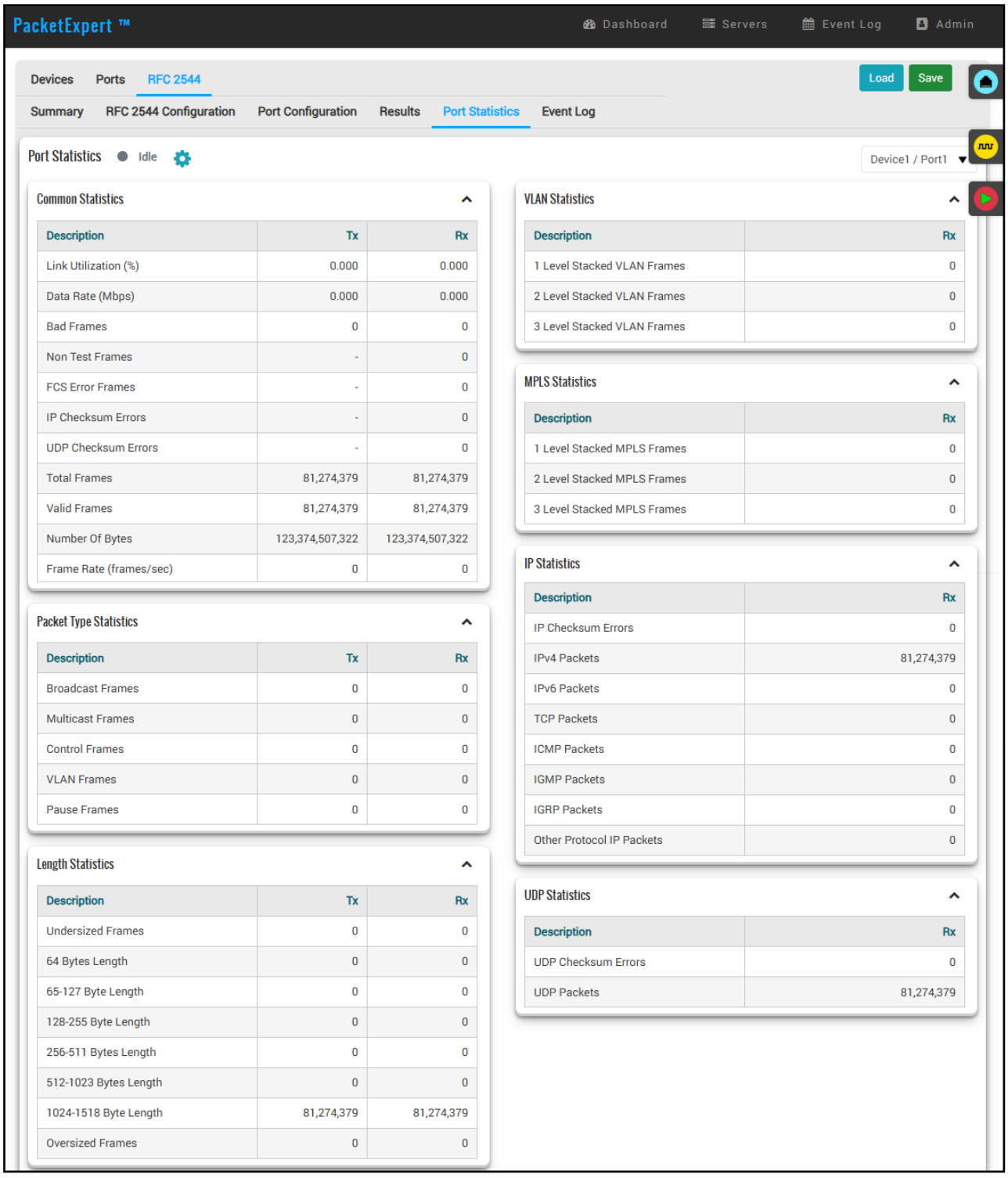


Figure: Per Port Statistics

RFC 2544 Test Results

Results are displayed in both tabular as well as graph format. Supports test report generation in both PDF and CSV formats.

Status – displays test status such as In Progress, Completed, and Aborted. In addition, it displays status of learning frames and test frames for the current trial along with Bandwidth, Frame Size, and Frame Count.

Throughput – Throughput results are displayed in terms of bandwidth (both in percentage as well as Mbps) for each frame size. Graphically, it is plotted as throughput vs frame size.

Latency – Latency values are displayed in terms of microseconds for each frame size. Graphically, the latency value is plotted against frame size.

Back-to-Back – Back-to-Back values are displayed in terms of the burst size (in milliseconds) for each frame size. Graphically, the burst size is plotted against frame size.

Frame Loss – Frame Loss results are displayed in terms of the throughput (in percentage) measured over the range of input rates (in percentage) for each frame size. Graphically, for each frame size, the throughput is plotted against the test rate.

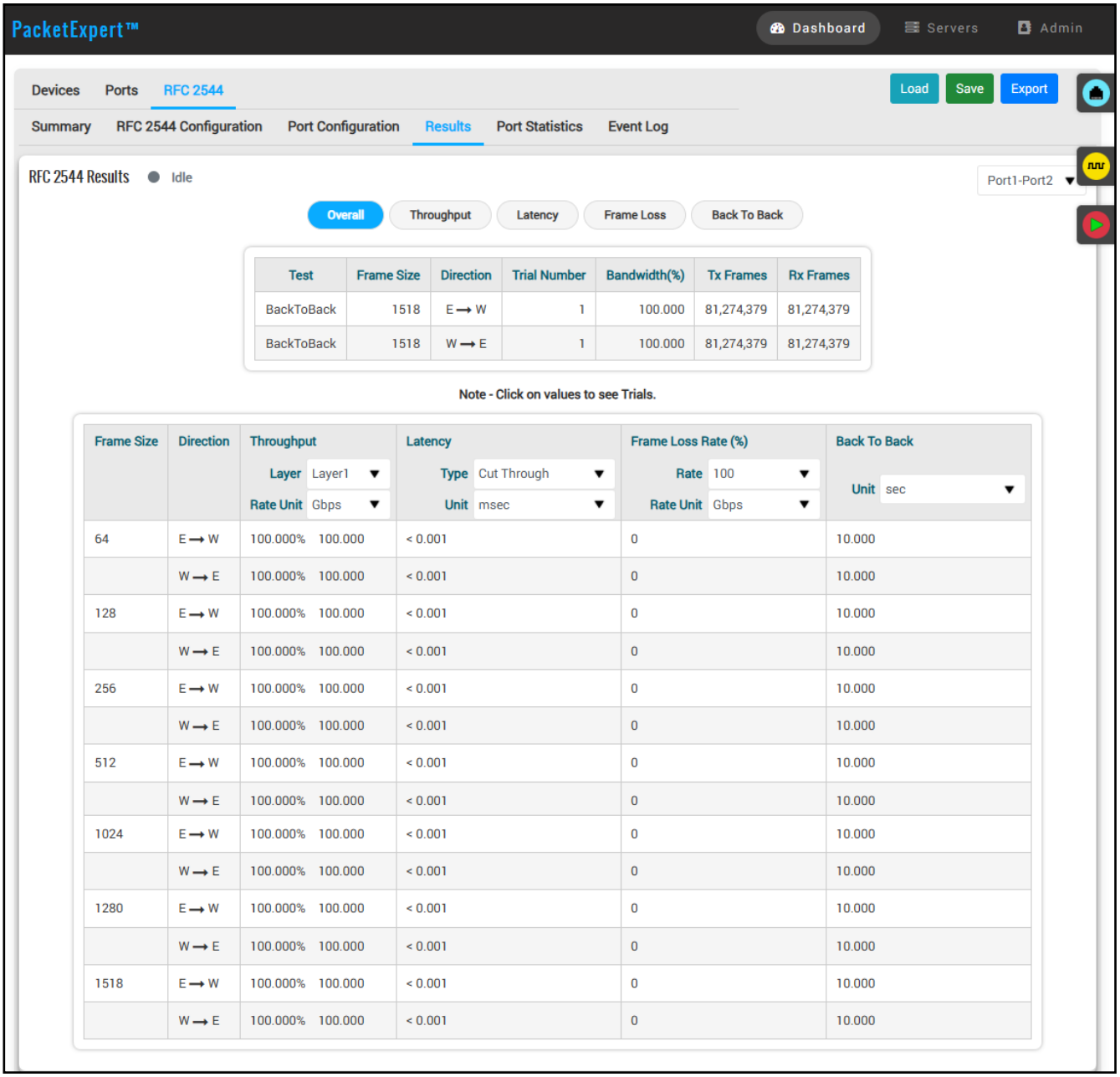


Figure: Overall Test Results

RFC 2544 Test Results (Contd.)

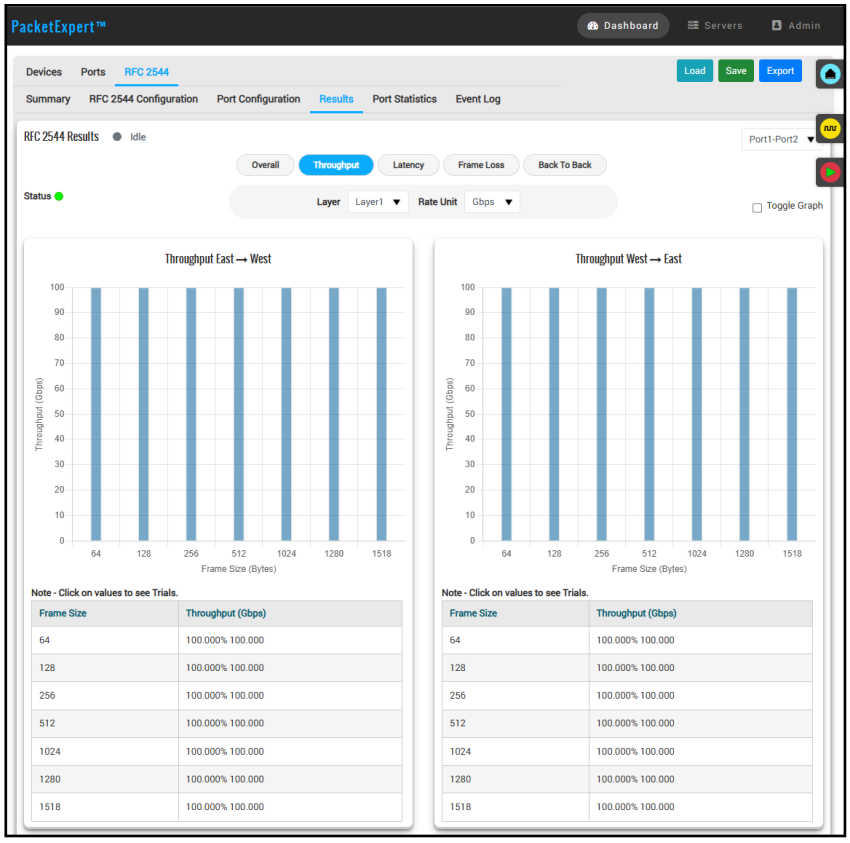


Figure: Throughput Test Results

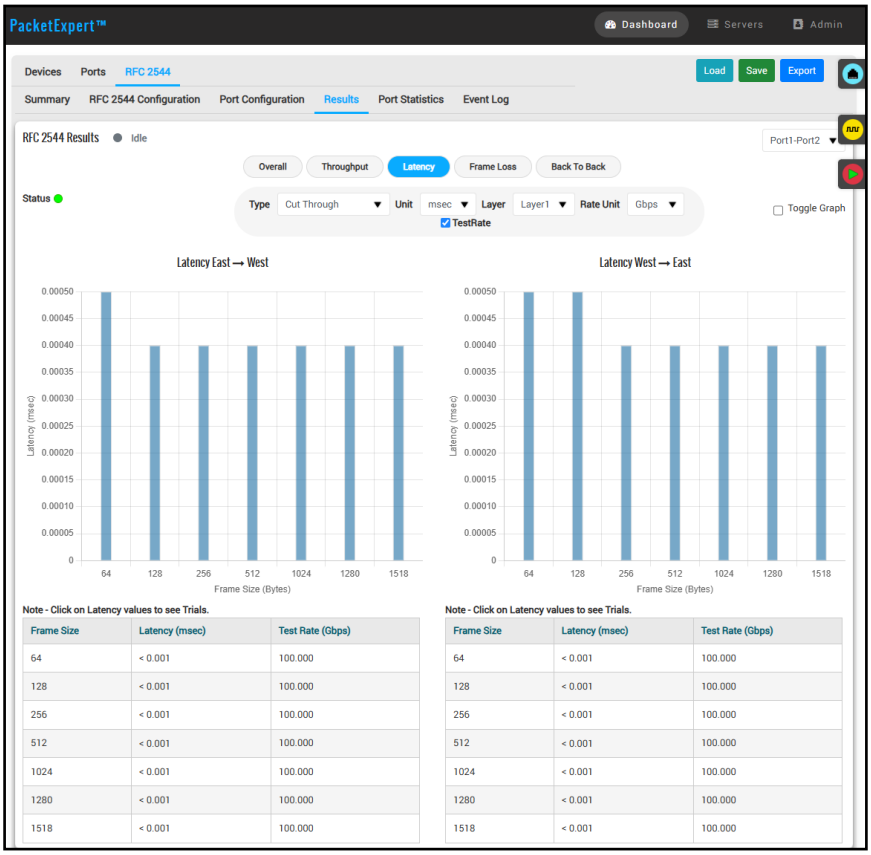


Figure: Latency Test Results

RFC 2544 Test Results (Contd.)

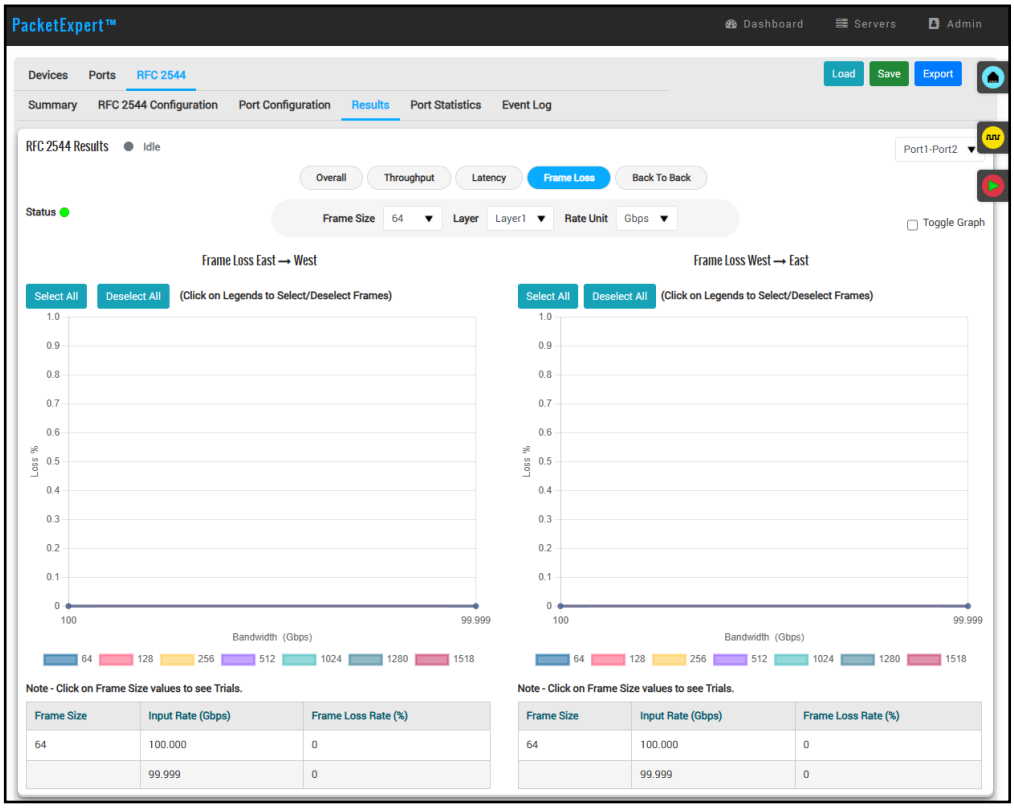
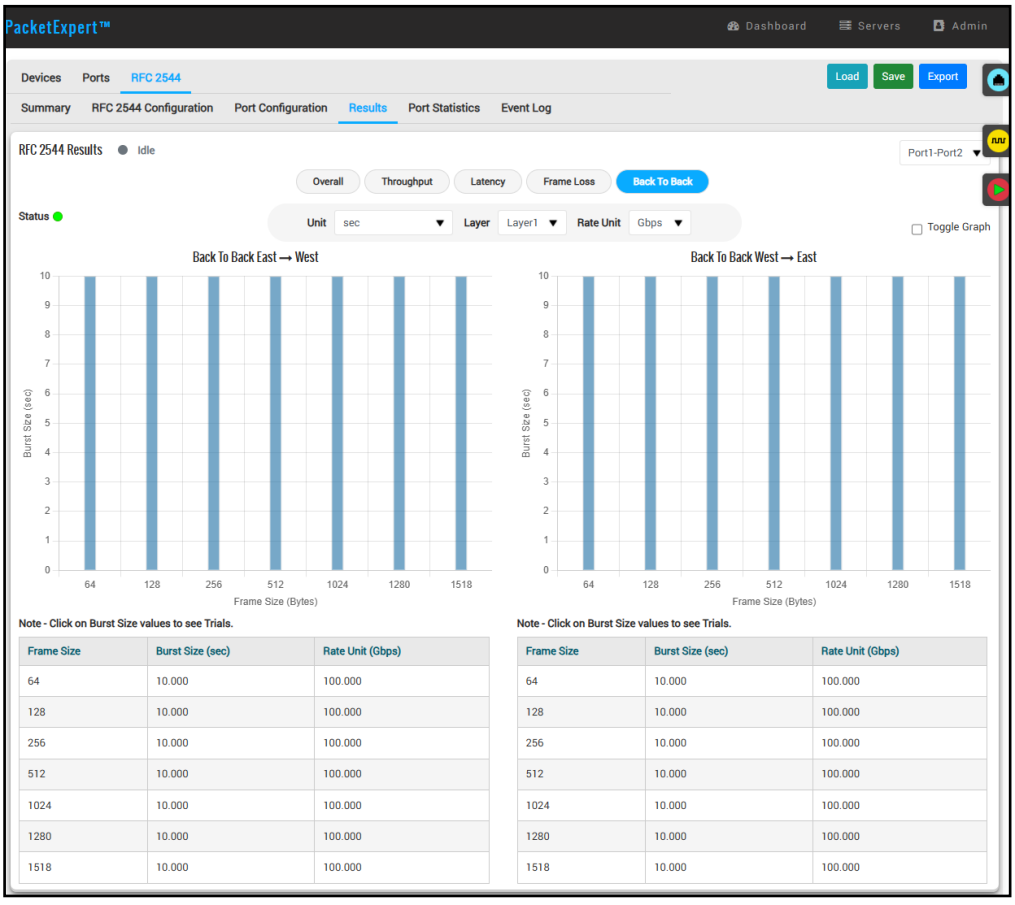
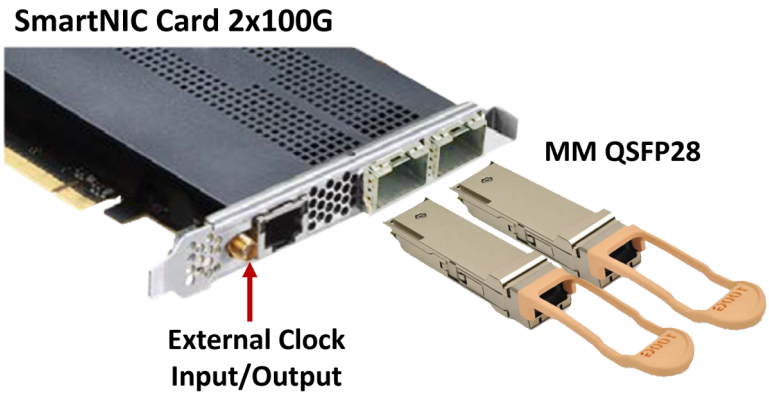


Figure: Frame Loss Test Results



Hardware Specifications



PacketExpert™ 100G SmartNIC

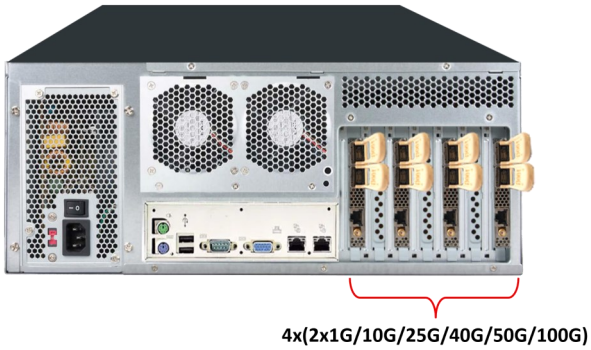
SmartNIC Specifications (Per Card)	
Optical Components	• 2 x QSFP28 cages for 2 x 100 GbE, 2 x 50GbE, and 2 x 40 GbE • Supports 2 x 25 GbE, 2 x 10 GbE, and 2 x 1 GbE with QSFP-to-SFP adapter
PCIe	PCIe Gen 3, 16 lanes
RAM	8 GBytes DDR4 SDRAM
1000Base-T Port	RJ45 for IEEE1588v2
Single-ended Coaxial I/O	SMA connector, 50 Ohms for External Clock Input/Output
Temperature Range	0C to 45C
Operating Humidity	20% to 80%
Storage	-10 to 60C
Oscillator Accuracy	+/- 4.6ppm

Hardware Specifications (*Contd.*)

PacketExpert™ 100G Rack mount Platforms

- Ideal for Lab environments that require centralized management of multiple servers and network devices
- Rackmount units offer flexibility for scaling up or down as needed by adding or removing individual units

PacketExpert™ 100G 4U Rack-mount

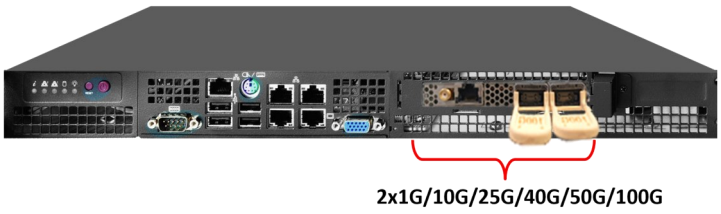


Specifications	
Dimensions	6.9” H x 16.9” W x 17.5” D
Weight	72 lbs.
Number of Supported Cards/Ports	Up to 7 Cards x (2x100G Ports), Maximum of 14 Ports
Power supply	800W

PacketExpert™ 100G 2U Rack-mount

Specifications	
Dimensions	3.5” H x 17.2” W x 17.7” D
Weight	30 lbs.
Number of Supported Cards/Ports	Up to 2 Cards x (2x100G Ports), Maximum of 4 Ports
Power supply	800W

PacketExpert™ 100G 1U Rack-mount



Specifications	
Dimensions	1.7” H x 17.2” W x 9.8” D
Weight	10 lbs.
Number of Supported Cards/Ports	1 x Full-height 1 Card x (2x100G Ports), Max-
Power supply	200W

PacketExpert™ 100G Portable Platforms

- Ideal for field engineers, military personnel, or researchers who need a powerful and portable computing solution in remote or rugged locations
- Suitable for environments where traditional desktops or laptops may be too fragile or lack necessary durability

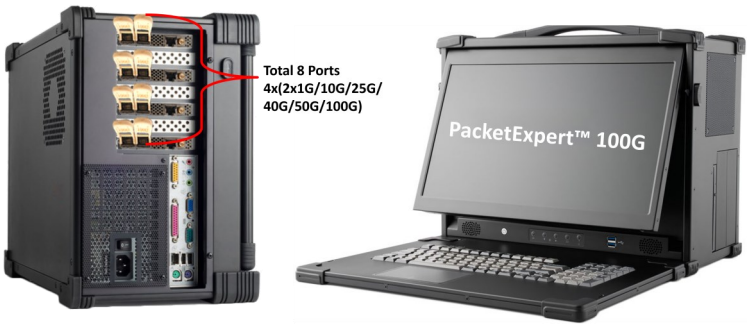
Ultra-Portable PacketExpert™ 100G (Lunchbox)

Specifications	
Dimensions	12.4” H x 16.41” W x 4.39” D
Display	17.3” 1920x1080
Weight	16.5 lbs.
Number of Supported Cards/Ports	Up to 2 Cards x (2x100G Ports), Maximum of 4 Ports
Power supply	400W (optional 500W)

Portable PacketExpert™ 100G (Lunchbox)

Specifications	
Dimensions	13.62” H x 16.50” W x 7.25” D
Display	17.3” 1920x1080
Weight	~23 lbs. (10.4kg)
Number of Supported Cards/Ports	Up to 3 Cards x (2x100G Ports), Maximum of 6 Ports
Power supply	680W 100/240VAC

PacketExpert™ 100G Portable Platform (Lunchbox)



Specifications	
Dimensions	17.06” x 13.67” x 9.02” (H x W x D)
Display	17.3” 1920x1080
Weight	~ 30 lbs.
Number of Supported Cards/Ports	Up to 6 Cards x (2x100G Ports), Maximum of 12 Ports
Power supply	1000W 100-240VAC

Buyer's Guide

Item No	Product Description
PXX100	PacketExpert™ 100G Platform (1G, 10G, 25G), All Port BERT, BERT/Loopback, RFC2544, Y.1564
PXX101	Basic Software (Required for PXX100)
PXX103	Additional 2-port card with Basic Software (Up to 4, 2-Port Cards (including the basic 2-Port Card) total per system for 8-Port testing; required for PXX107)
PXX105	40G, 50G, 100G Optional Software
PXX106	PacketExpert™ 100 G – One card / 2 Port Platform with MM Kit
PXX107	PacketExpert™ 100G - Two Card / 4 Port Portable Platform
PXX108	PacketExpert™ 100 G – One card / 2 Port Platform with SM Kit
PXX109	Optional Software for CLI Support
PXX110	PacketExpert™ 100 G - Two Card / 4 Port Platform with SM Kit
PXX10X	PacketExpert 100 G – 4 Card Platform / 8 Port Platform
Item No	**Related Hardware and Software**
PXN100	PacketExpert™ 10GX
PXN101	10G option for PXN100

Note: PCs which include GL hardware/software require Intel or AMD processors for compliance.

For more information, visit PacketExpert™ 100G- Comprehensive Ethernet/IP Testing Solution webpage.

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