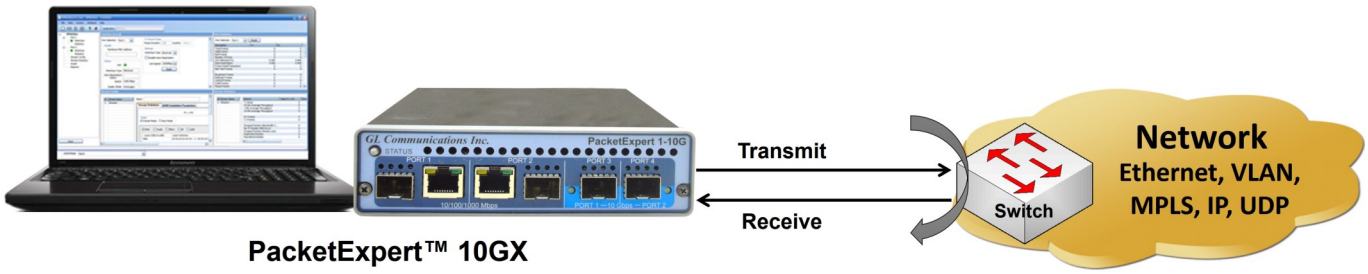
PacketExpert™ - RFC 2544 Testing

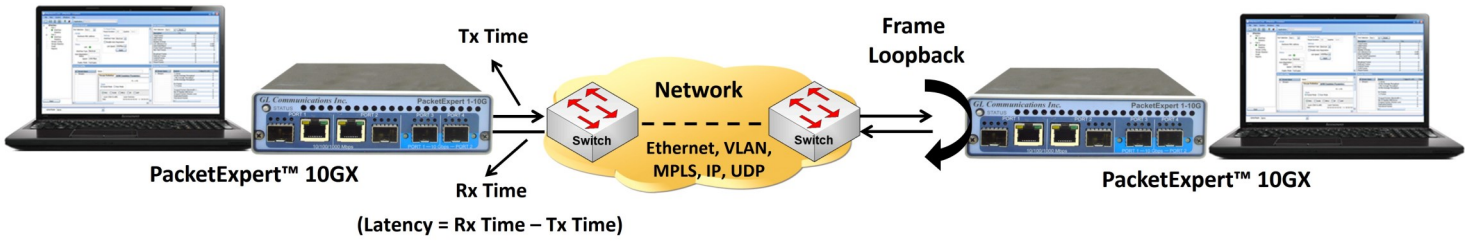
The **RFC2544** application is designed to perform a test which includes Throughput, Latency, Frame Loss, and Back-to-Back. Similar to BERT, RFC 2544 can be done over Framed Ethernet (Layer2), Stacked VLAN (Q-in- Q), Stacked MPLS, IP and UDP.

The application is available with PacketExpert™ 10G/1G hardware, a **Quad Port** Ethernet / VLAN / MPLS / IP / UDP Tester.

- 2x Electrical (10/100/1000 Mbps) or Optical 1G ports using SFP
- 2x 10G/1G Electrical/Optical interface, which can be downshifted to support 1G or 2.5 Gbps Electrical/Optical interface using appropriate SFPs.



In Dual port RFC 2544 test, the PacketExpert™ allows RFC 2544 specific tests on Port #1 and Port #2. The test is setup such that the traffic can be generated and transmitted on either of the ports (Port #1 or Port #2) and the looped back traffic from the DUT is received on the opposite port validating the test parameters.



In Single port RFC 2544 test, the PacketExpert™ allows RFC 2544 specific tests on Port #1 or Port #2. The test is setup such that the traffic is transmitted on Port #1 or Port #2 and the PacketExpert™ at the DUT end can be configured to loop the traffic back on the same port measuring the Tx and Rx time thus calculating the latency. The RFC 2544 test can be run on either Port #1 or Port #2 at a time.

For more information, please visit PacketExpert™ 10GX webpage.

Main Features

- Benchmarking Service Level Agreement (SLA) RFC2544 tests - Ethernet Throughput, Latency, Frame Loss, and Back-to-Back performance tests
- RFC2544 tests supporting uni-directional and bi-directional traffic between ports
- Supports RFC 2544 on 1G, 2.5G and 10G Electrical/Optical ports
- Support for frame lengths from 64 bytes to Jumbo frames (up to 16000 bytes)
- Single port and Dual ports RFC 2544 test modes
- Includes various parameter configurations such as Test Selection, Frame Sizes 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 for both the directions
- Capability of remote operation, and test automation with C#, Python API clients and MAPS CLI server, client-server based architecture

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Global and Test 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. RFC 2544 recommends 20 different frame sizes for Ethernet.

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.

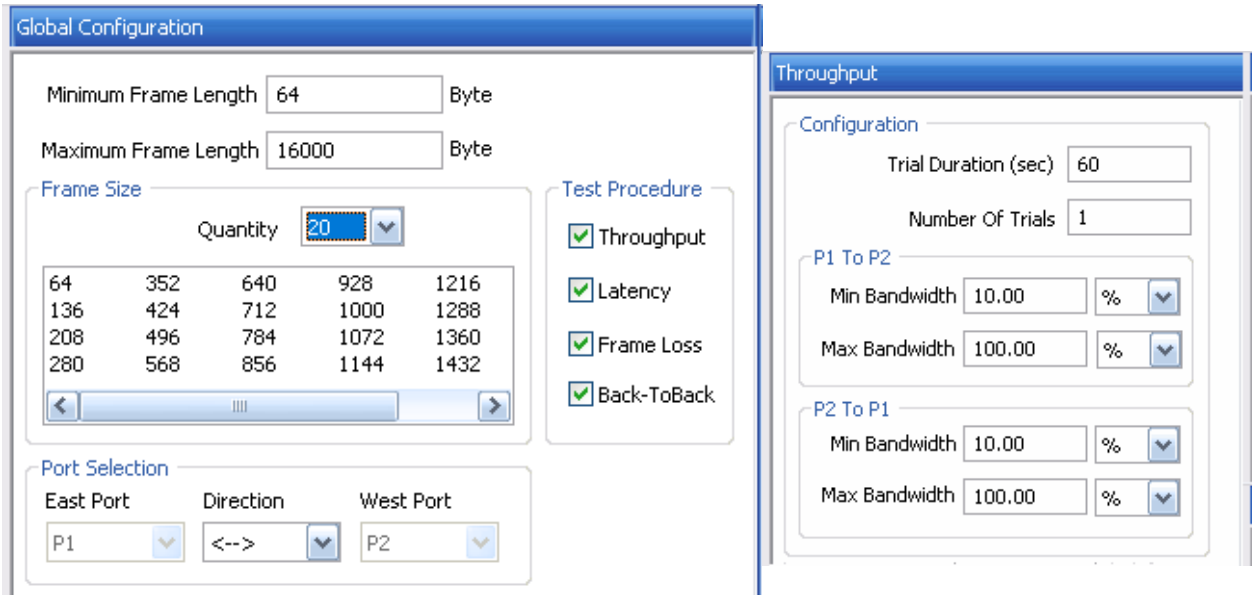
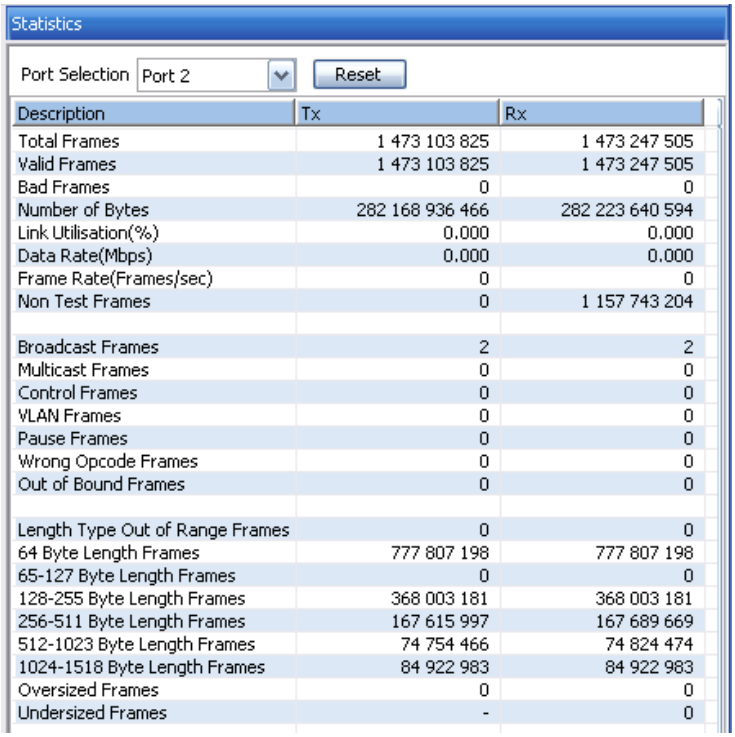


Figure: Global and Test Configurations

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.



Description	Tx	Rx
Total Frames	1 473 103 825	1 473 247 505
Valid Frames	1 473 103 825	1 473 247 505
Bad Frames	0	0
Number of Bytes	282 168 936 466	282 223 640 594
Link Utilisation(%)	0.000	0.000
Data Rate(Mbps)	0.000	0.000
Frame Rate(Frames/sec)	0	0
Non Test Frames	0	1 157 743 204
Broadcast Frames	2	2
Multicast Frames	0	0
Control Frames	0	0
VLAN Frames	0	0
Pause Frames	0	0
Wrong Opcode Frames	0	0
Out of Bound Frames	0	0
Length Type Out of Range Frames	0	0
64 Byte Length Frames	777 807 198	777 807 198
65-127 Byte Length Frames	0	0
128-255 Byte Length Frames	368 003 181	368 003 181
256-511 Byte Length Frames	167 615 997	167 689 669
512-1023 Byte Length Frames	74 754 466	74 824 474
1024-1518 Byte Length Frames	84 922 983	84 922 983
Oversized Frames	0	0
Undersized Frames	-	0

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.

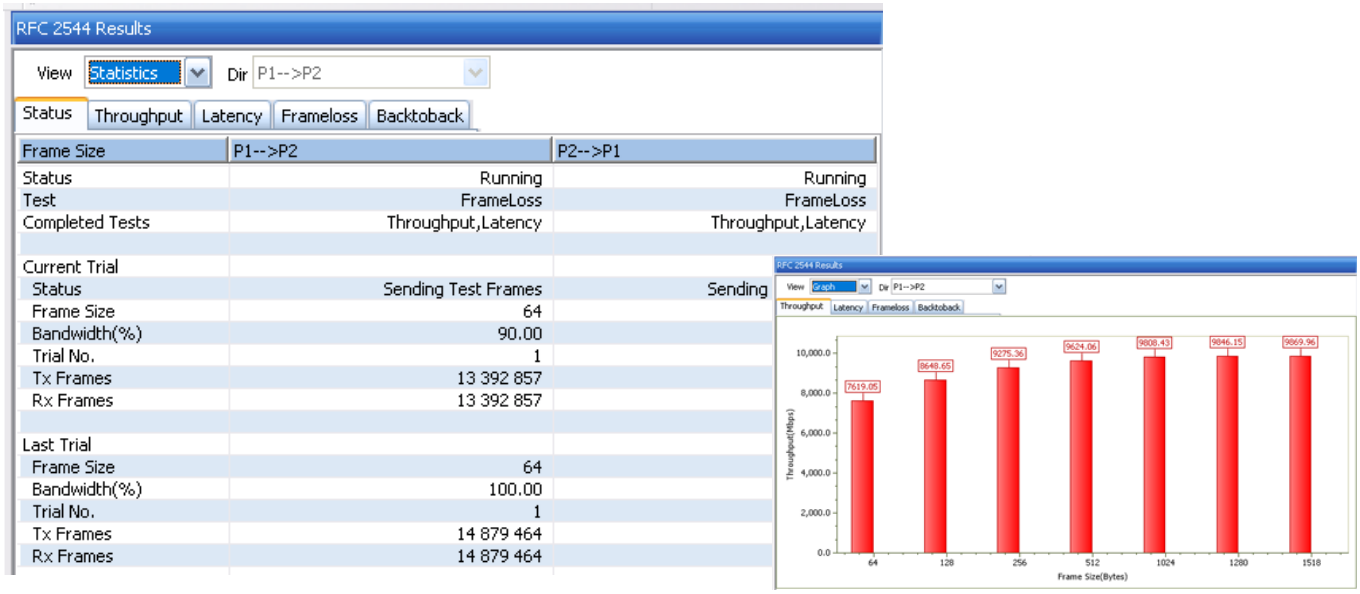


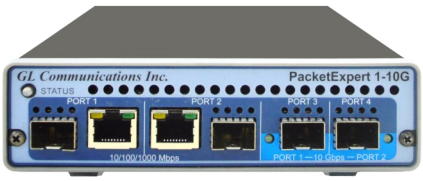
Figure: RFC 2544 Throughput Test Statistics and Graph

Command Line Interface (CLI)

PacketExpert™ is enhanced to support Command Line Interface (CLI) to access all the functionalities remotely using C#, Python clients and MAPS™ CLI Server/Client architecture.

The CLI supports all the PacketExpert™ test modules including - All Port Bert, Bert Loopback, All Port Loopback, RFC 2544, Record Playback, ExpertSAM™, Multistream Traffic Generation and Analysis, ExpertTCP™, PacketBroker and IP WAN Emulation.

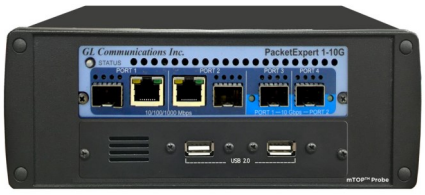
Hardware Specifications



Portable 10GX Hardware Unit

1U mTOP™ PacketExpert™ 10GX Rack Unit (3 PXN100s)

Stacked 2U mTOP™ PacketExpert™ 10GX Rack Unit



PacketExpert™ 10GX mTOP™ Probe

Physical Specification:
Length: 8.45 in. (214.63 mm)
Width: 5.55 in. (140.97 mm)
Height: 1.60 in (40.64 mm)
Weight: 1.713 lbs. (0.75 kg)

- **Dimension:** 1U/2U mTOP™ - 19" W x 16" L
- 1U mTOP™ Rackmount Enclosure can support up to 3 PXN100s
- 2U mTOP™ Rackmount Enclosure can support up to 6 PXN100s
- Optional 4 to 12 Port SMA Jack Trigger Board (TTL Input/Output)
- **Weight:** (not including the rails)
  1U with 3x PXN100 : 11 lbs
  2U with 6x PXN100 : 22 lbs

Physical Specification:
Length: 10.4 in. (264.16 mm)
Width: 8.4 in. (213.36 mm)
Height: 3.0 in. (76.2 mm)

Bus Interface: USB 3.0
External Power Supply:

- +12 Volts (Medical Grade), 3 Amps (For portable units having serial number ≥ 188400)
- +9 Volts, 2 Amps (For portable units having serial number < 188400)
- Optional 4-Port SMA Jack Trigger Board (TTL Input/Output)

SBC Specifications:

- Intel Core i3 or optional i7 Equivalent, Windows® 11 64-bit Pro OS
- USB 3.0 and USB 2.0 Hub, ATX Power Supply
- USB Type C ports, Ethernet 2.5GigE port
- 256 GB Hard drive, 8G Memory (Min)
- Two HDMI ports

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- Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro OS
- USB 3.0 and USB 2.0 Hub, Power Supply +12 Volts, 3 Amps
- USB Type C ports, Ethernet 2.5GigE port
- 256 GB Hard drive, 8G Memory (Min)
- Two HDMI ports

Temperature: Operating Temperature
0° C to +50° C (only up to operating altitude of 5000 feet, and for Optical SFPs only i.e. Non Electrical SFPs)
+5° to +40° C (for operating altitude up to 10,000 feet, and for both Electrical and Optical SFPs)
Non-Operating Temperature: -30° to +60° C

Humidity: Operating Humidity: 0% to 80% RH
Non-Operating Humidity: 0% to 95% RH

Altitude: Operating Altitude: up to 10,000 feet
Non-Operating Altitude: up to 50,000 feet

Interfaces:
4 x 1G Base-X Optical OR 10/100/1000 Base-T Electrical
2 x 100Mbps Base-FX Optical
2 x 2.5 Gbps Electrical/Optical Interface
2 x 10G Base-SR, -LR -ER Electrical/Optical Interface
Single Mode or Multi Mode Fiber SFP support with LC connector
Protocols:
IEEE 802.3ae LAN PHY compliance
RFC 2544 compliance

Pelican Carry Case

Buyer's Guide

Item No	Product Description
PXN100	PacketExpert™ 10GX
PXN101	10G and 2.5G option for PXN100
CXN100	CLI Server for PXN100
CXE100	CLI Server for PXE100

Item No	Related Hardware
PXE100	PacketExpert™ 1G
PXN112G	PacketExpert™ 10GX (12-Port) - Rackmount
PXN124G	PacketExpert™ 10GX (24-Port) - Rackmount
MT001	mTOP™ 1U Rackmount Enclosure w/ SBC
MT002	mTOP™ 1U Rackmount Enclosure w/o SBC

Item No	Related Software
PXN105	Wirespeed Record / Playback
PXN107	PacketBroker 10GX
PXN108	Multi-Stream UDP/TCP Traffic Generator and Analyzer
IPN507	IPNetSim™ and IPLinkSim™ options for PXN100

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

For more information, please visit PacketExpert™ 10GX webpage.

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