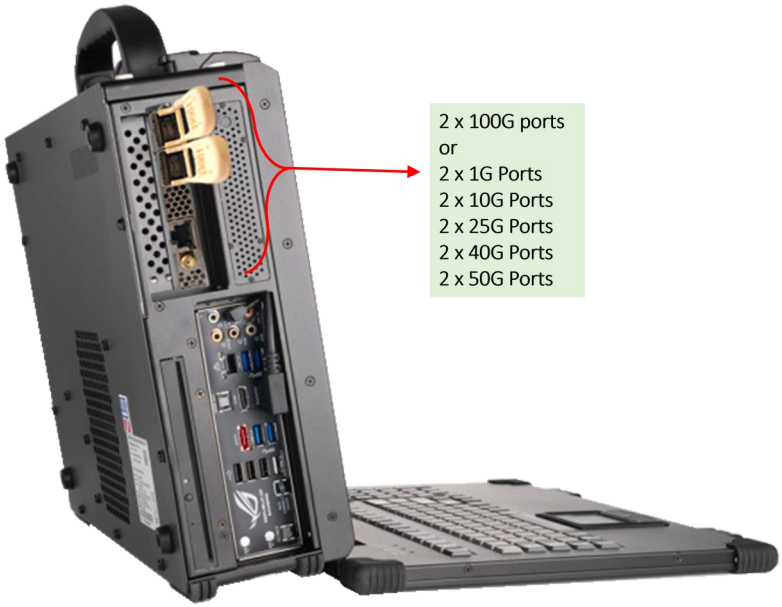
# PacketExpert™ 100G
# (Ethernet/IP Traffic Generation and Analysis up to 100G)

The PacketExpert™ 100G hardware platform features a dual-port configuration with two high-speed 100G QSFP28 ports (Port 1 and Port 2).

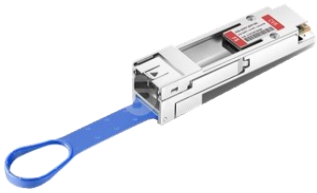
These versatile QSFP28 ports can be easily adapted to support 1G, 10G, 25G, 40G, 50G and 100G Electrical/Optical connections by utilizing QSFP+ adapters with respective SFP modules.

This flexibility empowers the platform to offer two Electrical/Optical ports for comprehensive Ethernet testing. Additionally, if higher test port density is desired, multiple NIC cards can be seamlessly connected to the appliance.




**100G QSFP28 Optical Transceiver**

**SFP+ Optical Transceiver (with Adapter)**



**Adapter**

## Key Features

- Supports 2 x 100G ports, upgradeable by 2 ports with addition of each device, up to 8 ports per 4U Rack.
- Includes RFC2544, Y.1564, MTGA, OAM, BERT, Smart Loopback, and Scripting capabilities (Python) for test automation
- Complete loopback plugs, and adapters
- Flexibility of testing at different speeds (100G, 50G, 40G, 25G, 10G, 1G)
- Dual Ports QSFP28 Cages with Adapters
- Supports QSFP28 form factor
- Supports Forward Error Correction (FEC), including Fire Code and RS-FEC (528, 514) and RS-FEC (544, 514)

## GL Value Set

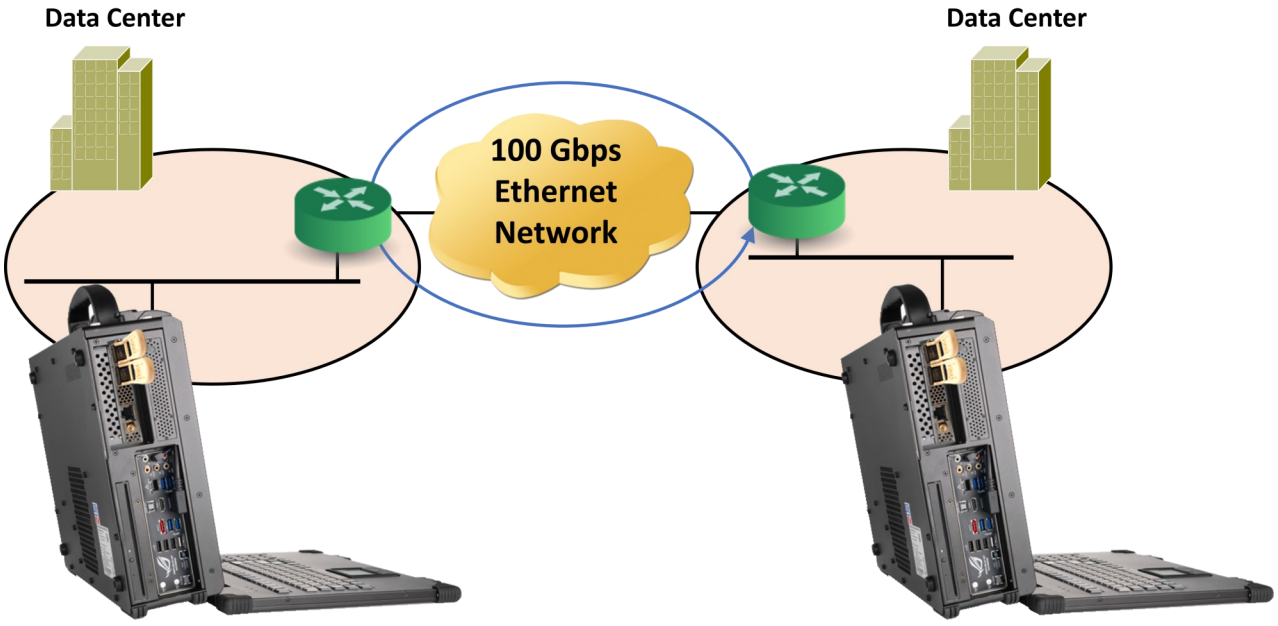
- Free Online Training
- Three years of Software Support and Warranty including free upgrades (if any)
- Three years of Hardware Support and Warranty

## Interface Options

Two QSFP28 cages each supporting:

- 100GBASE-SR4/LR4/FR or
- 50GBASE-SR2/LR2 or
- 40GBASE-SR4/LR4 or
- 25GBASE-SR/LR (with QSFP to SFP adapter) or
- 10GBASE-SR/LR (with QSFP to SFP adapter) or
- 1000BASE-X (with QSFP to SFP adapter)

# PacketExpert™ 100G
# (Next-Generation 100G Carrier-Grade Ethernet Networks )




## Overview

GL's **PacketExpert™ 100G (PXX100/PXX101)** is a cutting-edge hardware platform designed for extensive testing of wire-speed Ethernet and IP networks, supporting speeds of up to 100 Gbps. The PacketExpert™ 100G is a high performance appliance with specialized network interface cards, GL's PacketExpert™ software, large RAM and storage, with optimized processing, and cooling capability. Available in rack-mount and portable platforms.

This versatile device comes with a web-based user interface. All functionalities can be easily accessed through any standard web browser, allowing convenient control from multiple locations and various access devices such as PCs, laptops, and tablets.

PacketExpert™ 100G can perform Bit Error Rate Testing (BERT), Loopback Testing, RFC 2544 Testing (throughput, packet loss and latency measurements), ExpertSAM™ (ITU-T Y.1564) and Multi Stream Traffic Generator and Analyzer. Each 100G port provides independent Ethernet/VLAN/MPLS/IP/UDP layer-wise testing at wirespeed. BERT, RFC 2544, and Loopback applications are implemented on all transport Layers including Layer 2 (Ethernet), Layer 2.5 (VLAN / MPLS), Layer 3 (IPv4 / IPv6), and Layer 4 (UDP).

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

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# Main Features

### PacketExpert™ 100G Hardware - Portable LunchBox / Rackmount

- Portable PCIe based hardware supports 2*100G ports
- Upgradeable to 8 ports in 2 ports increments
- Supports QSFP28 form factor
- Supports 1G, 10G, 25G, 40G, 50G and 100G speeds on the same ports, with suitable adapters and breakout cables.

### Web based User Interface

- Includes web-based interface, accessible by standard web browsers across different operating systems
- The web interface allows multiple users to connect to a single or multiple web servers and independently run tests on different hardware units
- Control multiple devices from a single GUI, multiplying the number of ports available per system

### Wirespeed Ethernet / IP Testing

- Simultaneously generate and receive Ethernet traffic at 100% wire-speed (bidirectional 100 Gbps rate)
- User-configurable frame size, rate, MAC, IP, MPLS, and VLAN
- Supports Forward Error Correction (FEC) with IEEE 802.3-compliant, including Fire Code and RS-FEC (528, 514) and RS-FEC (544, 514)
- Wirespeed BERT, Smart Loopback and RFC 2544 applications
- Support for frame lengths from 64 bytes to Jumbo frames (up to 16000 bytes)
- Test at Ethernet (Layer 2), VLAN / Stacked MPLS (Layer 2.5), IP (Layer 3 including IPv4 and IPv6) and UDP (Layer 4)
- Customize Ethernet, IP and UDP protocol headers
- Supports DAC (Direct Attach Cable) and AOC (Active Optical Cable), offering cost-effective, low-latency, and energy-efficient solutions for short-distance connectivity in data centers.
- Up to 4 multi-device support for all high density testing applications
- BERT Patterns, supports industry ANSI and ITU standard PRBS patterns – 2^9-1, 2^11-1, 2^15-1, 2^20-1, 2^23-1 and 2^31-1, as well as user defined static patterns
- Python Application Programming Interfaces to allow scripting and automation
- Real-time results are displayed in both tabular and graphical representations
- Test result reports available in PDF and CSV file formats
- Detailed frame statistics presented in tabular format for all the ports

### Wirespeed BERT Across all Layers

- BERT is applicable for Ethernet (Layer2), up to 3 stacked VLAN (Q-in-Q), up to 3 stacked MPLS (Layer 2.5), IPv4/IPv6 (Layer3) and UDP (Layer4)
- Ability to introduce single bit errors or selectable error insertion rates
- User-defined header parameters for MAC, VLAN, MPLS, IPv4/IPv6 and UDP layers
- Multi-device support for wire-speed BERT and simultaneous BERT/Loopback applications to increase the number of parallel BERT tests
- Real-time graphical representation of the combined throughput and Bit Error rate can be plotted over time for BERT testing

### RFC 2544 Network Testing

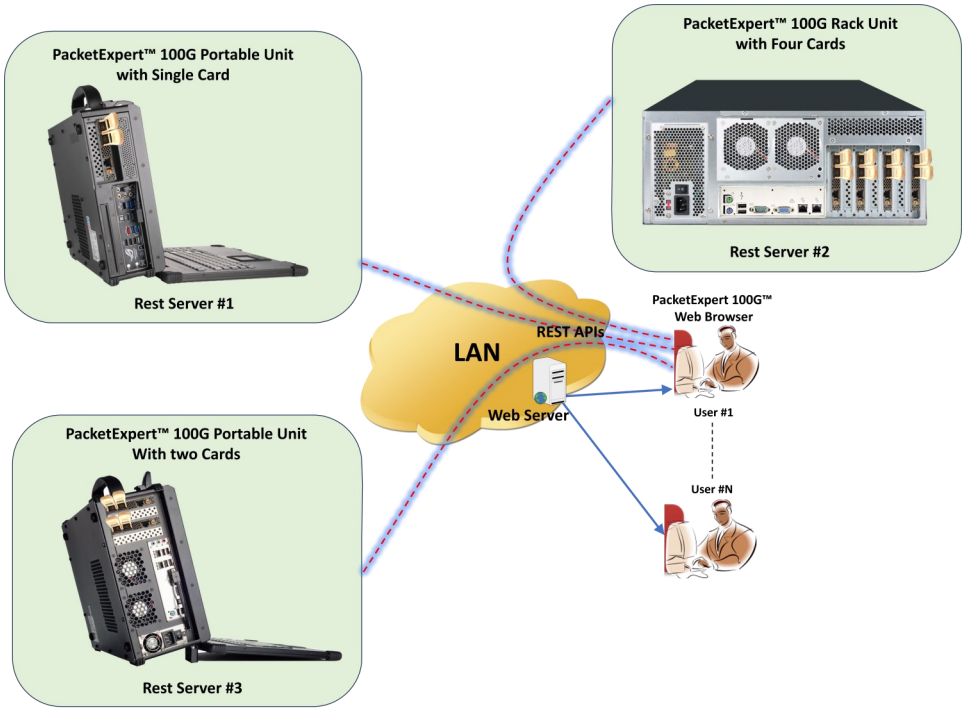
- RFC 2544 is applicable for Layers Ethernet, VLAN, MPLS, IPv4/IPv6
- Supports Throughput, Latency, Frame Loss, and Back-to-Back performance tests
- Uni-directional and bi-directional RFC 2544 testing supported
- User-defined configuration parameters such as frame size, trial duration, number of trials, etc.
- User selectable single or dual ports RFC 2544 testing
- Multi-device support for multiple parallel RFC 2544 tests
- Graphs and Statistics for all the RFC 2544 tests

### Smart Loopback Testing

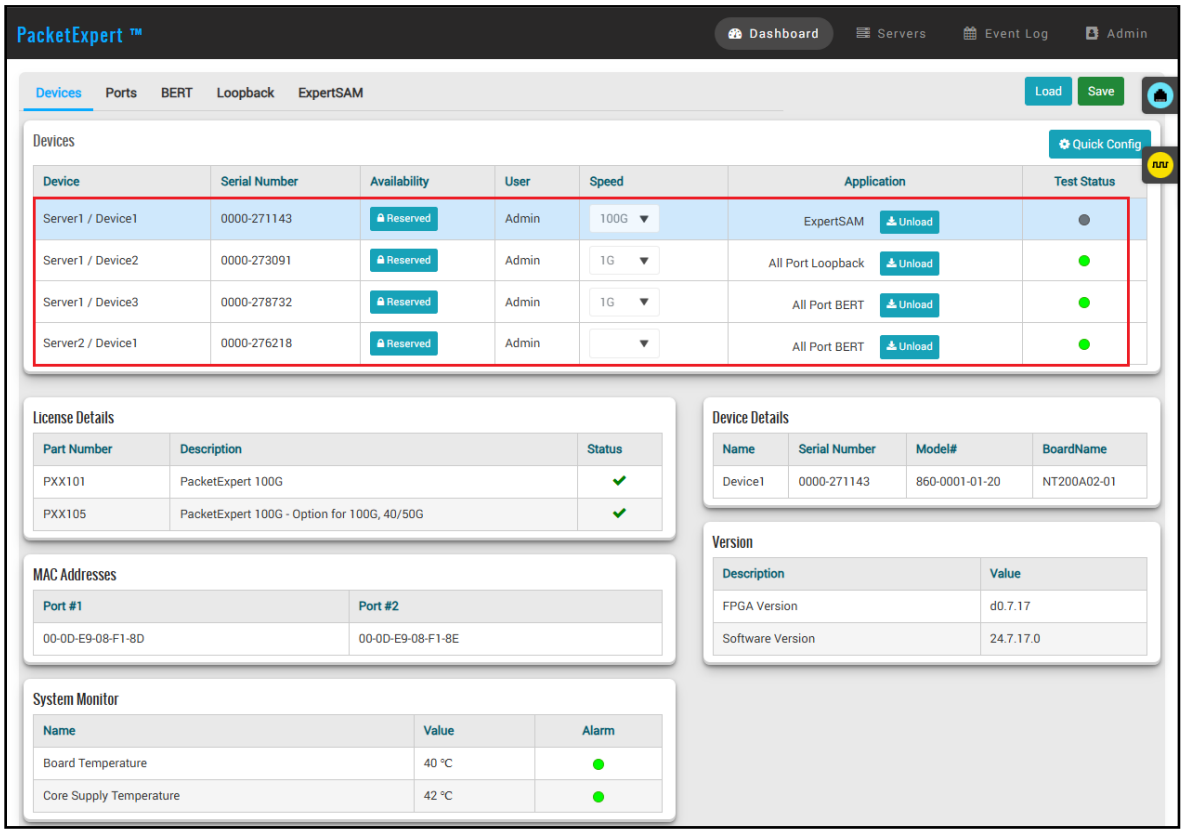
- Supports smart loopback (auto layer detection), swap source and destination addresses at MAC, IP, and UDP layers
- Muti-device support for all port loopback applications will increase the number of simultaneous loopback ports

# Multiple Servers and Multiple Devices

The PacketExpert™ 100G Web interface offers users the convenience of accessing multiple servers that are located in different areas within the same LAN. This allows for seamless connectivity and management of multiple PacketExpert™ 100G devices from a single server, enhancing efficiency and control.



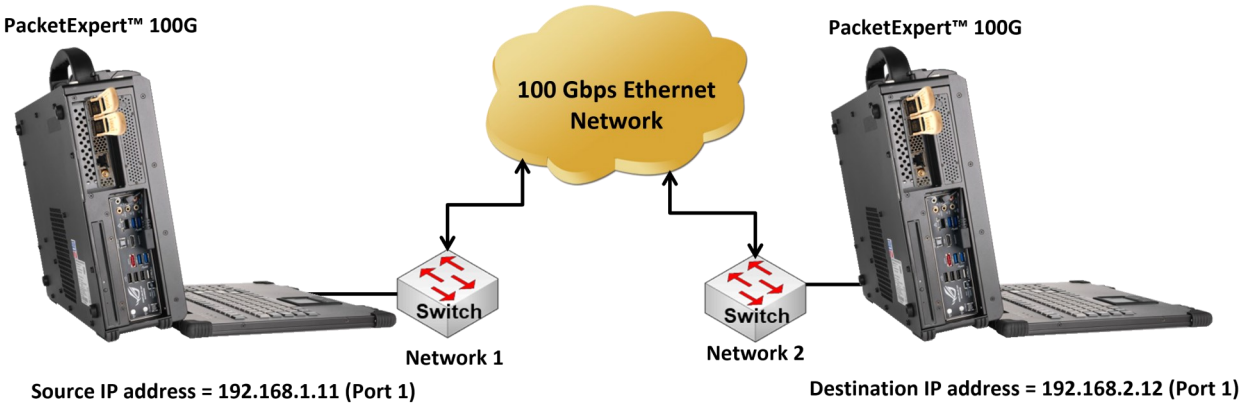

**PacketExpert™ 100G - Multiple Servers and Multiple Devices**




**PacketExpert™ 100G Web Interface with Multiple Devices**

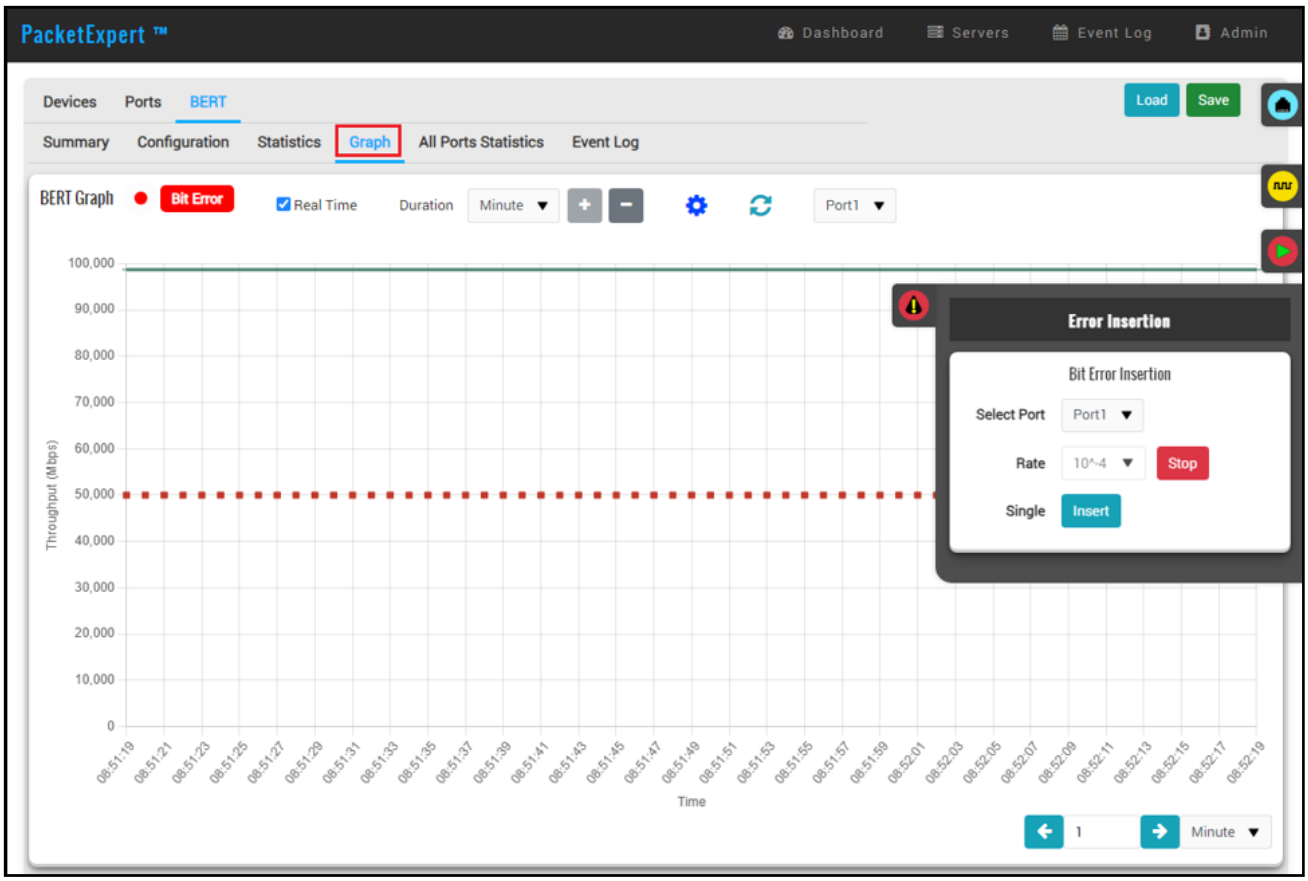
# Wirespeed BER Testing

PacketExpert™ 100G supports wirespeed Bit Error Rate Testing (BERT) up to 100Gbps over Framed Ethernet (Layer2), Stacked VLAN (Q-in-Q), Stacked MPLS (Layer 2.5), IPv4/IPv6, and UDP layers at specific frame length and traffic rate. It can generate and receive various BER Traffic Patterns, including various industry standard PRBS patterns, User-defined test patterns, Bit Error Insertion, and FCS Error Insertion. Wirespeed BERT is supported on two 100 Gbps optical ports. The screen below displays the PacketExpert™ 100G web interface, running All Port BER test on both the Port#1 and Port#2 optical ports. Optional sequence number insertion allows detecting out-of-sequence packets and packet loss.




**PacketExpert™ 100G - BERT Testing**

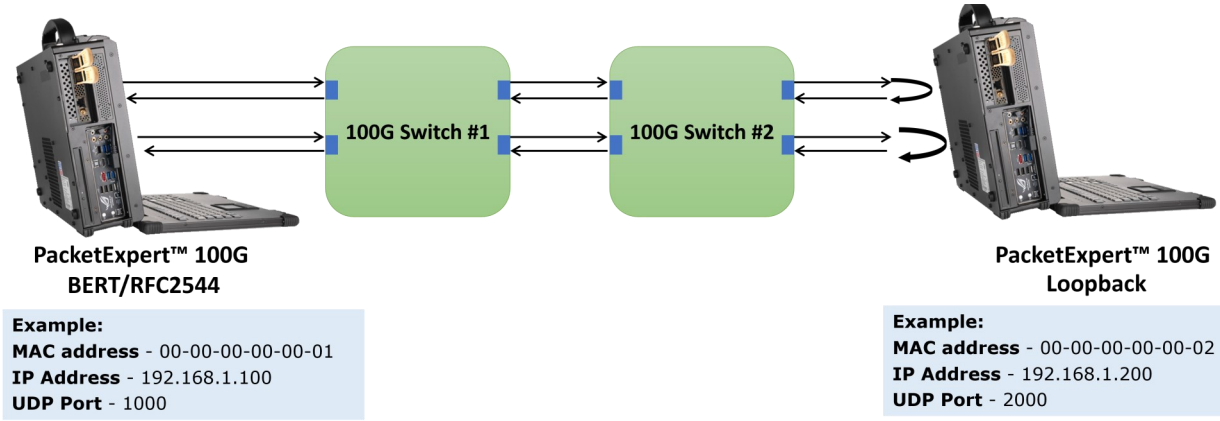
PacketExpert™ 100G offers a real-time presentation of the combined Throughput and Error Events detected during Bit Error Rate Testing. These occurrences are depicted on a graphical chart as data points over the course of the test. The graph initiates at the beginning of the BER test and stops when the BER test is terminated.



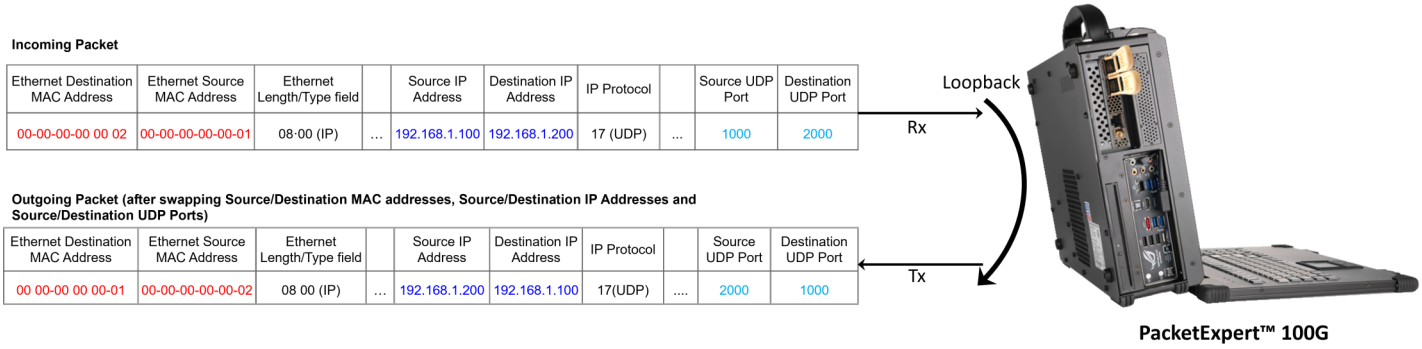

**All Port BERT Graph with Bit Error**

## All Port Loopback Testing

PacketExpert™ 100G offers Smart Loopback capability on two 100 Gbps Optical ports (Port 1 and Port 2). When in Smart Loopback mode, PacketExpert™ 100G analyzes incoming traffic, identifies Source and Destination Addresses, and then redirects the traffic on the same port after swapping them. It effortlessly manages stacked VLAN and stacked MPLS configurations.



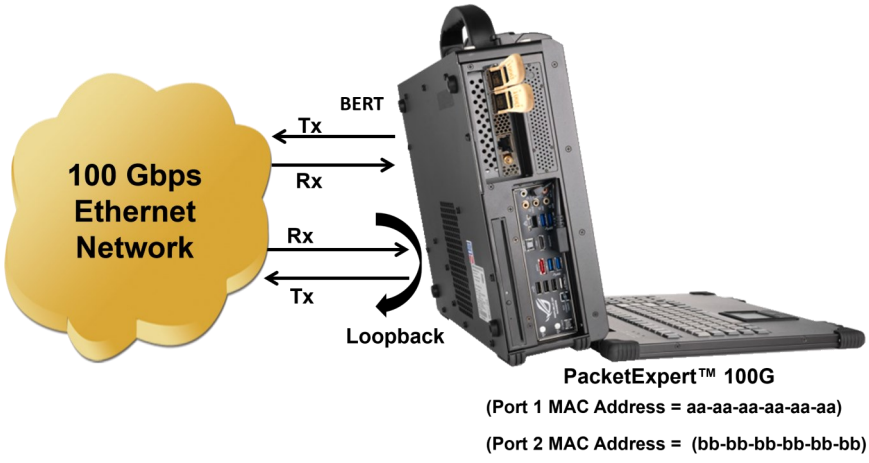

**PacketExpert™ 100G - All Port Loopback Testing**




**PacketExpert™ 100G - Smart Loopback Testing**

## BERT and Loopback Testing

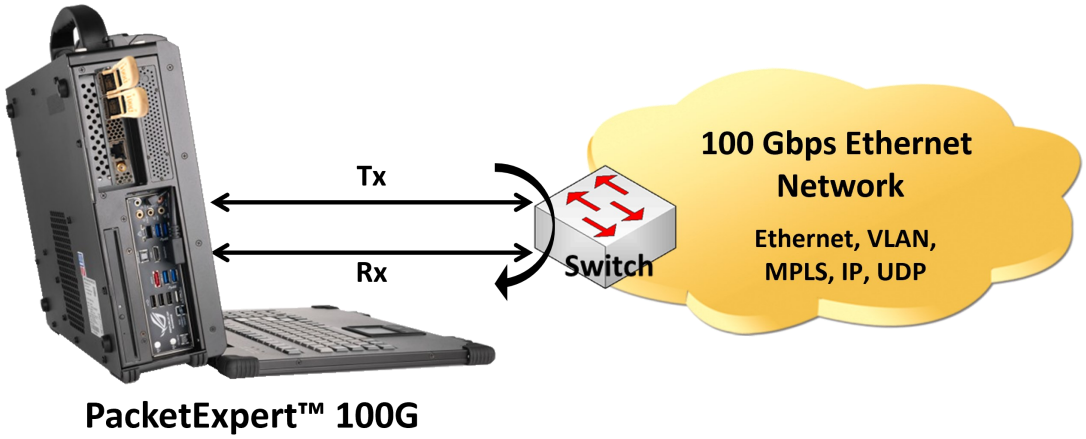
For testing across a network, the remote PacketExpert™ 100G can be left in Loopback mode. BERT is controlled by the local end PacketExpert™ 100G.




**PacketExpert™ 100G - BERT and Loopback Testing**

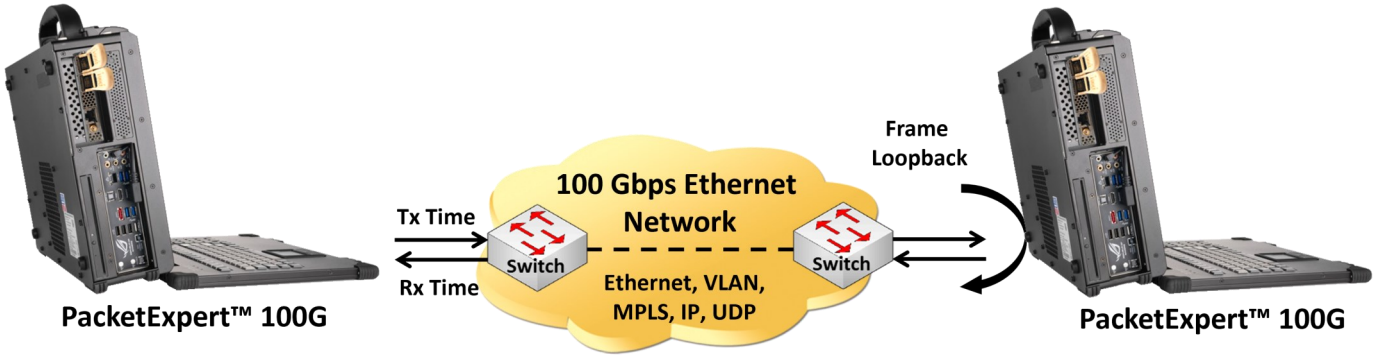
## RFC 2544 Testing

PacketExpert™ 100G supports RFC 2544 tests on two 100 Gbps Optical ports (Port 1 and Port 2) on Layers 2, 2.5, and 3. RFC 2544 tests includes Ethernet Throughput, Latency, Frame Loss, and Back-to-Back performance tests in accordance with RFC 2544 specifications. The test is setup such that the traffic can be generated and transmitted on either of the ports and the looped back traffic from the DUT is received on the opposite port validating the test parameters.




**PacketExpert™ 100G - Dual Port RFC2544 Testing**

When conducting a single-port RFC 2544 test using PacketExpert™ 100G, you can choose to perform the test on either Port 1 or Port 2 individually, but it is not feasible to run RFC 2544 tests concurrently on both Port 1 and Port 2.

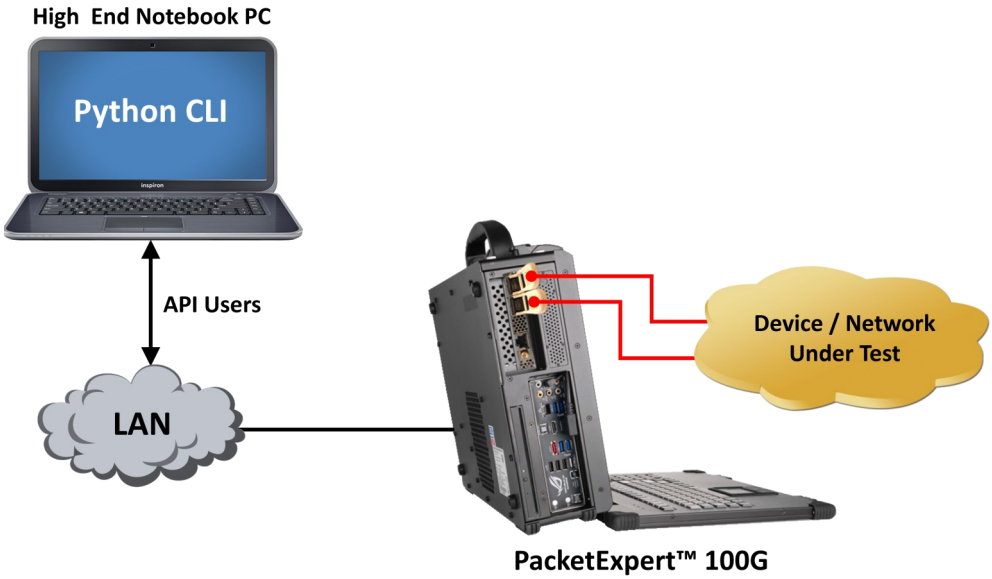



**(Latency = Rx Time – Tx Time)**

**PacketExpert™ 100G - Single Port RFC2544 Testing**

# Python Client

The Python interface developed for PacketExpert™ 100G allows users to control all features of PacketExpert™ through Python APIs. The Python interface is implemented based on a client-server (Rest API's) model.



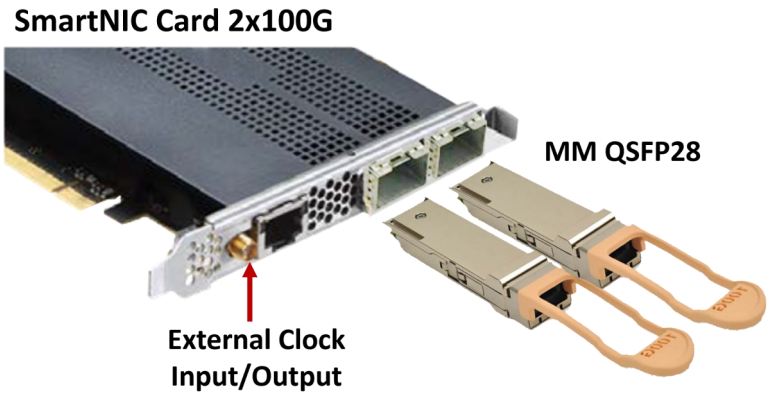

**PacketExpert™ 100G - Python client**

AllPortBert_Sample_app.py

```python
from Core.Utils import *
from PacketExpertTests import *
import time


def main():
    # Specify server details and test configuration
    server_ip = "192.168.1.152"
    server_port = 3333
    device_list = [1]
    port_list = [1, 2]

    err, device_test_configuration = set_device_traffic_config(device_list)

    # Configure TC1 Bert Test Parameters

    device_test_configuration[1].port_mode = PortMode.Gbps100
    device_test_configuration[1].start_frame_size = 64
    device_test_configuration[1].start_rate = 1
    device_test_configuration[1].start_error_rate = 4  # Bit error insertion rate 10^-4

    test_duration = 10

    default_json_path = 'C:\\Users\\Desktop\\PXXPythonClient-Release\\JSON\\'
    result_file_path = 'C:\\Users\\Desktop\\PXXPythonClient-Release\\Log\\'
    result_file_name = "Bert_Results"

    generate_report_info = GenerateReport()
    generate_report_info.test_conducted_by = "GLIndia"
    generate_report_info.filename = "Bert_Report"
    generate_report_info.title = "All Port Bert"

    generate_report_info.init_selected_ports(device_list, port_list, AppName.AllPortBERT)

    enable_generate_report = True
```

**PacketExpert™ 100G - Python Script**

# Hardware Specifications




**PacketExpert™ 100G SmartNIC**

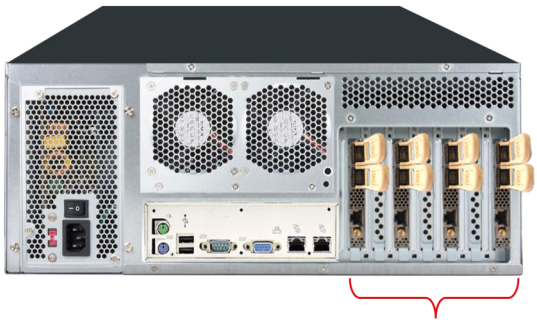
| SmartNIC Specifications (Per Card) | |
|---|---|
| **Optical Components** | • 2 x QSFP28 cages for 2 x 100 GbE, 2 x 50GbE, and 2 x 40 GbE<br>• Supports 2 x 25 GbE, 2 x 10 GbE, and 2 x 1 GbE with QSFP-to-SFP adapter |
| **PCIe** | PCIe Gen 3, 16 lanes |
| **RAM** | 8 GBytes DDR4 SDRAM |
| **1000Base-T 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 Rackmount Platforms

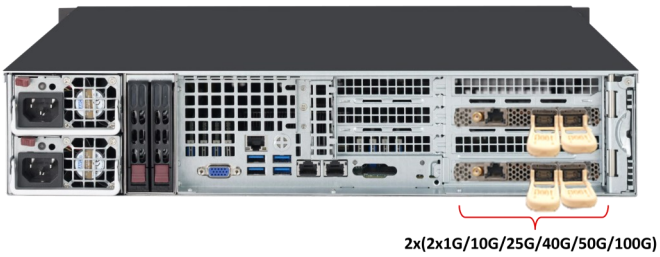
- Ideal for Lab environments that require centralized management of multiple servers and network devices
- Rackmount units offer flexibility for scaling up or down as needed by adding or removing individual units

### PacketExpert™ 100G 4U Rack PC



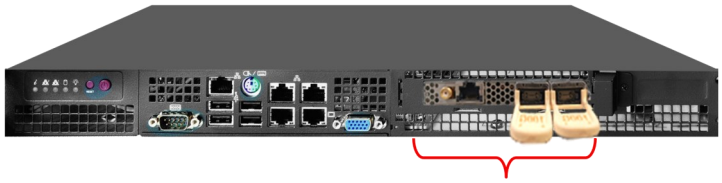

| Specifications | |
|---|---|
| **Dimensions** | 6.9” H x 16.9” W x 17.5” D |
| **Weight** | 72 lbs. |
| **Number of Supported Cards/Ports** | Up to 7 Cards x (2x100G Ports), Maximum of 14 Ports |
| **Power supply** | 800W |

### PacketExpert™ 100G 2U Rack PC




| 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 PC




| 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<br>1 Card x (2x100G Ports), Maximum of 2 Ports |
| **Power supply** | 200W |

# Hardware Specifications (*Contd.*)

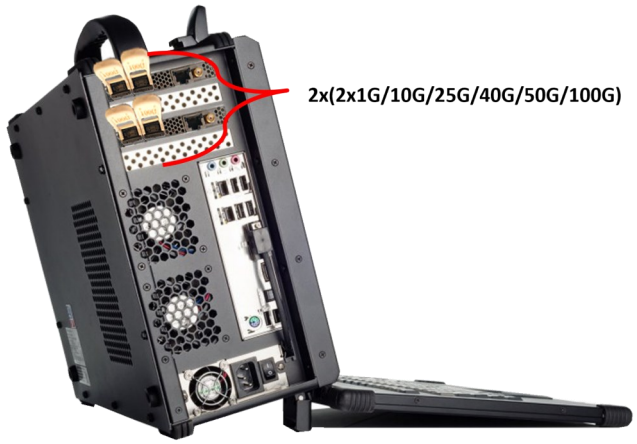
## PacketExpert™ 100G Portable Platforms

- 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)

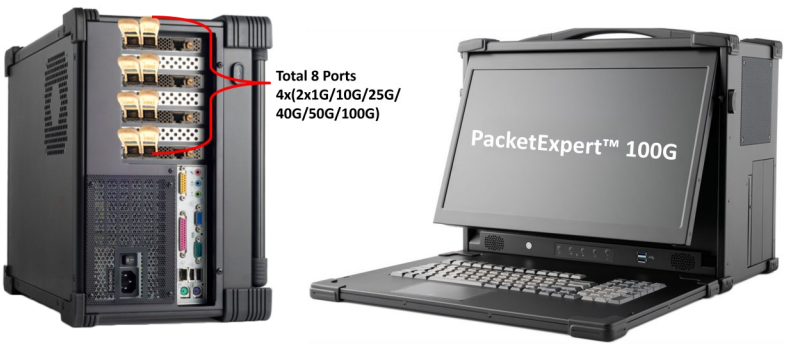

| Specifications | |
|---|---|
| **Dimensions** | 12.4” H x 16.41” W x 4.39” D |
| **Display** | 17.3” 1920x1080 |
| **Weight** | 16.5 lbs. |
| **Number of Supported Cards/Ports** | Up to 2 Cards x (2x100G Ports), Maximum of 4 Ports |
| **Power supply** | 400W (optional 500W) |

### 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, on related Software and Accessories, visit PacketExpert™ 100G– Resources and PacketExpert™ 100G–Accessories webpage.