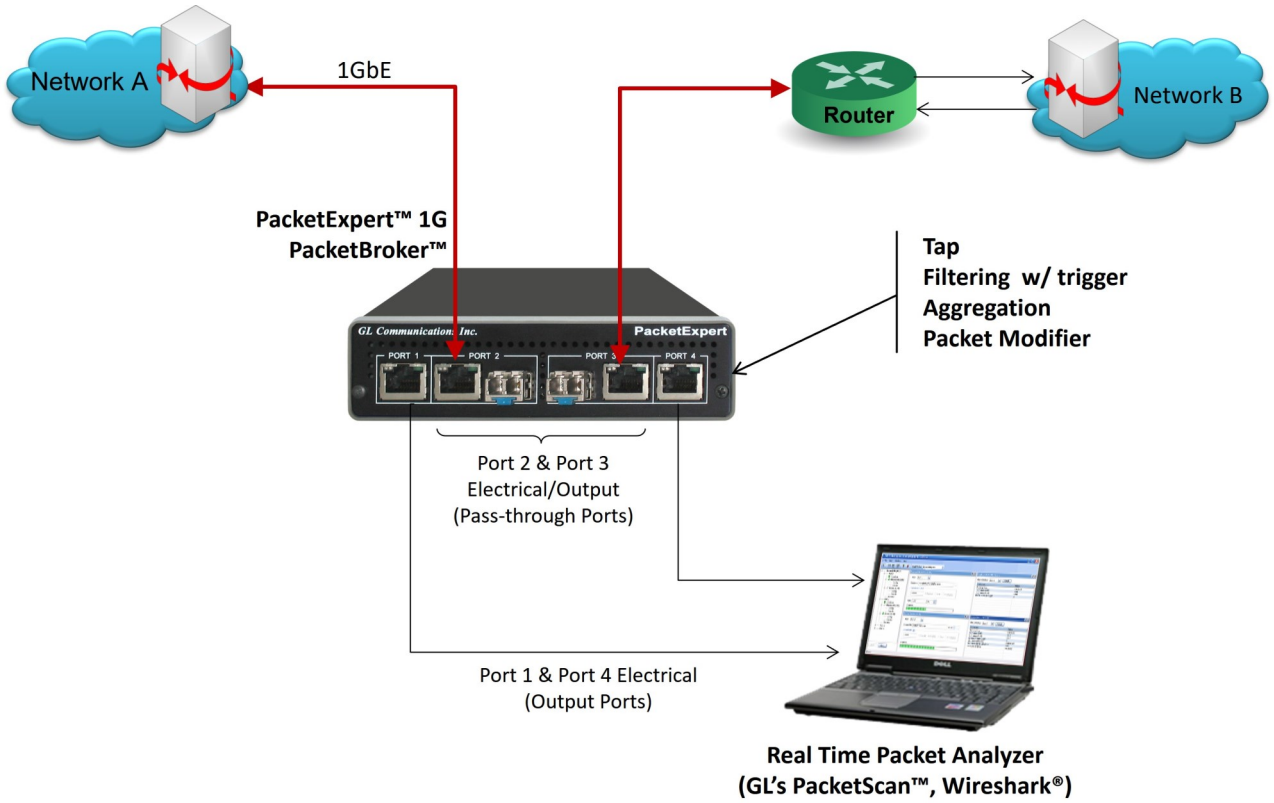
PacketBroker (PacketExpert™ 1G)



Overview

The PacketBroker is an optional application designed as a test tool to be used as a highly precise non-intrusive Wirespeed Ethernet Tap with all the necessary features packaged within to capture real world traffic, define multiple filters for drilling-down to traffic of interest, generate triggers based on packet filters, and transmit filtered/aggregated packets for deep-packet data analysis.

PacketBroker is an **Active Ethernet Tap** where the incoming frames Ethernet FCS is checked and the frames with bad FCS are dropped. The frames with valid FCS are taken up for processing after the FCS is stripped off. After processing, while sending the packet out of the opposite port, the FCS is recalculated and attached to the outgoing Ethernet frame.

The application is available as an optional software with PacketExpert™ 1G, a Quad Port Ethernet / VLAN / MPLS / IP / UDP Tester with 4 Electrical Ethernet ports. 2 of the 4 ports can be Electrical or Optical ports, enabling testing on optical fiber links as well. The electrical ports support 10/100/1000 Mbps, and optical ports support 1000 Mbps using SFP.

PacketExpert™ 1G is available in portable as well as Rack mount platforms. The portable PacketExpert™ 1G platform supports all the features of high-end taps providing mobility and storage capacity to reach any point in the network.

The PacketBroker application captures on Port 2 & Port 3 (Pass-through ports) and outputs the filtered and modified packets on Port1 and Port4 (Output ports) respectively, or aggregates the output to either Port1 or Port4. All the features of high-end taps are packaged into this portable unit making it suitable for field testing and remote testing any point in the network. The traffic-of-interest captured on a live network can be analyzed using packet analyzers such as PacketScan™-All IP analyzer or Wireshark®.

For more details, refer to PacketBroker – Passive Ethernet Tap webpage.

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Main Features

- Network Tap - capable of handling bidirectional 100% wirespeed traffic up to 1 Gbps
- Wirespeed Filtering - powerful and easy to use
- Packet Modification to convey useful information like Timestamp, Filter number, etc.
- Output aggregation - both direction traffic multiplexed on the same output port
- Command Line Interface (requires CXE100) for automated testing and remote accessibility using API clients C#, Python and MAPS™ Client Server architecture

Capture

- Supports capturing on Port 2 and Port 3, in either SFP or Electrical mode
- Capture packets non-intrusively over RJ-45 (Electrical) and SFP (Optical) ports at nano-second precision
- Supports capturing Full Duplex traffic (traffic from both directions) at wire speed (10/100/1000 Mbps)
- Turn On/Off advanced features like Filters, Aggregation, Packet Modification, and Output traffic at run time

Filters

- Supports a total of 32 filters per PacketExpert™ unit, with up to 16 user-configurable filters per port, combined into simple AND/OR expression
- High filter definition flexibility – drill down to the bit level and define mask at bit level, so that each bit can either be filtered or ignored
- Up to 40 bytes wide filter that covers almost entire packet header up to UDP
- User defined filter offset to filter from any byte within the packet, including payload
- Continuous mode (filters packets continuously) and Trigger mode (stops after the first packet detected and waits till the filter is enabled again)
- Enable/disable individual filter at run time for maximum flexibility

Packet Modification

- Modify filtered packets to include useful information like timestamp with nanosecond precision, filter number, port number etc. before sending out through the output ports

Aggregation

- Aggregate packets filtered from both directions and send out on a single output port

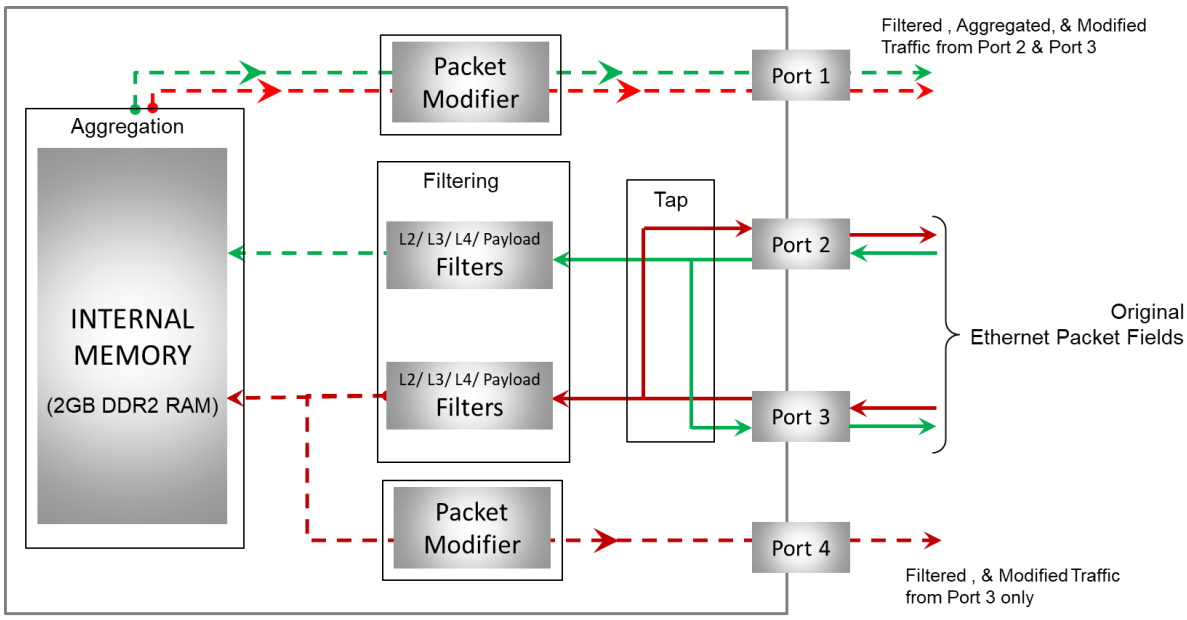
Output

- Supports forwarding the filtered, modified and/or aggregated packets on either Port 1 or Port 4 of PacketExpert™ (Electrical mode only)

Statistics

- Provides port level statistics like Total Frames/Bytes Received, Rx Frame Rate, Rx Data Rate, etc.

Working Principle



PacketBroker supports tap, filter, packet modification, and aggregation functions.

Tap: Traffic is forwarded between the Pass-through ports (Port 2 and Port 3) without any modification or delay. except processing the Ethernet FCS. The incoming frames' Ethernet FCS is checked and the frames with bad FCS are dropped. The frames with valid FCS are sent to the opposite port after stripping off the FCS. While sending the packet out of the opposite port, the FCS is recalculated and attached to the outgoing Ethernet frame

Filter: It supports wirespeed filtering of Layer 2/ Layer 3/ Layer 4 Ethernet packets, with each port featuring up to 16 simultaneous filters each of 40 bytes in length. Mono Trigger and Continuous filter modes are also supported.

Aggregation: The Port2 (pass-through port) traffic filtered is normally sent out on Port1 (output port). Similarly, Port3 traffic filtered is sent out on Port4. Alternatively, the filtered traffic from both Port 2 and Port 3 can be aggregated and sent out on a single port as a single stream. Since the aggregated stream rate can exceed wirespeed rate of a single port, the aggregated traffic is buffered in the onboard 2 GB DDR2 RAM memory, before being sent out.

Packet Modification: Filtered packets can be modified to insert useful information within the packet itself. PacketBroker uses an inband method of conveying this information to the packet analyzer by carrying this information in the packet's MAC header itself.

Hardware Filters

PacketBroker application includes a powerful “Wirespeed filter” feature that allows user to filter-in, and continuously capture only the traffic of interest.

- Captured traffic on pass-through ports are filtered as per the filter criteria
- In real-time up to 16 simultaneous filters per port each of length 40 bytes can be set
- Edit the raw filter bytes and Mask and Individual Filter Fields
- Filter can be set to each bit in the packet (Raw mode)
- “Packet Display Mode” is also provided for the user’s convenience

- In Raw mode, each bit can be set to ‘filtered’ or ‘don’t care’ condition via filter mask
- For each filter, offset can be set to any byte within the packet (from 0 to 2047) which gives flexibility to filter any fields within any protocol headers, and even the payload
- Up to 16 filters can be defined, and combined with “AND” /”OR” condition. Further, “Accept“ or “Reject” the packet conditions can be applied

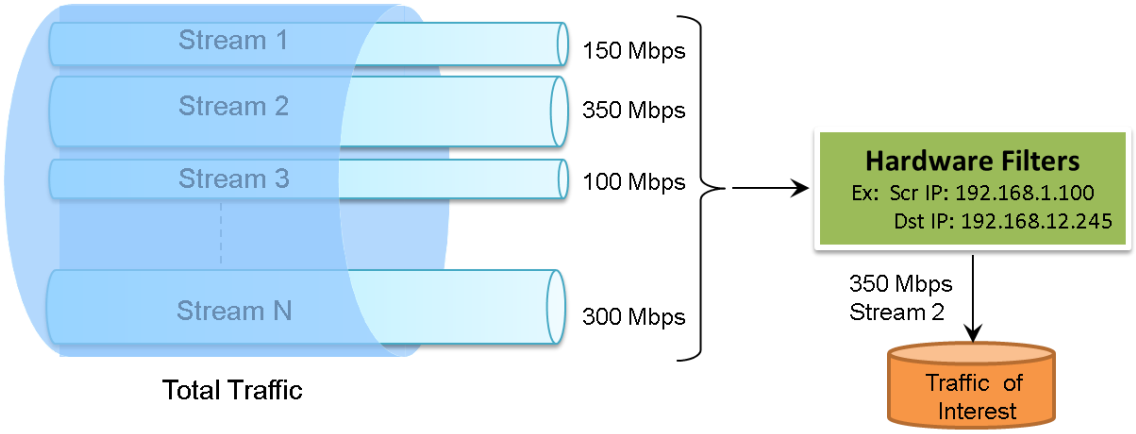


Figure: Capture Traffic of Interest

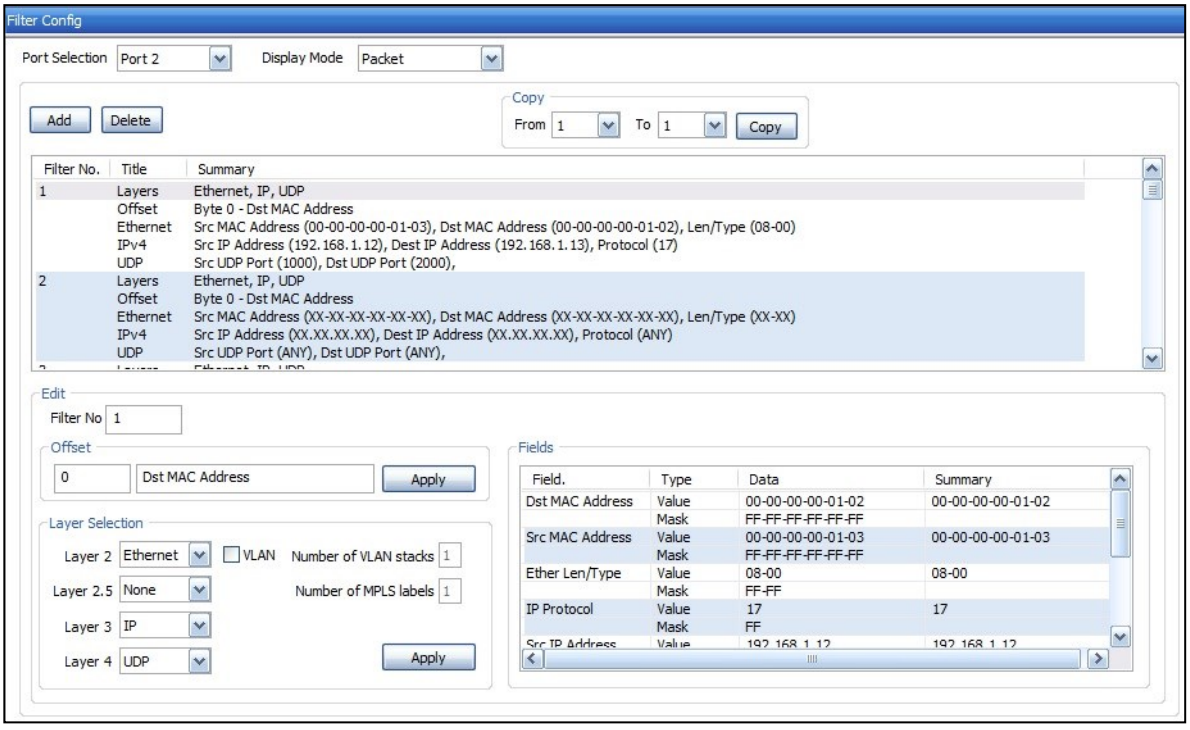


Figure: Filter Configuration

Filter Trigger Setup

Each filter can be configured to run in either mono trigger or continuous filter mode.

Continuous mode is the normal filter operation mode where packets are set to filter continuously. Correspondingly, Triggered / Filtered Packets statistics are logged. In **Mono Trigger filter mode**, once the packet that matches the filter is filtered, filtering is stopped and, any further packets are not accepted, even if they match the filter. The first single matching packet is said to have "triggered" the filter.

Figure: Mono Trigger and Continuous Filter Setup

Aggregation option

Aggregation option can be enabled /disabled and the output port for the aggregated traffic is selected accordingly. The selected aggregation port is indicated by the double arrows, and Aggregate Port (P4) in the Out Ports, as shown in the figure below.

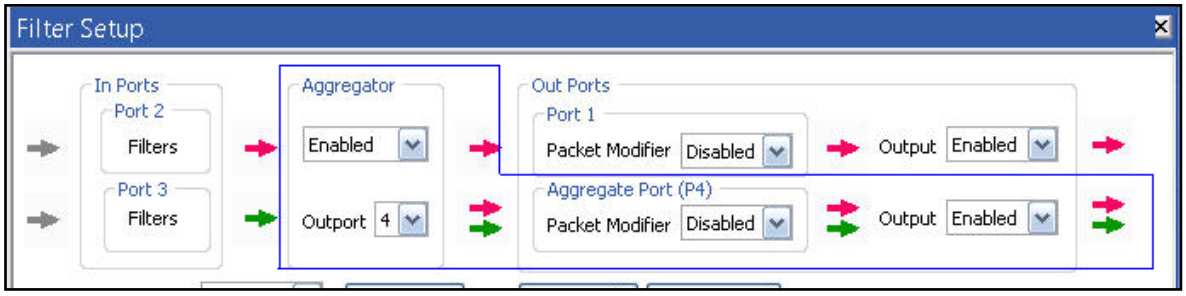


Figure: Aggregation Enabled and Output on Port 4

Packet Modification option

Packet Modification option can be enabled / disabled on either of the output ports (1/4). The aggregated or filtered traffic will be modified and is sent on the output ports accordingly.

Finally, user can completely stop any traffic being sent out on the output ports by disabling the Output ports (Port1 or Port4) as shown in the figure below.

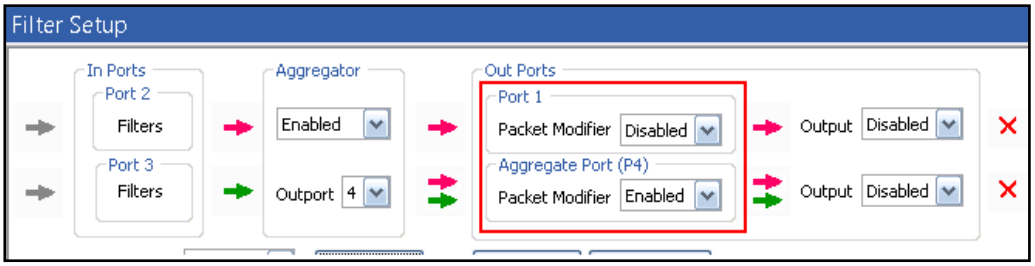


Figure: Packet Modification Enabled/Disabled

Packet Modifier Field Configuration

The PacketExpert™ hardware modifies the received Original Ethernet packets at Port 2 /3 and replaces the Source and Destination MAC Addresses (of 12 bytes) fields with Timestamp (8 bytes), Filter No (2 bytes), Board Serial No. (1 byte), and Port No (4 bits) fields as shown in the figure. The new CRC is calculated for the modified fields and the new CRC (4 bytes) is appended. The Hardware modified packets are then sent on Port 1 and Port 4 (Output Ports).

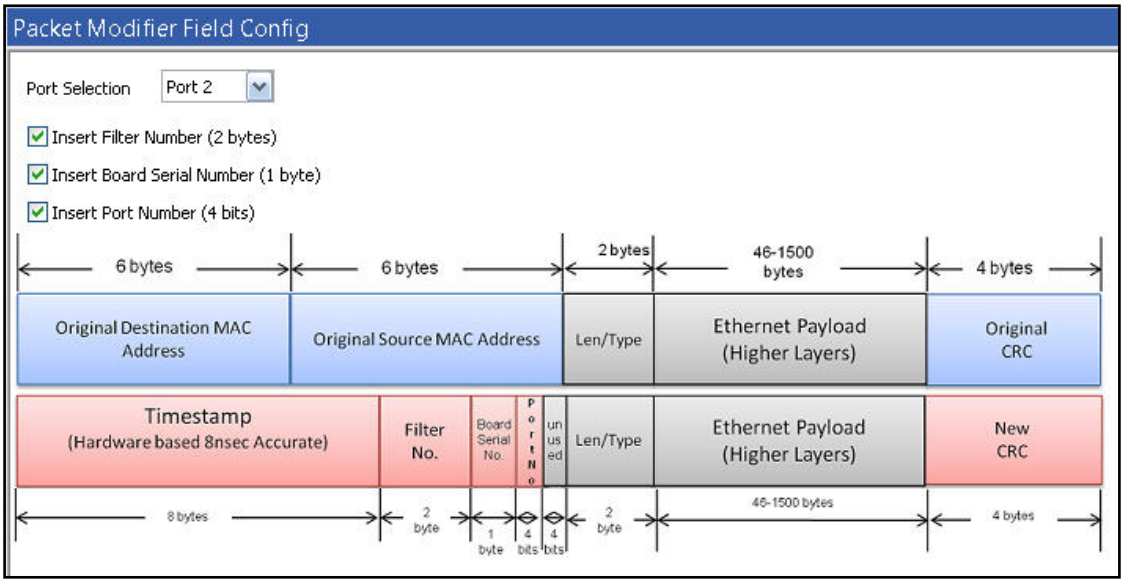
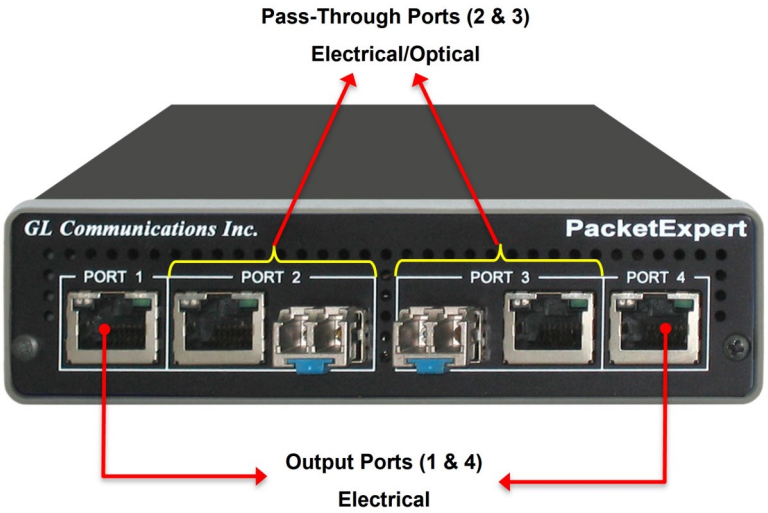


Figure: Packet Modifier Field Configuration

Pass Through and Output Ports

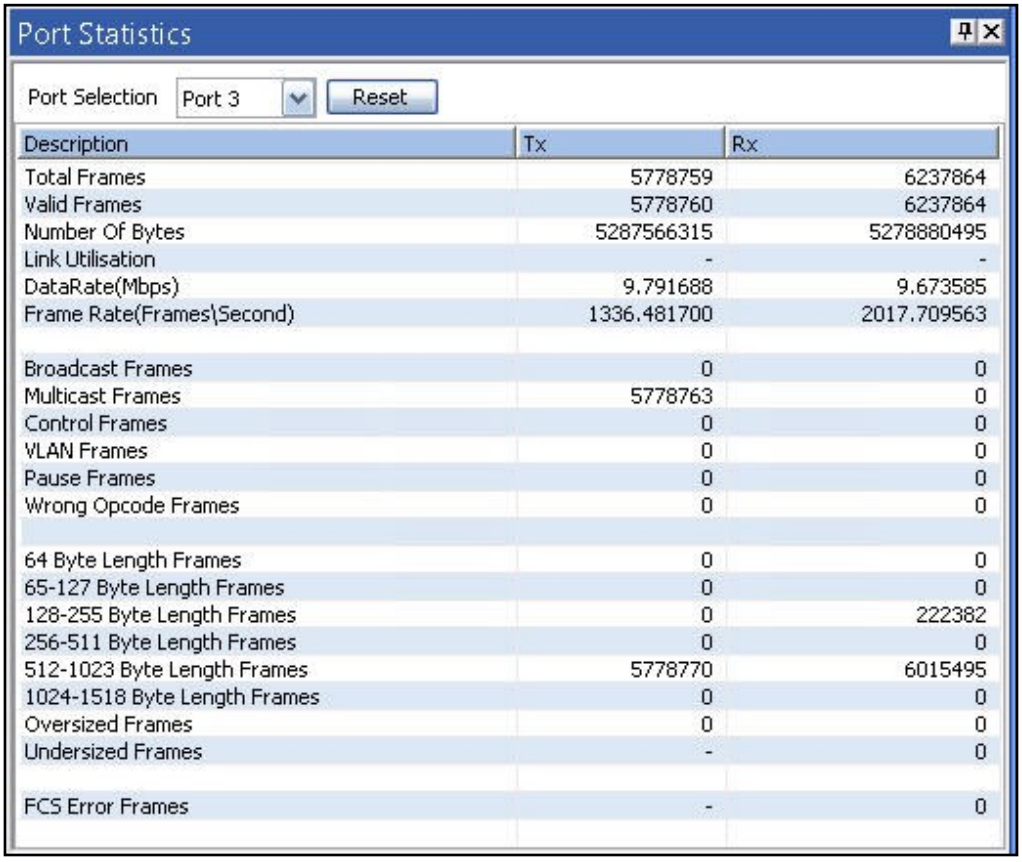
The PacketExpert™ hardware unit is equipped with both RJ-45 ports (Electrical) and SFP ports (Optical). The Port 2 and Port 3 can be used in either SFP or Electrical mode, and are generally called as Pass-through ports. The Ports 1 and Port 4 are RJ-45 ports, and are generally called as the Output ports. When these are used, connect the PacketExpert™ unit with an external storage device or an analyzer.

- Pass Through Ports (2): Dual SFP or RJ-45 based 1 Gb/s ports. The Ports 2 and 3, are generally connected in Pass Through Mode to tap the network under test
- Output Ports (2): Dual RJ-45 ports for electrical connection 10/100/1000BASE-T. The Output Ports interfaces are used to forward captured packets to real-time packet analyzer



Statistics

The detailed Tx Rx frame statistics per port are provided. In addition to statistics like Frame Count, Frame Rate, Link Utilization, other statistics like Frame Type (Unicast / Broadcast / Multicast / VLAN), frame lengths (64, 65-127, 1024-1518, Oversized, Undersized), and FCS Error Frames are also provided.



Description	Tx	Rx
Total Frames	5778759	6237864
Valid Frames	5778760	6237864
Number Of Bytes	5287566315	5278880495
Link Utilisation	-	-
DataRate(Mbps)	9.791688	9.673585
Frame Rate(Frames\Second)	1336.481700	2017.709563
Broadcast Frames	0	0
Multicast Frames	5778763	0
Control Frames	0	0
VLAN Frames	0	0
Pause Frames	0	0
Wrong Opcode Frames	0	0
64 Byte Length Frames	0	0
65-127 Byte Length Frames	0	0
128-255 Byte Length Frames	0	222382
256-511 Byte Length Frames	0	0
512-1023 Byte Length Frames	5778770	6015495
1024-1518 Byte Length Frames	0	0
Oversized Frames	0	0
Undersized Frames	-	0
FCS Error Frames	-	0

Figure: Port Statistics

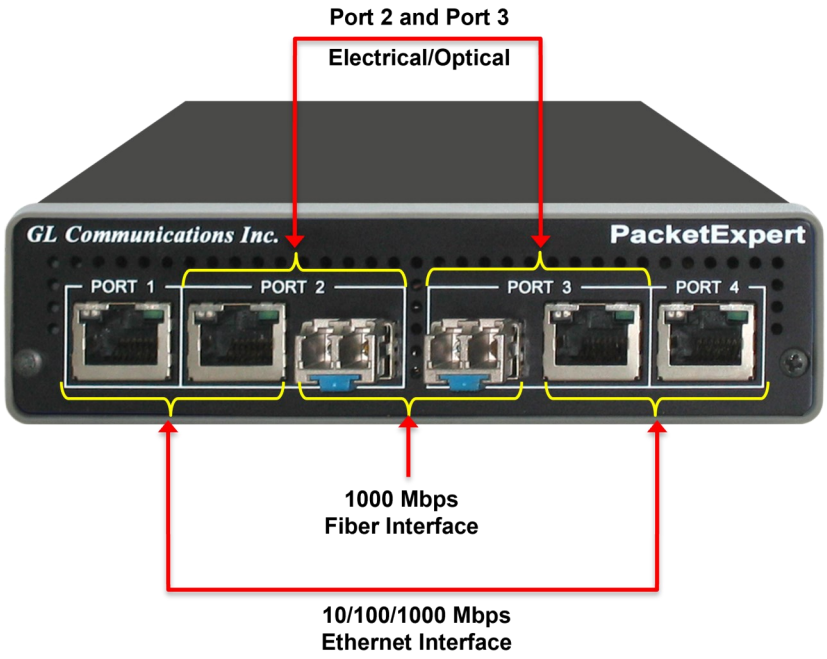
Command Line Interface (CLI)

PacketExpert™ is enhanced to support Command Line Interface (CLI) requires additional license CXE100 to access all the functionalities remotely using Python, C#

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™ and PacketBroker.

Portable PacketExpert™ 1G Specifications



Interfaces	• 2 x 10 / 100 / 1000 Base-T Electrical only • 2 x 1000 Base-X Optical OR 10/100/1000 Base-T Electrical • Single Mode or Multi Mode Fiber SFP support with LC connector
Protocols	• RFC 2544 compliance
Bus Interface	• USB 2.0 or USB 3.0
Power	• +12 volts (Medical Grade), 3 Amps
Temperature	• Operating Temperature: +5 to +40C • Non-Operating Temperature: -30 to +60C
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
Physical Specification	• Length: 8.45 in. (214.63 mm) • Width: 5.55 in. (140.97 mm) • Height: 1.60 in (40.64 mm) • Weight: 1.66 lbs. (0.75 kg)

mTOP™ PacketExpert™ 1G Rack Specifications

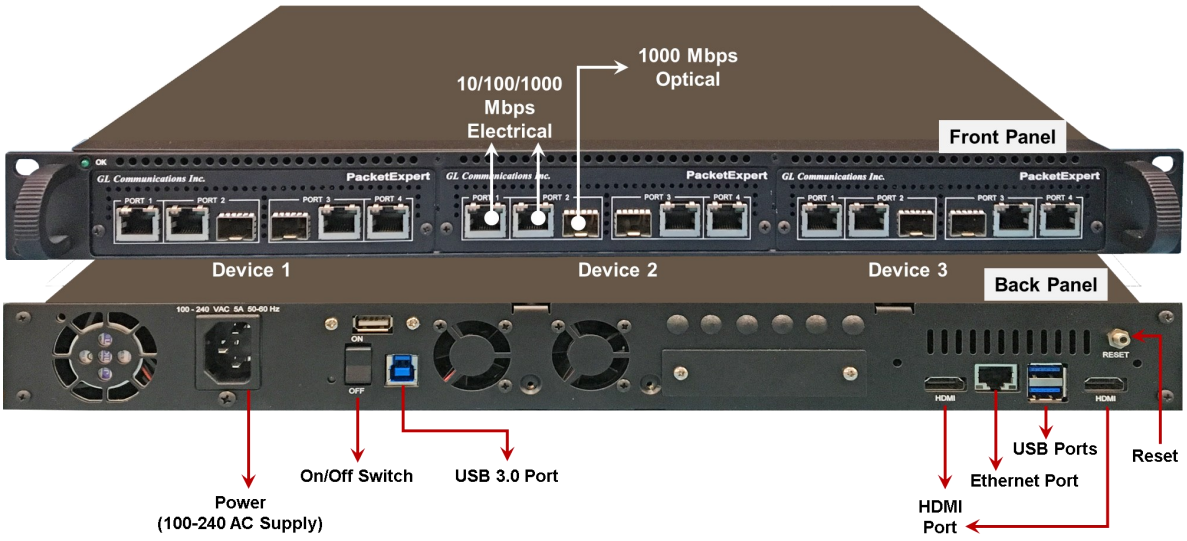


Figure: 1U mTOP™ Rack Based 1G Hardware Unit (3 PXE100s)

Interfaces	12 Total Ethernet Ports (HD-PacketExpert-12) • mTOP™ System (embedded SBC, 3x PXE100) • PacketExpert™ 1G (PXE100) interfaces - – 6x 1000 Base-X Optical OR 10/100/1000 Base-T Electrical – 6x (10/100/1000) Base-T Electrical 24 Total Ethernet Ports (HD-PacketExpert-24) • mTOP™ System (embedded SBC, 6x PXE100) • PacketExpert™ 1G (PXE100) interfaces - – 12x 1000 Base-X Optical OR 10/100/1000 Base-T Electrical – 12x (10/100/1000) Base-T Electrical
SBC Specifications	• Intel Core i3 or optional i7 NUC Equivalent, • Windows® 11 64-bit Pro Operating System • USB 3.0 and USB 2.0 Ports, ATX Power Supply • USB Type C Ports, Ethernet 2.5GigE port • 256 GB Hard drive, 8G Memory (Min) • Two HDMI ports
External Dimension	• Length: 16 Inches • Width: 19 Inches • Height: 2x 1U mTOP™ (HD-PacketExpert-24) or 1U mTOP™ (HD-PacketExpert-12)
Power Supply	• ATX Power Supply
Order Information	• PXE100 - PacketExpert™ Options • MT001/MT001E (1U) • MT001+MT002/ MT001E+MT002 (Stacked 1U)

mTOP™ 1G Probe Specifications

Figure: mTOP™ Probe with 1G Hardware Unit + SBC

Interfaces	• 4x Total Ethernet ports • 2x 10/100/1000 Base-T Electrical only • 2x 1000 Base-X Optical OR 10/100/1000 Base-T Electrical • Single Mode or Multi Mode Fiber SFP support with LC connector
SBC Specifications	• Intel Core i3 or optional i7 NUC Equivalent, • Windows® 11 64-bit Pro Operating System • USB 3.0 and USB 2.0 Ports, 12V/3A Power Supply • USB Type C Ports, Ethernet 2.5GigE port • 256 GB Hard drive, 8G Memory (Min) • Two HDMI ports
External Dimension	• Length: 10.4 inches • Height: 3 inches • Width: 8.4 inches
Power Supply	• 12 volts (Medical Grade), 3 Amps
Order Information	• PXE100 • MT005/MT005E

Pelican Carry On Case

Buyer's Guide

Item No	Product Description
PXE107	PacketBroker 1G
CXE100	CLI support for PXE100

Item No	Related Hardware
PXE100	PacketExpert™ 1G Portable
PXE104	PacketExpert™ - SA (4 ports) 1G
PXE112	PacketExpert™ -SA (12 Ports) 1G
PXE124	PacketExpert™ -SA (24 Ports) 1G

Item No	Related Software
PXE105	Wire speed Record /Playback 1G
PXE108	Multi Stream Traffic Generator and Analyzer 1G
PXE108	ExpertTCP™ 1G
PKV100	PacketScan™ (Online and Offline)

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

For more details, refer PacketBroker – Passive Ethernet Tap webpage.

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