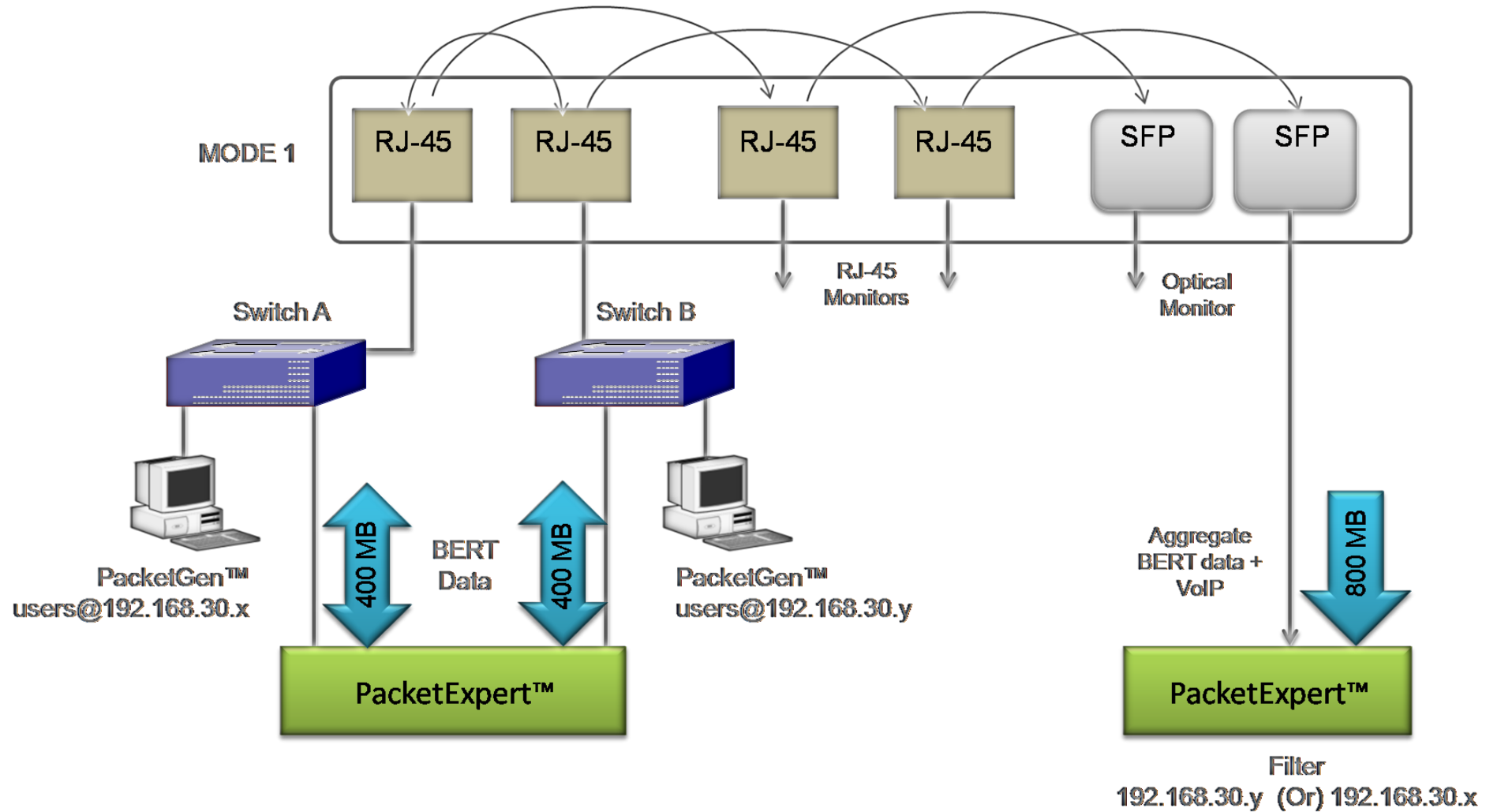

PacketExpert™ -1G

Wirespeed Ethernet Packet Capture and Playback

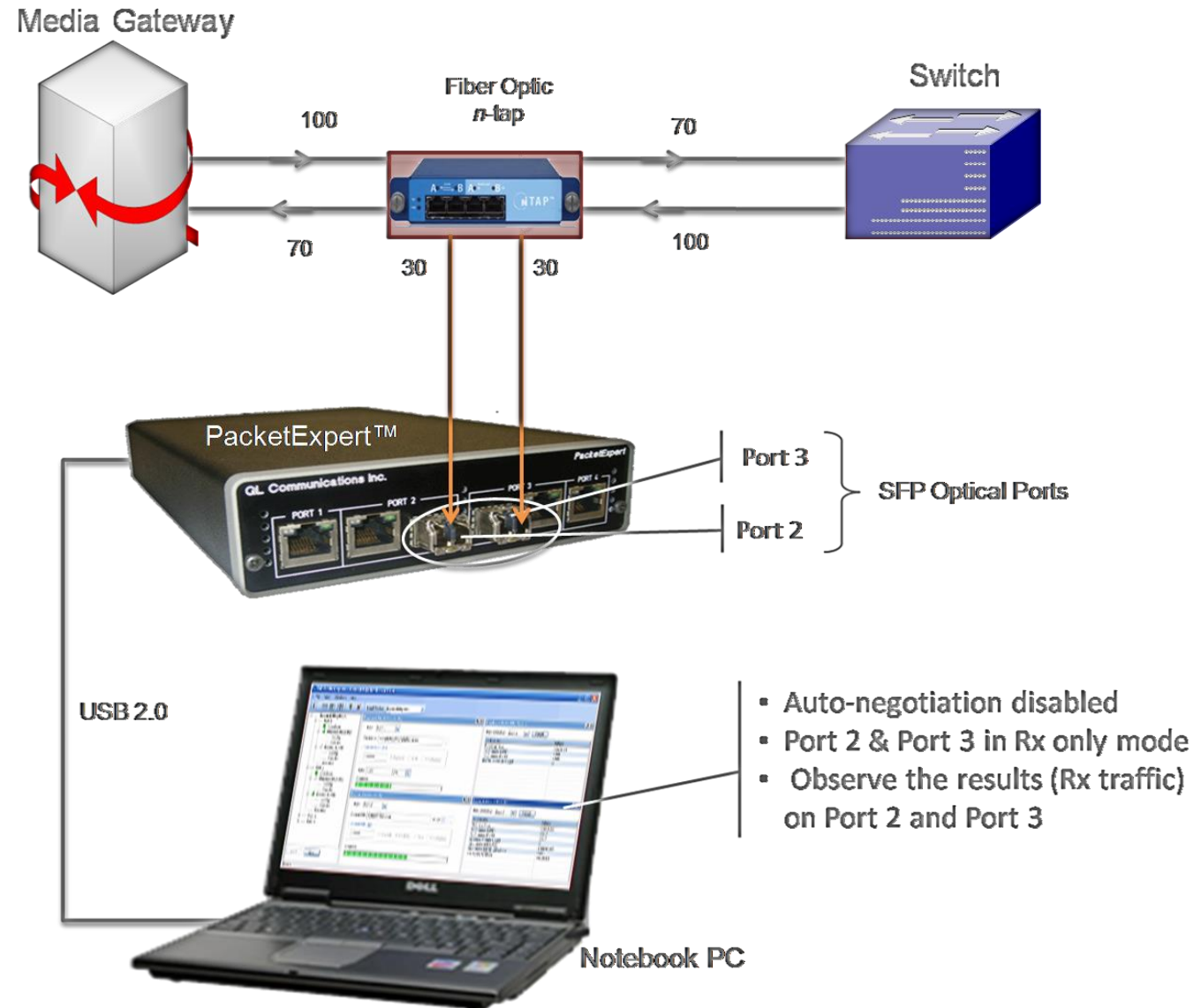


818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: <https://www.gl.com>

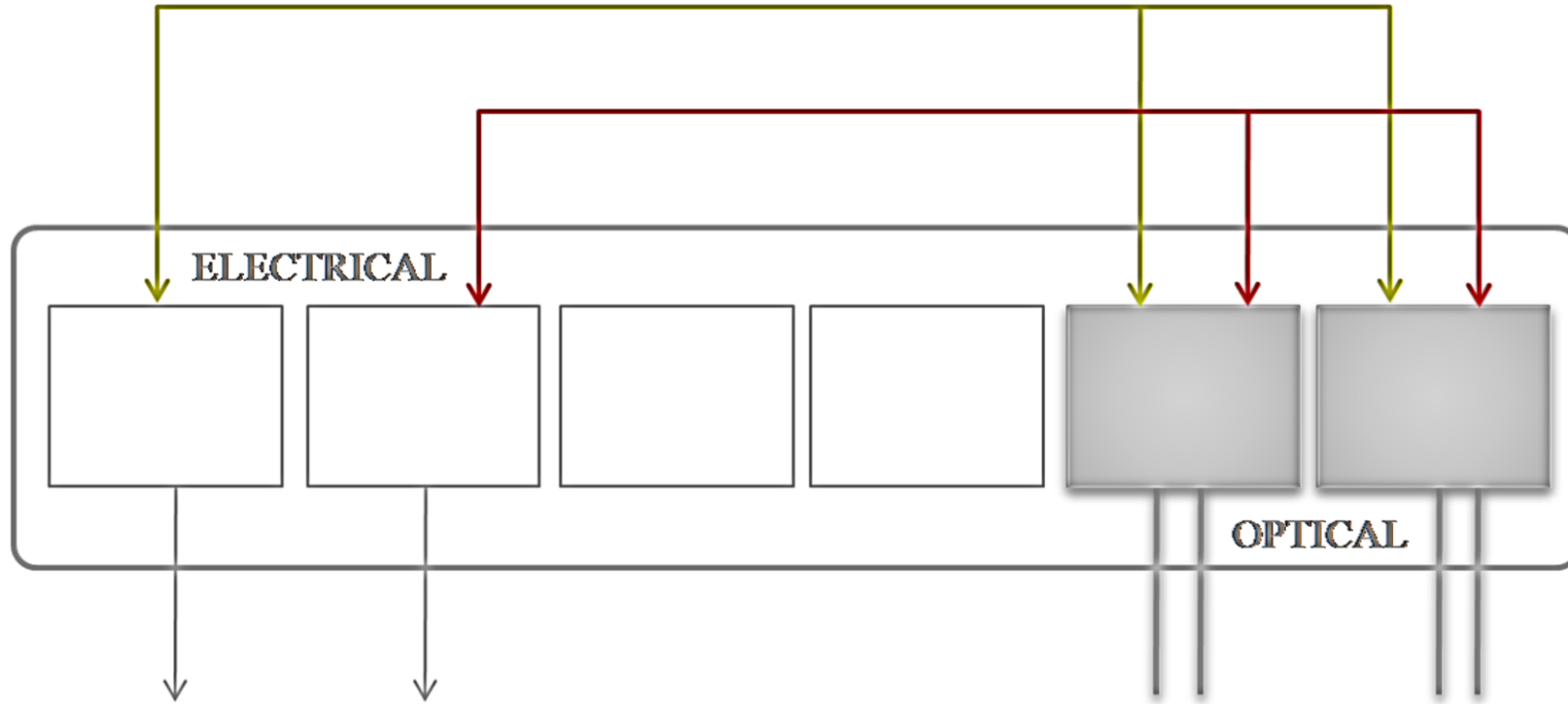
Configuration



Non-Intrusive Tapping of Electrical or Optical Lines



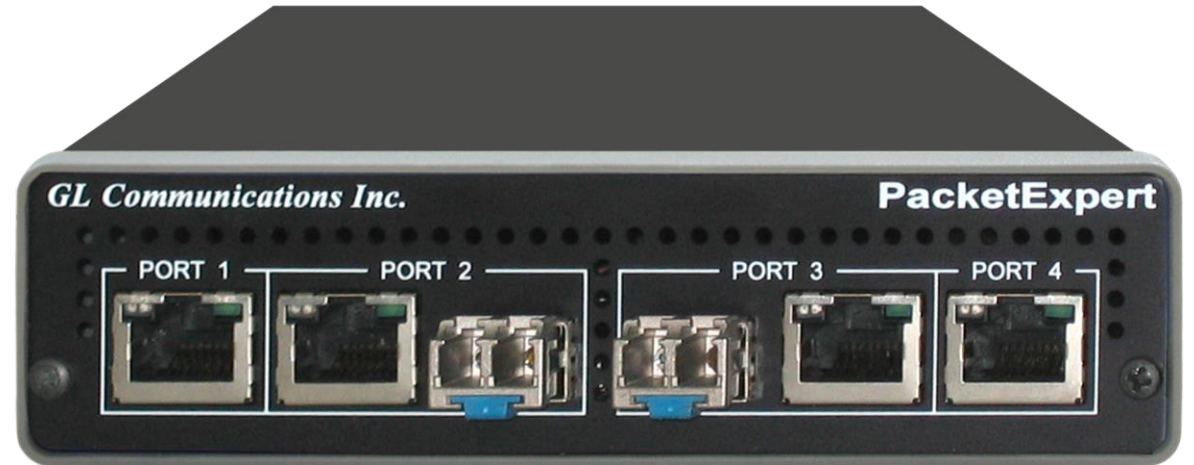
Electrical to Optical Converter



To Electrical 1G ports on PacketExpert™
for Monitoring

Ethernet / IP Testing Modules

- Wire-Speed BERT
- Layer-wise and Smart Loopback
- RFC 2544 (Single and Dual Port)
- ITU-T Y.1564 (ExpertSAM™)
- Wire-Speed Record / Playback with Filter

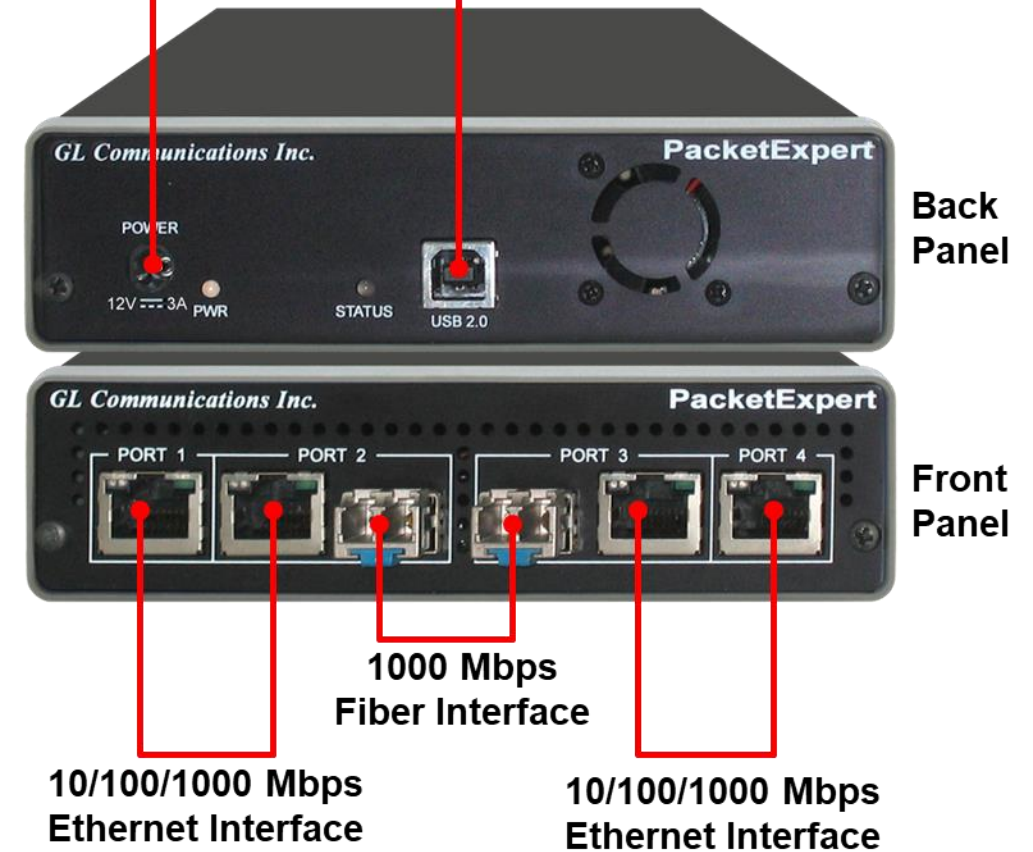


Portable Unit

- 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
 - Optional 4-Port SMA Jack Trigger Board (TTL Input/Output)
- Protocols:
 - RFC 2544 compliance
 - ITU-T Y.1564 (ExpertSAM™)
- Power:
 - +12 Volts (Medical Grade), 3 Amps
- Bus Interface:
 - USB 2.0

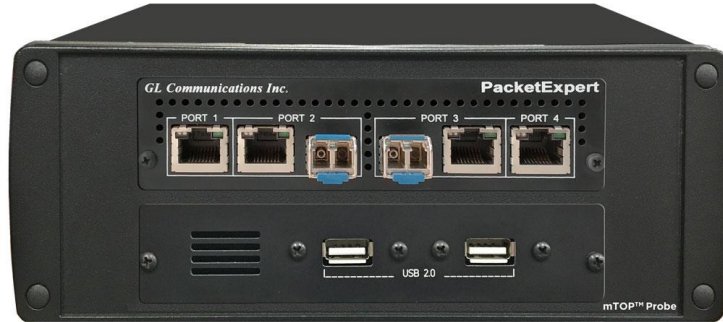
Power: 12V (Medical Grade), 3A

USB 2.0



PacketExpert™ mTOP™ Probe

Front Panel View



Rear Panel View



- Portable Quad Port Ethernet/VLAN/MPLS/IP/UDP Tester with 4 Electrical Ethernet Ports (10/100/1000 Mbps) and 2 Optical Ports (100/1000 Mbps). Embedded with Single Board Computer (SBC).
- **SBC Specs:** Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 3.0 and USB 2.0 Ports, 12V/9A Power Supply, USB Type C Ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports
- Each GigE port provides independent Ethernet/VLAN/MPLS/IP/UDP testing at wire speed for applications such as BERT, RFC 2544, and Loopback. BERT is implemented for all layers.
- RFC 2544 is applicable for Layers 2, 2.5, and 3, and Loopback is applicable for Layers 2, 3, and 4.

PacketExpert™ High-Density 12/24 GigE Ports mTOP™ Rack

PacketExpert™ SA (PXE112) is a 12-Port PacketExpert™ w/ Embedded Single Board Computer (SBC).

SBC Specs: 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 2.5 GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports

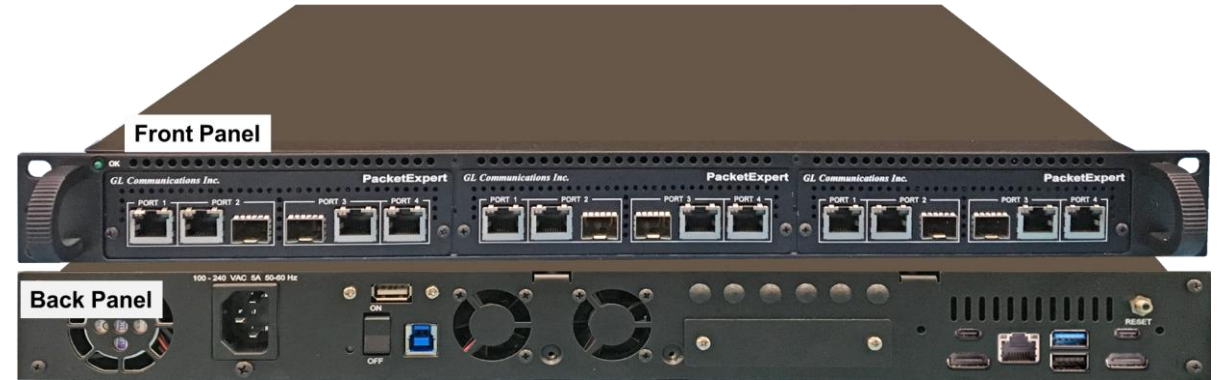
19" 1U Rackmount Enclosure (If options, then x 3).

PacketExpert™ SA (PXE124) is a 24-Port PacketExpert™ w/ Embedded Single Board Computer (SBC).

SBC Specs: 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 2.5 GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports

19" stacked 1U Rackmount Enclosure (If options, then x 6).

PacketExpert™ SA (PXE112)

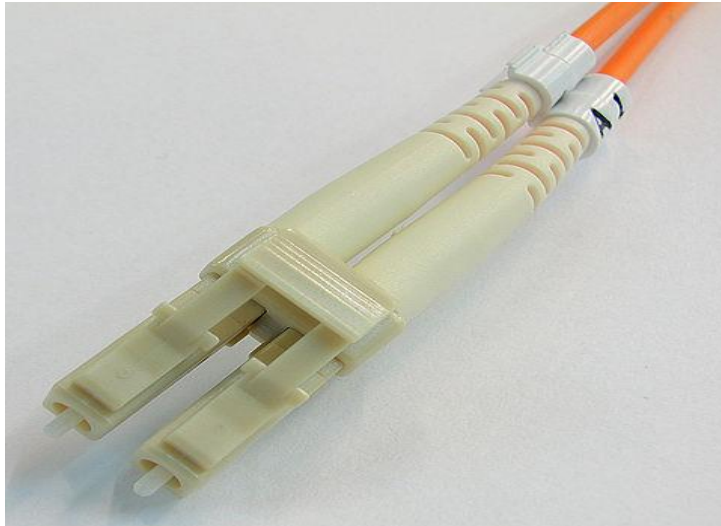


PacketExpert™ SA (PXE124)



Optical Connectors and SFP Transceivers

LC Connectors



850nm/1310nm/1550nm

SFP Module



- PacketExpert™ supports LC connectors and 850nm/1310nm/1550nm SFP (Small Factor Pluggable) modules

Note: In case customer have different type of connectors, then we need converters like LC-to-SC, LC-to-FC and vice-versa

Record/Playback Application

GL PacketExpert - Record Only

File View System Windows Help

Application: Record Only

Record Only (Pass Through)

- Port 2
 - Interface
 - Filter Config
 - Filter Setup
 - Port Statistics
- Port 3
 - Interface
 - Filter Config
 - Filter Setup
 - Port Statistics
 - Record Configuration**
 - Record Statistics

Record Configuration

Capture Ports: 2, 3

Capture File Name: SampleFile
File Type: DAT(GL Hw Format)

☒ Enable Split Recording

File Names:
☐ Seq File Name
☒ DateTime Formatted Names: DD_MM_YY_HR_MM

Split Limit:
☒ Size: 1 GB
☐ Time
☐ Packet
Warning: If the Size or PacketLimit is reached within 1 minute, and the split file name format is DateTime, then the split file will be overwritten until 1 minute elapses

Capture Size:
0 ☐ Size MBytes ☐ Frames ☐ Max Capacity ☒ Continuous

Record Statistics

Reset

Record Statistics	Port 2	Port 3	Aggregate
Capture Duration	00:00:00	00:00:00	00:00:00
Total Rx Frames	0	0	0
Frames not matched to filter	0	0	0
Frames matched to filter	0	0	0
Overflowed Frames	0	0	0
Overflowed Count	0	0	0
Transferred Frames	0	0	0
Disk Write Rate (Bytes/Sec)	0	0	0
Disk Write Buffer Utilization (...)	-	-	0.00
Capture File Size (Bytes)	0	0	0

Port Statistics

Port Selection: Port 2 Reset

Description	Tx	Rx
Total Frames	0	0
Valid Frames	0	0
Number Of Bytes	0	0
Link Utilisation	-	-
Data Rate(Mbps)	0.000	0.000
Frame Rate(Frames/Second)	0	0
Broadcast Frames	0	0
Multicast Frames	0	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	0
256-511 Byte Length Frames	0	0
512-1023 Byte Length Frames	0	0
1024-1518 Byte Length Frames	0	0
Oversized Frames	0	0
Undersized Frames	-	0
FCS Error Frames	-	0

Filter Config

Port Selection: Port 2 Display Mode: Raw

☐ Enable

Add Delete

Copy From 1 To 1 Copy

Filter No.	Offset	Type	Bytes 0-7	Bytes 8-15	Bytes 16-23	Bytes 24-31
1	0	Value	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00
2	0	Mask	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00
3	0	Value	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00
		Mask	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00

Edit

Filter No: 1

Offset: 0 Dst MAC Address Apply

Fields

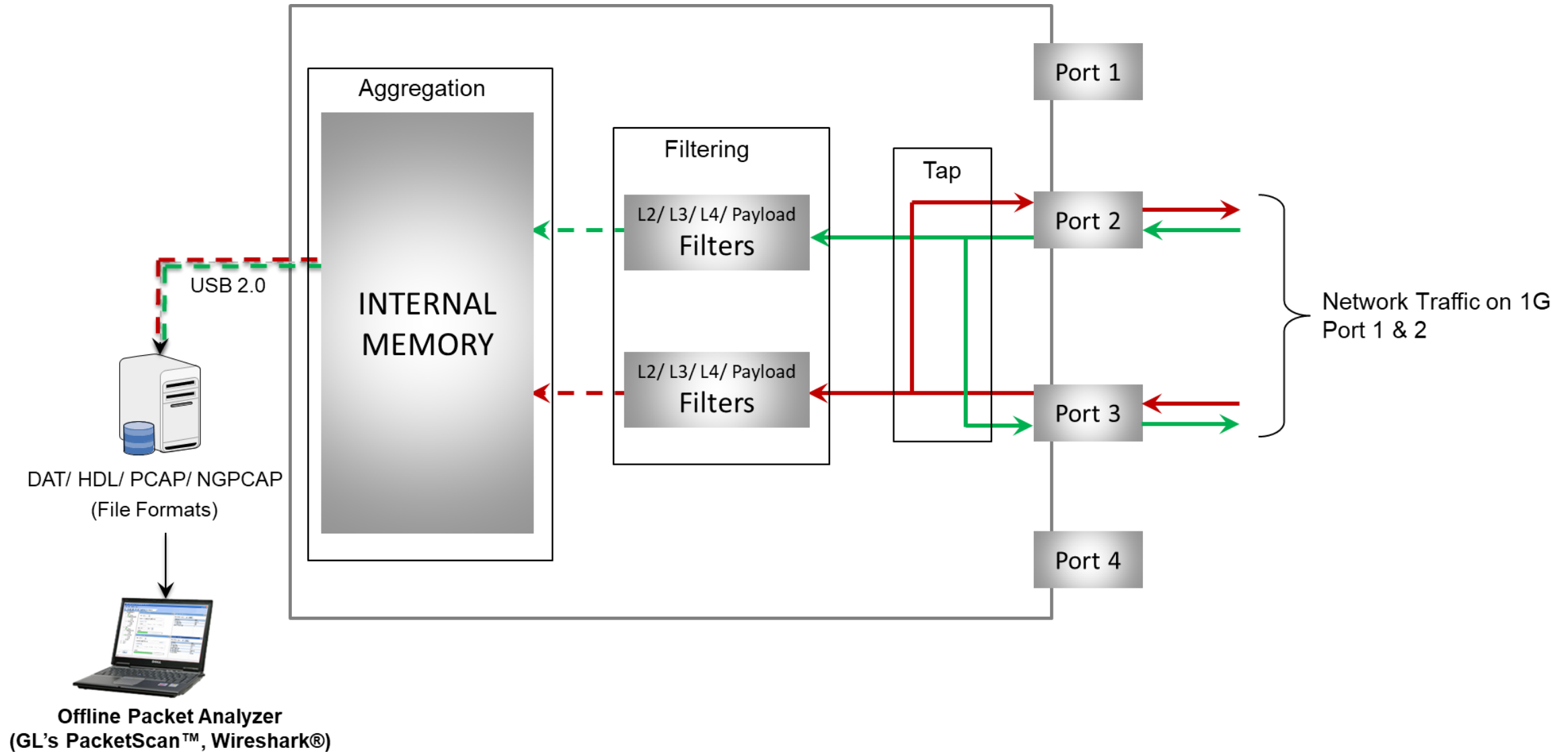
Field.	Type	Data
Dst MAC Address	Value	00-00-00-00-00-00
	Mask	00-00-00-00-00-00

Layer Selection

Start

Ready

Working Principle



Working Principle (Contd.)

The tap, filter, and aggregation modes of PacketExpert™ Record Playback are detailed below:

- **Tap:** Traffic is forwarded between the span ports (Port 2 and Port 3) without any modification or delay
- **Filter:** wire-speed filtering of L2/L3/L4 packets. The packets that are traffic compliant with any of the set filters is forwarded to the drop ports (Port 2 to Port 1, and Port 3 to Port 4) and can be analyzed using a real-time packet analyzer
- **Aggregation:** Alternatively, the filtered traffic from both Port 2 and Port 3 can be aggregated to present them as a single stream. This aggregated stream is saved to the onboard 2 GB memory card (SD) in any of the following file formats (DAT, HDL, PCAP, NGPCAP). Then the data is transferred to the PC at 350 Mbps rate, which can be later used for offline analysis

Record/Playback Application

- Record Only mode
 - capture packets to files simultaneously on 2 ports and on either port
 - onboard 2 GB memory is available for wirespeed capture
- Playback Only mode
 - playback on upto 3 ports simultaneously
 - onboard 2 GB memory is available for transmission

Features

- **Record Packets to File**

- Comprehensive receive testing capabilities
- Records the received packets into a file up to hard drive capacity (limited by disk write speed)
- Packets can be captured continuously (till user manually stops the capture or up to hard drive capacity) or limited by a specified size in MB, specified packet count, or specified time duration
- Supported output file formats are *.pcap, *.hdl, *.dat, and *.pcapng/*.ntar
- Result count includes the total number of packets received by the port as well as the host, dropped packet, number of bytes written to the file, disk write buffer utilization, and disk write bytes/sec
- Provides Port level statistics like total frames/bytes received, Rx Frame rate, Rx Data rate etc.
- Test non-intrusively with electrical and optical ports
- DDR2 memory size of 2GB
- Record is based on time-stamp

Features (Contd.)

- **Playback from File**

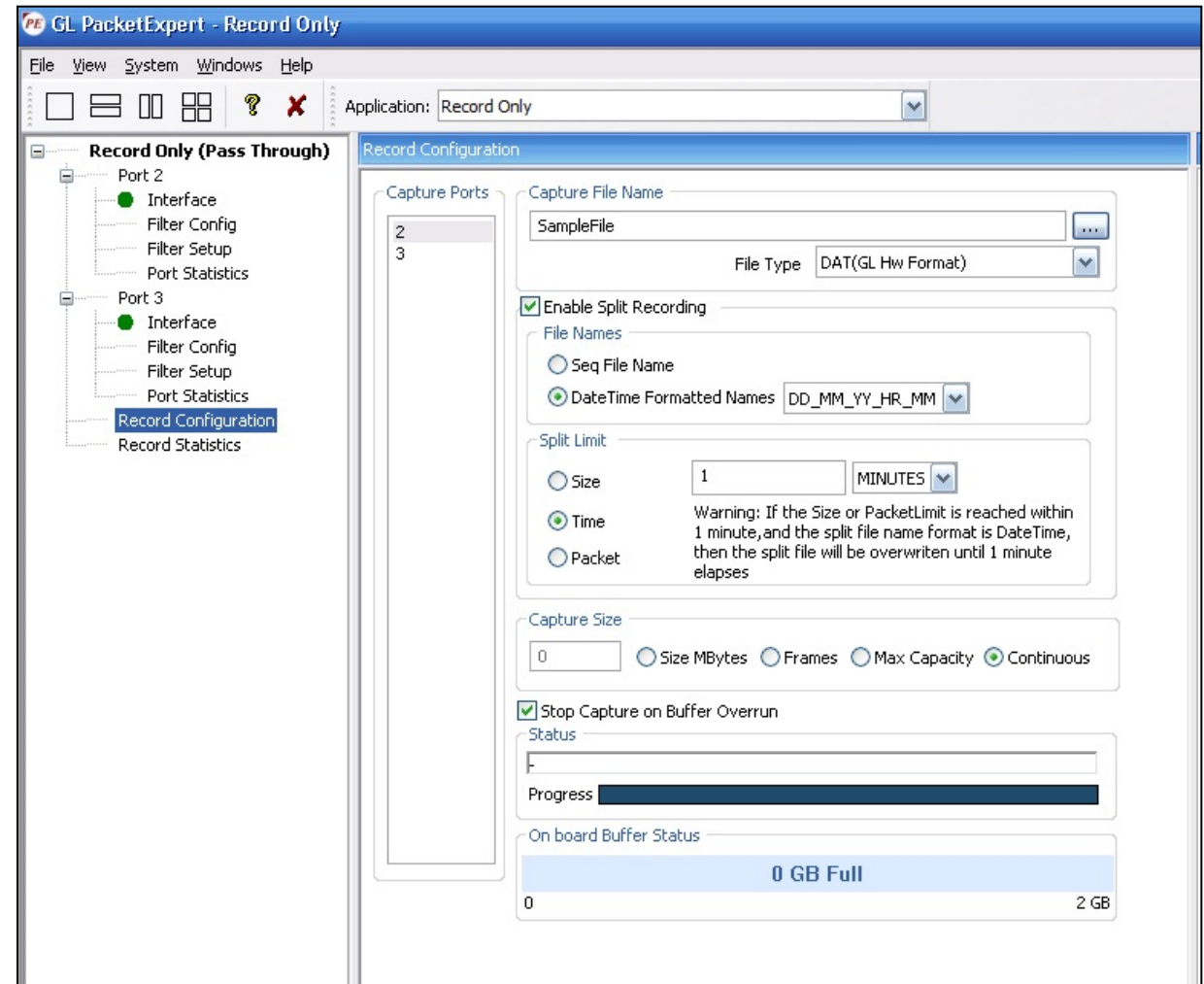
- Playback packets from the captured or pre-recorded files
- Playback can be done on up to 3 ports simultaneously
- Each port can transmit a file separately and independently. 'As per File' option allows the users to playback the traffic the same way as it was captured
- Captured traffic on one port can be transmitted on the same or any other port – will be redirected to the correct port at run time.
- Packets can be transmitted either continuously, limited by number of packets, or till the end-of-file (EOF)
- Packet's transmission is from USB2.0 to DDR2 and playback is based on time-stamp depending on the captured rate
- Supported file formats are DAT (.dat - GL proprietary), HDL (.hdl - GL Proprietary and can be used for offline analysis by GL's PacketScan™), PCAP (.pcap - used by Wireshark) and NGPCAP (.pcapng/.ntar – next generation Wireshark) formats
- Displays some useful statistics that help user to check the progress of the playback

Limitations

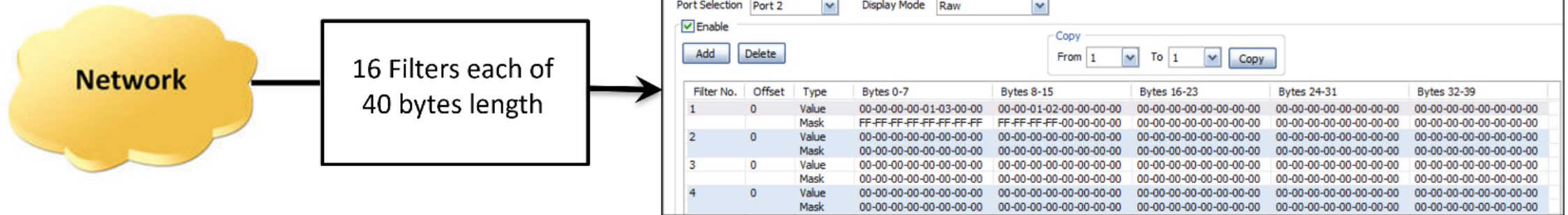
- The overall transmit rate is limited to the USB 2.0 transfer rate (rate of data transfer from host to hardware via the USB 2.0 interface)
- Transmit rate can go up to 350 Mbps depending on the host PC configuration

Configuration - Record Only Mode

- Receive ports: Supports ports 2 & 3 for capturing in read only mode
- Output File: Record file name (HDL, PCAP, DAT, PCAPNG format)
- Output File Limit: Limit after which Rx will stop. Size in MB or Number of packets, or Continuous capture
- Status: Status message
- Progress: Test progress
- Buffer status: DDR2 memory status (max 2GB)

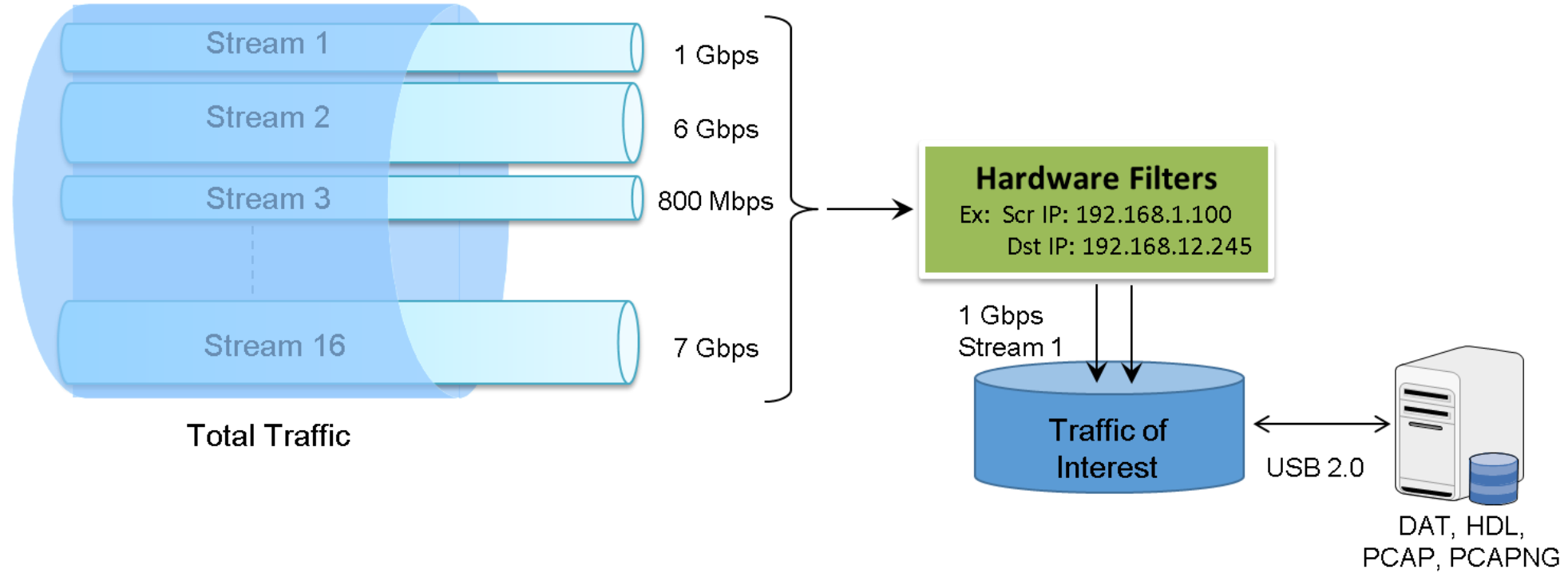


Wireshpeed Packet Filters and Triggers



- Filter packets and record only packets of interest
- Capture simultaneously on 2 ports with 120 bytes deep filter per port (for record application) and set filter on any one of the ports or all ports
- Packet filtering can be based on all Layer 2 (Ethernet), Layer 3 (IP) Layer 4 (UDP/TCP) Headers
- Up to 16 filters can be defined per port. Each filter is up to 120 bytes wide
- Filter can be set to each bit in the packet (Raw mode) or each field (Packet Mode)
- Generates a trigger (1 Microsecond pulse) for each packet that passes the filter
- Filter on various header fields like Source/Destination MAC Address, VLAN Id, MPLS Label, Source/Destination Ipv4 Address, Source/Destination UDP ports

Capture Traffic of Interest



- The network traffic containing n streams of varying data rate is filtered at the PacketExpert™ hardware as per the filter settings. The overall transmit rate is limited to the USB 2.0 transfer rate
- Transmit rate can go up to 350 Mbps depending on the host PC configuration

Wireshed Filter - Record Only Mode

Raw Mode Filter Option

- Each bit can be set to 'filtered' or 'don't care' condition via filter mask
- Filter can be set to any offset within the packet, which gives flexibility to filter fields within protocol headers. Eg:
Source/Destination MAC Address,
Source/Destination IP Address etc.
- Capture simultaneously on 2 optical or electrical GigE ports and on either port, user can set filter up to 40 bytes in length.
- Record statistics display includes Capture Duration, Total Rx Frames, Frames not matched to filter, Frames matched to filter, Overflowed Frames, Overflowed Count, Transferred Frames, Disk Write Rate (bytes/sec), Disk Write Buffer Utilization (%), and Capture File Size

Filter Config

Port Selection: Port 2 Display Mode: Raw

Copy From 1 To 1 Copy

Add Delete

Filter No.	Offset	Type	Bytes 0-7	Bytes 8-15	Bytes 16-23	Bytes 24-31	Bytes 32-39
1	0	Value	00-00-00-00-01-02-00-00	00-00-01-03-08-00-00-00	00-00-00-00-00-00-00-11	00-00-C0-A8-01-0C-C0-A8	01-0D-03-E8-07-D0-00-00
		Mask	FF-FF-FF-FF-FF-FF-FF-FF	FF-FF-FF-FF-FF-FF-00-00	00-00-00-00-00-00-00-FF	00-00-FF-FF-FF-FF-FF-FF	FF-FF-FF-FF-FF-FF-00-00
2	0	Value	00-00-00-00-01-04-00-00	00-00-01-05-08-00-00-00	00-00-00-00-00-00-00-11	00-00-C0-A8-01-0E-C0-A8	01-0F-03-E8-07-D0-00-00
		Mask	FF-FF-FF-FF-FF-FF-FF-FF	FF-FF-FF-FF-FF-FF-00-00	00-00-00-00-00-00-00-FF	00-00-FF-FF-FF-FF-FF-FF	FF-FF-FF-FF-FF-FF-00-00
3	0	Value	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00
		Mask	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00
4	0	Value	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00
		Mask	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00
5	0	Value	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00
		Mask	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00	00-00-00-00-00-00-00-00

Edit

Filter No. 1

Offset: 0 Dst MAC Address Apply

Layer Selection

Layer 2: Ethernet ☐ VLAN Number of VLAN stacks: 1

Layer 2.5: None Number of MPLS labels: 1

Layer 3: IP

Layer 4: UDP Apply

Fields

Field.	Type	Data	Summary
Dst MAC Address	Value	00-00-00-00-01-02	00-00-00-00-01-02
	Mask	FF-FF-FF-FF-FF-FF	
Src MAC Address	Value	00-00-00-00-01-03	00-00-00-00-01-03
	Mask	FF-FF-FF-FF-FF-FF	
Ether Len/Type	Value	08-00	08-00
	Mask	FF-FF	
IP Protocol	Value	17	17
	Mask	FF	
Src IP Address	Value	192.168.1.12	192.168.1.12

Wireshark Filter - Record Only Mode (Contd.)

Packet Mode Filter Option

Filter Config

Port Selection: Port 2 Display Mode: Packet

☒ Enable

Add Delete

Copy
From 1 To 1 Copy

Filter No.	Title	Summary
1	Layers	Ethernet, IP, UDP
	Offset	Byte 0 - Dst MAC Address
	Ethernet	Src MAC Address (00-00-00-00-01-02), Dst MAC Address (00-00-00-00-01-03), Len/Type (XX-XX)
	IPv4	Src IP Address (192.168.1.13), Dest IP Address (XX.XX.XX.XX), Protocol (ANY)
	UDP	Src UDP Port (ANY), Dst UDP Port (ANY),
2	Layers	Ethernet, IP, UDP
	Offset	Byte 0 - Dst MAC Address
	Ethernet	Src MAC Address (XX-XX-XX-XX-XX-XX), Dst MAC Address (XX-XX-XX-XX-XX-XX), Len/Type (XX-XX)
	IPv4	Src IP Address (XX.XX.XX.XX), Dest IP Address (XX.XX.XX.XX), Protocol (ANY)
	UDP	Src UDP Port (ANY), Dst UDP Port (ANY),

Edit

Filter No: 1

Offset
0 Dst MAC Address Apply

Layer Selection

Layer 2: Ethernet ☐ VLAN Number of VLAN stacks: 1

Layer 2.5: None Number of MPLS labels: 1

Layer 3: IP

Layer 4: UDP Apply

Fields

Field.	Type	Data	Summary
Dst MAC Address	Value	00-00-00-00-01-03	00-00-00-00-01-03
	Mask	FF-FF-FF-FF-FF-FF	
Src MAC Address	Value	00-00-00-00-01-02	00-00-00-00-01-02
	Mask	FF-FF-FF-FF-FF-FF	
Ether Len/Type	Value	08-00	XX-XX
	Mask	00-00	
IP Protocol	Value	17	ANY
	Mask	00	
Src IP Address	Value	192.168.1.13	192.168.1.13

Results – Record Only Mode

Port wise Results

Record Statistics			
Reset			
Record Statistics	Port 2	Port 3	Aggregate
Capture Duration	00:00:15	00:00:15	00:00:15
Total Rx Frames	12 910	129 122	142 032
Frames not matched to filter	0	0	0
Frames matched to filter	12 908	0	12 908
Overflowed Frames	0	0	0
Overflowed Count	0	0	0
Transferred Frames	12 909	129 116	142 025
Disk Write Rate (Bytes/Sec)	1 242 601	12 424 788	13 667 389
Disk Write Buffer Utilization (%)	-	-	0.00
Capture File Size (Bytes)	19 759 086	197 627 604	217 386 690

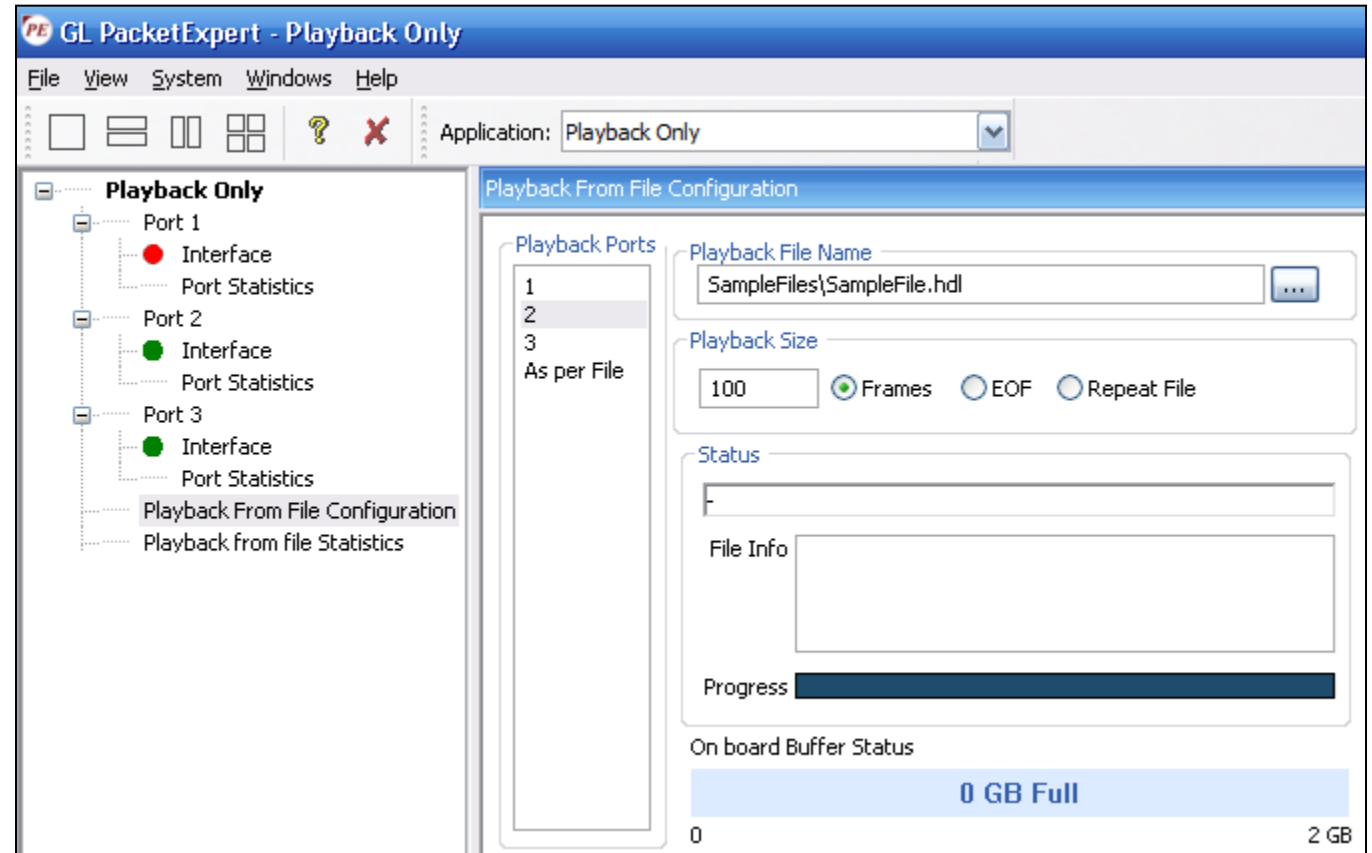
- Capture Duration: Test time
- Rx Frames (Port): Total number of frames received(includes filter fail, filter pass, dropped frame count)
- Filter Fail Frame count: Number of frames failed the filter criteria
- Filter Pass Frame count: Number of frames passed the filter criteria
- Dropped frame count: Number of frames dropped due to DDR2 memory overflow
- Rx Frames(USB): Number of frames transferred to USB from the port.
- Disk Write bytes/sec: Number of bytes written to the disk per second (Bytes/sec)
- File Bytes Written: Total number of bytes written to the disk

Statistics – Record Only Mode

Port Statistics			⌵	✕
Port Selection	Port 3	Reset		
Description	Tx	Rx		
Total Frames	0	2410330		
Valid Frames	0	2410334		
Number of Bytes	0	3658878544		
Link Utilization(%)	-	-		
Data Rate (Mbps)	0.000	98.847		
Frame Rate (Frames/Sec)	0	8139		
Broadcast Frames	0	0		
Multicast Frames	0	10		
Control Frames	0	10		
VLAN Frames	0	0		
Pause Frames	0	10		
Wrong Opcode Frames	0	0		
64 Byte Length Frames	0	10		
65-127 Byte Length Frames	0	0		
128-255 Byte Length Frames	0	0		
256-511 Byte Length Frames	0	0		
512-1023 Byte Length Frames	0	0		
1024-1518 Byte Length Frames	0	2410377		
Oversized Frames	0	0		
Undersized Frames	-	0		
FCS Error Frames	-	0		

Configuration – Playback Only Mode

- Transmit ports: User must select the ports to transmit. Supported on port 1, 2, and 3. 'As per File' option allows the users to playback the traffic the same way as it was captured
- File Name: Name of the file to playback (DAT, HDL, PCAP)
- Transmission limit: Number of packets, EOF and continuous
- Buffer status: DDR2 memory status (max 2GB)



Results - Playback Only Mode

Aggregate Results

Playback from File Statistics				
<div>Reset</div>				
Playback Statistics	Port 1	Port 2	Port 3	Aggregate
Playback Time	00:01:23	00:01:23	00:01:23	00:01:23
Transferred Frames to on board buffer	65 338	65 338	65 338	196 014
Total Frames transmitted	361 741	361 743	361 749	1 085 233

- Playback Time – Displays total test run time duration. During playback, the relative timestamps for each packet transmitted is maintained exactly like in the source file. Since playback happens in the hardware, it can achieve microsecond accuracy in maintaining the timestamps
- Transferred Frames to Board Buffer - Displays number of frames transferred to the buffer
- Tx Frames transmitted – Displays actual frames transmitted out of the physical port

Statistics – Playback Only Mode

Port Statistics		
Port Selection	Port 2	Reset
Description	Tx	Rx
Total Frames	3243845	0
Valid Frames	3243845	0
Number of Bytes	4924148242	0
Link Utilization(%)	-	-
Data Rate (Mbps)	98.853	0.000
Frame Rate (Frames/Sec)	8140	0
Broadcast Frames	0	0
Multicast Frames	10	0
Control Frames	10	0
VLAN Frames	0	0
Pause Frames	10	0
Wrong Opcode Frames	0	0
64 Byte Length Frames	10	0
65-127 Byte Length Frames	0	0
128-255 Byte Length Frames	0	0
256-511 Byte Length Frames	0	0
512-1023 Byte Length Frames	0	0
1024-1518 Byte Length Frames	3243884	0
Oversized Frames	0	0
Undersized Frames	-	0
FCS Error Frames	-	0

	PacketExpert™ 10G	PacketExpert™ 1G
Record Only	<ul style="list-style-type: none"> • Capture packets non-intrusively over 10G Optical ports and 10/100/1000 Mbps Electrical/Optical ports at nano-second precision. 	<ul style="list-style-type: none"> • Capture packets non-intrusively over 10/100/1000 Mbps Electrical/Optical ports at nano-second precision.
	<ul style="list-style-type: none"> • Wirespeed capture and storage can be accomplished utilizing the onboard DDR3 memory size of 8GB 	<ul style="list-style-type: none"> • Wirespeed capture and storage can be accomplished utilizing the onboard DDR2 memory size of 2GB
	<ul style="list-style-type: none"> • Up to 120 bytes wide filter that covers almost entire packet up to UDP 	<ul style="list-style-type: none"> • Up to 40 bytes wide filter that covers almost entire packet up to UDP
	<ul style="list-style-type: none"> • Supports raw-mode and packet-mode filtering for greater flexibility 	<ul style="list-style-type: none"> • Supports raw-mode filtering for greater flexibility
	<ul style="list-style-type: none"> • Hardware based Wirespeed filtering at full line rate • Tapping (Pass through mode), and Tap-Filter-Aggregate modes. • Recording can be done on multiple ports simultaneously. • Supported file formats for recording are *.pcap, *.hdl, *.dat, and *.pcapng/*.ntar • Packets can be captured continuously (till user manually stops the capture or up to hard drive capacity) or limited by a specified size in MB, packet count, time duration, or capture continuously (until the disk is full) • Result count includes the total number of packets received by the port as well as the host, dropped packet, number of bytes written to the file, disk write buffer utilization, and disk write bytes/sec • Provides Port level statistics like total frames/bytes received, Rx Frame rate, Rx Data rate etc. • Supports 16 filters per SFP / Ethernet port. • Filter on various header fields like Source/Destination MAC Address, VLAN Id, MPLS Label, Source/Destination Ipv4 Address, Source/Destination UDP ports 	

	PacketExpert™ 10G	PacketExpert™ 1G
Playback Only	<ul style="list-style-type: none"> Wirespeed playback can be accomplished utilizing the onboard DDR3 memory size of 8GB 	<ul style="list-style-type: none"> Wirespeed playback can be accomplished utilizing the onboard DDR2 memory size of 2GB
	<ul style="list-style-type: none"> Packets transmission is from USB2.0 to Onboard memory buffer and playback is based on time-stamp depending on the captured rate Playback packets from the captured or pre-recorded files Playback can be done on both ports simultaneously Each port can transmit a file separately and independently. 'As per File' option allows the users to playback the traffic exactly the same way as it was captured Captured traffic on one port can be transmitted on the same or any other port – will be redirected to the correct port at run time Packets can be transmitted either continuously, limited by number of packets, or till the end-of-file (EOF) Highly accurate Playback based on the recorded nanosecond timestamp Supported file formats are DAT (.dat - GL proprietary), HDL (.hdl - GL Proprietary and can be used for offline analysis by GL's PacketScan™), PCAP (.pcap - used by Wireshark®) and PCAP-NG (.pcapng/.ntar – next generation Wireshark®) formats Supports Pause frame transmission with user defined quanta on each port independently Displays some useful statistics that help user to check the progress of the playback 	
Record and Playback	<ul style="list-style-type: none"> Supports both record to a file and playback from the file on the two 10G or 1G ports simultaneously. It can work in Tap, Filter, and Aggregation mode. Onboard 4 GB memory each is available for capturing and transmission of data respectively. 	<ul style="list-style-type: none"> Supports both record to a file and playback from the file on three 1G simultaneously. It can work in Tap, Filter, and Aggregation mode. Onboard 1 GB memory each is available for capturing and transmission of data respectively.

Thank You