

## Comparison of Ethernet Testers – GL Communications Inc

Features	PacketCheck ETH100	PacketExpert™ PXE100 (4x 1 Gbps)	PacketExpert™ PXN100 (2x10 Gbps/ 4x1 Gbps)
<b>Interface &amp; Link Speed</b>	<ul style="list-style-type: none"> <li>• Software Only</li> <li>• Works with regular NIC on the PC, data rate up to 800 Mbps</li> </ul>	<ul style="list-style-type: none"> <li>• Quad Port 1 Gbps Only</li> <li>• 2 x 1 Gbps Optical OR 2 x 10/100/1000Mbps Electrical</li> <li>• 2 x 10/100/1000 Mbps Electrical only Ports</li> </ul>	<ul style="list-style-type: none"> <li>• Quad Port 1 Gbps &amp; 10 Gbps</li> <li>• All 4 x 1 Gbps Optical OR</li> <li>• All 4 x 10/100/1000Mbps Electrical</li> <li>• 2 x 10 Gbps Optical only</li> </ul>
		<p>In essence, testing is possible on 4 x 1 Gbps Electrical ports 2 x 1 Gbps Optical ports</p>	<p>In essence, testing is possible on 4 x 1 Gbps Electrical/Optical ports* 2 x 10 Gbps Optical ports *The unit offers 10 Gbps downshift to 1 Gbps Electrical/Optical, and hence 4x 1 Gbps</p> <p>In 10GX platform, 1G mode</p> <ul style="list-style-type: none"> <li>• Each port can be either Electrical or Optical.</li> <li>• Switch between Electrical to Optical anytime</li> <li>• Any combination Electrical/Optical ports is possible                             <ul style="list-style-type: none"> <li>▪ All Electrical, All Optical</li> <li>▪ 1 Electrical, 3 Optical</li> <li>▪ 2 Electrical, 2 Optical</li> <li>▪ 3 Electrical, 1 Optical</li> </ul> </li> </ul>

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Form Factor	--- na---	<ul style="list-style-type: none"> <li>• Portable</li> <li>• Single and Multi- Device Rackmount</li> <li>• A Multi-Device Rackmount can offer up to 24x 1 Gbps ports for testing; multiple devices can be controlled from a single GUI.</li> <li>• One disadvantage is that the Optical/Electrical interface choice is limited to only 12 ports. The other 12 ports are fixed to Electrical only.</li> </ul>	<ul style="list-style-type: none"> <li>• Portable</li> <li>• Single and Multi-Device mTOP™ Rackmount</li> <li>• A Multi-Device Rackmount can offer up to 24x 1 Gbps ports / 12x 10 Gbps ports for testing</li> <li>• The narrow body design of this pod allows up to 3 PXN100 units to be easily placed in a rack enclosure mTOP™, thus offering a higher density GigE ports form factor solution</li> <li>• One advantage is that all 24x 1 Gbps ports can work in either Electrical or Optical mode, increasing the connectivity flexibility.</li> </ul>
SMA	Not supported	Optional external 4-Port SMA Jack Trigger Board (TTL Input/Output) can be connected to the board	Optional 4-Port to 12-Port SMA Jack Trigger Board (TTL Input/Output) on the back panel  12-port enhancement supports user- configurable Filter to TTL mapping
Bus Interface	--- na---	<ul style="list-style-type: none"> <li>• USB 2.0</li> </ul>	<ul style="list-style-type: none"> <li>• USB 3.0</li> </ul> Full support for USB 3.0 for higher USB data transfer speeds
Dimension	--- na---	<ul style="list-style-type: none"> <li>• Length: 8.45 in. (214.63 mm)</li> <li>• Width: 5.55 in. (140.97 mm)</li> <li>• Height: 1.60 in (40.64 mm)</li> <li>• Weight: 1.66 lbs. (0.75 kg)</li> </ul>	<ul style="list-style-type: none"> <li>• Length: 8.45 in. (214.63 mm)</li> <li>• Width: 5.55 in. (140.97 mm)</li> <li>• Height: 1.60 in (40.64 mm)</li> <li>• Weight: 1.66 lbs. (0.75 kg)</li> </ul>
System Requirements	Windows® 10 64-bit/32-bit	Windows® 10 64-bit/32-bit	Windows® 10 64-bit/32-bit
Layers	✓	✓ Layer1, Ethernet, VLAN, MPLS, IP, and UDP	✓ Layer1, Ethernet, VLAN, MPLS, IP, and UDP

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Stacked MPLS, VLAN (Q-in-Q)	✓ up to 3 stacks	✓ up to 3 stacks	✓ up to 3 stacks
ARP	✓	✓	✓
Ping	Not supported	✓	✓
Frame Size variation	<ul style="list-style-type: none"> <li>• Fixed</li> <li>• Increasing</li> <li>• Decreasing</li> <li>• Random</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed only</li> <li>• Supports pause frame transmission with user defined quanta</li> </ul>	<ul style="list-style-type: none"> <li>• Constant Rate</li> <li>• Variable Rate (Fixed, Increment, Random)</li> </ul>
Jumbo Frames	As NIC 64 bytes to 1518 bytes	✓ up to 2048 bytes frame size	✓ up to 16000 bytes frame size
IPv6	Not supported	✓	✓
ARP	✓	✓	✓
NDP	Not supported	✓	✓

Features	PacketCheck™ ETH100	PacketExpert™ PXE100 (4x 1 Gbps)	PacketExpert™ PXN100 (2x 10 Gbps / 4x 1 Gbps)
<b>Wirespeed BERT (All-Port)</b> (Included with Base Software)	 Tx data in 2 modes – <b>Burst Mode</b> and <b>IFG (Inter Frame Gap)</b> . In IFG, traffic is sent at a regular user defined interval	 <ul style="list-style-type: none"> <li>• On all 4x 1 Gbps ports - totalling up to 8 Gbps</li> <li>• 1 Gbps ports can be 10/100/1000Mbps Electrical or 1Gbps Optical</li> <li>• <b>IFG (Inter Frame Gap)</b> mode only – the hardware picks and maintains a regular interval as appropriate for configured bandwidth; frame size can be fixed, incremental, or randomized</li> <li>• 2<sup>9</sup>-1, 2<sup>11</sup>-1, 2<sup>15</sup>-1, 2<sup>20</sup>-1, 2<sup>23</sup>-1, constant patterns like all ones, all zeroes, alt ones-zeroes and user- defined test patterns ranging between 1 to 32 bits.</li> <li>• Bit error and FCS error insertion</li> </ul>	 <ul style="list-style-type: none"> <li>• On all 4x 1 Gbps ports - totalling up to 8 Gbps</li> <li>• On 2x 10 Gbps ports - totalling up to 40 Gbps</li> <li>• 1 Gbps ports can be 10/100/1000Mbps Electrical or 1Gbps Optical</li> <li>• <b>IFG (Inter Frame Gap)</b> mode only – the hardware picks and maintains a regular interval as appropriate for configured bandwidth; frame size can be fixed, incremental, or randomized</li> <li>• 2<sup>9</sup>-1, 2<sup>11</sup>-1, 2<sup>15</sup>-1, 2<sup>20</sup>-1, 2<sup>23</sup>-1, 2<sup>29</sup>-1, and 2<sup>31</sup>-1, constant patterns like all ones, all zeroes, alt ones-zeroes and user- defined test patterns ranging between 1 to 32 bits.</li> <li>• Bit error and FCS error insertion</li> </ul>
<b>BERT &amp; Loopback</b> (Included with Base Software) Simultaneously perform BERT and Loopback on different ports	Not supported	<ul style="list-style-type: none"> <li>• Simultaneous BERT on 2x 1 Gbps ports and Loopback 2x 1 Gbps - totalling up to 4 Gbps BERT and 4 Gbps Loopback</li> </ul>	<ul style="list-style-type: none"> <li>• Simultaneous BERT on 2x 1 Gbps ports and Loopback 2x 1 Gbps - totalling up to 4 Gbps BERT and 4 Gbps Loopback</li> <li>• <b>OR</b> Simultaneous BERT on 1x 10 Gbps and Loopback 1x 10 Gbps port - totalling up to 20 Gbps BERT and 20 Gbps Loopback</li> </ul>
<b>Smart Loopback</b> (Included with Base Software)		 On all 4x 1 Gbps ports	 On all 4x 1 Gbps ports on all 2x 10 Gbps ports

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<b>RFC2544</b> (Included with Base Software)	Not supported	 On 2 Ports (1 Gbps) In addition to the standard 7 frame sizes in RFC-2544, user can configure up to 20 frame sizes per test, from 64 to a maximum of 2048.	 On 2 ports (10 Gbps / 1 Gbps) In addition to the standard 7 frame sizes in RFC-2544, user can configure up to 20 frame sizes per test, from 64 to a maximum of 16000
<b>Playback &amp; Record</b>	<ul style="list-style-type: none"> <li>• Playback Only</li> <li>• Only *.HDL files playback</li> </ul>	 <ul style="list-style-type: none"> <li>• Playback on 3 ports (1 Gbps)</li> <li>• Record on 2 ports (1 Gbps)</li> <li>• Simultaneous Record/Playback - on any of the 3 ports (1 Gbps)</li> <li>• *.PCAP, *.PCAPNG, *.HDL, *.DAT files playback-from-file and record-to-file</li> <li>• Hardware filters (up to 16)</li> <li>• Onboard DDR2 memory of 2 GB</li> <li>• In <b>Record Only</b> mode, complete onboard 2 GB memory is available for capturing traffic at wirespeed.</li> <li>• In <b>Playback Only</b> mode, complete onboard 2 GB memory is available for file transmission</li> <li>• In <b>Record and Playback</b> mode, onboard memory of 1 GB is available, each for capturing and transmission of data</li> </ul>	 <ul style="list-style-type: none"> <li>• Playback on all 4x 1 Gbps ports OR on 2x 10 Gbps ports only</li> <li>• Record on 2 ports (10 Gbps/1 Gbps)</li> <li>• Simultaneous Record/Playback - on any of the 2 ports (10 Gbps /1 Gbps)</li> <li>• *.PCAP, *.PCAPNG, *.HDL, *.DAT files playback-from-file and record-to-file</li> <li>• Hardware filters (up to 16 per port)</li> <li>• Onboard DDR3 memory of 8 GB</li> <li>• In <b>Record Only</b> mode, complete onboard 8 GB memory is available for capturing traffic at wirespeed.</li> <li>• In <b>Playback Only</b> mode, complete onboard 8 GB memory is available for file transmission</li> <li>• In <b>Record and Playback</b> mode, onboard memory of 4 GB is available, each for capturing and transmission of data</li> <li>• USB 3.0 interface helps in faster transfer from onboard memory to the host PC.</li> <li>• USB 3.0 interface helps in nearly 1 Gbps simultaneous Record and Playback.</li> </ul>

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Multi-Stream UDP TCP Test  ExpertTCP™	 Up to 25 streams on a 1 Gbps NIC	 <ul style="list-style-type: none"> <li>Multi-stream Traffic Generation and analysis on 1 Port (1/10 Gbps), and Smart Loopback on 1 port (1/10 Gbps)</li> <li>Up to 12 multiple streams</li> </ul>	 <ul style="list-style-type: none"> <li>Multi-stream Traffic Generation and analysis on 1 Port (1/10 Gbps), and Smart Loopback on 1 port (1/10 Gbps)</li> <li>Up to 16 multiple streams</li> <li>Periodic Logging</li> </ul>
ExpertSAM™ (ITU_T Y.1564)	Not supported	<ul style="list-style-type: none"> <li>On 1 port (1 Gbps)</li> <li>Up to 12 multiple services on the single port</li> </ul>	<ul style="list-style-type: none"> <li>On 1 port (10 Gbps / 1 Gbps)</li> <li>Up to 16 multiple services on the single port</li> </ul>
PacketBroker	Not supported	<ul style="list-style-type: none"> <li>2 SPAN (pass-through) ports and 2 DROP (Output) ports; All 1 Gbps</li> <li>Hardware filters</li> </ul>	<ul style="list-style-type: none"> <li>2 SPAN (pass-through) ports and 2 DROP (Output) ports; SPAN ports can be 10Gbps/1Gbps, while DROP ports can be 1 Gbps</li> <li>Hardware filters</li> <li>Grouping and Super Group Filters</li> </ul>
Hardware Filters (applies to Record, PacketBroker and IPNetSim)	Not Supported	Only Raw Mode filter <ul style="list-style-type: none"> <li>16 filters with each filter up to 40 bytes width and offset</li> </ul>	<ul style="list-style-type: none"> <li>Raw mode and Packet Mode filter</li> <li>Raw mode with offset</li> <li>16 filters with each filter up to 120 bytes width</li> <li>Packet Mode with exact match, any match and range-based match for individual fields</li> </ul>
Internal Memory (applies to Record, PacketBroker and IPNetSim)	Not Supported	2 GB DDR2 <ul style="list-style-type: none"> <li>The onboard 1 GB memory is available, each for capturing and transmission of data.</li> </ul>	8 GB DDR3 <ul style="list-style-type: none"> <li>The onboard 4 GB memory is available, each for capturing and transmission of data.</li> </ul>

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<b>IPNetSim™</b> <b>IPLinkSim™</b> <b>(Impairments)</b>	Byte Impairment Generation - Delete, Insert, AND, OR and XOR  Bit Level Impairment – Not Supported	Not supported	2 Ports (10 Gbps/1 Gbps) <ul style="list-style-type: none"> <li>• IPLinkSim™ - Single bi-directional link</li> <li>• IPNetSim™ - multi-streams per bi- directional links (In 10G – up to 16 streams, 1G up to 4 streams)</li> <li>• Hardware filters</li> <li>• Scheduler</li> <li>• Impairment Types               <ul style="list-style-type: none"> <li>▪ Latency</li> <li>▪ Jitter</li> <li>▪ Packet Loss Models</li> <li>▪ Error Rate</li> <li>▪ Packet Reordering</li> <li>▪ Packet Duplication</li> <li>▪ FCS Error Rate (Only in IPLinksim™)</li> <li>▪ Background utilization (Only in IPLinksim™)</li> </ul> </li> <li>• <b>Latency in IPNetSim™ 1G</b> - (0 msec to 1.25 sec; 10G - (0 msec to 0.5 sec)</li> <li>• <b>Latency in IPLinkSim™ 10G &amp; 1G</b> - (0 msec to 8 sec)</li> </ul>
<b>Reports</b>	PDF XML CSV	PDF CSV	PDF CSV
<b>Automation</b>	CLI	CLI APIs	CLI APIs

**RESULTS**

<b>BERT Loopback RFC 2544 Results</b>	<b>Playback and Record Results</b>	<b>MTGA Results</b>	<b>ExpertSAM™ Results</b>	<b>PacketBroker™ Results</b>	<b>IPNetSim™ &amp; IPLinkSim™ Results</b>
<p><b>BERT</b></p> <ul style="list-style-type: none"> <li>Bert SYNC Status</li> <li>Bert OUT OF SYNC</li> <li>Test Time</li> <li>Bits Received</li> <li>Bit Error Rate</li> <li>Bit Error Count &amp; Seconds</li> <li>Sync Loss Count &amp; Seconds</li> <li>Error Free Seconds</li> <li>Out of Sequence Count and Seconds</li> <li>Live per port throughput and Bit error events plotted on graph</li> <li>Graph Duration is supported from 10 seconds up to 1 day</li> </ul> <p>RFC2544 - for different frame lengths, measure,</p> <ul style="list-style-type: none"> <li>Throughput - Actual data rate in Mbps</li> <li>Latency in micro seconds</li> <li>Back-to-Back Performance - Frames/Burst</li> <li>Frame Loss Rate vs Bandwidth</li> </ul> <p><b>Port Level (Per-Port) Statistics</b></p> <ul style="list-style-type: none"> <li>Total Tx and Rx Frames</li> <li>Valid Tx and Rx Frames</li> <li>Bad Tx and Rx Frames</li> </ul>	<p><b>Playback from file Statistics</b></p> <ul style="list-style-type: none"> <li>Playback Time</li> <li>Transferred Frames to Board Buffer</li> <li>Tx Frames transmitted</li> <li>Aggregate Filter Statistics - the number of frames passing a filter</li> </ul> <p><b>Record to File Statistics</b></p> <ul style="list-style-type: none"> <li>Capture Duration</li> <li>Total Rx Frames</li> <li>Frames not matched to filter</li> <li>Frames matched to filter</li> <li>Overflow Frames</li> <li>Overflow Count</li> <li>Transferred Frames</li> <li>Disk Write Rate (Bytes/Sec)</li> <li>Disk Write Buffer Utilization (%)</li> <li>Capture File Size (Bytes)</li> </ul> <p><b>Per Port Statistics</b> -do-</p>	<p><b>Bi-directional Statistics Per Stream / Single Link</b></p> <ul style="list-style-type: none"> <li>Tx Rx Frames</li> <li>Rx Bytes</li> <li>Current, Minimum, Maximum, Average Vales of IR (Mbps), FLR (%), Frame Loss Count, FTD (msec), and FDV (msec)</li> <li>Individual graphs for all results</li> <li>Live throughput consolidated graph view for all the streams</li> <li>Graph Duration is supported from 10 seconds up to 1 day.</li> </ul> <p><b>Per Port Statistics</b></p> <ul style="list-style-type: none"> <li>-do-</li> </ul>	<p><b>Service Configuration Results</b></p> <ul style="list-style-type: none"> <li>Max IR (Mbps), FLR (%), Max FTD (msec), and Max FDV (msec) parameters for each configured service</li> <li>Overall global verdict (PASS/FAIL) of the Service Configuration</li> </ul> <p><b>Service Performance Results –</b></p> <ul style="list-style-type: none"> <li>IR (Mbps), FLR (%), FTD (msec), and FDV (msec) (Current, Minimum, Mean, &amp; Maximum).</li> <li>Current Step of the service (CIR/EIR/Traffic Policing),</li> <li>Verdict for each step for each service is reported after the completion of the test</li> </ul> <p><b>Per Port Statistics</b> -do-</p>	<p><b>Triggered/Filtered Packets Statistics</b></p> <ul style="list-style-type: none"> <li>Filter Trigger Status (Waiting, Completed)</li> <li>Filter Trigger Count</li> </ul> <p><b>Per Port Statistics</b> -do-</p>	<p><b>Bi-directional Statistics Per Stream / Single Link</b></p> <ul style="list-style-type: none"> <li>Tx and Rx Frames</li> <li>Dropped Packets (due to Bandwidth Control)</li> <li>No. of Packets with Errors</li> <li>Dropped Packets (Packet Loss)</li> <li>Duplicated Packets</li> <li>Reordered Packets</li> <li>Tx Bytes</li> <li>Average throughput for varying time durations (10 Sec Avg, 1 Min Avg, 10 Min Avg)</li> <li>Live throughput consolidated graph view for all the streams</li> <li>Graph Duration is supported from 5 seconds up to 1 day.</li> </ul> <p><b>Per Port Statistics</b> -do-</p>

<ul style="list-style-type: none"><li>• Number of Bytes</li><li>• Link Utilization (%)</li><li>• Data Rate (Mbps)</li><li>• Frame Rate (Frames/sec)</li><li>• Classification and Count of Frames by lengths (64, 65-127, 1024-1518, Oversized, Undersized)</li><li>• Classification and Count of Frames by type (Non-Test, Broadcast, Multicast, Control, VLAN, Pause)</li><li>• Classification and Count of Frames by errors (Wrong Opcode Frames, FCS Error, UDP Checksum Errors, IP Checksum Errors)</li><li>• IPv4 and IPv6 Packet Counts</li><li>• UDP Packets Counts</li><li>• VLAN and MPLS Frame Counts</li><li>• IP, UDP, TCP, ICMP, IGMP, IGRP, and Other Protocols Count in IP Packet</li></ul>					
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