- **Hardware Based**
  - PacketExpert™ - Ethernet/ IP Tester (available in 1G, 10G, and Multi-Port HD Versions)
  - mTOP™ PacketExpert™ Ethernet Probe
  - PacketProbe™ - embedded CPE based VoIP monitoring Probe
  - IPNetSim™/IPLinkSim™ - IP WAN Network Impairment Simulator
  - MAPS™ RTP HD Emulation
  - PacketLoad™ for Mobile GTP Packet Traffic Simulation
  - Voice Quality Testing and Analysis (VQuad™)

- **Software Based**
  - PacketScan™ - All-IP Signaling and Traffic Analyzer
  - Storage and Analysis of SIP Calls using CDR
  - NetSurveyorWeb™ - Centralized Network Monitoring System
  - MAPS™ - SIP, RTP, MGCP, MEGACO, SCCP, SIP-I Protocol Simulator
  - Traffic Simulation
  - MAPS™ Media Gateway Controller (MGC), a multi-interface simulator
  - Fax and Modem Decode and Analysis using GLInsight™
  - PacketCheck™ - Software Ethernet Tester
  - RTPToolBox™ - RTP Packet Testing & Simulation Tool
Packet Test Platforms

PacketExpert™ - Ethernet/ IP Tester (available in 1G, and 10G Versions)

PacketExpert™ 10GX is a multi-functional ethernet tester which supports both Electrical and optical interfaces, all listed functionalities and 10G/1G port capacity for comprehensive testing of wirespeed Ethernet/IP networks.

The PacketExpert™ 10GX includes two 10/1 Gbps Optical ports, and two 10/100/1000 Mbps Electrical or 100/1000 Mbps Optical capable ports. The 10/1 Gbps Optical ports can be down-shifted to support 1Gbps Electrical ports, thus offering 4 Electrical/ 4 Optical 1 Gbps ports for ethernet testing.

Each port supports independent testing such as Wire speed BERT, Smart Loopback, and RFC 2544. Optional supported functionalities include - Record and Playback, ExpertSAM™, PacketBroker, Multi Stream UDP/TCP Traffic Generator and Analyzer, ExpertTCP™, and IP WAN Link Emulation.


Multiport PacketExpert™ - 24-port, 12-port Ethernet, IP Tester

GL offers high density variant using mTOP™ 1U/2U rack mount enclosures within which PacketExpert™ 10GX USB units are stacked to provide high density GigE ports form factor solution for testing GigE switches, routers and network conditions.

The sleek design of PacketExpert™ 10GX (PXN100) portable hardware allows multiple units to be easily placed in a mTOP™ rack enclosure (MT001, MT002, MT003, MT004) to provide high density GigE ports form factor solution (MT001 + PXN100) and extraordinary scalability for testing across various environment.

The chassis comprises of both electrical and optical (fiber) interfaces. Electrical ports can operate at 10/100/1000 Mbps line rates, while Optical ports can operate at 100/1000/10000 Mbps line rates in Full Duplex mode.

For more details, refer to [https://www.gl.com/packetexpert-high-density-12-24-port-ethernet-tester.html](https://www.gl.com/packetexpert-high-density-12-24-port-ethernet-tester.html)
Packet Test Platforms

mTOP™ PacketExpert™ Ethernet Probe

mTOP™ PacketExpert™ Probe unit includes GL’s USB based PacketExpert™ 1G/10Gx hardware unit combined with necessary PC interface, which makes it portable stand-alone unit suitable for field testing.

For more information, visit https://www.gl.com/test-tools-in-rack-based-platforms.html

Figure: PacketExpert™ 10GX mTOP™ Probe

Figure: PacketExpert™ 1G mTOP™ Probe

PacketProbe™ - embedded CPE based VoIP monitoring Probe

PacketProbe™ can be integrated and embedded into intelligent third-party network devices like Routers, Bridges, WAN Terminators, or Firewalls. PacketProbe™ can be also deployed as a standalone Probe within networks at strategic locations for passive traffic monitoring using port spanning or port mirroring of Ethernet switches or using external network-taps.

In any scenario it passively monitors VoIP traffic and produces real-time per call and per-stream voice quality metrics necessary for network administrators to isolate and diagnose voice quality problems. Multiple PacketProbes™ can provide network wide voice quality visibility through GL’s PacketScanWeb™ or other NMS systems.

For more information, visit http://www.gl.com/packetprobe.html.
Packet Test Platforms

IPNetSim™/ IPLinkSim™— IP WAN Emulators

GL’s IPNetSim™ is an optional (IPN506, IPN507) application within PacketExpert™. The multi-stream IP WAN Link Emulator help to test the performance of WAN network-dependent applications by emulating all the WAN conditions in a local setup easily and cost effectively. The IPNetSim™ 1G application has a multi-stream capability (16 bidirectional unique streams) and bidirectional aggregate traffic capacity of 1 Gbps.

IPNetSim™ 10G application has a multi-stream capability (4 bidirectional unique streams) and bidirectional aggregate traffic capacity of 10 Gbps.

For more information on IPNetSim™, refer to https://www.gl.com/wan-link-emulation-ipnetsim.html

IPLinkSim™ (IPN506, IPN507) is a simple-to-use IP WAN (Wide Area Network) link simulator. It simulates a single bi-directional stream between the two active ports. It offers bandwidth control to emulate various WAN link speeds from 10 Mbps to 10 Gbps.

For more information on IPLinkSim™, refer to https://www.gl.com/wan-link-emulation-ipnetsim.html

IPNetSim™ Handheld – Ethernet, IP, WAN Network Emulator (Coming Soon)

GL’s IPNetSim™ Handheld (IPN701) is a hand-held battery operated instrument that can simulate the real-time IP and Carrier Ethernet network dynamics by means of hardware controlled packet delay, loss, jitter, errors, bandwidth limitations, congestion, and duplication.

IPNetSim™ Handheld offers to manage network behaviors of up to 1 Gbps rates with accuracy always better than 1ms. IPNetSim™ Handheld is equipped with hardware based impairments generator, and dual GbE ports.

For more information, visit https://www.gl.com/ipnetsim-handheld-wan-emulator.html
Packet Check™ - Software Ethernet Tester

GL's PacketCheck™ is a comprehensive PC based Ethernet / IP test tool with BERT and Throughput testing abilities. It is very easy to use as a general purpose network performance analysis tool for 10Mbps, 100Mbps and 1Gbps LANs and WANs.

The application generates multi stream Ethernet/IP/UDP traffic with on-demand bandwidth (up to 800 Mbps) and measures end to end performance such as Byte Error Rate, Total Packets, Packet loss, Out of Sequence Packets, and Erred Packets.

It also includes a Command Line Interface (CLI) to support all the GUI functionalities of PacketCheck™ through simple commands, allowing easy scripting and automation testing.

For more information, visit http://www.gl.com/packetcheck.html

RTP ToolBox™ - RTP Packet Testing & Simulation

GL’s RTP ToolBox™ testing and simulation tool is designed not only to monitor RTP and RTCP packets, but also allows user to manually create and terminate RTP sessions, independent of call-signaling protocols such as SIP, H323, MEGACO, or MGCP.

This tool can be used for testing and developing enhanced voice features (VAD, echo cancellation, codec, digit regeneration, digit generation, fax over IP, jitter implementation etc) within end-user equipment (IP phones, ATA, MTA etc), testing media gateway telephony interfaces, end-to-end network testing before and during VoIP deployment, automated testing of digital signal processing embedded into network elements.

For more information, visit https://www.gl.com/rtptoolbox.html
MAPS™ - IP and Wireless Network Simulator (Message Automation and Protocol Simulation)

Message Automation & Protocol Simulation (MAPS™) is a protocol simulation and conformance test tool that supports a variety of protocols such as SIP, SIP-I, MEGACO, MGCP, SKINNY, IMS over VoIP and LTE, UMTS, GSM, GPRS, INAP (ANSI, ITU), BICC, SS7/ISDN SIGTRAN, MAP, CAP over IP Wireless network.

MAPS™ supports transmission and detection of various RTP traffic such as, digits, voice file, single tone, dual tones, fax, and video. With support of additional licensing (PKS108) RTP voice quality metrics for the received calls are calculated and are reported to MAPS™ application. Quality metrics include R-Factor, Listening and Conversational Quality MOS scores, PacketLoss, Discarded Packets, Out of Sequence Packets and Duplicate Packets.

MAPS™ application supports command line interface (PKS170) where MAPS™ is configured as server-side application, and enables remote operations through multiple command-line based clients (Java, VBScripts, TCL, Python), which requires additional licensing.

Remote MAPS™ Controller application (PKS111) has the ability to remotely control multiple MAPS™ Servers running on different PCs from a single remote client application. Vice-versa is also possible where multiple clients remotely control MAPS™ applications (PKS113) running on a single server, from any of the remote client applications.

For more information, visit https://www.gl.com/signaling-and-traffic-simulator.html
Packet Test Solutions

Traffic Simulation

MAPS™ is GL’s standard framework for emulation of IP, TDM, and Wireless protocols.

MAPS™ supports transmission and detection of various RTP traffic (with RTP Core PKS102 licensing) such as, voice, digits, single tone, dual tones, and IVR. With additional licenses, Video (PKS106) and Fax (PKS200) traffic can also be simulated over the established RTP sessions.

The RTP core also provides useful voice call quality metrics such as Listening and Conversational Quality MOS scores - MOS-LQ, MOS-CQ, and Listening and Conversational Quality R factors - R-LQ, R-CQ. Estimates are based on the ITU G.107 E Model.

High Density version of MAPS™ (PKS109) is also available, which is a special purpose 1U network appliance that is capable of high call intensity (hundreds of calls/sec) and high volume of sustained calls (tens of thousands of simultaneous calls/1U platform).

MAPS™ supports transmission, detection and capture of the following traffic types with the support of necessary hardware over established calls.

- RTP Traffic (Digits, Voice files, Single/ Dual Tones, FAX (T.38), Video, and IVR)
- Transmit and receive pre-recorded voice files, and live voice
- RTP based Voice Quality (MOS and R-Factor) measurement for the received streams**
- Transmit pre-recorded video traces with video codecs like H.264, H.263 etc**

** Some of these features requires additional licenses

For more information, visit [http://www.gl.com/traffic-simulation.html](http://www.gl.com/traffic-simulation.html)
High Density Mobile GTP Traffic Simulation

GL’s MAPS™ Server with PacketLoad appliance supports massive simulation of UEs (up to 500000) with high density (up to 4 Gbps or 40 Gbps) mobile data traffic simulation for both UMTS, and LTE networks.

The solution offers stateful TCP/HTTP, and PCAP Replay traffic types. PacketLoad supports HTTP traffic simulation with the base requirements such as port number, server IP address, and pre-canned HTTP traffic file.

PacketLoad is available in following platform variants -
- PacketLoad™ 4 x 1Gbps (PKS172)
- PacketLoad™ 4 x 10Gbps (PKS174)

MAPS™ with PacketLoad verifies the received data and provides various statistics, including Total packets transmitted and received, Latency, Delay, Bandwidth, Total TCP connections created, Successful connections, Packet loss, etc.

Users can customize the statistics for the generated stateful TCP/HTTP, and PCAP Replay and other Mobile Data traffic.
- Link state/speed, ARP
- TX/RX Packets/Bytes Rate/s per port
- Packet Payload Size via MSS (1B to 9400B)
- SYN, SYN_ACK, ACK, FIN, RST, HTTP POST/RESPONSE, TCP/IP Checksum Errors
- PCAP Replay
- UDP Packets Sent and Received
- Connections Established
- FW Addresses Not Blocked
- URL HTTP Wrong Response RX

Call Graphs plotting the Bandwidth on each port, HTTP_latency, TCP_Latency, and UE related statistics graphically in form of Bar/Line/Pie charts.

For more information, visit [https://www.gl.com/packetload-high-density-traffic-simulation-using-maps.html](https://www.gl.com/packetload-high-density-traffic-simulation-using-maps.html)
Packet Test Platforms

MAPS™ Multi-Interface MGC Emulator

GL’s MAPS™ Multi-Interface Media Gateway Controller can be configured to simulate end-to-end call between the Signaling Gateway (SG) and to handle bulk traffic (RTP Media) between the Media Gateway (MG) terminals.

MAPS™ MGC allows you to test different scenarios – such as troubleshooting media gateways, test call flow and voice quality in hybrid networks.

With regular RTP Traffic, the maximum simultaneous calls up to 2500, and calls per second (cps) up to 250 is achievable. Almost all industry standard voice/video codecs are supported.

High Density version (HD) is also available, which is capable of high call intensity (hundreds of calls/sec) and high volume of sustained calls (tens of thousands of simultaneous calls/platform).

For more information, visit https://www.gl.com/megaco-protocol-simulator-maps.html

Test Solutions for Air Traffic Management

MAPS™ ED-137 Radio simulator software simulates Air-to-Ground calls per EUROCAE standards (ED-137/1C, ED137/1B) to perform functionality and performance testing of network elements within VoIP ATM core network.

MAPS™ ED-137 Telephone simulator software simulates bulk Ground-to-Ground calls per EUROCAE standards (ED-137/2B). The simulator software provides ability to customize the call parameters for testing different call scenarios between Controller Working Positions (CWPs) across VoIP ATM network.

MAPS™ ED-137 Recorder can emulate call recording functionality at CWP, GRS and Recorder interfaces, generating more than hundreds of recording sessions to verify performance and load testing.

For more information, visit https://www.gl.com/test-solutions-for-voip-air-traffic-management.html
Packet Test Platforms

End-to-End 2G/3G/4G IMS Lab Simulation

GL’s End-to-End Wireless Network Simulation Test Suite provides an advanced full-fledged “Live Network” at your company premises in any customized package to suit test requirements.

The entire test suite is built on common MAPS™ Platform framework architecture. The test suite can be used to simulate all or specific elements within wireless networks infrastructure using simple ready-to-use testbed setup.

The test suite provides reliable integrated solutions to vendors and service providers for simulation, monitoring, troubleshooting the any wireless network, including, 4G, 3G, 2G and upcoming 5G. All functionalities conform to industry standards.

For more information, visit https://www.gl.com/telecom-test-solutions/wireless-network-simulation-in-your-lab.html

VoIP Testing using VQuad™

VQuad™ platform supports end-to-end Voice, Data, Video quality metrics for VoIP devices (soft phones, IP phones) with complete automation and centrally controlled system.

GL’s VQuad™ with VoIP option, along with VQT (PESQ, POLQA), provides the ability to perform manual or automated Wideband audio tests using HD codecs on the VoIP network. The VQuad™ provides direct connection to the VoIP network with up to 12 user agents connected simultaneously.

The VQuad™ along with the Dual UTA HD can connect to a VoIP network in several ways including through an ATA, through a Softphone, via wireless Bluetooth, and through the customer’s phone itself (the Dual UTA HD can replace the handset of ANY Analog, Digital, or VoIP phone). The VQuad™ can also act as an end point and directly connect to the VoIP network via SIP protocol.

For more information, visit http://www.gl.com/ipsoftphonetesting.html
PacketScan™
All-IP Signaling and Traffic Analyzer

GL’s PacketScan™ is a powerful software tool that provides extensive real-time reporting using graphical charts and statistics of live IP, VoIP, and IP based Video traffic.

Hundreds of calls can be monitored in real-time including detailed analysis of selected voice band streams. It captures, segregates, and collects statistics on VoIP calls (H323, SIP, MEGACO, MGCP, T.38, and others). Supports monitoring of protocols such as SIP, MGCP, MEGACO, LTE, Diameter including other protocols transported over IP such as ISDN, GSM, UMTS, GPRS, MAP.

PacketScan™ has the ability to collect vital statistics about calls for theoretically infinite time. The ability of PacketScan™ to capture data is limited only by the hard disk capacity of the PC. It features rich graphics, ladder diagrams and CDRs (Call Detail Records).

The CDR Analysis System permits,
- Capture for extended periods of time from hours to months
- Once calls are captured, a search for "calls of interest" can be performed while live capturing continues
- Drill-down to problem calls for post analysis
- Identify customer and user calling patterns
- Network usage and performance monitoring

GL’s PacketScan™ HD is a high density multi-protocol 2U rack mounted Network Monitoring Appliance w/ 4x1GigE (PKV120) and w/2x10GigE (PKV122) (Includes PKV100 online for temporary audio codec support) network interface cards that can capture and process high volumes of communication protocols over IP and Wireless networks.

PacketScan™ HD supports simultaneous capture and processing of up to 5000 Calls with duplex traffic at 1 Gbps to 10 Gbps.

For more information, visit http://www.gl.com/packetscan.html.
Packet Test Solutions

NetSurveyorWeb™ (over IP)

NetSurveyorWeb™ (PKV170) is a simple, easy to use Web browser client, with which users can remotely monitor the status of entire IP network with the PacketScan™ probes or PacketProbes™ distributed within network. Whenever a monitored call completes, the probe calculates a variety of quality metrics (MOS, loss, delay, jitter, etc) and sends the metrics to the central Oracle database for storage. This data can then be accessed in real-time from anywhere in the world through NetSurveyorWeb™.

The PacketScan™ is a feature-robust Windows® based software probe that captures and monitors live IP traffic. In the VoIP world, it can monitor and measure SIP, H323, Megaco, MGCP, SCCP, Diameter, T.38 fax, and video calls. With additional licensing, it can monitor 2G, 3G, and 4G protocols over IP network such as GSM, GPRS and UMTS (PKV103), SIGTRAN (PKV105), and LTE (PKV107).

For more information, visit [Packet and Wireless Network Monitoring and Surveillance System](http://www.gl.com/packet箴and-wise-sys.html)

Fax and Modem Decode and Analysis over IP using GLInsight™ and FaxScan™

GL Insight™ enables decoding and analysis of pre-recorded modem and fax transmissions. The transmission signals can be recorded from PSTN or IP media.

GL Insight™ receives the recorded modem or fax transmissions in one of the two ways:

- As raw signal files (PCM files)
- As IP capture files

GLInsight™ demodulates the raw transmissions and presents the decoded data in an easy to understand format.

For more details, refer to [http://www.gl.com/glinsight.html](http://www.gl.com/glinsight.html)

FaxScan™ application is used to process 2-Wire and 4-Wire voice band capture files as well as Win PCAP captures to provide analysis of the T.38 packets, T.30 frames, decode a Fax TIF image, and general call-flow indicators for detail analysis.