Ethernet/IP Test Solutions

January 2024
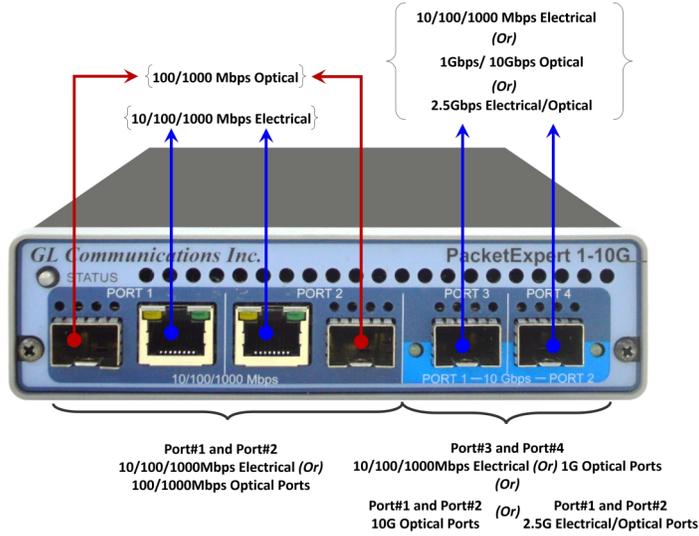
- ## Hardware Based

  - ♦ PacketExpert™ - Ethernet/ IP Tester (available in 1G, 10G, and Multi-Port Versions)
  - ♦ mTOP™ PacketExpert™ Ethernet Probe
  - ♦ MAPS™ RTP HD Emulation
  - ♦ PacketLoad™ for Mobile GTP Packet Traffic Simulation
  - ♦ Voice Quality Testing and Analysis (VQuad™)
  - ♦ vMobile™ - Ultra-Portable Equipment for Voice & Data Testing

- ## 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

10/100/1000 Mbps Electrical
(Or)
1Gbps/ 10Gbps Optical
(Or)
2.5Gbps Electrical/Optical

100/1000 Mbps Optical

10/100/1000 Mbps Electrical

Port#1 and Port#2
10/100/1000Mbps Electrical *(Or)*
100/1000Mbps Optical Ports

Port#3 and Port#4
10/100/1000Mbps Electrical *(Or)* **1G Optical Ports**
(Or)
Port#1 and Port#2 *(Or)* **Port#1 and Port#2**
10G Optical Ports **2.5G Electrical/Optical Ports**

12-Port PacketExpert™ 10GX
1U Rack-mount

24-Port PacketExpert™ 10GX
2U Rack-mount

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.

For more details, refer to PacketExpert™- Multi-Functional Ethernet/IP Test Solution webpage.

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) 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 Multi-Port GigE Ethernet/IP Tester webpage.

Packet Test Platforms

mTOP™ PacketExpert™ Ethernet Probe

mTOP™ PacketExpert™ Probe unit includes GL's USB based PacketExpert™ 1G/10GX hardware unit combined with in-built NUC mini PC can be controlled remotely using browser application which makes it portable stand-alone unit suitable for field testing.

PacketExpert™ 10GX mTOP™ Probe

PacketExpert™ mTOP™ Probe (MT005/MT005E + PXN100) includes a single 4-Port PacketExpert™ 10GX (10G) USB unit w/ Embedded Single Board Computer (SBC). SBC Specs: Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 2.0 or and USB 3.0 Ports, 12V, 3Amps Power Supply, USB Type C ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports for display

For more details, refer to Multi-Port GigE Ethernet/IP Tester webpage.

PacketExpert™ 1G mTOP™ Probe

PacketExpert™ mTOP™ Probe (MT005/MT005E + PXE100) includes a single 4-Port 1G PacketExpert™ USB unit w/ Embedded Single Board Computer (SBC). SBC Specs: Intel Core i3 or optional i7 NUC Equivalent, Windows® 11 64-bit Pro Operating System, USB 2.0 or and USB 3.0 Ports, 12V, 3Amps Power Supply, USB Type C ports, Ethernet 2.5GigE port, 256 GB Hard drive, 8G Memory (Min), Two HDMI ports for display.

For more details, refer to Multi-Port GigE Ethernet/IP Tester webpage.

For more information, visit Multi-Interface TDM, Optical, and Packet/IP Rackmount & Probe Test Platforms webpage

Packet Test Solutions

PacketCheck™ - 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 PacketCheck™ - Software Ethernet/IP Tester webpage.

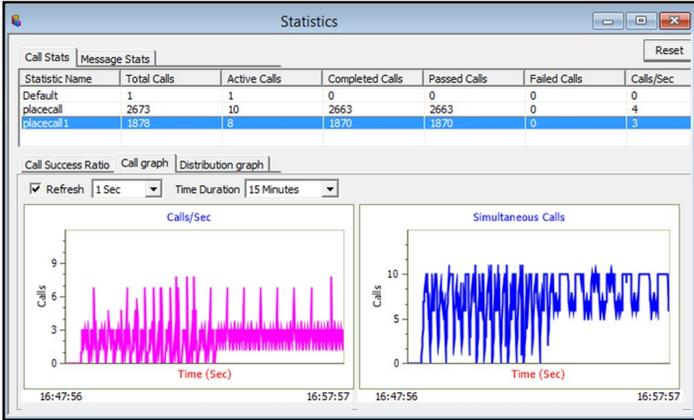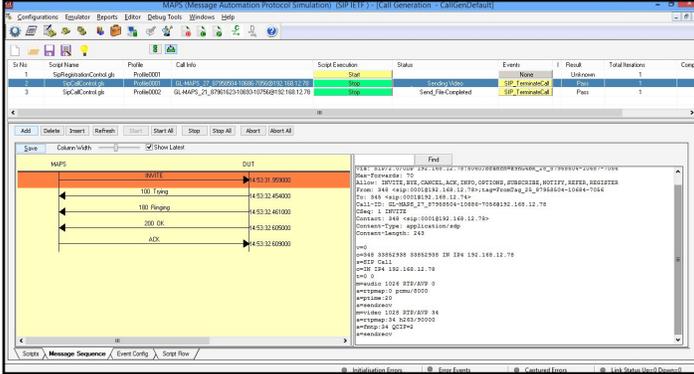## RTP ToolBox™ - RTP Packet Testing & Simulation

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 RTP Toolbox™ webpage.

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/PKS114) running on a single server, from any of the remote client applications.

For more information, visit Message Automation & Protocol Simulation (MAPS™) webpage.

Packet Test Solutions

Voice, Digits, Tones, Fax, Video, SMS, Data, Packet, GTP
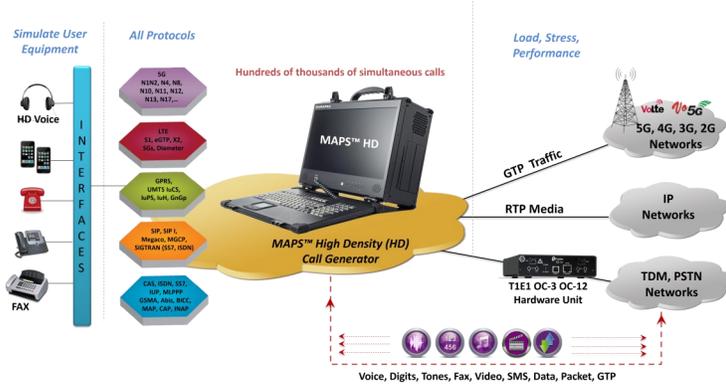
Traffic Simulation

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 Traffic Simulation across IP, Analog, TDM, and Wireless Networks with MAPS™ webpage.
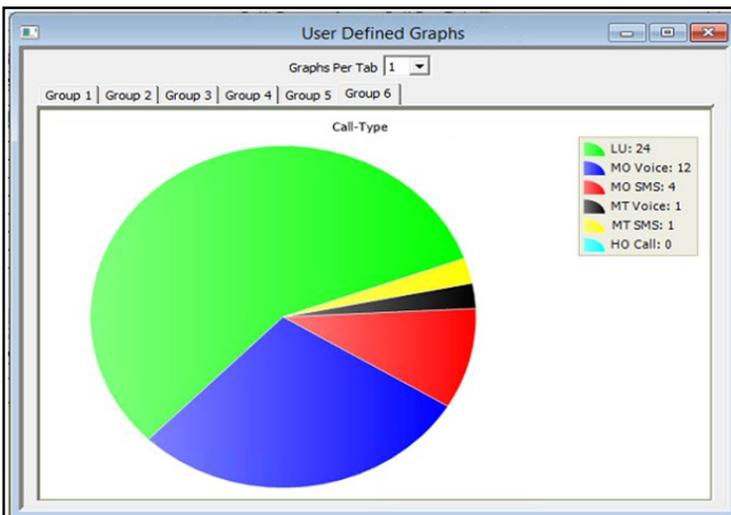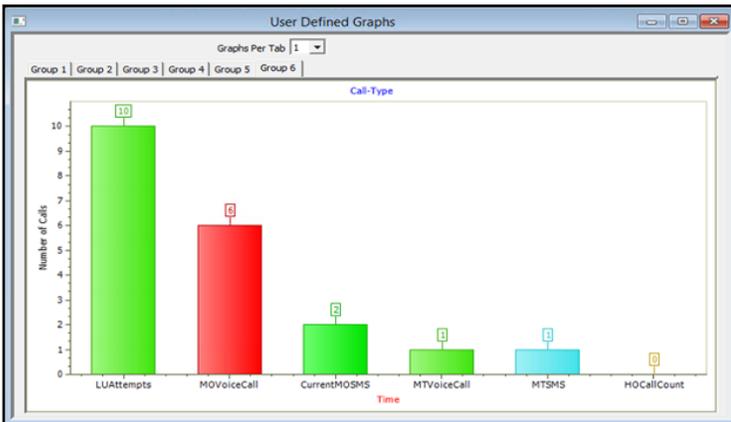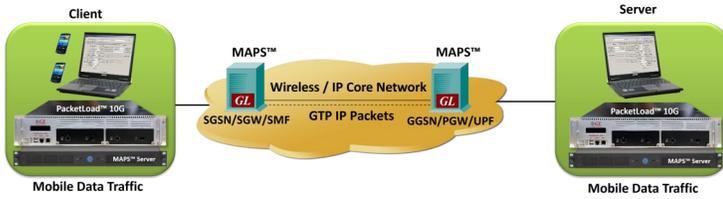
High Density Mobile GTP Traffic Simulation

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)
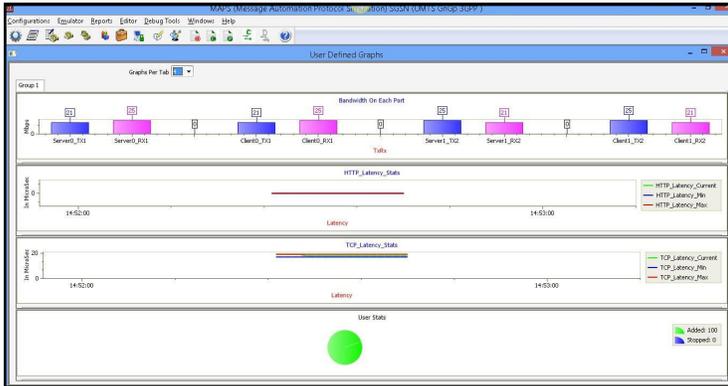- PacketLoad™ 4 x 10Gbps (PKS174)

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.
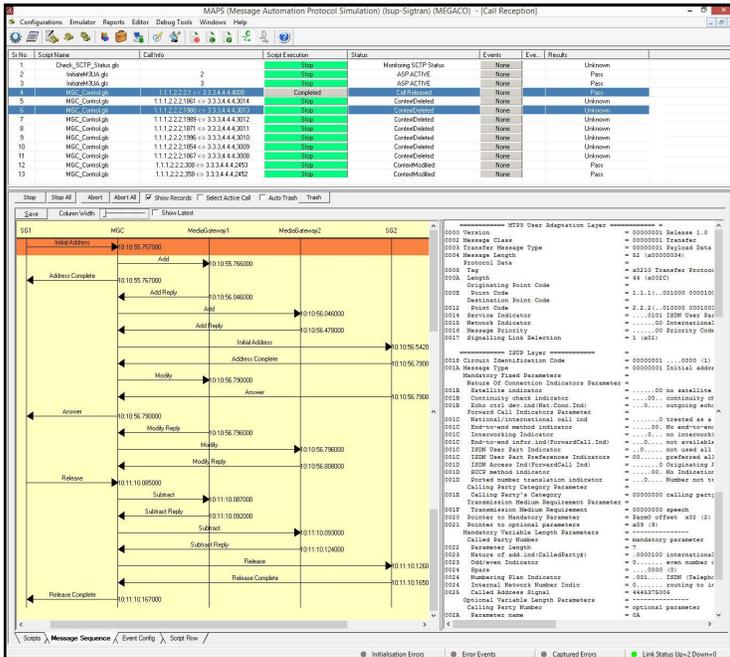
For more information, visit PacketLoad™ - High Density Mobile Traffic Generation webpage.

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 MAPS™ MEGACO Protocol Emulator webpage.

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 Testing ED-137 and ED-138 Interoperability Standards for VoIP Air Traffic Control webpage.

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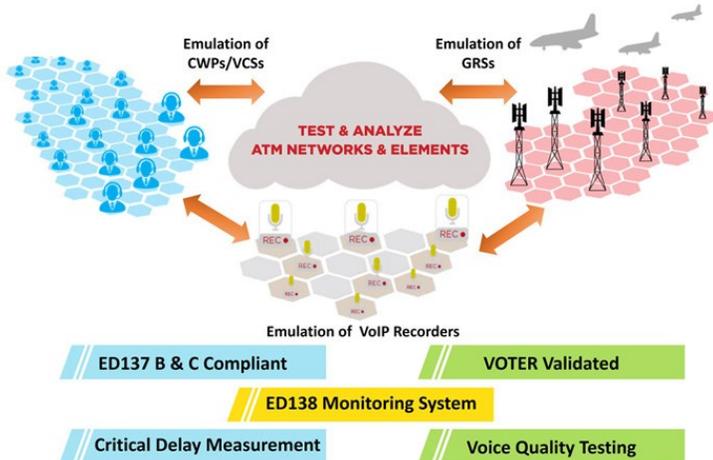
Packet Test Platforms
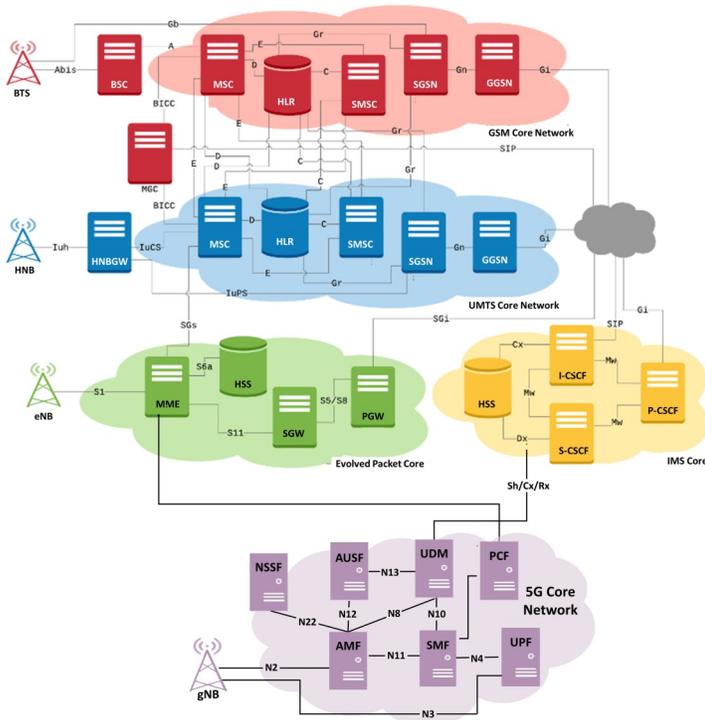
End-to-End 2G/3G/4G/5G IMS Lab Simulation

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.

Test, monitor, and troubleshoot all the core network elements and traffic types within the Wireless infrastructure for deployment-readiness, functionalities, inter-operability, performance and latest mobile features. Test end-user applications, devices, and services on a simulated wireless infrastructure environment prior to deployment on a real-time network.

For more information, visit Wireless Network Simulation (5G, 4G, 3G, 2G, IP, TDM) webpage.

Packet Test Platforms
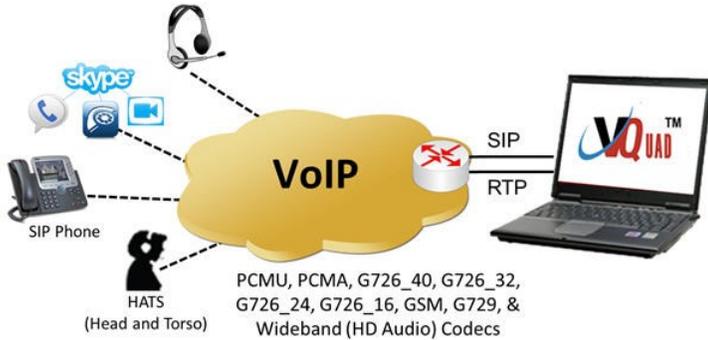
VoIP Testing using VQuad™

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 VoIP Testing using VQuad™ webpage.

## vMobile™ - Ultra-Portable Equipment for Voice & Data Testing

The vMobile™ is a handheld ultra-portable device that brings true mobility to voice and data quality testing for any mobile phone and any mobile radio, changing the way automated drive and walk testing is performed. The vMobile™ is simple to setup and conduct operate for running these tests in order to benchmark both mobile phone networks and mobile radio networks.

The vMobile™ can be hand-carried for walk and drive testing (includes GPS) as well as left in labs and can work directly with GL's VQuad™ solution for very flexible end-to-end testing. All functionality and configuration of the vMobile™ is provided using the remote web-based Console and Console App which is installed on any Android or iOS device. In essence, the vMobile™ is an expansion of GL's current VQuad™ Voice and Data testing solution.

For more information, visit vMobile™ - Ultra-Portable Equipment for Voice & Data Testing webpage
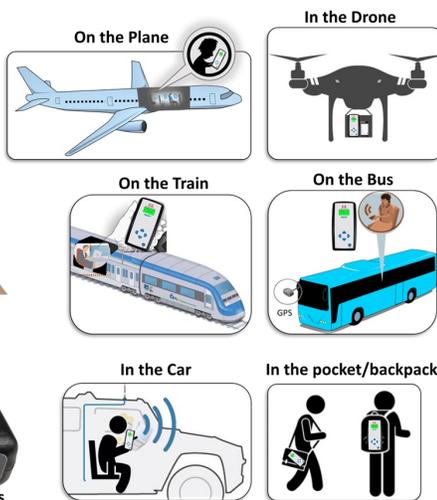
PacketScan™
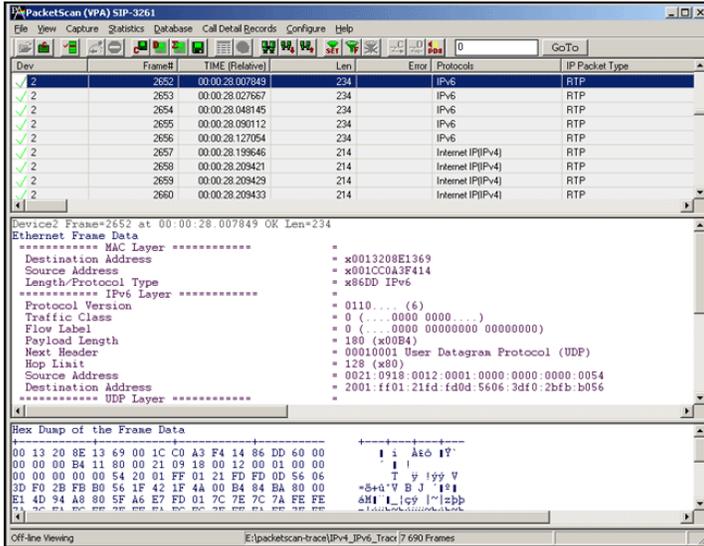
All-IP Signaling and Traffic Analyzer

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 PacketScan™ - All-IP Analyzer webpage.

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 Network Surveillance System webpage.
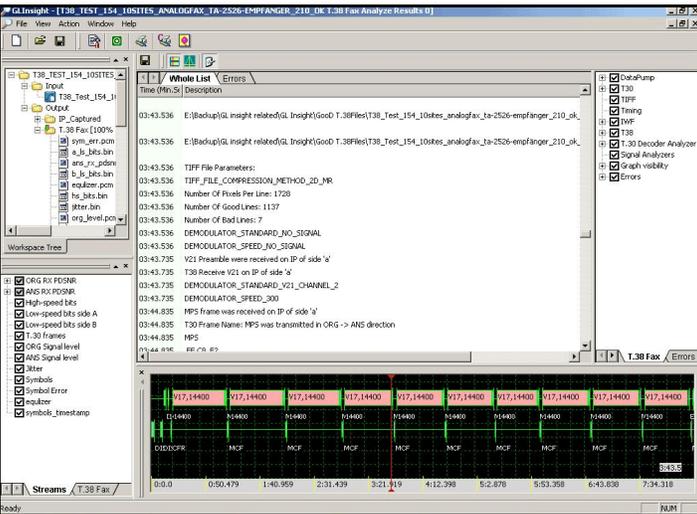
Fax and Modem Decode and Analysis over IP using GLInsight™ and FaxScan™

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 information, refer to GLInsight™ webpage.

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.

For more information, refer to Analysis of Fax over IP, TDM, & PSTN - FaxScan™ webpage.