Ethernet Test Solutions
Wireless Test Solutions
Fiber Optics Test Solutions
TDM & PSTN Test Solutions
Voice, Fax, Data, & Video Quality
Network Monitoring Solutions

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- Centralized Network Monitoring and Test Solutions (End-to-End Voice, Video, & Data QoS)
- Wireless Network Test Solutions (4G, 3G, 2G, Wi-Fi, Wi-Max, Bluetooth®, QoS)
- Ethernet Network Test Solutions 1 Gbps, 10 Gbps
- TDM Network Analysis & Simulation Products
- SONET / SDH Network Analysis & Simulation
- PSTN Network Analysis & Simulation
- Echo Measurement, and Simulation, Echo Canceller Testing Solutions
GL Communications has over the years worked with major telecom equipment vendors (EVs) and system integrators to meet the testing requirements arising at various stages of telecommunications product development life-cycle.

With its proven expertise of over 30 years, GL has a comprehensive suite of telecom testing solutions to verify and ensure 'quality and reliability' of variety of telecom networks including Wireless, and high-speed fiber optic lines. A privately held company, founded in 1986, GL offers customers a team of seasoned experts with a broad understanding of the specific challenges they face and the technical creativity to meet complex requirements.

Unlike conventional test equipment, our test platforms provide unprecedented visualization, capture, storage, & features without sacrificing portability, convenience, or cost-effectiveness.

GL's test tools range from simple PC-based software test tool to all-encompassing hardware units with futuristic expansion capacities. GL's test solutions cover wide array of networks -

- **WIRELESS (4G (LTE), 3G, 2G)**
- **IP, Ethernet,**
- **T1, E1, T3, E3, PSTN**
- **OC-3/STM-1, OC-12/STM-4**

The tools are widely used by the telecommunication industry for conformance testing, automated stress/load testing, performance testing, remote accessibility, centralized web-based control and analysis, fault testing and analysis, and customized testing.

GL Communications Inc. provides consulting services for telecommunication companies all around the world. We offer consulting services for WIRELESS, SONET/SDH, T1/E1, and T3/E3 testing and analysis, and system design of wireless, satellite, fiber optic, and microwave networks. Please visit www.gl.com for any additional information regarding GL's consulting services.

A broad classification of the test and measurement solutions based on different networks is detailed in this brochure

Visit [http://www.gl.com](http://www.gl.com) for more details.
Centralized Network Monitoring & Test Solutions
End-to-End Voice, Video, & Data QoS

For more details, please visit - http://www.gl.com/completevqtsolutions.html

For more details, please visit - www.gl.com/web-based-client-for-voice-and-data-quality-testing.html
Centralized Network Monitoring & Test Solutions
End-to-End Voice, Video, & Data QoS

Summary of Products

- Intrusive VQuad™ with Dual UTA system, or a self-contained VQuad™ Probe - a portable hardware that interfaces Wireless, VoIP, PSTN, and TDM networks to send and receive speech signals
- Voice Quality Test (VQT) software - analyzes the transmissions using POLQA, PESQ LQ/LQO/WB, PSQM, and PAMS
- Data Quality Testing - perform data test over wired and wireless networks using VQuad™ Probe
- Video Quality Testing (VAC™) application - perform fully automated Video Conference testing and get Audio and Video MOS QoS results along with several analytical metrics
- VQT WebViewer™ - facilitates a voice quality test result display using a simple web browser. Also supports user-defined statistics and events configuration for both tabular and graphical outputs.
- Voice Band Analyzer (VBA) - analysis tool for monitoring the quality of voice band traffic over VoIP, TDM and Wireless networks
- Echo Measurement Utility - analysis tool for echo, and delay measurements of voice calls in VoIP, TDM, 2Wire, and Mobile networks
- Non-Intrusive Probes - PacketScan™ for IP and Wireless networks, LightSpeed1000™ Analyzer for Optical networks, and T1/E1 Analyzer for TDM and PSTN networks.

Features

- Typical networks supported by GL's VQuad™ - Dual UTA -
  - Wireless communication devices
    (Mobile phones, Smart phones -Blackberry, iPhone, Android, Military/Mobile radio PTT, Bluetooth®, WiMax, WiFi, 3G, 4G, LTE, VoLTE)
  - PC Internet connection (Broadband 3G/4G/LTE, WiFi, Wired)
  - 2-wire Analog Simulation (FXO port) for connecting to ATA, PSTN, Switch Router
  - Phone Handset for connecting to VoIP phones, Digital phones, Analog phones.
- Intrusive and Non-Intrusive Probes
- Solutions support low-density and high-density networks
- Type of tests or measurements that can be performed include -
  - Automated Data Testing - TCP, UDP, VoIP, Route, HTTP, FTP, SMS, Email, DNS, Phone / User Equipment/ SIM Information
  - Voice Quality testing as per ITU-P.862.1/2 PESQ
  - Automated Video Conference testing - get Audio and Video MOS QoS results along with several analytical metrics
  - Active Speech and Noise Levels, Latency, Jitter, Clipping, and Power Measurements
  - E-Model and Mean Opinion Score (MOS) results
  - Echo Measurements, Round Trip Delay (RTD), One Way Delay (OWD), Post Dial Delay (PDD), Signal to Noise Ratio (SNR)
  - Drive Testing - GPS and ITS location tracking with results overlay
- All results/measurements/events are automatically sent to central database via TCP/IP Results are accessible remotely via browser based clients
- Scripting for automated testing, and portability for mobile drive testing
- Remote control and access with centralized data retrieval, and analysis
Wireless Network Test Solutions (4G, 3G, 2G, Wi-Fi, Wi-Max, Bluetooth®)

For more details, please visit - www.gl.com/maps.html and Communications Networking 4G, 3G, 2G Lab

For more details, please visit - Wireless Voice, Video, and Data QoS Testing
Summary of Products

- **Complete Wireless Lab Suite** for simulation, monitoring, troubleshooting the 4G, 3G, and 2G mobile networks.

- **Testing IMS Network** - simulate Cx/Dx, Rx, Gx, Gm, SGi, Mw, Mi, Mj interfaces using MAPS™ IMS and Diameter simulators; Analyze all these interface GL’s PacketScan™

- **Testing LTE and VoLTE Network** - simulate S1-u, S1-MME, X2, S3, S4, S5/S8, S6a, S10, S11, S13, S16 interfaces using MAPS™ LTE Simulator & analyze with GL’s PacketScan™

- **Testing UMTS Network** - Iub, Iur, IuCS, IuH, and IuPS Interfaces - Analysis using GL’s PacketScan™, and Simulation using MAPS™ UMTS Simulator

- **Testing GSM Network** - A, Abis, Mobis, Gs, Ls, Lb, Lp, & Up interfaces; supported codec - AMR, HR, FR, EFR -Analysis using GL’s GSM Analyzer or PacketScan™, Simulation using MAPS™ GSM Abis or A Simulator

- **Testing GPRS Network** - Simulate Gn Gp interface using MAPS™ Gn Gp Simulator, and analyze Gb, Gn, Gp, Gs interfaces with GL’s GPRS Analyzer or PacketScan™.

- **Testing TRAU Protocols** using TRAU Analysis, Playback and Simulator

- **End-to-End Voice, Data, and Video QoS and Drive Testing** – VQuad™ Probe, VQuad™ with DUAL UTA - includes support for call control of variety of wireless networks – from 2G to 4G LTE and beyond, including the capability of sending/recording voice, performing video conferencing tests, and a variety of data tests on the mobile devices, for evaluating Voice, Video, and Data Quality.

- **Monitoring CDMA2000 Network** - interfaces pertaining to packet transmission namely A1, A3/A7 - using GL’s CDMA 2000 Analyzer

- **PacketScan™** (available in Basic, HD Versions) - Captures live high-density VoIP traffic, visual analysis, Call QOS with E-model based MOS & R-factor scores; All - IP Protocol Analysis — SIP, SIGTRAN, MGCP, MEGACO, H.323, GSM, GPRS, UMTS, LTE, Diameter, and more.

- **NetSurveyorWeb™** - Centralized report collection from PacketScan™ probes & remote monitoring using web-based clients

Features

- All traffic types (Voice, Digits, Tones, Fax, Modem) - Simulation and Analysis
- Authenticate and confirm security procedures
- Long term activity recording with Web-based analysis and reporting
- In-lab and Field Testing Solutions
- Unlimited ability to edit wireless communication protocol messages and control call scenarios
- Perform end-to-end SMS testing and SMS testing between two entities within a Wireless infrastructure
- GPS and ITS location tracking with results overlay
- Includes broadest range of test and simulation for echo testing
Ethernet Network Test Solutions (1 Gbps, 10 Gbps)

For more details, please visit - http://www.gl.com/voipanalysis_simulation.html
Summary of Products

- **PacketScan™ (available in Basic, HD Versions)** - Captures live high-density VoIP traffic, visual analysis, Call QOS with E-model based MOS & R-factor scores; All - IP Protocol Analysis — SIP, SIGTRAN, MGCP, MEGACO, H.323, GSM, GPRS, UMTS, LTE, Diameter, and more.

- **PacketProbe™** - Embedded CPE based VoIP Monitoring Probe

- **MAPS™ VoIP (available in Basic, HD Versions)** - High-density VoIP call generation with traffic for performance testing and troubleshooting; The application gives users the unlimited ability to edit messages and control scenarios (message sequences).
  - UMTS IuCs and IuH
  - UMTS IuPs, Gn, Gp
  - LTE X2, S1, eGTP
  - Diameter S6a, S6d, S13, Cx/Dx, Gx, Rx, Sh
  - IMS (Cx/Dx, Rx, Gx, Gm, SGI, Mw, Mi, Mj)
  - SIP, SIP-I, MGCP, MEGACO, Skinny
  - Air-Ground calls (ED137_1B: Radio) and Ground-Ground (ED137_2B: Telephone) calls as per EUROCAE standards.
  - SS7, and ISDN over IP (SIGTRAN)
  - GSM, BICC, MAP, INAP over IP, GPRS Gb

- **PacketExpert™ (available in 1G, 10G, and HD Versions)** -
  - 4, 12, and 24 Port (HD Only)
  - VLAN, MPLS, Q-in-Q, IP, UDP Tester
  - Electrical Ethernet and Optical Ports
  - Wire speed Packet Capture and Playback, PacketBroker
  - WAN IP Link Emulation
  - BERT, RFC2544, Y.1564 SLA Verification

- **IPNetSim™ 1G/10G** - emulates an IP network with access to 10 Gbps full duplex link or a 10/100/1000 Mbps full duplex link. incoming traffic can be identified into separate user defined streams (up to 16 streams for 1 Gbps pipe and up to 4 streams for 10 Gbps pipe)

- **VQuad™ Probe, VQuad™ with DUAL UTA** - End-to-End Voice, Data, Video quality metrics for VoIP devices (soft phones, IP phones) with complete automation and centrally controlled system

- **PacketCheck™** - Ethernet performance analysis for 10Mbps, 100Mbps and 1Gbps

- **PacketShark™** - Handheld GigE Packet Capture, Filter and Aggregation Tap

- **RTPToolBox™** - Simulate RTP sessions independent of signaling and test RTP packets

- **PacketH323™** - H.323 Call Simulator

- **NetSurveyorWeb™** - Centralized report collection from PacketScan™ probes & remote monitoring using web-based clients

- **GLInsight™, FaxScan™** - Decode and analyze fax and modern calls over IP

Features

- Generate/analyze thousands of calls simultaneously over IP networks.
- Test individual links, switches, Gateways, IADs, IP phones, Soft phones, LAN, WAN, Core/MPLS networks
- Generate/analyze traffic over IP; Traffic types include voice files, digits, tones, T.38 fax, & modem
- Tap packet networks, capture Ethernet packets at wire speed, transmit the recorded traffic conditions to test the network
- Impairments generator - 1Gbps, 10 Gbps
- Ethernet, VLAN, Q-in-Q, MPLS, IPv4, IPv6, UDP testing at wire speed for applications such as BERT, RFC 2544, Y.1564 SLA, and Loopback testing
- Supports all industry standard codecs - G.711, G.729, G.726, AMR, EVRC, GSM, and more
- Visual analysis, real-time listening, recording, statistics
- Intrusive and non-intrusive test/monitoring solutions
- Automated test setup for monitoring IP networks
- Unlimited ability to edit IP protocol messages and control call scenarios
- Capture, storage and analysis of calls over packet network
- Centralized Network Monitoring System
- Network-wide Voice, Video, and Data Quality (QoS) Monitoring System
- Includes broadest range of test and simulation for echo testing
TDM Network Test Solutions
T1 E1, T3 E3, Datacom

Dual T1 E1 Express (PCIe) Board
Quad / Octal T1 E1 PCIe Card
Dual HD Universal T1 E1 PCI Card

16-Port T1 E1 Breakout-Box
PCIe Board

tProbe™ - Portable USB based T1 E1 VF FXO FXS and Serial Datacom Analyzer
Portable USB based Dual T1 E1 Analyzer Unit

VQuad™ Probe

LinkTest™ SINGLE (LTS001)
LinkTest™ SINGLE+ (LTS002)
LinkTest™ DUAL (LTS003)

LinkSim™ (LTS101)
LinkTest™ DualE1 (LTS010)

For more details, please visit - http://www.gl.com/hardware_platforms.html
TDM Network Test Solutions
T1 E1, T3 E3, Datacom

Summary of Products

- **T1/E1 and T3/E3 Test Solutions** - GL’s T1/E1 Analyzers provide a wide range of functionalities and testing capabilities for testing T1 and E1 links. The hardware can be USB based portable, Handheld, or PC-based platforms. Any capacity from Dual-port, to High Density 16 T1/E1 ports can be supported.

- **Serial Data Communications Analyzer** - Datacom Analyzer is an optional board available with GL’s tProbe T1 E1 Analyzer USB Unit. Non-intrusive monitoring of serial interfaces (X.21, V.24, V.35, RS-449, RS-485, EIA-530 and EIA-530A).

- **NetSurveyorWeb™** Centralized report collection from T1/E1/T3/E3/Optical probes & remote monitoring using web-based clients.

- **MAPSTM TDM** - High-density call generation with traffic for performance testing and troubleshooting. The application gives users the unlimited ability to edit messages and control scenarios (message sequences).
  - SS7
  - ISDN
  - MAP, CAP, INAP
  - BICC, IUP
  - MLPPP
  - APS, CAS
  - GSM
  - UMTS

- **GLInsight™, FaxScan™** - Decode and analyze fax and modem calls over PSTN, and TDM networks

- **Repeaters—Multi-port, T1E1J1 Switch**

Features

- **All interfaces (Analog, T1, E1, Serial Interface, T3, E3)** - Simulation and Analysis

- **All traffic types (Voice, Digits, Tones, Fax, Modem)** - Simulation and Analysis

- **All protocols (SS7, ATM, MLPPP, ISDN, CAS, GSM, MAP, INAP, GPRS, TRAU, UMTS, Frame Relay, CDMA 2000, V5.x, HDLC, and more)**

- **Unlimited ability to edit TDM communication protocol messages and control call scenarios**

- **Capture, storage and analysis of calls over TDM network**

- **Network-wide Voice and Data Quality (QoS) Monitoring System**

- **Centralized Network Monitoring System**

- **Includes broadest range of test and simulation for echo testing**
SONET / SDH Network Test Solutions

For more details, please visit - SONET SDH Testing
SONET / SDH Network Test Solutions

Summary of Products

- **LightSpeed1000™**: comes with all the necessary software for overall capturing, monitoring, emulation, and protocol analysis over SONET-SDH links. Supports wire-speed recording and playback of Unchannelized and Channelized ATM, PoS, and RAW Traffic over OC-12/STM-4, and OC-3/STM-1 lines.

- **ATM Protocol Analyser**: Capture and analyze the ATM cells across the U-plane for both NNI and UNI interface carrying AAL0, AAL2 and AAL5 traffic.

- **PoS Protocol Analyzer**: Capture and analyse the packets over SONET-SDH using Point-to-Point Protocol (PPP) link layer protocol, which encapsulates other network layer protocols like IP for transmission on synchronous and asynchronous communications lines.

- **UMTS Protocol Analyser**: helps in fault diagnosis and troubleshooting UMTS network.

- **Channelized access for T1 E1 T3 E3**: Analyze/Simulate thousands of channels for processing ISDN, SS7, CAS and other channelized protocols.

- **NetSurveyorWeb™**: Centralized report collection from Optical probes & remote monitoring using web-based clients.

- **Optical Ethernet Test Solutions** – GL offers **PacketExpert™** (available in 1G, 10G, and HD Versions) provide independent Ethernet (VLAN, MPLS, IP, UDP) testing at wire speed
  - 4, 12, and 24 Port (HD Only)
  - VLAN, MPLS, Q-in-Q, IP, UDP Tester
  - Electrical Ethernet and Optical Ports
  - Wire speed Packet Capture and Playback, PacketBroker
  - WAN IP Link Emulation
  - BERT, RFC2544, Y.1564 SLA Verification

Features

- **Wirespeed processing of ATM, PoS or RAW data for Tx and Rx**: supports BERT, Capture and playback of packets, Delay emulation, and protocol analysis.

- **Hardware based filtering options**: sixteen 128 bit independently filters with bit masks, for both ports with AND/OR include/exclude conditions

- **Hardware based precise time stamping of cells / packets**: with 10 nsec resolution, 1 ppm accuracy

- **Precisely emulates packet delays that occur over SONET/SDH carrying ATM or PoS traffic**: delay is adjustable from 1 ms to maximum of 500 mSec

- **Comprehensive analysis / emulation of voice, data, fax, protocol, and voice quality testing**

- **Channelized ports allow direct access to anything and everything on SONET / SDH**
  - Framing and Payload, including structured traffic (T1, E1, STS-1, DS3 etc) or unstructured traffic (ATM, PoS, etc)
  - Supports multiplexing multiple T1 or E1 channels to a single channelized OC-3/STM-1 OC-12/STM-4 line and vice versa
  - Supports any combination of DS0/64/56/16/8 kbps fractional T1/E1, and N x T1/E1 interface definitions (a total of 252 E1s or 336 T1s – on each OC-12/STM-4 line)
PSTN Network Test Solutions

For more details, please visit - http://www.gl.com/hardware_platforms.html
PSTN Network Test Solutions

Summary of Products

- **tProbe™ FXO FXS** - The FXO and FXS ports on tProbe™ unit allows to simulate all of the FXO and FXS functionalities using tProbe™ Client Server or using MAPS™ FXO FXS application. The FXO port on the tProbe™ also permits non-intrusive capture and analysis of voice-band signals from a two-wire telephone line.

- **MAPS™ APS** - High capacity Analog 2-wire Bulk Call Generator used to test a Central Office (CO), PBX, ATAs, Gateway or other telecommunications equipment, which provide local loop interfaces. Supports automated bulk analog call simulation for up to 192 independent FXO ports per 1U MAPS™ CAS Server (includes 1 Octal T1 card)

- **GLInsight™, FaxScan™** - Decode and analyze T.30 fax calls over PSTN networks

- **VQuad™ Probe, VQuad™ with Dual UTA** - Two Analog FXO ports per Dual UTA provides complete automated analog testing with QoS measurements. VQuad™ can also work with handheld analog tester – vHandi™ to automated voice quality testing on analog lines.

Features

- Support up to 384 FXO port simulation per 4U MAPS™ APS
- Call monitoring and call recording
- Capture, storage and analyze calls for quality and performance
- Test signaling termination, detection , and call flow over PSTN switch
- Flexibility to control FXO and FXS functionality via scripts
- Multiple users and tests per system
- Functionalities
  - Basic Telephony functions - On-hook, Off-hook, Detect ringing signal, Dial, Hook flash
  - Digit related functions - Send and Detect digits
  - File transfer functions - Send and Receive file
  - Tone related functions - Detect busy tone, call waiting tone, dial tone, reorder tone, ring-back tone, special dial tone, Send and Detect test tone, tones
  - Fax related Functions - Send and Receive fax
  - FSK related functions - Detect Caller ID, Detect VMWI
  - VQT (Optional) - MOS, E-Model, PESQ, POLQA Scores
Testing Echo Cancellers
Echo Simulation and Analysis

Echo, noise, and delay possibilities

- Acoustic Echo Canceller
- Noise Suppression
- Speech level control

For more details, please visit - http://www.gl.com/echocan.html
Testing Echo Cancellers
Echo Simulation and Analysis

Summary of Products

- Test Echo Cancellers in PSTN, TDM, IP, and Wireless environments
- **AutoECTest** - G.168 EC Compliance Testing of ATAs and Gateways
- **Auto AEC Test** - Test Acoustic Echo Cancellation as per G.167 and P.340 Standards
- Testing your developmental EC software without any hardware
- Test Voice Enhancement Device per G.160 and G.169
- **Echo Path Delay/Loss Simulation** software - simulates delay, loss, double-talk, noise, and other impairments over T1/E1 lines
- **Echo Path Delay / Loss Measurement** software - allows intrusive and non-intrusive measurement of Echo Return Loss (ERL) & Echo Path Delay (EPD)
- **Voice Band Analyzer (VBA)** - analysis tool for monitoring the quality of voice band traffic over VoIP, TDM, and Wireless networks
- **Echo Measurement Utility (EMU)** - analysis tool for echo, and delay measurements of voice calls in VoIP, TDM, 2Wire, and Mobile networks
- **VQuad™ Probe, VQuad™ with DUAL UTA** - Network-wide monitoring of speech levels, noise levels, hybrid echo, acoustic echo and voice quality (QoS)

Features

- Simulate a real network with echo paths at one or both ends
- Simulate delay, loss, double-talk, noise, and other impairments
- Accurate field characterization of echo paths, impulse responses, delay, and loss statistics
- Simulate acoustic echo into modules such as a Sound Card, a Mobile Phone, a Regular Phone, an IP Phone, or a Speaker Phone
- Generate dynamic (changing) acoustic echo
- Compliance testing with hybrid simulation, application of stimulus, capture of response, and graphical analysis of response.
- Test cases for all possible variations of echo path loss, delay, hybrid filters, etc
- Typical Scenarios -
  - Stimulus / Simulation all Digital (TDM Applications)
  - Stimulus / Simulation all Analog (Mobile Phone Applications)
  - Stimulus RTP (Ethernet) / Simulation Analog or Digital (VoIP IP Phone Applications)
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