GL Communications Inc.

Test & Measurement for Telecom Networks

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

Wireless (LTE, VoLTE, UMTS, GSM)

Test
Analyze
Monitor

Fiber Optics

Networks Under Test

TDM, PSTN

Devices Under Test

Wireless Devices

IP End Points

PSTN Devices

GL Communications Inc.

818 West Diamond Avenue - Third Floor Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Index

- End-to-End Voice, Video, & Data QoS
- Wireless Network Test Solutions (4G, 3G, 2G, Wi-Fi, Bluetooth®, QoS)
- Ethernet / IP Network Test Solutions (1 Gbps, 10 Gbps)
- SONET / SDH Network Analysis & Simulation
- TDM Network Analysis & Simulation Products
- PSTN Network Analysis & Simulation
- Test Solutions for Military | Maritime | Government Communications Networks
- Test Solutions for Aerospace Communications Networks
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/VOIP, Ethernet (Electrical and Optical)**
- **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 [https://www.gl.com](https://www.gl.com) for more details.
Centralized Network Monitoring & Test Solutions
End-to-End Voice, Video, & Data QoS

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

For more details, please visit—https://ww.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

- Following VQuad™ platforms support connecting to various device types (Wireless, VoIP, PSTN, and TDM) to establish calls over the real-network, send and receive voice/video/data traffic and evaluate performance of devices and networks.
  - VQuad™ - Dual UTA HD system is a compact hardware designed for portability; it can simultaneously connect to any 2 telephony devices end to end for end-to-end voice/video/data quality; requires PC or laptop.
  - VQuad™ Probe HD is a compact self-contained hardware designed for in-field or walk-around testing; supports one Dual UTA HD unit and an embedded SBC; it can simultaneously connect to any 2 telephony devices to evaluate end-to-end voice/video/data quality.
  - VQuad™ MITOP system is a self-contained hardware suitable for in-lab and drive testing; it supports up to 6 Dual UTA HD units and an embedded SBC using Two-stacked 1U MITOPs; it can simultaneously connect up to 12 telephony devices to evaluate end-to-end voice/video/data quality.
- Voice Quality Test (VQT) software is used with VQuad™, MAPS™, or as stand-alone application for fully automated testing of NB, WB, and SWB speech per PESQ LQ/LQO/WB and POLQA standards.
- GL NetTest Data Quality Testing can be used with VQuad™ or as stand-alone application on Android, IOS and PC devices to perform data test over wired and wireless networks.
- Video Quality Testing (VAC™) application can be used with VQuad™ or as stand-alone application on any Android, Windows PC, and Linux PC to perform fully automated Video Conference testing and get Audio and Video MOS QoS results along with several analytical metrics.
- Drive Test for evaluating quality of Voice calls, Video calls, and Data on the go; with all results and call control information plotted on Google Maps, one can easily monitor the call quality as well as signal strength from a central remote location.
- 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.

Features

Supported Device Types:
- Any Wireless phone independent of Network. Connect via Bluetooth® headset or wired headset for full Call Control. Supports legacy networks as well as VoLTE, 5G, and next generation networks.
- 2-Wire FXO (simulates analog phone). Connect to any PSTN device, ATA, or Media Gateway in the analog network.
- 4-Wire analog (Tx/Rx) replaces headset on any system. Also supports replacing phone handset at the curly cord (RJ22).
- SIP Call Agent (act as a SoftPhone while configuring Proxy and Registrar). Includes both SIP Call Control as well as RTP audio traffic.

Supported Analysis and Functionalities:
- Automated Call Control with Pass/Fail statistics for Place Call and Dropped Call. Supports 2-wire Analog, Mobile Phone Bluetooth/wired headset, PTT and VoIP SIP.
- Voice Quality Analysis using GL POLQA (ITU P.863); supports NB, WB and SWB audio. Fully automated testing with MOS along with Speech Level, Noise Level, and Speech Activity.
- Audio Analysis includes both Power and Frequency. Allows to verify if proper audio bandwidth was sustained during the call. Also includes Path Confirmation, Double-Talk analysis, and Audio dropout analysis.
- Delay Measurement supports both One-Way and Round-Trip during the established call.
- Data Testing using GL NetTest supports Android, IOS and PC devices. Includes TCP, UDP, HTTP, FTP, DNS, VoIP and network specific tests. Fully automated (also includes manual operation) and remote controllable.
- Drive Testing - GPS and ITS location tracking with results overlay
- Complete Automation using VQuad™ scripting for Call Control, Voice Analysis, Data Testing, and Video Testing.
- Remote operation via CLI and API. In addition, each VQuad™ node can control remote VQuad™ node allowing a single VQuad™ script to control both sides of the call. Additional Remote operation provided directly from the GL WebViewer™.
Wireless Network Test Solutions (4G, 3G, 2G, Wi-Fi, Bluetooth®)

MAPSTM - Simulation of all network elements and functionalities
PacketScan™ - Non-intrusively monitor a wireless network infrastructure

Wireless Network - In your Lab

For more details, please visit Communications Networking 4G, 3G, 2G Lab

For more details, please visit Wireless Voice, Video, and Data QoS Testing (E2E)
Wireless Network Test Solutions
(4G, 3G, 2G, Wi-Fi, Bluetooth®)

Summary of Products

- **Complete Wireless Lab Suite** for simulation, monitoring, troubleshooting the 4G, 3G, and 2G mobile networks
- **LTE and VoLTE Network** - Simulate entire network infrastructure using MAPS™ LTE Simulator & analyze using GL’s PacketScan™; supported interfaces - S1-u, S1-MME, X2, S3, S4, S5/S8, S10, S11, S13, S16, Location Services (LCS) over SLs, Circuit Switched Fall Back (CSFB) and SMS procedures over SGs
- **IMS Network** - Simulate entire network infrastructure using MAPS™ IMS and Diameter Simulator & analyze using GL’s PacketScan™; supported interfaces - S6a, S6d, S3, Sh, SLg, SLh, Cx/Dx, Rx, Gx, Gy/Ro, Rf, Gm, SGi, Mw, Mi, and Mj interfaces
- **UMTS Network** - Simulate entire network infrastructure using MAPS™ UMTS Simulator & analyze using GL’s PacketScan™; supported interfaces - IuCS and IuH (over IP and ATM), IuPS (over IP), and Location Services (LCS) over IuPc Interfaces
- **GSM Network** - Simulate entire network infrastructure using MAPS™ GSM Abis or A Simulator & analyze using GL’s PacketScan™; supported interfaces - A, Abis, Mobis, Gs, Ls, Lb, Lp, & Up interfaces
- **GPRS Network** - Simulate Gb, Gn/Gp interface using MAPS™ Gp Simulator, and analyze all these interfaces with PacketScan™
- **TRAU Protocols** - Test using TRAU Analysis, Playback and Simulator
- **End-to-End Voice, Data, and Video QoS and Drive Testing** – VQuad™ platforms include support for call control of variety of wireless devices independent of underlying network – from 2G to 4G LTE and beyond, for evaluating Voice, Video, and Data quality testing
- **PacketScan™** (available in Basic, HD Versions) - Captures live high-density Wireless and VoIP traffic, visual analysis, call QOS monitoring with E-model based MOS & R-factor scores; Supports All - IP based Protocols - SIP, UMTS, LTE, Diameter, IMS, SIGTRAN, MGCP, MEGACO, BICC, MAP, CAP, GSM, GPRS, and more
- **NetSurveyorWeb™** - Centralized report collection from PacketScan™ probes & remote monitoring using web-based clients

Features

- Includes broadest range of test and simulation tools for wireless devices and network
- Perform end-to-end tests as well as tests between two entities within a Wireless infrastructure conforming to international standards
- Simulation and Analysis - All traffic types (Voice, Digits, Tones, Fax, Modem)
- Unlimited ability to edit wireless communication protocol messages and control call scenarios
- Verify complete functionality of a element or an entity within the wireless network infrastructure
- Authenticate and confirm security procedures
- In-lab and Field Testing Solutions
  - Automated Mobile Phones Testing using Wired Headset Method or using Bluetooth®
  - Automated Data and Video Quality Testing
  - Automated Voice Quality Analysis using POLQA and/or PESQ
  - One Way Delay and Round-Trip Delay Measurements
  - Frequency and Power Measurements for Network Confirmation
  - GPS and ITS location tracking with results overlay
  - Long term activity recording with Web-based analysis and reporting
Ethernet/IP Network Test Solutions (1 Gbps, 10 Gbps)

For more details, please visit - https://www.gl.com/voipanalysis_simulation.html
Ethernet/IP Network Test Solutions
(1 Gbps, 10 Gbps)

Summary of Products

- Multi-functional Ethernet/IP Tester - PacketExpert™ (available in 1G, 10G, and Multi-Port Versions)
  - 4-port, 12-port, and 24-port
  - 1 Gbps, 10 Gbps Electrical/Optical Ethernet
  - VLAN, MPLS, Q-in-Q, IP, TCP, UDP Tester
  - 40/100 Gbps Coming Soon !!
  - BERT, Loopback, RFC2544, Y.1564 SLA Verification
  - Wire speed Packet Capture and Playback
  - Multi-stream Traffic Generation and Analysis; RFC6349 (ExpertTCP™)
  - PacketBroker

- All-IP Monitoring Probe - PacketScan™ (available in 1G, 10G Versions) - allows to capture high-density live VoIP traffic, provides visual analysis, call QoS with E-model based MOS & R-factor scores; almost all IP and Wireless Protocols supported.

- MAPS™ IP (available in 1G, 10G, and 40G Versions) - allows to generate high-volume calls with traffic for performance testing and troubleshooting IP networks; The application gives users the unlimited ability to edit messages and control scenarios (message sequences); almost all IP and Wireless over IP Protocols supported.

- IPNetSim™ and IPLinkSim™ (available in 1G, 10G Versions) - Emulates single stream or multi-stream full duplex IP WAN link of up to 1 Gbps or 10 Gbps. Test the performance of WAN network by emulating the WAN conditions (Bandwidth throttling, Congestion emulation, Latency, Packet Loss, Packet effects, Packet Corruption etc.). In IPNetSim™, the 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).

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

- PacketProbe™ - Embedded CPE based VoIP Monitoring Probe

- PacketCheck™ - Software based 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

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

- GLInsight™, FaxScan™, Fax Simulator - Decode and analyze T.38 and G.711 pass-through fax calls over IP

Features

- Generate/analyze thousands of calls simultaneously over IP networks.
- Impairments generator - 1Gbps, 10 Gbps
- High Volume Mobile Data Traffic Generation over LTE, UMTS, and GPRS Networks (4 Gbps or 40 Gbps)
- 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, and retransmit the recorded traffic conditions to test the network behaviour
- 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
SONET / SDH Network Test Solutions

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

Summary of Products

- **Channelized SONET/SDH** - Analyze/Simulate thousands of channels for processing ISDN, SS7, CAS and other channelized protocols. In an OC-3/STM-1, all 84 T1s or all 63 E1s can be identified and processed in transmit and receive modes. In an OC-12/STM-4, all 336 T1s or all 252 E1s can be identified and processed in transmit and receive modes.

- **Channelized T3/E3** - Analyze/Simulate thousands of channels for processing ISDN, SS7, CAS and other channelized protocols. In an OC-12/STM-4, all 336 T1s or all 252 E1s can be identified and processed in transmit and receive modes.

- **Unchannelized 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 ATM, PoS, and RAW Traffic over OC-12/STM-4, and OC-3/STM-1 lines.

- **Ethernet Testing for Fiber Optic Networks** – GL offers PacketExpert™ (available in 1G, 10G, Multi-port Versions) to perform independent layer-wise (VLAN, MPLS, IP, UDP) testing at wire speed for both Optical and Electrical interfaces.

- **IP WAN Emulators** - IPLinkSim™ and IPNetSim™ includes 10G Optical (SFP) ports for wire speed testing of WAN networks.

- **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 analyze 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 Analyzer** - helps in fault diagnosis and troubleshooting UMTS network.

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

Features

- Wire-speed processing of ATM, PoS or RAW data for Tx and Rx; supports BERT, capture and playback of packets, delay emulation, and protocol analysis.

- Software selectable OC-3 / OC-12, or STM-1 / STM-4 for Unchannelized and Channelized traffic.

- 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)

- Hardware based filtering options: sixteen 128-bit independent 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

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

- API Toolkit to develop user specific applications

- 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

- Test the impact of delay and congestion under various real world conditions

- Assess impact of delay on SLA (Service Level Agreements),

- Simulate and measure satellite delay and long Fiber Loops

- Test WAN application performance under deteriorated but repeatable conditions
TDM Network Test Solutions
T1 E1, T3 E3, Datacom

For more details, please visit - https://www.gl.com/hardware_platforms.html

Echo, Delay, and Noise Possibilities

- AEC built in to mobile phone
- Mobile Phone
- Speaker Phone
- Handsfree in car

- Acoustic Echo Canceller
- Noise Suppression
- Speech level control

- Short 2-wire Loop
- Short Echo Delay
- Good Echo Path Loss

- AEC built in to mobile phone
- VoIP Phone
- Speaker Phone
- Soft Phone

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

- **Simulation and Analysis**
  - All interfaces (Analog FXO and FXS, T1, E1, Serial Interface, T3, E3)
  - All traffic types (Voice, Digits, Tones, Fax, Modem)
  - Wide range of functionalities and testing capabilities for testing T1 and E1 links
  - Hardware can be USB based portable, Handheld, Laptop-based, or Rackmount platforms
  - Any capacity from Dual-port, to High Density 16 T1/E1 ports can be supported
  - All protocols (FXO, FXS, CAS, SS7, ATM, MLPPP, ISDN, GSM, BICC, IUP, MAP, CAP, INAP, GSM, TRAU, GPRS, UMTS, HDLC, ML-PPP, Frame Relay and more)

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

- **MAPSTM TDM** - Allows high-volume call generation with traffic for performance testing and troubleshooting:
  - Unlimited ability to edit messages and control scenarios (message sequences)
  - Bulk call generation and protocol specific traffic simulation over TDM network

- **VQuad™** with TDM option provides the ability to perform automated tests simulating up to 8 simultaneous CAS, PRI ISDN, or No Call Control (NOCC) calls on either T1 or E1 trunks.

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

- **Repeaters - Multi-port, T1 E1 J1 Switch**


- Includes broadest range of test and simulation for echo testing for PSTN, TDM, IP, and Wireless networks; Typical Scenarios -
  - Stimulus / Simulation all Analog, Digital, and RTP Ethernet) Applications; Simulate acoustic echo into modules such as a Sound Card, a Mobile Phone, a Regular Phone, an IP Phone, or a Speaker Phone
  - Testing your developmental EC software without any hardware
  - **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
  - Accurate field characterization of echo paths, impulse responses, delay, and loss statistics
  - Generate dynamic (changing) acoustic echo
  - Compliance testing w/ 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.
  - Test **Voice Enhancement Device (VED)** per G.160 and G.169
  - **Echo Path Delay Simulation** software - Simulate a real network with echo paths at one or both ends; simulates delay, loss, double-talk, noise, and other impairments over T1/E1/IP network
  - **Echo Path Delay 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, 2-Wire, and Mobile networks
  - Centralized Network-wide monitoring of speech levels, noise, hybrid echo, acoustic echo and voice quality (QoS)
PSTN Network Test Solutions

For more details, please visit - https://www.gl.com/hardware_platforms.html

VQuad™ Probe HD

VQuad™ 24-Port FXO

tProbe™ FXO FXS T1 E1 Datacom

vHandi (VQT290)
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 364 independent FXO ports per MAPS™ CAS Server (includes 2 Octal T1 cards)

- GLInsight™, FaxScan™, Fax Simulator - Simulate, decode and analyze T.30 fax calls over PSTN networks

- CAS Protocol Analyzer: helps in fault diagnosis and troubleshooting signalling in PSTN network.

- VQuad™ Probe HD, VQuad™ with DUAL UTA HD - Two Analog FXO ports per Dual UTA provides complete automated analog testing with QoS measurements.

- VQuad™ 24-port HD FXO solution is an all-in-one 2U rack supporting both Wide Band (WB) and Narrow Band (NB) Audio (HD and SD Audio)

- vHandi™ - a portable device designed for field testing; works as stand-alone or with VQuad™ to perform automated voice quality testing on analog lines.

Features

- Test a Central Office (CO), PBX, ATAs, Gateway or other telecommunications equipment which provide local loop interfaces

- Call monitoring, call recording and analysis or quality and performance

- Traffic Classifier provides non-intrusive, real-time monitoring and classification in real-time for 16 different traffic types including silence, voice, a variety of data modulations, fax modulations, DTMF digits, and call progress signals traffic.

- Support up to 384 FXO port simulation per 4U MAPS™ APS

- Supports 24 independent HD FXO ports per 2U VQuad™ system. Solution is scalable for unlimited number of FXO ports.

- Flexibility to control FXO and FXS functionality via scripts

- 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
  - P.56 analysis of any captured audio file (Active Speech Level, Noise Level, Speech Activity Factor, DC Offset, and Total RMS Power.)
  - Delay, Power, Frequency Measurements

- Supported FXO call scenarios
  - Caller ID
  - Two-way Calling, Three-way Conference Calling, Three-way Calling with Calling Party Number ID
  - VMWI – Voice Mail with MWI (message waiting indicator) & SDT (stutter dial tone)
  - Call Waiting – Detect tone, Call ID, Flash to accept call
  - Call Forwarding
  - FXO Metrics (Line Current, Line Voltage and Ring Voltage, Audio C-Message)

- Supported FXS call scenarios
  - User-programmable call progress tone generation for different countries/regions:
  - Dial tone, Ringback tone, Busy tone, Reorder tone
  - Howler tone (extended off-hook signal)
  - Ring generation with programmable ring cadence
Custom Test Solutions for Communications Networks
Military | Maritime | Government

For more details, please visit - https://www.gl.com/completevqt solutions.html

Speech intelligibility and coverage
Voice Quality Testing – PESQ, POLQA
Data Testing – TCP, UDP, HTTP, Email, SMS
Delay Measurements (OWD, RTD)
Portable Field Testing with GPS
Automated & Remote Testing

VQuad™ Probe HD

Satellite, Microwave, Terrestrial

User #1
Radio Channel Banks (CB)
D1 = 300 to 4000 ms
Satellite

User #2
Radio CBs
D2 = 50 to 500 ms
Microwave, Terrestrial

User #3
Radio CBs
D3 = 10 to 100 ms
Optical Fibre

Audio Signals Not Aligned

RRCS Radio Control Consoles

Conventional Channel Gateway

Delay Measurement and Simulation in Milliseconds Accuracy
Audio Signals Aligned

Summary of Products

- Customized test solutions for Communications Networks in Military/Maritime/Government
  - Precise Delay measurements tools
  - Precise Delay simulation tools
  - Echo measurements and mitigation tools
  - TDM, Optical, Ethernet / IP
- Precise Packet Triggering, Capture, and Analysis over Ethernet, IP, & UDP/TCP
  - Filter and record only packets of interest
  - Packet filtering can be based on all layer headers
  - Generates a trigger (1 µsec pulse) for each packet that satisfies filter criteria
- Military Radio Communication - Simulation and Analysis of Speech per ITU-T PESQ and POLQA
- STI field test services for evaluating public safety networks (at Railways, Airports, Malls)
- Automated Test Solution for Land Mobile Radios (LMR) and Mobile Phones (connects via Bluetooth or Wired)
  - In-lab, Drive-test or field-test – platforms customized for every need
  - Drive-test - GPS and ITS location tracking with results overlay
  - Unattended, 24/7 testing to ensure reliability of 911 services
  - End-to-end device testing independent of underlying network
  - Perform Voice Quality, Delay, Echo and Signal Quality Measurements
  - Perform Video Conference Testing
  - Perform Data Testing – a variety of tests supported, HTTP, Email, SMS, TCP, UDP, including Phone Info, Sim Info and Device Info
  - All systems are connected to the central system for remote monitoring, remote operation, storing and display of results/events.
- Audio Analysis over Ethernet, IP, Optical, TDM, and PSTN
  - Bulk audio call generation to stress test network
  - Transmit and receive audio signals at the network elements and gateway interfaces
  - Emulate Balanced Audio and PTT Contact Closure Interface
  - Perform Voice Quality Assessment per PESQ and POLQA
- Video Analysis
  - Bulk video call generation to stress test network
  - Perform video quality assessment - Audio MOS, Video MOS, Audio/Video MOS
  - Simulate video calls from any endpoint device - Android Phones, Windows/Linux PCs
  - Video codecs supported are JPEG, H.261, H.263, H.263+, H.264, MPEG, MPEG-2, MPEG-4, VC1
- Centralized Network Surveillance
  - Probes to monitor live signaling and traffic behavior at different points in the networks
  - Probes for IP, Wireless, SONET/SDH and Traditional TDM / Analog, based ATM Networks
  - All protocols over Wireless, IP and TDM network supported – LTE, UMTS, GSM, SIP, ED137, CAS, ISDN, SS7, …
Custom Test Solutions
Aerospace Communications Networks

MAPSTM ED137 Radio
MAPSTM ED137 Telephone

Critical Time Measurement in Air Traffic Management

GL MAPSTM TMATM
Packet Analyzer (1U)
Packetizer (1U)
Event Data Logger (1U)
Audio Analyzer (1U)

For more details, please visit - https://www.gl.com/delay-tests-voip-air-traffic-management.html

Controller 1
Legacy VCS

Controller 2

VoIP Gateway

VolP Backbone

For more details, please visit - https://www.gl.com/delay-tests-voip-air-traffic-management.html

Phone: (301) 670-4784  Fax: (301) 670-9187  Email: info@gl.com
Summary of Products

- Customized test solutions for VoIP Air Traffic Management networks
  - Simulation Test Tools for ATM per ED-137
  - ATM Network Quality Monitoring Tools per ED-138
  - Critical Timing Measurement Tools for ATM
  - WAN link simulation
  - Inter-operability Test Tools

- Simulation Test Tools for ATM per ED-137
  - MAPS™ ED-137 tools generate Air-to-Ground (AG) calls and Ground-to-Ground (GG) calls as per EUROCAE ED-137 (1B and 1C)
  - MAPS™ ED-137 Recorder emulates call recording functionality at CWP, GRS, and Recorder interfaces
  - Test the functions of Controller Working Position (CWP), Ground Radio Station (GRS), or Radio Media Gateway (RMG) entities
  - Simulate hundreds of CWPs/Radios with unique IP addresses in a single instance
  - Supports hundreds of simultaneous calls with traffic with complete automation
  - Fully integrated, complete test environment for Air Traffic Management
  - Linked Session Management to group and identify all calls belonging to particular Radio
  - DSCP (Differentiated Service Code Point) option for signaling and voice traffic
  - Depicts easy to understand call flow graphs of SIP message exchanges and message contents (SIP headers and SDP attributes)
  - Provides aggregated voice quality statistics such as MOS/R-Factor, packet loss, duplicate and out of sequence packets

- ATM Network Quality Monitoring Tools per ED-138
  - PacketScan™ captures and monitors live signaling and traffic over Air Traffic Management network
  - Waveform viewer, Call-flow graphs, and QoS monitoring - analyze calls for voice quality (MOS), packet loss, jitter, latency, etc.
  - Real-time and/or historical data analysis
  - Centralized monitoring of several probes deployed over the network with NetSurveyorWeb™
  - Individual call recording and retrieval system (*Requires additional system configurations)

- Critical Timing Measurement Tools for ATM
  - MAPS™ TM-ATM (Timing Measurements in Air Traffic Management) test suite to accurately simulate end points in ATM network and provide critical timing measurements for various types of delay occurrences in signaling and voice transmission through the network
  - Includes all necessary hardware and software to identify, capture, timestamp, and correlate events at Analog, TDM and IP interfaces.
  - Capable of generating triggers based on PTT activation
  - Capture, filter and record only packets of interest
  - Generates a trigger (1 Microsecond pulse) for each packet that satisfies filter criteria
  - Packet filtering can be based on all Layer 2 (Ethernet), Layer 3 (IP) Layer 4 (UDP/TCP) Headers
GL Communications Inc.

Phone: (301) 670-4784  Fax: (301) 670-9187  Email: info@gl.com

GL Headquarters
818 West Diamond Avenue - Third Floor
Gaithersburg, MD 20878
Contact: Shelley Sharma at Ext. 114
Phone: (301) 670-4784
Fax: (301) 670-9187
Email: info@gl.com

GL Shanghai, China Office
21D, Hua Min Empire Plaza,
726 West Yan An Road,
Shanghai, 200050
China
Contact: James Xin
Phone: 86-21-6237-0268, 86-21-6270-3066
Fax: 86-21-6237-0268 Ext:103
Email: glchina@gl.com, jxin@gl.com

GL Bangalore, India Office
GL Communications India Pvt. Ltd.
#1, "Uma Admiralty", Ground Floor,
Bannerghatta Road,
Bangalore - 560029 | India
Contact: Sanjeev Kulkarni
Phone: 91-80-40488400 Ext. 404
Fax: 91-80-40488401
Email: glindia@gl.com

Representatives

Central Europe Representative
AVOTEL Handels GmbH
Email: edmund.dziurdz@avotel.net

Eastern European Representative
TransTech Electronic
Email: vavrousek@transtech.cz

UK and Ireland Representative
Laser 2000 (UK) Ltd.
Email: sales@laser2000.co.uk

France Representative
Elexo
Email: info@elexo.fr

Switzerland Representative
YOTAVIS AG
Email: info@yotavis.com

Romania Representative
TELEDATANET
Email: dinu.dragomir@teledatanet.com

India Representative
APARNA ECOMMERCE PRIVATE LIMITED
Email: raja@aparnainfonet.com

Taiwan Representative
Systemcom Co., Ltd.
Email: dennis.ting@systemcom.com.tw

Japan Representative
ComWorth
Email: info2@comworth.co.jp

Malaysia Representative
Aviindos (M) Sdn Bhd.
E-mail: naveen@aviindos.com

Australian & New Zealand Representative
Maser Technology Group
Email: kevin.redmond@maser.com.au

Vietnam Representative
Chuongmy., JSC
Email: sozo@chuongmy.com

Turkey Representative
Partner Electronic
Email: sales@partnerelectronic.com

Netherlands Representative
C.N. Rood B.V.
E-mail: wleenders@cnrood.com

Belgium & Luxembourg Representative
C.N. Rood N.V./S.A.
Email: bpolleunis@cnrood.com

Israel Representative
RDT Equipment & Systems
Email: info@rdt.co.il

Phone: (301) 670-4784  Fax: (301) 670-9187  Email: info@gl.com

GL Offices