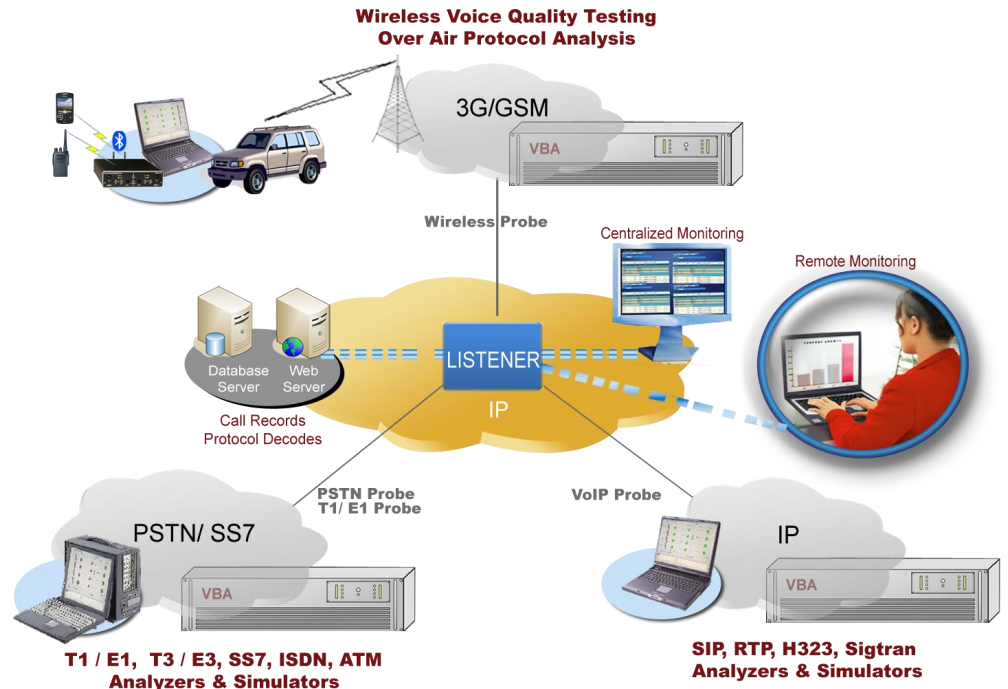


Network Wide Testing Solutions

TDM, VoIP, & Wireless Networks



Call Trace & Recording

Fraud Detection / Location

Remote Analysis and Troubleshooting

Real-time Monitoring

Traffic Optimization / Engineering / Statistics

Revenue Billing Verification

Alarm Monitoring

Quality of Service Measurements

SIP, RTP, MEGACO, CAS, ISDN, SS7, GSM, GPRS, and more

CAS, ISDN, SS7, GSM, GPRS, and more

Overview

The SS7 network is the backbone for fast and efficient signaling, irrespective of network type - whether wireless, wired, or VoIP. Also, the inherent database features of SS7 make today's advanced intelligent features and services a reality. To keep pace with this evolution, GL has enhanced its SS7 monitoring and diagnostic system. Not only can it be used for billing verification, remote protocol analysis, and traffic engineering, but now it can also provide key performance indicators, failure analysis, and call trace capability, to name a few. A network operator, service provider, or equipment manufacturer must have the means to perform the above surveillance tasks cost effectively, remotely, automatically, and non-intrusively. Fortunately, the network backbone contains a wealth of information that can be monitored and collected to support these activities.

GL provides a variety of solutions for network wide monitoring and surveillance. The solutions consists of:

- Intrusive and non-intrusive 'PC Probes' for TDM, VoIP, and Wireless networks
- Probes deployed at strategic locations in a network transmit and collect voice, data, protocol, statistics, and performance information, and relay this information to a central / distributed network management system (NMS)
- NMS may be client-server based or WEB based system and consists of a database and applications for controlling, collecting, and analyzing the information provided by the various probes

GL's current NMS solutions for VoIP and TDM are:

- Packet Monitoring and Surveillance System (passive / non-intrusive)
- ISDN, SS7, & Wireless Protocol Monitoring and Surveillance System (passive / non-intrusive)
- Probes to capture, analyze, and measure voice-band quality over VoIP, TDM & Wireless networks (passive / non-intrusive)
- Wireless, Wireline, and VoIP Voice Quality Monitoring System (active / intrusive)

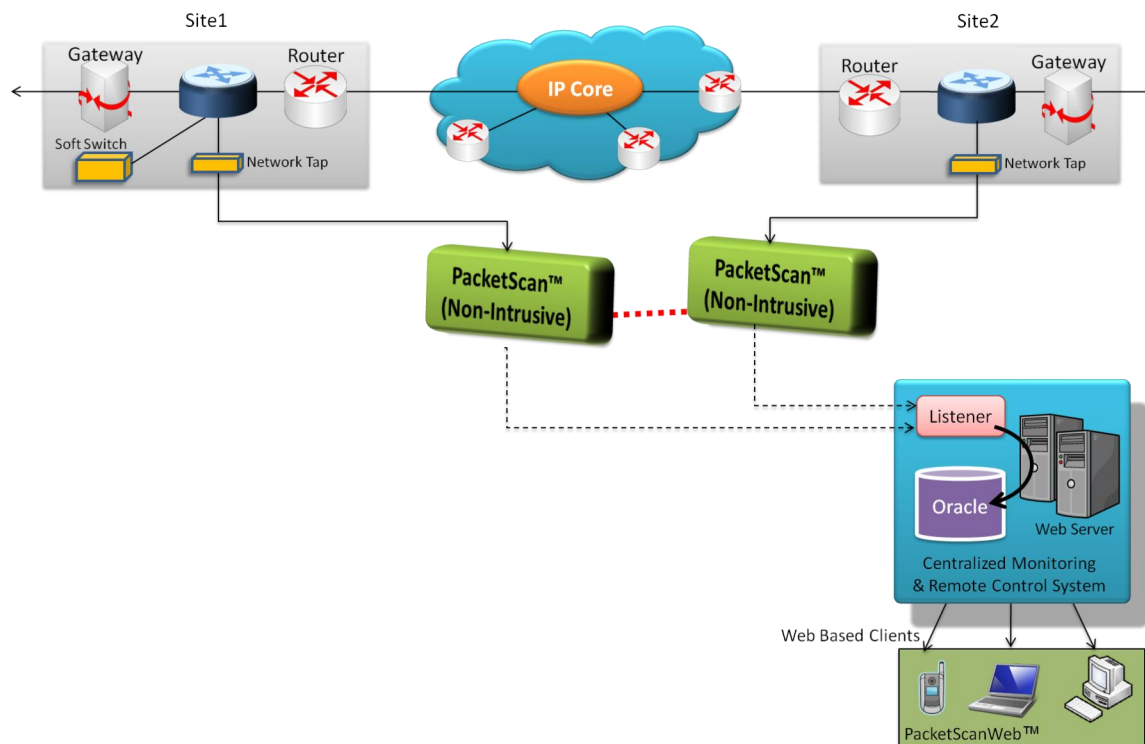
For more details, please visit our web page <http://www.gl.com/networkmonitoring.html>

 **GL Communications Inc.**

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A

(Web) <http://www.gl.com/> - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) gl-info@gl.com

Passive / Non-Intrusive Packet Monitoring and Surveillance System (VoIP)



GL's PacketScan™ monitors packet flows in real-time within a VoIP network & provides detailed analysis of voice band streams gathering QoS statistics such as E-model based MOS (Mean Opinion Score), R-factor, total packet count, reordered, duplicate and missing packet counts, gap, jitter, and delay. All major VoIP protocols are supported including SIP, H.323, Megaco, and MGCP.

- GL's PacketScan™ acts as a probe and gathers IP packet information in a non-intrusive fashion, and forwards call detail records (CDRs) as well as statistics to a central database.
- A central database stores the real-time and historic data. A web-server accesses the data and allows clients across WAN to view results.
- PacketScanWeb™ facilitates result display using a web interface. With this, one can view real-time data, navigate through records, filter the collected VoIP traffic summary, and graphically analyze the call volume, MOS, call completion, failed calls, completed calls, PDD, and so on through a simple web browser.

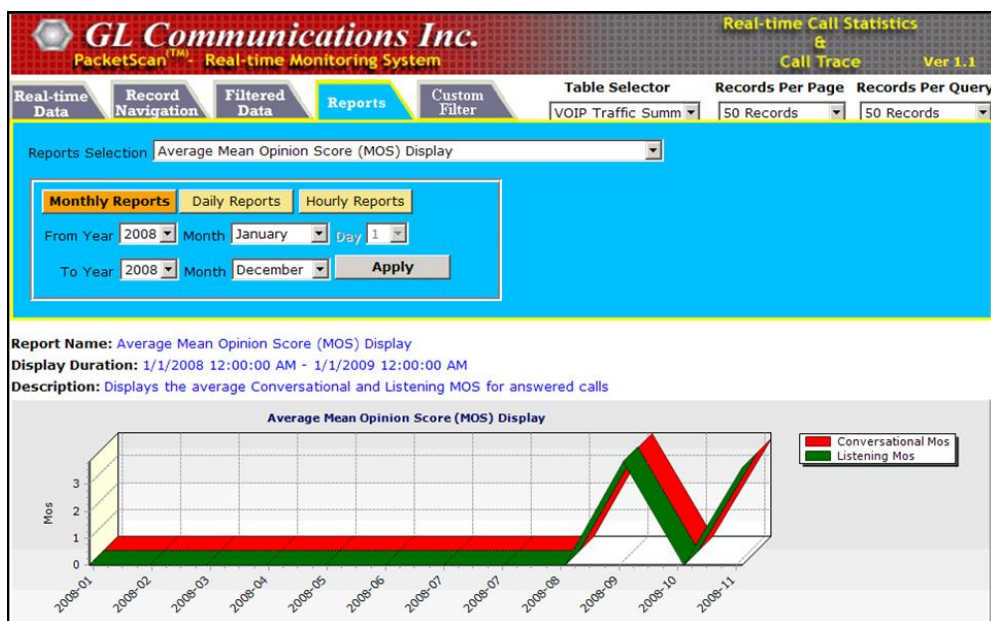


Figure: PacketScanWeb™ - Reports View

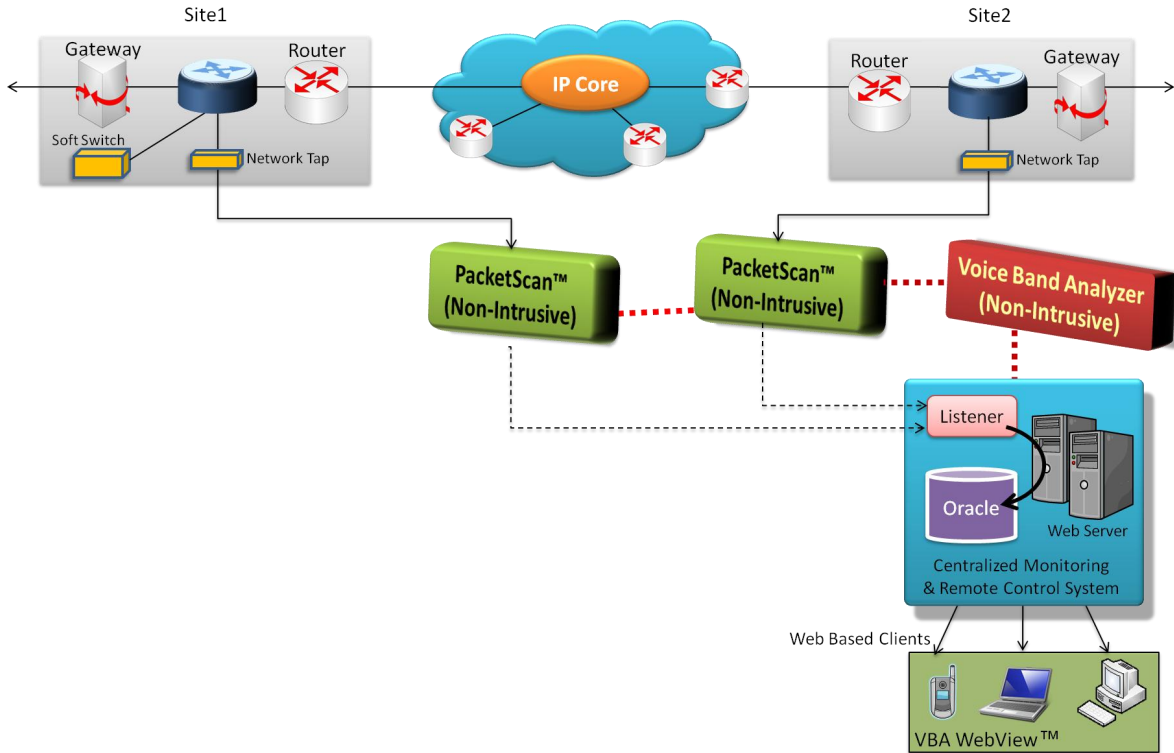
Visit <http://www.gl.com/netvoip.html> for more details.

 **GL Communications Inc.**

818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A

(Web) <http://www.gl.com/> - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) gl-info@gl.com

Passive / Non-Intrusive Voice-band Monitoring System (VoIP)



- GL's **Voice Band Analyzer (VBA)** works in conjunction with GL's **PacketScan™** (VoIP Analysis Tool) to monitor the quality of voice band traffic over VoIP. With appropriate modules, one can perform P.56 Active Voice Level analysis, Noise analysis, Hybrid, Line, and Acoustic echo analysis. Other analysis modules such as ITU-T P.561, P.562, P.563, fax and modem analysis, and many others can be hosted as plug-ins and will be available soon.

- The VBA web server provides real-time and historic views of the data through various "browser based" interface - VBAWebViewer™. Real-time data displays Call ID, Direction, Probe name, Calling number, Called number, Start time, Elapsed time, Speech level/% active, RMS/noise level, clip, DC offset, Line Echo, and Acoustic Echo.

GL Communications Inc. Voice Band Analyzer™ - Voice Band NRT Monitor										
Call Data & Voice Band Analysis Results										
Real-time Data		Record Navigation		Table Selector		Records Per Page		Records Per Query		
				Call Data		50 Records		50 Records		
Refresh Interval: No Refresh										
DB Table Name: SYSTEM.VBACALL										
Number of Records: 100										
Version: 1.2										
Call ID	DIR	Probe Name	Start Time	Elapsed Time	Speech Lvl/ % Active	RMS/Noise Lvl	Clip	DC Offset	Line Echo ERL/Delay	Acoustic Echo ERL/Delay
137158	➡	SanDiego_Line3	2008-08-19 05:26:01	25.07	-41.5/73	-42.9/-82.2	0	-1	-21.1/70	0/0
137158	⬅	SanDiego_Line3	2008-08-19 05:26:01	25	-21.5/72.5	-22.9/-63.5	0	-9	0/0	0/0
137157	➡	SanDiego_Line3	2008-08-19 05:24:00	185	-26.2/38.6	-30.3/-91	0	-4	0/0	0/0
137157	⬅	SanDiego_Line3	2008-08-19 05:24:00	185	-44.6/37.3	-48.9/-98.8	0	0	-20/91	0/0
137156	➡	SanDiego_Line3	2008-08-19 05:22:01	190	-36.6/68.5	-38.3/-101.3	0	0	-15.5/62	0/0
137156	⬅	SanDiego_Line3	2008-08-19 05:22:01	190	-22.7/69.9	-24.2/-59.7	0	-1	0/0	0/0
137155	➡	SanDiego_Line3	2008-08-19 05:20:14	200	-23.7/52.3	-26.6/-64.1	0	0	0/0	0/0
137155	⬅	SanDiego_Line3	2008-08-19 05:20:14	200	-25.5/43.4	-29.1/-67.9	0	0	0/0	0/0
137154	➡	SanDiego_Line3	2008-08-19 05:18:26	185	-25.3/54.5	-28/-57.5	0	11	0/0	0/0

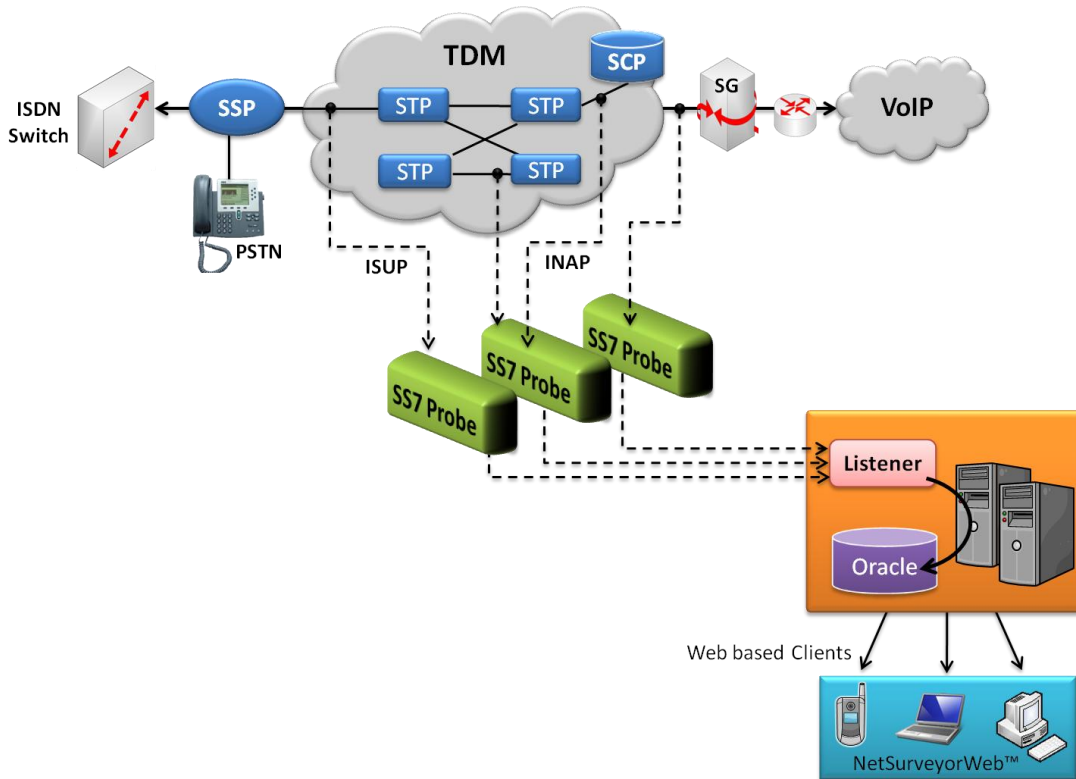
Figure: VBA WebViewer™ - Real-time Data View

Visit <http://www.gl.com/vbalivedemo.html> for more details.



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A
 (Web) <http://www.gl.com/> - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) gl-info@gl.com

Passive / Non-Intrusive ISDN / SS7 / Wireless Protocol Monitoring (TDM)



GL's T1/E1 Analyzer probes provide the basis for a network wide management of T1 and E1 lines, including line health, non-intrusive diagnostics, and much more.

The essential elements of the systems are:

- T1 E1 / T3 E3 / OC-3 Hardware probes that monitor many protocols non-intrusively, including ISDN, SS7, and others. These intelligent protocol analyzers extract relevant contents, and forwards call detail records (CDRs) and statistics to a central NMS for storage, display, and control
- Records are stored into a relational database (Oracle, DB2, Sybase, Microsoft Access....) using ODBC. This provides a user friendly interface to query and display database custom records.
- The web-based client NetSurveyor™ connected to SS7 and ISDN probes through a web server facilitates result display using a web interface as shown in the screenshot.
- The NetSurveyor™ is driven by non-intrusive T1/E1 hardware probes, intelligent software, and a database engine. With this, one can view real-time data (Call ID, Probenname, Disposition, Callingnumber, Callednumber, Duration), navigate through records, filter the required call records (based on the start time and date of each call) through a simple web browser. Custom Filter option allows users to filter the call records based on Called number, Calling number, OPC, and DPC criteria

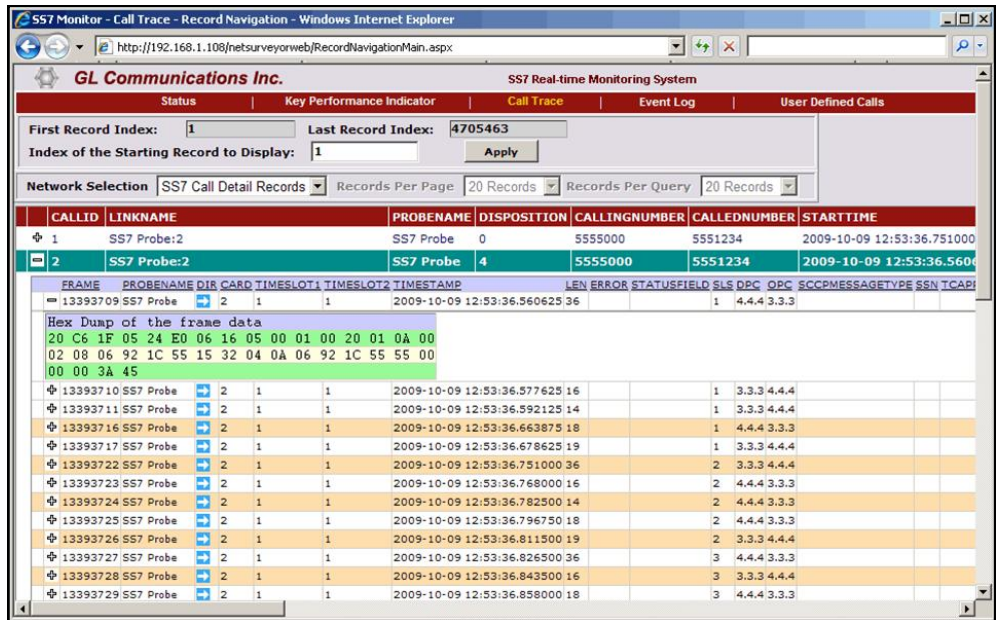


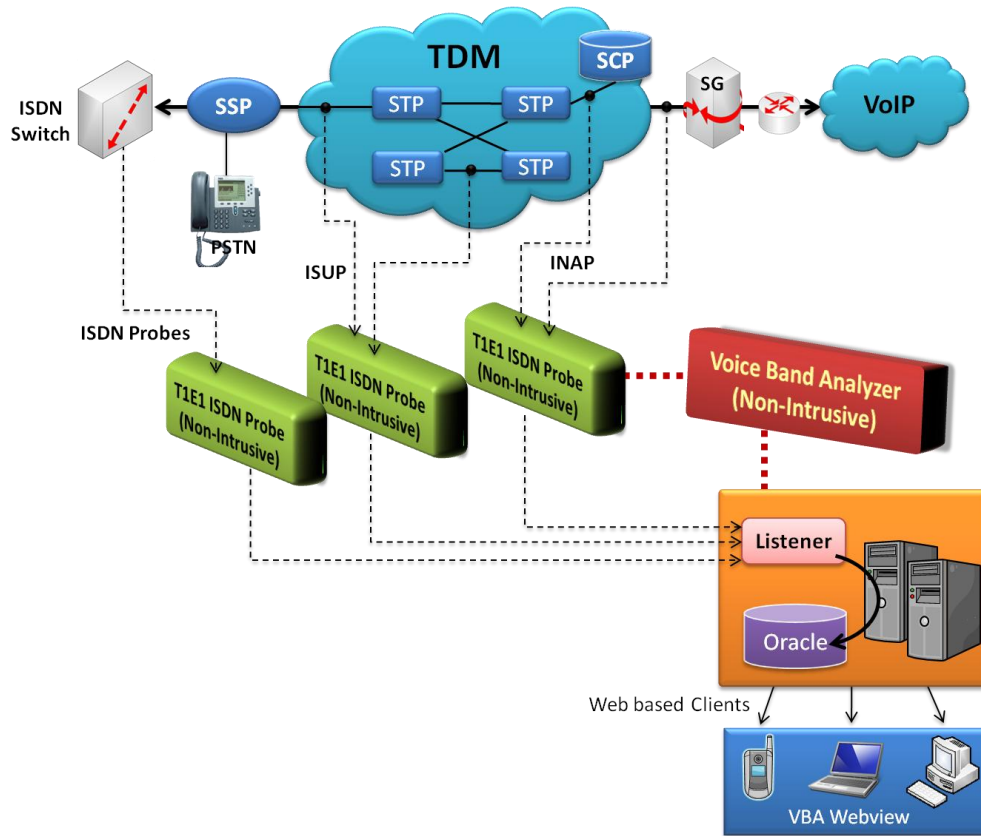
Figure: Net Surveyor Real-time Demo

Visit <http://www.gl.com/netsurveyor.html> for more details.



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A
 (Web) <http://www.gl.com/> - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) gl-info@gl.com

Passive / Non-Intrusive Voice-band Monitoring System (TDM)



- GL's Voice Band Analyzer (VBA) works in conjunction with GL's T1/E1 Hardware probes and Call Capture & Analysis application to monitor the quality of voice band traffic over TDM. With appropriate modules, one can perform P.56 Active Voice Level analysis, Noise analysis, Hybrid, Line, and Acoustic echo analysis. Other analysis modules such as ITU-T P.561, P.562, P.563, fax and modem analysis, and many others can be hosted as plug-ins and will be available soon.

- The VBA web server provides real-time and historic views of the data through various "browser based" interface - VBAWebViewer™. Real-time data displays Call ID, Direction, Probe name, Calling number, Called number, Start time, Elapsed time, Speech level/% active, RMS/noise level, clip, DC offset, Line Echo, and Acoustic Echo.

GL Communications Inc.										Call Data & Voice Band Analysis Results	
Real-time Data		Record Navigation		Table Selector		Records Per Page		Records Per Query			
				Call Data		50 Records		50 Records			
Refresh Interval: No Refresh											
DB Table Name: SYSTEM.VBACALL											
Number of Records: 100											
Version: 1.2											
Call ID	DIR	Probe Name	Start Time	Elapsed Time	Speech Lvl/ % Active	RMS/Noise Lvl	Clip	DC Offset	Line Echo ERL/Delay	Acoustic Echo ERL/Delay	
137158	→	SanDiego_Line3	2008-08-19 05:26:01	25.07	-41.5/73	-42.9/-82.2	0	-1	-21.1/70	0/0	
137158	←	SanDiego_Line3	2008-08-19 05:26:01	25	-21.5/72.5	-22.9/-63.5	0	-9	0/0	0/0	
137157	→	SanDiego_Line3	2008-08-19 05:24:00	185	-26.2/38.6	-30.3/-91	0	-4	0/0	0/0	
137157	←	SanDiego_Line3	2008-08-19 05:24:00	185	-44.6/37.3	-48.9/-98.8	0	0	-20/91	0/0	
137156	→	SanDiego_Line3	2008-08-19 05:22:01	190	-36.6/68.5	-38.3/-101.3	0	0	-15.5/62	0/0	
137156	←	SanDiego_Line3	2008-08-19 05:22:01	190	-22.7/69.9	-24.2/-59.7	0	-1	0/0	0/0	
137155	→	SanDiego_Line3	2008-08-19 05:20:14	200	-23.7/52.3	-26.6/-64.1	0	0	0/0	0/0	
137155	←	SanDiego_Line3	2008-08-19 05:20:14	200	-25.5/43.4	-29.1/-67.9	0	0	0/0	0/0	
137154	→	SanDiego_Line3	2008-08-19 05:18:26	185	-25.3/54.5	-28/-57.5	0	11	0/0	0/0	

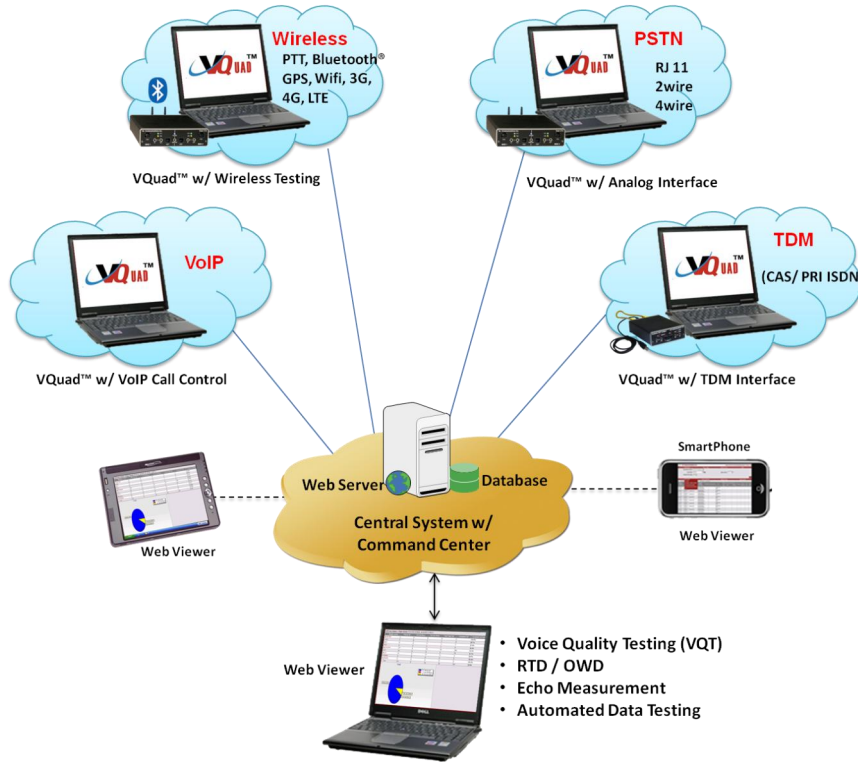
Figure: VBA WebViewer™ - Real-time Data View

Visit <http://www.gl.com/vbalivedemo.html> for more details.



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A
 (Web) <http://www.gl.com/> - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) gl-info@gl.com

Active / Intrusive Wireless, TDM, & VoIP Voice Quality Monitoring System



This system provides real-time voice quality measurement across a diverse set of networks. Voice calls are automatically placed between end points; quality is measured and provided for display at NMS. Voice measurements include MOS (Mean Opinion Score), round trip delay (RTD), jitter, clipping, voice levels, etc.

The essential elements of this system are:

- Intrusive VoIP / TDM Nodes - GL's VQAD™, is a low density network probe used for proactive testing of end-to-end voice connections. It is a common probe for Wireless, VoIP & TDM networks.
- Received voice (degraded) files are transmitted to Regional Command Center (RCC) for analysis. The RCC controls the "Nodes". It controls, schedules, and analyzes the degraded voice traffic received by the nodes. The RCC includes a database for storage and retrieval. Advance features include real-time monitoring, scripting of voice calls, scheduling of tests, Voice Quality Testing (VQT), Round Trip Delay (RTD), Post Dial Delay (PDD) calculations, and much more. Voice Quality Testing (VQT) software compares the two files ('reference' and 'degraded') and provides an ITU-standard score (PESQ, PESQ WB, PAMS, & PSQM).
- The system also facilitates result display using a simple web browser application VQT WebViewer™. The results are accessed from database that stores real-time and historic data.

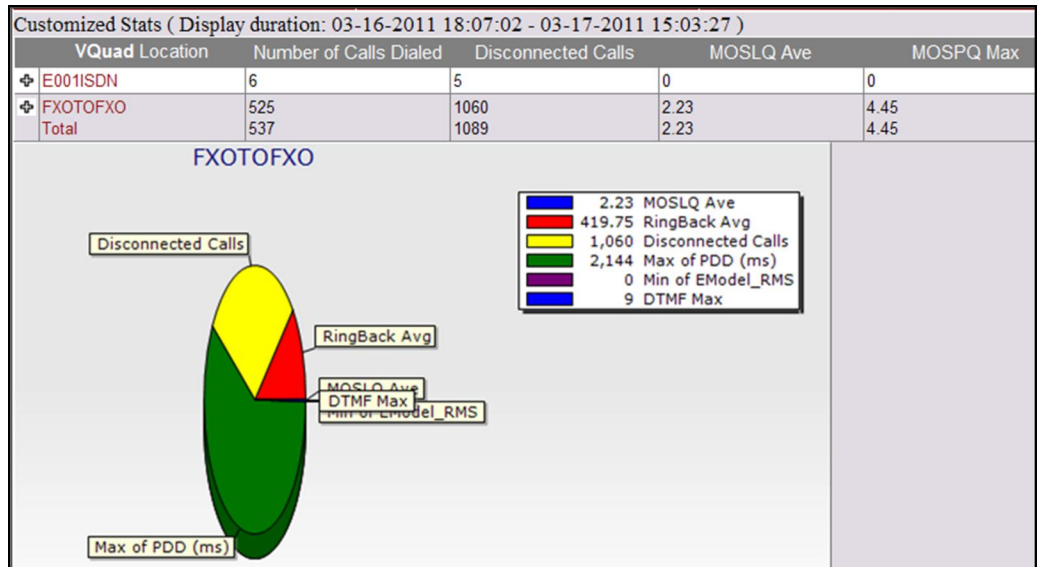


Figure: VQT WebViewer™ - Results View

Visit <http://www.gl.com/netvoicequality.html> for more details



818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878, U.S.A
 (Web) <http://www.gl.com/> - (V) +1-301-670-4784 (F) +1-301-670-9187 - (E-Mail) gl-info@gl.com