

PESQ LQ/LQO (ITU P.862/
P.862.1)

PAMS LE/LQ (ITU P.800)

PSQM (ITU P.861) and
PSQM (+)

VQT over VoIP, PSTN, ATM,
Frame Relay, Wireless
Networks

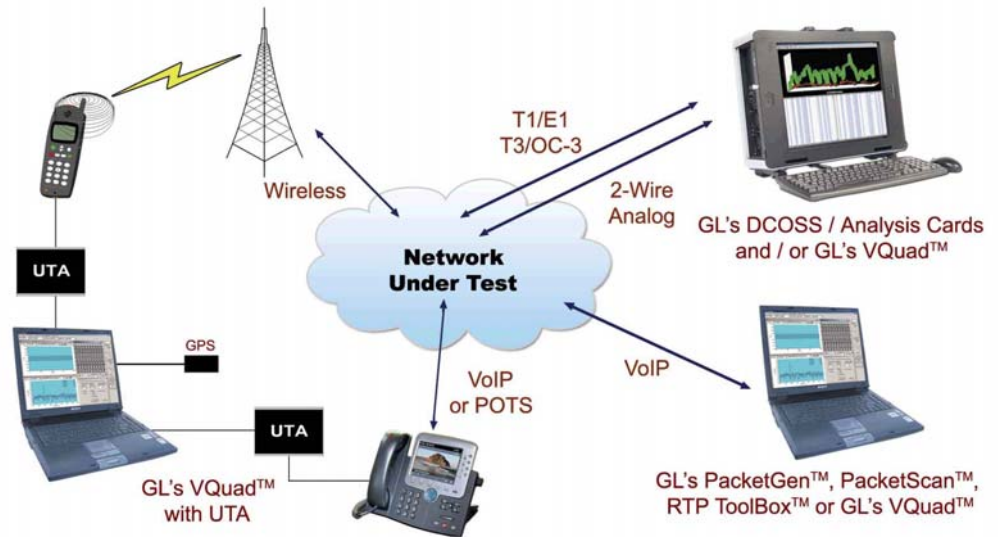
Measure Effects of Noise,
Delay and Echo in Networks

Measure Effects of Packet
Jitter in VoIP Networks

Compatible with VQuad™,
DCOSS, T1/E1 Analysis,
and PacketGen/PacketScan

Manual or Automatic
Operation with automatic
result logging

Voice Quality Testing Solutions (Wireless, VoIP, T1/E1, Landline)



Providing clear, uninterrupted voice is critical in Network and Echo Cancellation development. GL's Voice Quality Testing (VQT) along with GL's VQuad™, both accessed through easy to use GUI interfaces provides the voice quality measurement and analysis tools for all types of networks carrying voice traffic. Typical network applications include VoIP systems, PSTN, ATM networks, Frame Relay, and Wireless Networks.

The GL VQuad™ provides the mechanism to automatically establish calls (PSTN, VoIP, Wireless, T1/E1) and automatically send/record voice over the established call. Up to 8 fully independent tests using different interfaces can be executed simultaneously. The recorded voice files (degraded voice) are automatically analyzed using the GL VQT application.

The GL VQT utilizes three widely accepted algorithms to perform the voice comparisons, the Perceptual Evaluation of Speech Quality (PESQ LQ/LQO) per Rec. P.862/P.862.1, the Perceptual Analysis / Measurement System (PAMS) per Rec. P.800, and the Perceptual Speech Quality Measurement (PSQM) per Rec. P.861. The latest and most widely used algorithm, PESQ, provides an objective measurement of subjective listening tests on telephony systems. The GL VQT performs PESQ LQ/LQO, PAMS, and PSQM (+) simultaneously; using two voice files (Reference File and Degraded File) and provides the algorithm results in both a graphical and tabular format.

Voice Quality Assessment Main Features

- Manual / Automatic operation using GL's VQuad™
- Automatic call control and traffic generation for up to 8 simultaneous interfaces
- Testing the voice quality of all telecom networks
- Measuring the affect of Packet Jitter in VoIP network
- Measuring voice performance over Frame Relay networks
- Analyze the effects of codec compression in Wireless networks
- Provides PESQ LQ/LQO results along with Active Speech and Noise Levels, Latency, Jitter, Clipping, and Power Measurements
- Tabular as well as Graphical results
- Automatic Mode allows the VQT to execute on a network system or across the Internet for capturing and analyzing degraded voice files
- Complete automatic logging (utilizing a database) of all results with the ability to import log back into VQT
- Fully remote controllable



GL Communications Inc.

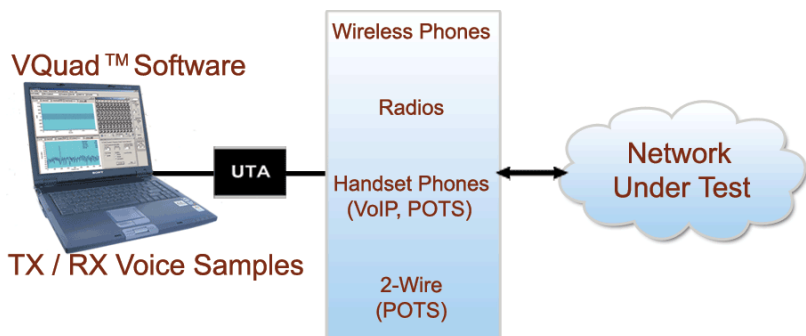
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Supported Network Interfaces



and Universal Telephony Adapter (UTA)

Networks Supported: Wireless Phones/Radios, Handset Phones (VoIP or POTS) and 2-Wire Analog (POTS)



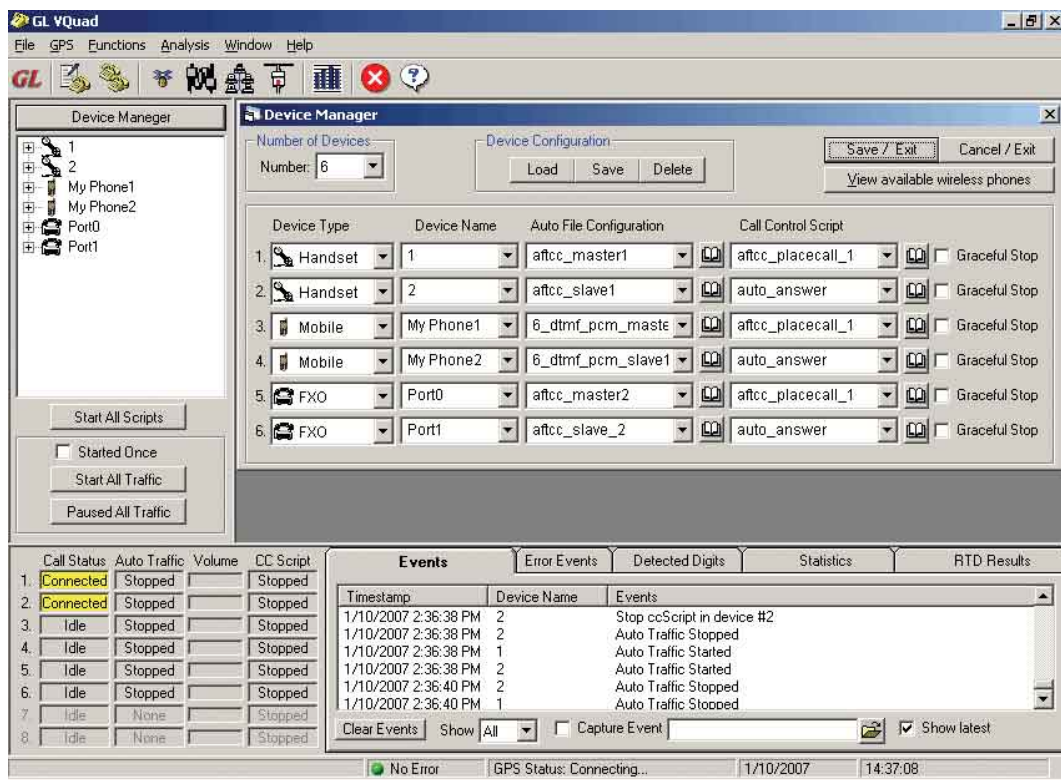
GL's VQuad™ with the **Universal Telephony Adapter (UTA)** solution is compact and portable; two notebook or desktop PC's utilizing VQuad™ and VQT software packages along with the necessary hardware. Independent locations connected to the network under test, via the network endpoints can be easily configured for sending and recording voice, thus allowing end-to-end path analysis. The VQuad™ acts as the engine for synchronously transmitting and recording voice files. The VQT software provides the ITU-standard MOS score along with other detailed measurements for each recorded voice file. In addition to the ITU-standard MOS scoring, a network delay measurement between any two endpoints is

possible using the VQuad™ and UTA hardware.

While in operational mode, the VQuad™ application provides a detailed log of all activity, including timestamps, power levels, sent/recorded voice samples, and time durations. A status bar also provides a quick look at current VQuad™ send/record voice activity.

File voice recording options include sequential or timestamp along with GPS position information. VQuad™ provides a save/load profile feature for quick execution from test to test.

Call control support for mobile phones, 2-wire Analog and VoIP provides a truly automatic test from call setup to teardown.



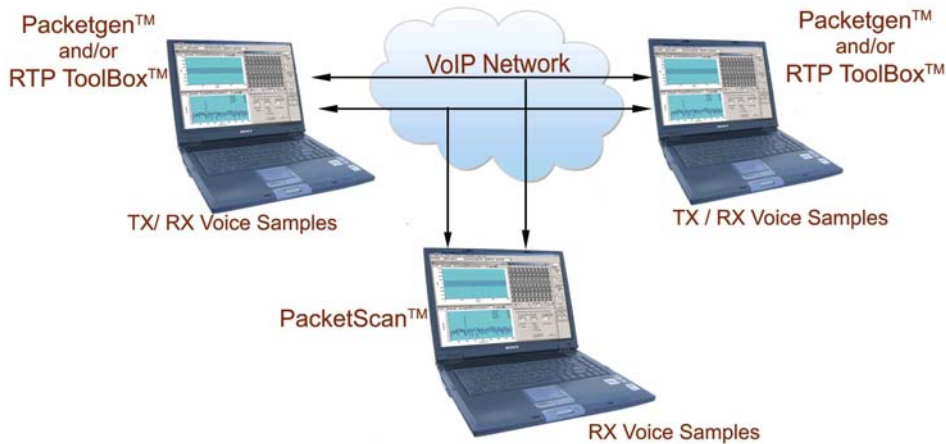
2-Wire Analog (POTS)

GL's VQuad™ supports four analog ports with RJ-11 interfaces (optional hardware required) and supports full call control and traffic generation. The VQuad™ may be connected to any US/European PSTN or any VoIP ATA and, using the user-friendly GUI, the user can place calls to any desirable number as well as answer incoming calls. The VQuad™ can be configured manually to send and record voice files. It may also be automatically configured to send and record a variety of voice files to be stored and analyzed by the GL VQT. Placing two VQuad™ 2-Wire Analog ports in synchronized mode, the automated call control and sending/recording voice file can provide a precise end-to-end test measurement. With four available analog ports, one can perform two synchronized tests simultaneously or allow each analog port to act independently, thus providing four simultaneous tests. Each port can be configured for generating or answering the call along with sending or recording the voice file.

Supported Network Interfaces cont...

GL's Packet Series

Network Supported: VoIP



PacketGen™ and **RTP ToolBox™** are PC-based emulators of endless User Agents. They can provide real-time VoIP bulk call generation for stress testing and precise analysis of the VoIP network equipment. PacketGen™ is based on a distributed architecture, wherein SIP and RTP software cores can be modularly stacked in one or many PCs to create a scalable high capacity test system. After the calls are established the PacketGen™ can automatically send and record voice files across the network, thus providing VQT measurements. RTP ToolBox™ is software that provides detailed statistics about the RTP stream. It can be used to generate and analyze RTP streams.

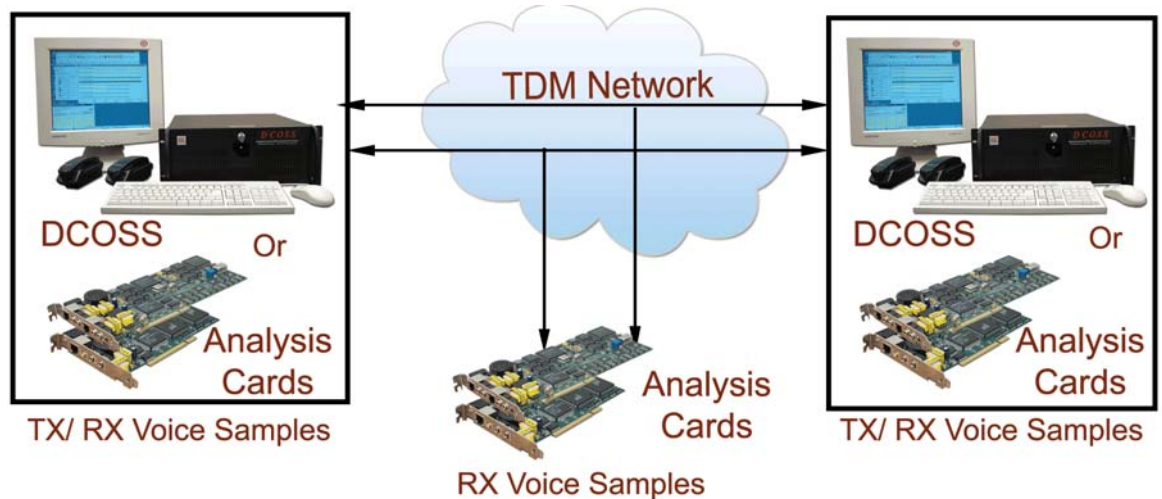
PacketScan™ is a real-time VoIP analyzer that runs on a standard PC with a NIC card. PacketScan™ is an invaluable tool for testing IP phones, Gateways, IP Routers and Switches, and Proxies. Hundreds of calls can be monitored in real-time including detailed analysis of selected voiceband streams. All calls can be recorded and used to test the voice quality at different points in the VoIP network. Detailed call statistics, call trace, RTP performance statistics, and unparalleled voiceband statistics can be viewed simultaneously. Listen in real-time to VoIP calls; perform power, frequency, spectral, tone and digit analysis with ease and precision. QoS statistics are also gathered such as packet loss, gap, jitter, delay, R-Factor and E-Model. Sophisticated filters permit zooming and recording of specific calls of interest.

GL's T1/E1/T3/OC3/STM-1

Networks Supported: TDM

The Digital Central Office Switch Simulator (DCOSS)

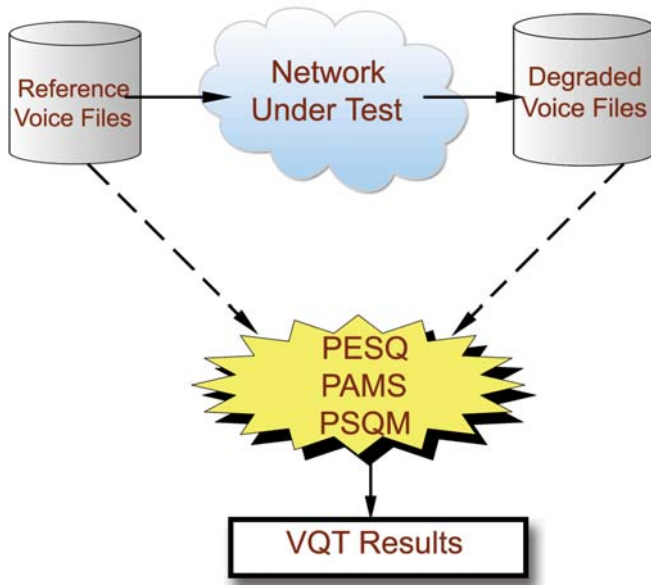
converts a Pentium PC (portable, tower, rack-mount) into a digital central office switch simulator (PBX and switch), complete with T1, E1, and POTS Interfaces. A user-friendly graphical interface (GUI), through which complex switching, signaling, and digital transmission functions are easily



controlled, provides the ease of operation as well as the flexibility required from telephony test equipment. DCOSS is ideal for simulating and testing advanced telecom networks and products, including switches, gateways, and transmission systems. The DCOSS can also be used for verifying T1/E1 signaling protocols of new systems. Calls can be generated and received and voice samples can be sent and recorded for voice quality testing operations.

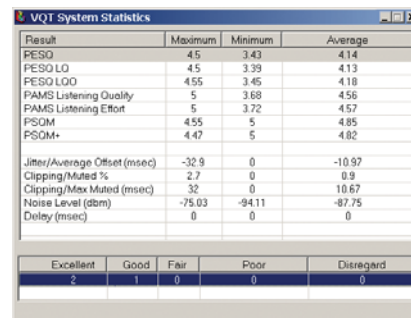
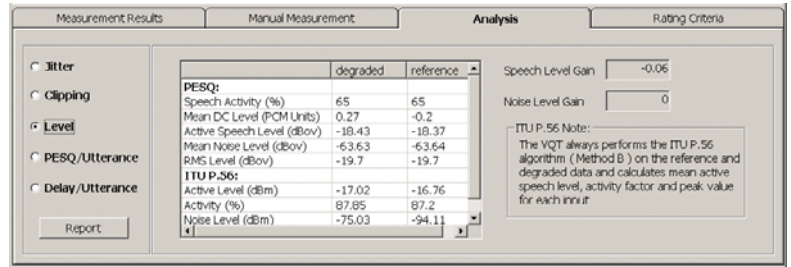
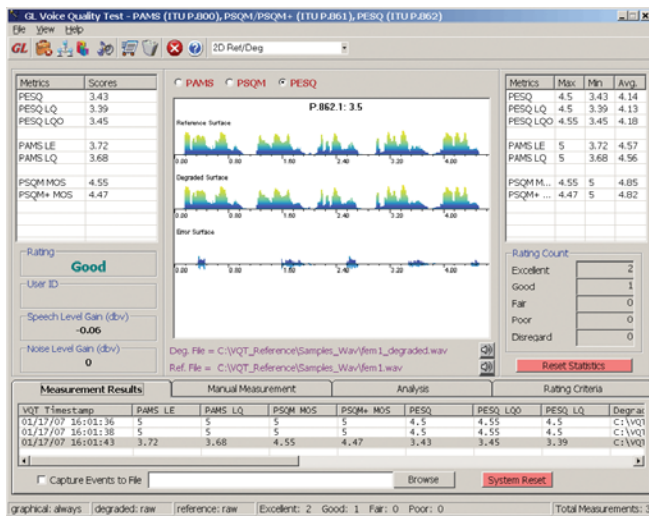
The **Ultra T1 and Ultra E1 Analysis Cards** plug into PC expansion slots, providing digital T1 and E1 input/output for analyzing, testing, simulating, and monitoring T1/E1 signals. A single (two for dual cards) analog input and output is provided to insert and receive analog signals into the digital stream. The analysis cards supports sending and recording of voice samples across the network. This ability of analysis cards allows itself to be used well with Voice Quality software to perform various voice quality tests.

Voice Quality Testing (VQT) Software Details



GL's **Voice Quality Testing (VQT)** software requires two files for operation. These files are typically referred to as the 'reference' and 'degraded' files. The software can act as a stand-alone product or can work along side other existing GL products. Other GL products assist with the interfacing to the network under test and the sending/recording of voice samples through the network under test. After this process has taken place the VQT software simply compares the two files ('reference' and 'degraded') and provides an ITU-standard score (PESQ, PAMS and PSQM).

The GL VQT provides a user-friendly interface, which allows the user to perform manual voice quality assessments by simply entering a Reference File and a Degraded File. The results of the VQT algorithms, PESQ LQ/LQO, PAMS, are displayed both in tabular format as well as graphically. Additional analytical results are displayed as part of the assessment such as jitter, clipping, noise level, and delay (end to end as well as per speech utterance). All results may be saved to file for post processing viewing along with sophisticated searching on the results within the VQT application.



The GL's VQT may also be executed in Auto Mode. This allows the GL VQT to reside on a network computer (or connected via the Internet) and point to a single or multiple user-specified network drives/directories. Degraded Voice files are recorded to this network drive/directory and n VQT automatically performs the voice quality analysis and displays the results. Multiple VQT Auto-Measurement sessions may be configured, each session with a unique set of requirements and a unique reference voice file. In addition, the user may specify voice files to be saved based on the rating criteria (i.e. if VQT is fair or poor, save the degraded voice file).

