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# Intrusive Network Voice Quality Testing (VQT)

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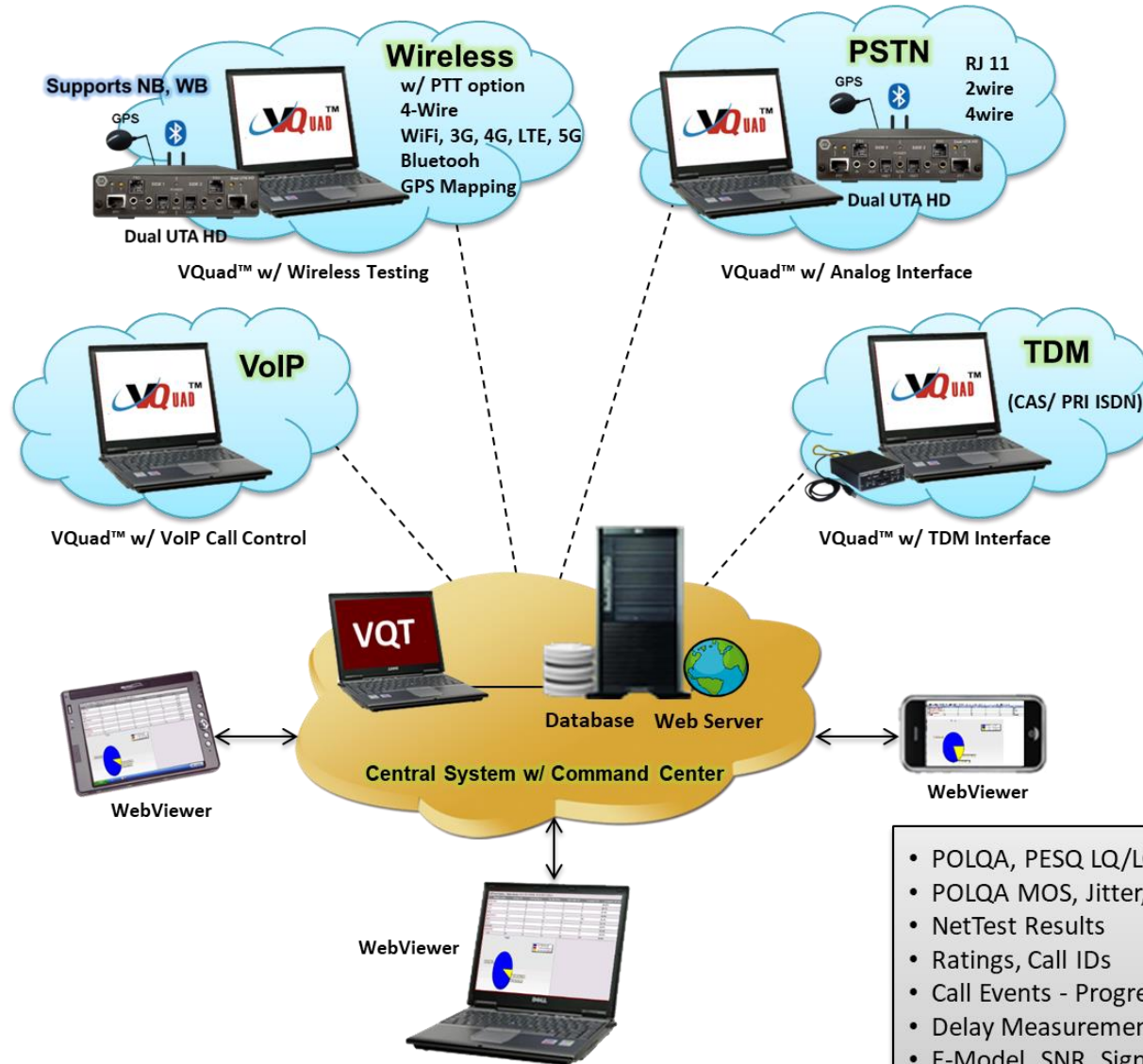


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# Network Topology



- POLQA, PESQ LQ/LQO/WB
- POLQA MOS, Jitter, Clipping, Levels
- NetTest Results
- Ratings, Call IDs
- Call Events - Progress & Failures
- Delay Measurements – RTD, OWD
- E-Model, SNR, Signal Level
- Echo ERL, Delay
- QoS, Timeouts, Retransmissions
- Fax Encoding, Resolution, ECM, Modem



# Hardware Platforms



**vMobile™**



**Dual UTA HD**



**VQuad™ Probe HD**



**VQuad™ mTOP™ Rack**



# System Highlights

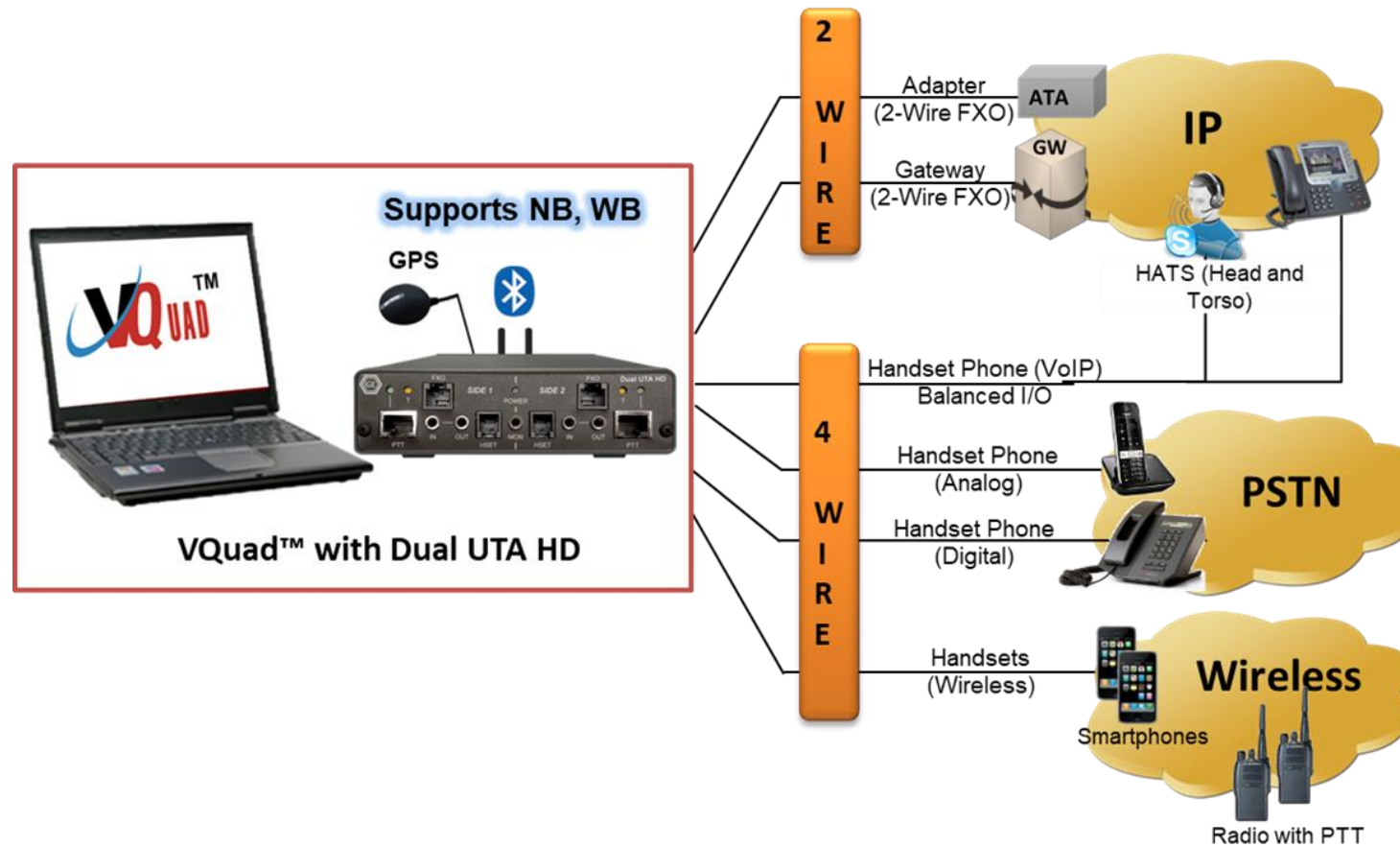
- VQuad™ uses the File Monitor to transfer all degraded voice files automatically the VQT for measurement and analysis
- The VQuad™ and VQT results are automatically transferred to the Central Database via TCP/IP
- If the Connection fails, the results are saved to local database until the connection is re-established
- VQT WebViewer™ provides query and result display, Network status, and remote operation of all nodes within Network from a Web based application



# System Components/Hardware



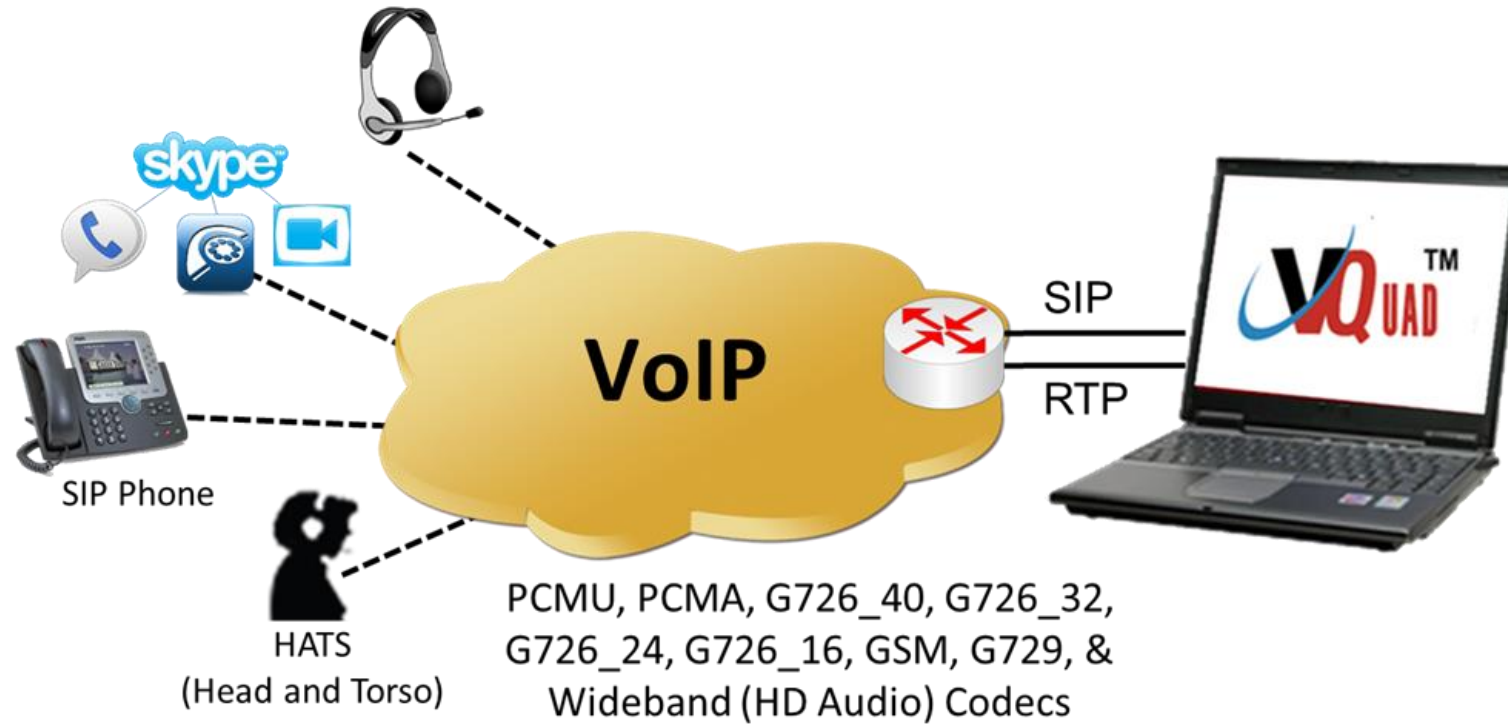
# Automated QoS Testing of Analog Network



- **Connectivity** – 2-Wire FXO, 4-Wire Balanced I/O, HSET Interfaces on Dual UTA HD
- **Devices** – Analog Phones, Next Generation Gateways, PBX, ATAs over PSTN network



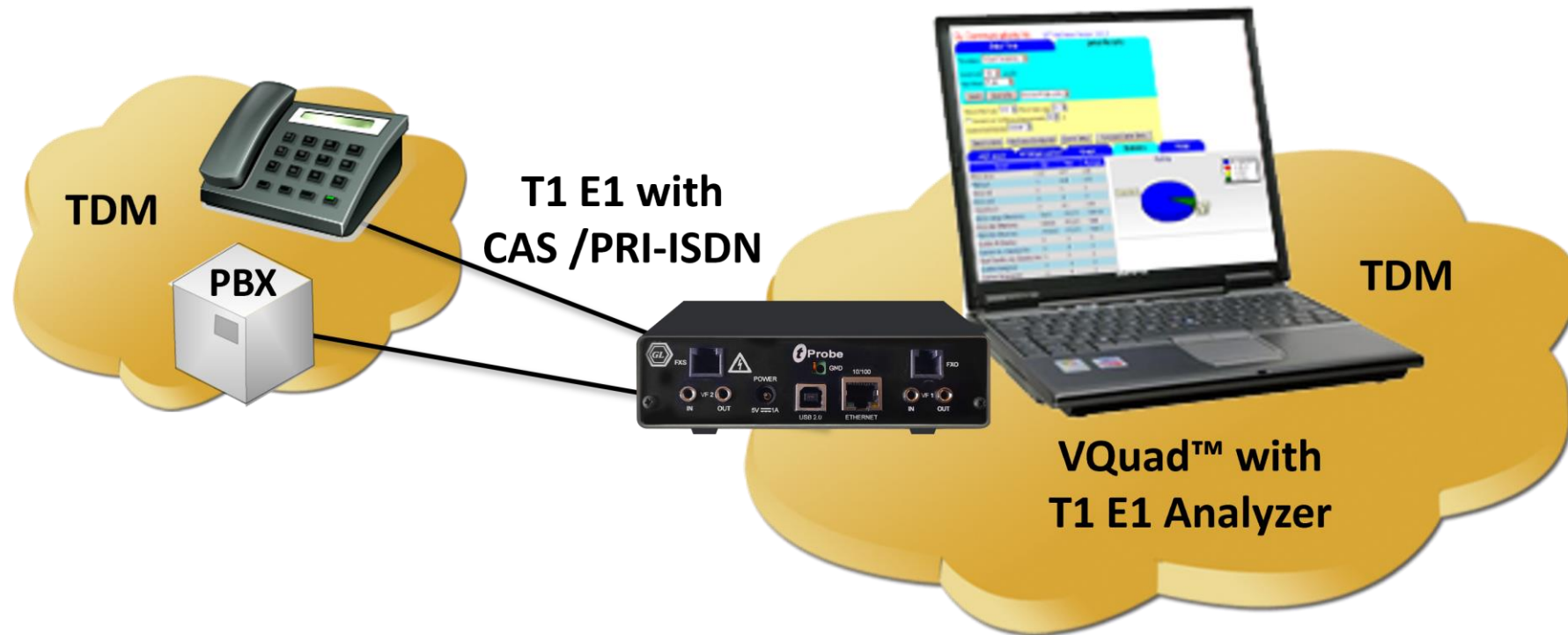
# Automated Testing of VoIP (SIP) Interface, Digital VoIP Phones, VoIP Softphones



- **Connectivity** – Internal SIP cores within VQuad™ (SIP and H.323 Signaling - Does not require Dual UTA HD), 4-wire Balanced I/O, HSET Interfaces on Dual UTA HD
- **Devices** – VoIP Phones, Soft Phone, HATS



# Automated Testing of TDM Network



- **Connectivity** – T1 E1 Interface facilitated through GL's T1 E1 Analyzer Hardware (ISDN and CAS Signaling - Does not require Dual UTA HD)
- **Devices** – Digital Phones, PBX, Media Gateways

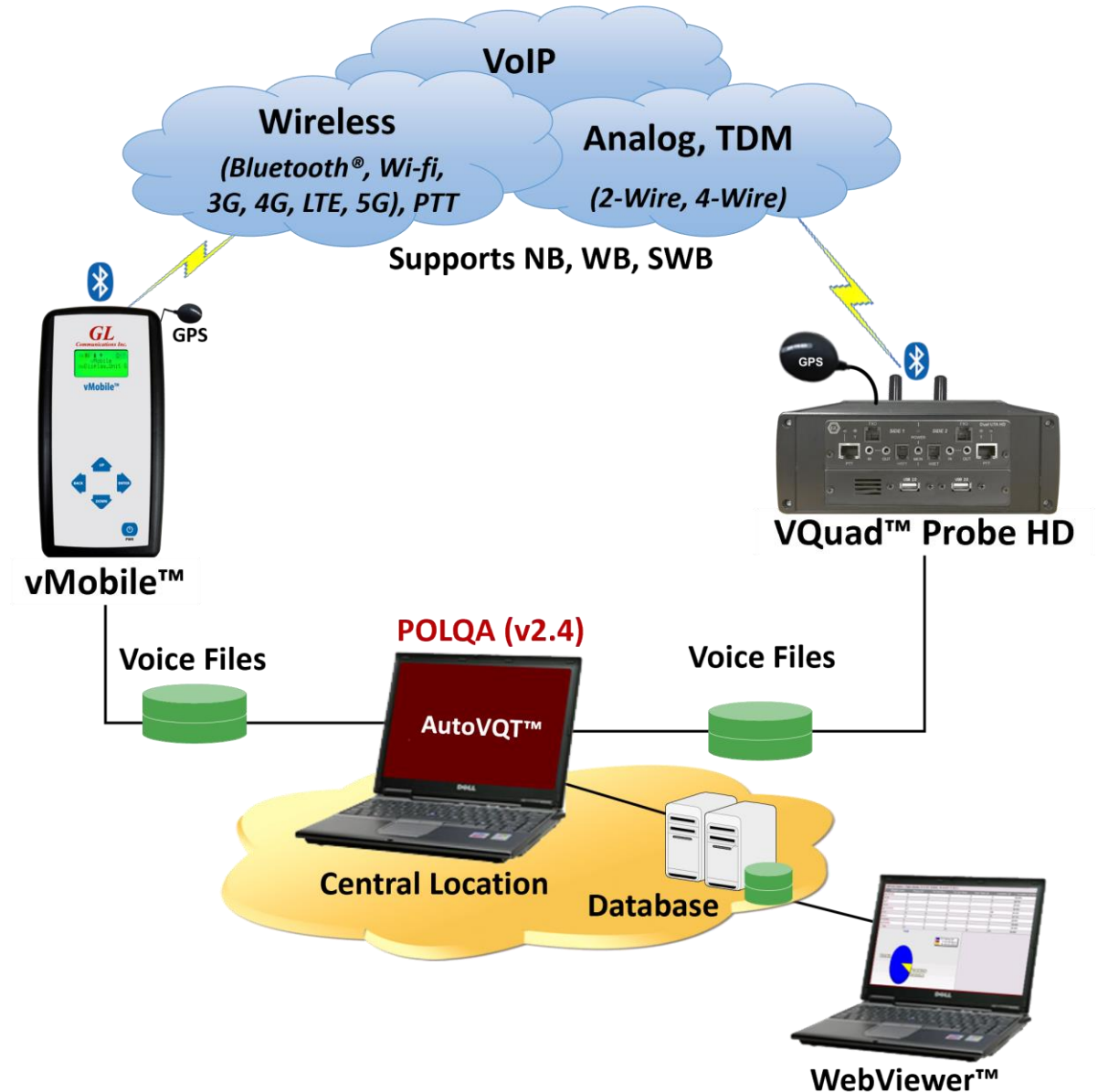


# Voice Quality Testing (VQT)



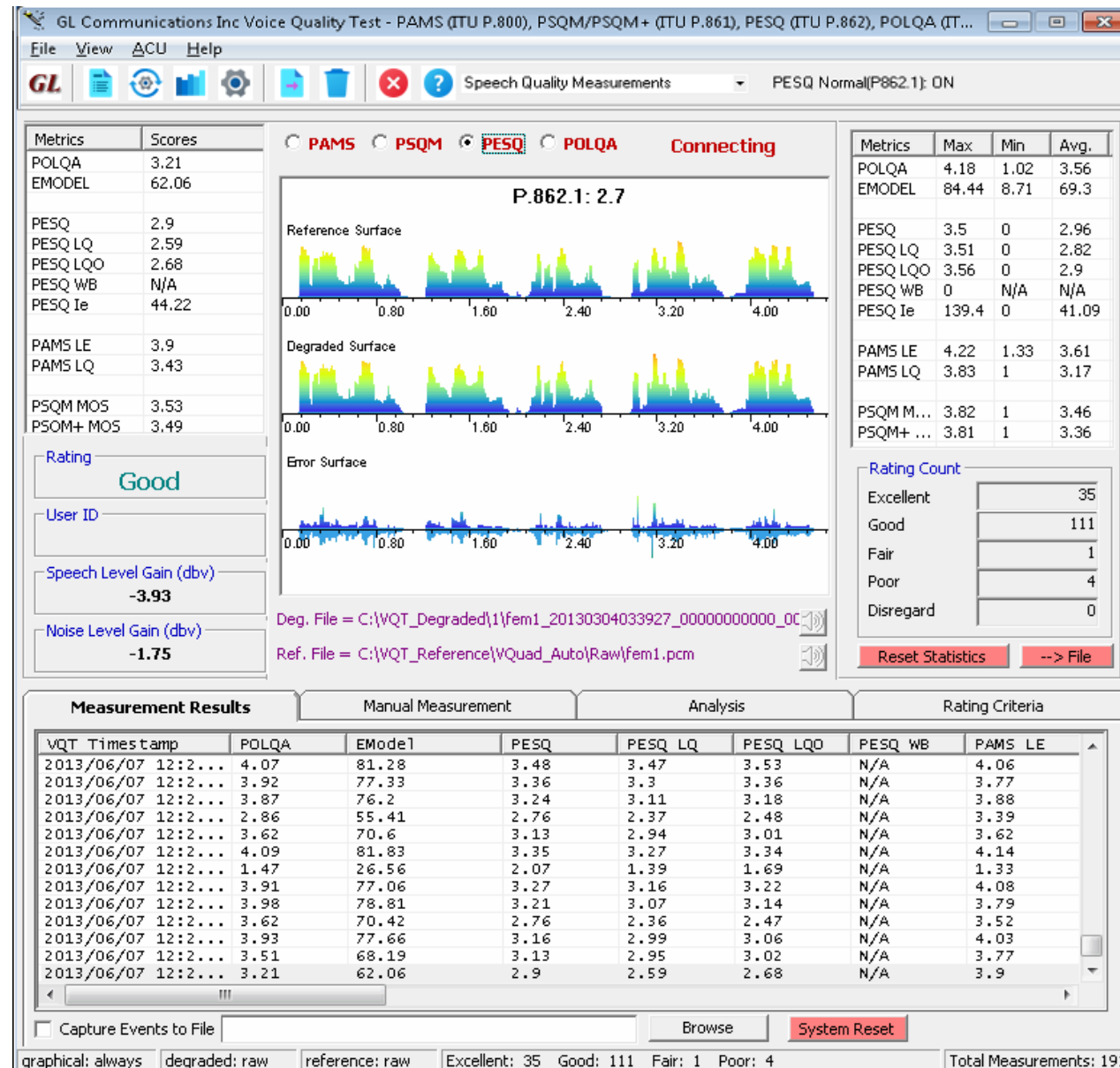
# Centralized Analog Voice Quality Testing

- Supports ITU Standards (POLQA, PESQ LQ/LQO / WB))
- Auto-Measurement Capabilities
- Detailed Results / Statistics
- Criteria Rating System
- Remote Access Capabilities
- Delay (One-Way or Round Trip)
- Jitter (Min, Max, Average per Utterance)
- Clipping (front, back, all)
- Noise/Signal Levels (Activity, Peak, etc.)
- PESQ/Delay per utterance
- Impairment Factor (Ie) measurement





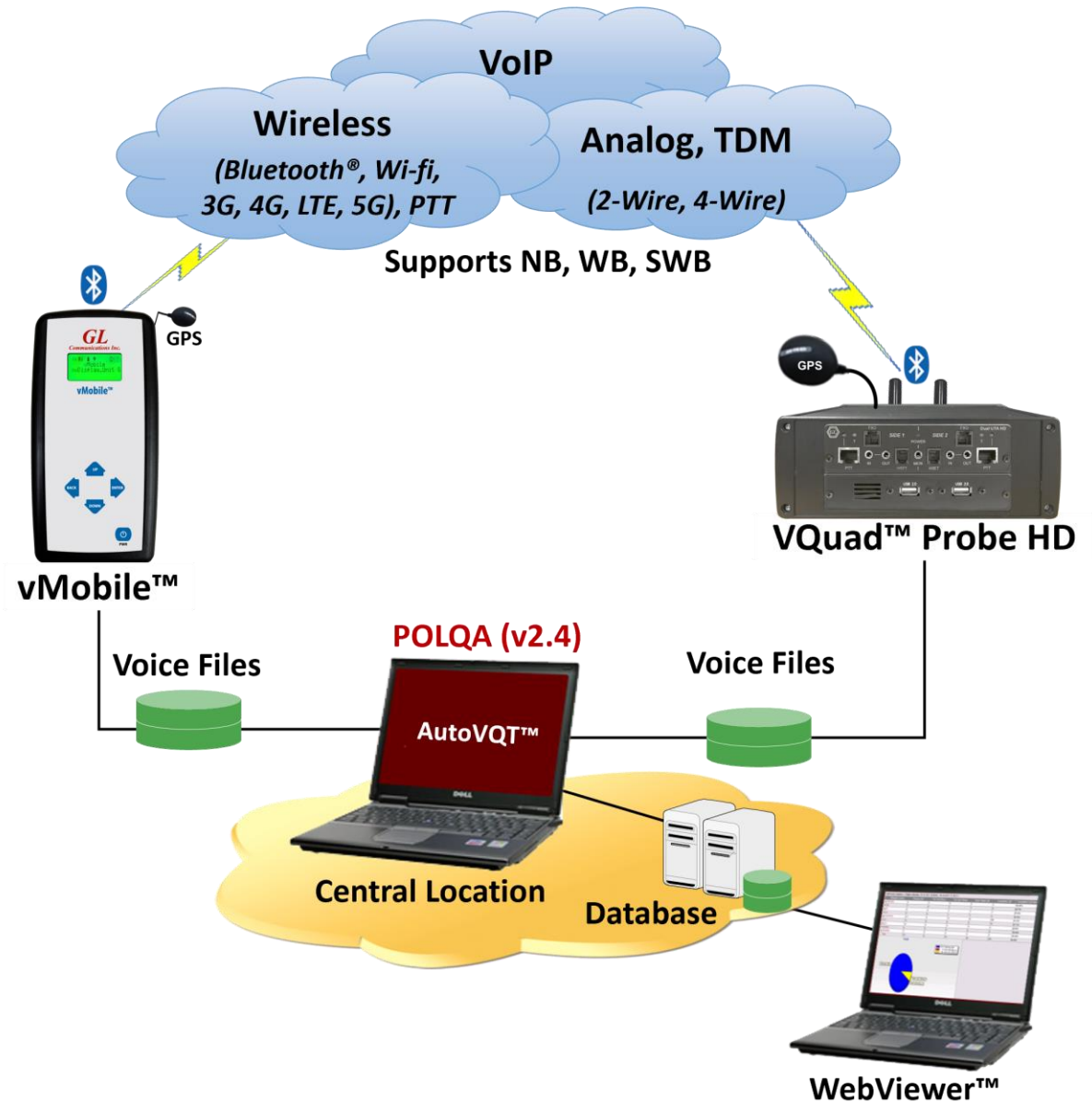
# Voice Quality Test Software





# Auto Measurement

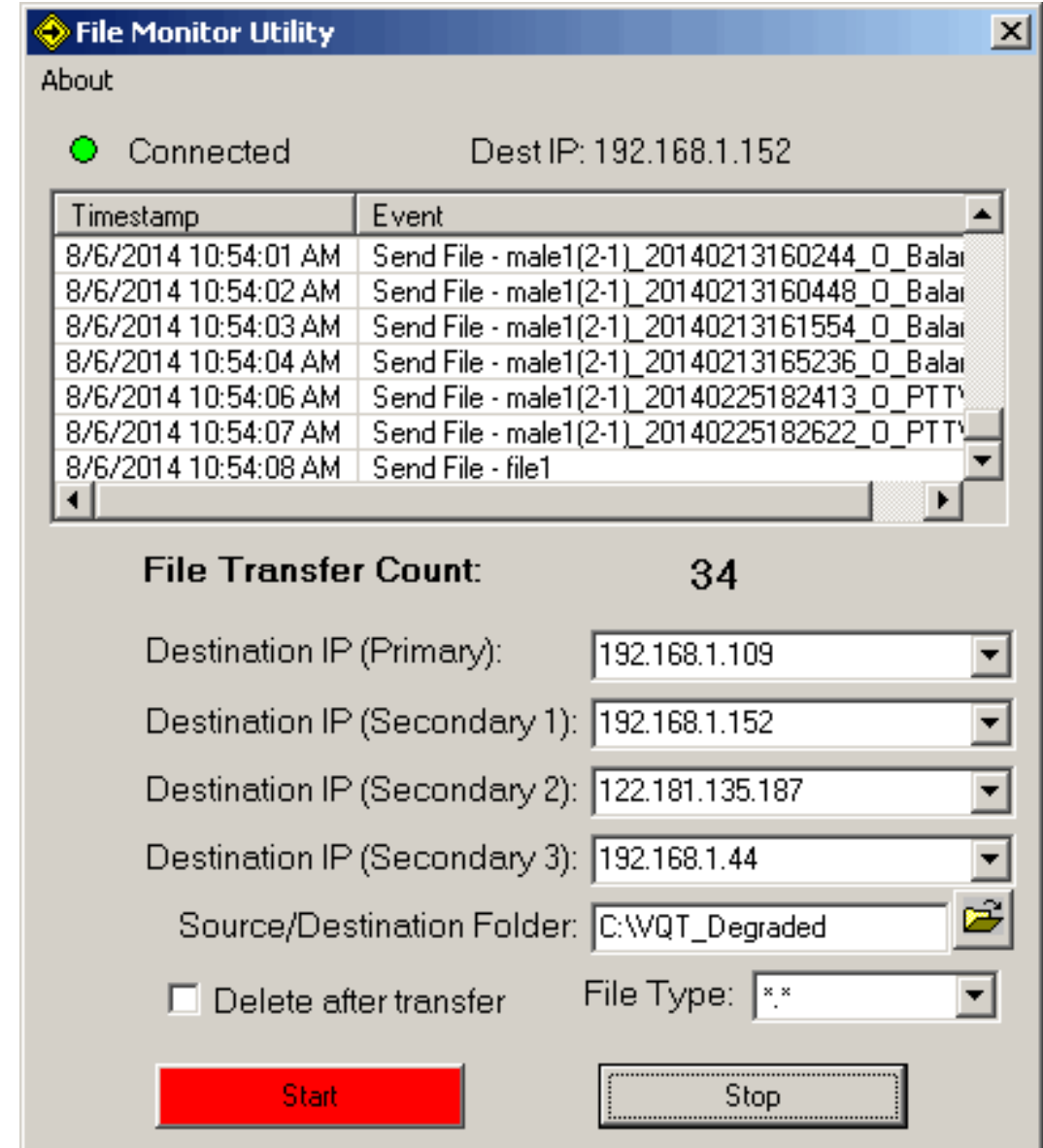
- Automatically analyze the degraded files using GL VQT Software
- Detailed results including Jitter (min / max / avg), Clipping (front/back/all), Latency, and Noise / Signal Measurements (activity / peak)
- VQT uses the File Monitor to perform automated measurements on remote locations





# File Monitor Utility

- Runs on all VQuad™ system automatically sending the Degraded voice files to the central location via TCP/IP
- Operates in automatic mode



**File Monitor Utility**

About

● Connected Dest IP: 192.168.1.152

Timestamp	Event
8/6/2014 10:54:01 AM	Send File - male1(2-1)_20140213160244_O_Balai
8/6/2014 10:54:02 AM	Send File - male1(2-1)_20140213160448_O_Balai
8/6/2014 10:54:03 AM	Send File - male1(2-1)_20140213161554_O_Balai
8/6/2014 10:54:04 AM	Send File - male1(2-1)_20140213165236_O_Balai
8/6/2014 10:54:06 AM	Send File - male1(2-1)_20140225182413_O_PTT
8/6/2014 10:54:07 AM	Send File - male1(2-1)_20140225182622_O_PTT
8/6/2014 10:54:08 AM	Send File - file1

**File Transfer Count: 34**

Destination IP (Primary): 192.168.1.109

Destination IP (Secondary 1): 192.168.1.152

Destination IP (Secondary 2): 122.181.135.187

Destination IP (Secondary 3): 192.168.1.44

Source/Destination Folder: C:\WQT\_Degraded

☐ Delete after transfer File Type: \*.\*

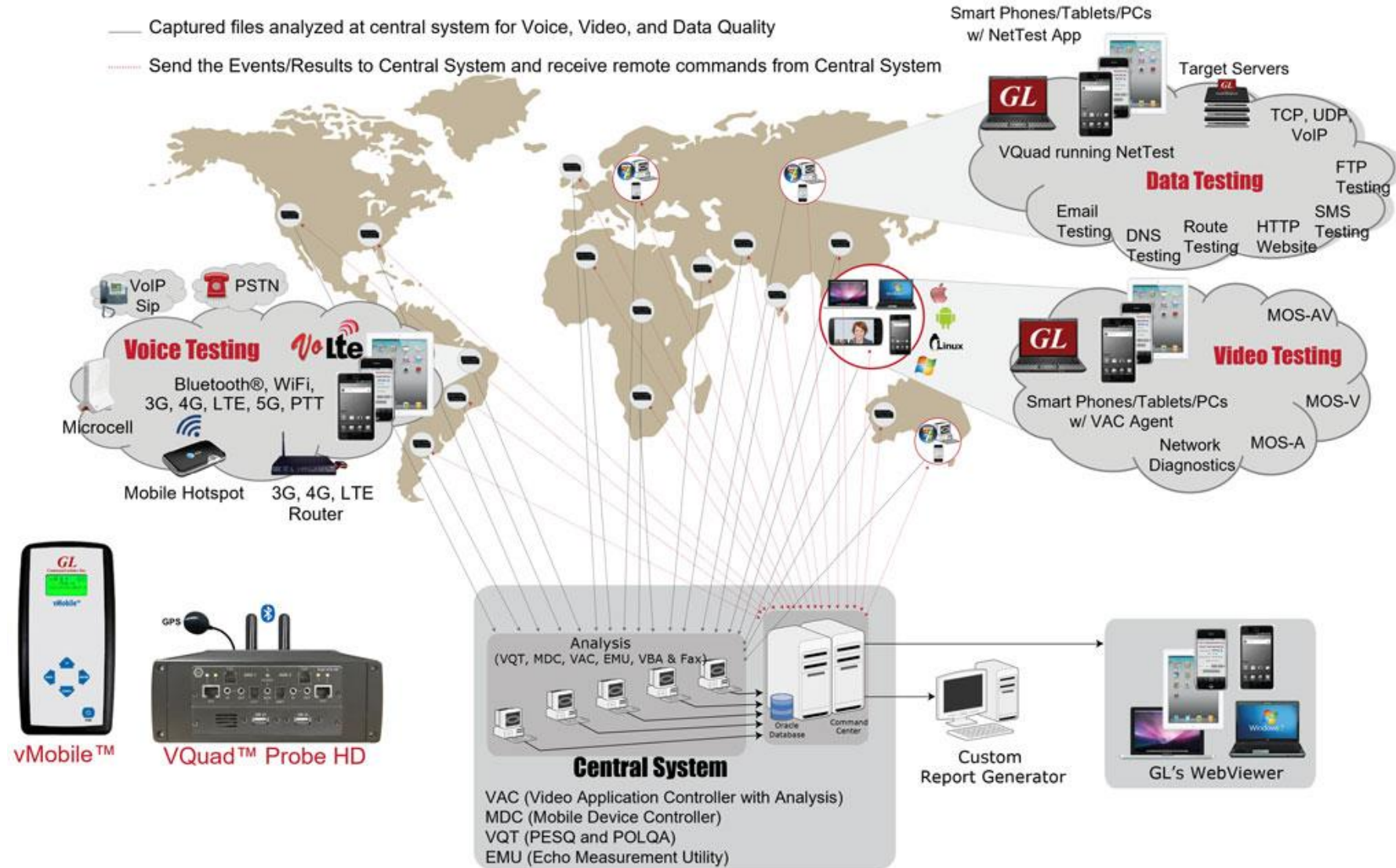
**Start** **Stop**



# WebView™ (Web Based Client for Voice and Data Quality Testing)



# VQT WebViewer™





# VQT WebViewer™ Records

GL Webviewer											
Results Call Events Status & Statistics Reports											
<div> <div> <div>Refresh</div> <div>admin</div> </div> <div> <div>Load Filters: --Select Filter--</div> <div>OFF</div> <div>Live Updates: 5 sec</div> </div> </div>											
<div> <div>Call Events</div> <div>between 07/12/2023 03:00:26 and 07/12/2023 15:00:26 (Last 12 Hours)</div> <div> <div>Date &amp; Time</div> <div>Standard 10 Minutes 1 Hour 12 Hours 24 Hours Today Yesterday 7 Days 1 Month 6 Months</div> </div> <div> <div>Timestamp Type</div> <div>VQuad / vMobile Timestamp</div> </div> <div> <div>Event ID Filter</div> <div>Contains</div> <div></div> </div> <div>Apply</div> <div> <div>Actions</div> <div>Records Per Page: 200</div> </div> <div>Error Events</div> </div>											
VQuad Timestamp	Call Timestamp	VQuad Call ID	VQuad Device ID	VQuad GPS	Latitude	Longitude	Call Control Event	Call Type Originating	Call Type Terminating	VQuad Event ID	
07/12/2023 15:00:12	07/12/2023 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'05"	12.93	77.6	RingBack	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P5Dial	
07/12/2023 15:00:12	07/12/2023 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'05"	12.93	77.6	PDD event	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P5	
07/12/2023 15:00:12	07/12/2023 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'05"	12.93	77.6	DTMF Digits Detected	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P59;Diale	
07/12/2023 15:00:11	07/12/2023 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'05"	12.93	77.6	DTMF Digits Detected	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P58;Diale	
07/12/2023 15:00:11	07/12/2023 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'05"	12.93	77.6	DTMF Digits Detected	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P54;Diale	
07/12/2023 15:00:09	07/12/2023 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'04"	12.93	77.6	DialTone	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P5Dial	
07/12/2023 15:00:08	07/12/2023 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'04"	12.93	77.6	Tone Detected	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P5Detect -34028	
07/12/2023 15:00:08	07/12/2023 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'04"	12.93	77.6	Placing Call	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P5Dial	
07/12/2023 15:00:05	07/12/2023 14:56:43	FXOPOLQATEST	Device1	N12°55'35" E077°36'04"	12.93	77.6	Disconnected	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712145643;P5Norma	

- Accessible remotely via browser based clients
- Database stores the real-time and historic data collected



# Voice Quality Statistics

GL Webviewer

Version 6.0

Results

Call Events

Status & Statistics

Reports

Load Filters: --Select Filter--

VQT-PESQ Results

between 11/09/2022 05:21:05 and 05/09/2023 05:21:05 (Last 6 Months)

Date & Time

Standard

10 Minutes

1 Hour

12 Hours

24 Hours

Today

Yesterday

7 Days

1 Month

6 Months

Timestamp Type

VQuad / vMobile Timestamp

Event ID Filter

Contains

Apply

Actions

Records Per Page:

200

VQuad Timestamp	Call Timestamp	VQuad Call ID	VQuad Device ID	VQuad GPS	Latitude	Longitude	Degraded Filename	Rating	PESQ	DAQ	PESQ LQ	PESQ LQO	PESQ WB	PSQM PLUS	PESQ Average Offset (ms)	PESQ Max Offset (ms)	PESQ Min Offset (ms)	Number All Clipping
03/27/2023 15:34:34	03/27/2023 15:26:14	GLRobFaxVQTTest	RobFXO2		39.14	-77.22	fem1		3.71	5	3.79	3.83		0	661.45	661.5	661.38	0
03/27/2023 15:34:23	03/27/2023 15:26:14	GLRobFaxVQTTest	RobFXO1		39.14	-77.22	fem1		3.34	4.7	3.26	3.33		0	618.52	618.62	618.5	0
03/27/2023 15:34:11	03/27/2023 15:26:14	GLRobFaxVQTTest	RobFXO2		39.14	-77.22	fem1		3.37	4.7	3.31	3.37		0	648.1	648.12	648	0
03/27/2023 15:34:00	03/27/2023 15:26:14	GLRobFaxVQTTest	RobFXO1		39.14	-77.22	fem1		3.37	4.7	3.32	3.38		0	625.02	625.12	625	0
03/27/2023 15:33:49	03/27/2023 15:26:14	GLRobFaxVQTTest	RobFXO2		39.14	-77.22	fem1		3.38	4.7	3.32	3.38		0	648.85	648.88	648.75	0
03/27/2023 15:33:38	03/27/2023 15:26:14	GLRobFaxVQTTest	RobFXO1		39.14	-77.22	fem1		3.39	4.8	3.35	3.4		0	606.4	606.5	606.38	0
03/27/2023 15:33:26	03/27/2023 15:26:14	GLRobFaxVQTTest	RobFXO2		39.14	-77.22	fem1		3.37	4.7	3.31	3.37		0	743.5	743.62	743.38	0



# Network Status

**Network Status**

VQuad
vMobile
MDC (NetTest)
VQT
File Monitor

✓ - Node Connected
✓ - Node Connected and Running Scripts
✗ - Node Disconnected
— - Node Out of service

	PC Name	Version	VQuad Name	Latitude	Longitude	Devices Count	IP Address	Central IP Addresses	Location	Dual UTA
^	✓ GLIN-23	V10.8 Release	Raga	12.93	77.6	7	AUTO GET LOCAL IP 192.168.1.212	PRIMARY IP 192.168.1.212	Fixed	Firmware version: 6/23/21 v72 Serial number: 157412 HV2
∨	✓ ROBTOWER	V10.7.7	RBICHOFFTESTPC	39.14	-77.22	6	USE THIS AS LOCAL IP 192.168.1.219	PRIMARY IP 192.168.1.212	Fixed	Firmware version: 6/23/21 v72 Serial number: 157214 HV2

**VQuad Device Script Running Status**

Device Type	Device Name	Script Name	Call Status	Call Type	Global Device & Start Variables	Start/Stop Script	Script Status	Actions
DuFxo	RobFX01	TestSchedule1	CONNECTED		Variables	⏹ Stop	✓	✍
DuFxo	RobFX02	VQuad Fax Emulation_FXOAnswerCall	CONNECTED		Variables	⏹ Stop	✓	✍
NetTest	PCNetTest	VQuad Fax Emulation_FXOAnswerCall	IDLE		Variables	▶ Start	✗	✍
NetTest	MDNetTest-Acer	UserEventTest_Control	IDLE		Variables	▶ Start	✗	✍
NetTest	VQNetTest-5	PCNetTest	IDLE		Variables	▶ Start	✗	✍
NetTest	MDNetTest-GS	VACTest1	IDLE		Variables	▶ Start	✗	✍

Bluetooth/FXO

^	✗ GLIN-07	V10.7.4	GLIN-07			2	AUTO GET LOCAL IP 192.168.1.226	PRIMARY IP 192.168.1.212	Fixed	Firmware version: 11/28/16 v20 Serial number: 156648 HV1
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- Displays status of all the VQuad™ probes, Mobile Devices, VQT, and File Monitor application status, also the VQuad™ device script running status



# NetTest Results

GL Webviewer Version 6.0																	
Results																	
Call Events																	
Status & Statistics																	
Reports																	
Load Filters: --Select Filter-- OFF Live Updates: 5 sec OFF																	
NetTest Results between 10/27/2022 01:47:31 and 04/27/2023 01:47:31 (Last 6 Months)																	
Switch to MobileInfo>>																	
TCP UDP VOIP ROUTE HTTP FTP DNS SMS EMAIL Apply																	
Date & Time Standard 10 Minutes 1 Hour 12 Hours 24 Hours Today Yesterday 7 Days 1 Month 6 Months																	
Timestamp Type VQuad / vMobile Timestamp																	
Event ID Filter Contains																	
Apply																	
Actions Records Per Page: 200																	
Sort By: Test Failed ASC, TCP Upload Out of Order (Packets) ASC, TCP Buffer Delay ASC																	
Device Timestamp (End)	Device Timestamp (Start)	Call Timestamp	VQuad Call ID	VQuad Device ID	Device GPS (End)	Device Latitude (End)	Device Longitude (End)	Device GPS (Start)	Device Latitude (Start)	Device Longitude (Start)	Net Speed Test	Battery Level (%)	RSSI (dBm)	Network Type	TN Number	Target Server/IP	Test Failed
11/04/2022 12:52:12		11/04/2022 12:52:12	ManualNetTest	RobG8	N39°8'36" W77°12'56"	39.14	-77.22				TCP					50.76.16.181:81	
11/04/2022 13:14:22		11/04/2022 13:14:22	ManualNetTest	RobG8	N39°8'36" W77°12'56"	39.14	-77.22				TCP					50.76.16.181:81	
10/28/2022 10:36:10	10/28/2022 20:04:03	10/28/2022 10:36:10	ManualNetTest	GLIndiaMoto5GPhor	N12°55'35" E77°36'4"	12.93	77.6	N12°55'36" E77°36'4"	12.93	77.6	UDP			WIFI	918618130297	50.76.16.181:81	
11/02/2022 09:25:33	11/02/2022 18:51:55	11/02/2022 09:25:33	ManualNetTest	GLIndiaMoto5GPhor	N12°55'36" E77°36'4"	12.93	77.6	N12°55'36" E77°36'4"	12.93	77.6	UDP			WIFI	918618130297	50.76.16.181:81	
11/02/2022 09:29:05	11/02/2022 18:55:47	11/02/2022 09:29:05	ManualNetTest	GLIndiaMoto5GPhor	N12°55'36" E77°36'4"	12.93	77.6	N12°55'36" E77°36'4"	12.93	77.6	UDP			WIFI	918618130297	50.76.16.181:81	
11/02/2022 11:19:26	11/02/2022 11:17:36	11/02/2022 11:19:26	ManualNetTest	RobG8	N39°8'36" W77°12'56"	39.14	-77.22	N39°8'36" W77°12'56"	39.14	-77.22	UDP			LTE	+12407025651	50.76.16.181:81	
11/17/2022 10:00:34	11/17/2022 20:28:45	11/17/2022 10:00:34	ManualNetTest	SGPhone2India	N12°55'35" E77°36'5"	12.93	77.6	N12°55'35" E77°36'5"	12.93	77.6	UDP			LTE	918217046126	50.76.16.181:81	
12/16/2022 15:39:29	12/16/2022 15:36:31	12/16/2022 15:39:29	ManualNetTest	Zhi5g	N39°8'36" W77°12'56"	39.14	-77.22	N39°8'36" W77°12'56"	39.14	-77.22	UDP			WIFI	No Sim	50.76.16.181:81	
12/16/2022 15:48:02	12/16/2022 15:44:31	12/16/2022 15:48:02	TinMDNetTest	US201Dev1	N39°8'36" W77°12'56"	39.14	-77.22	N39°8'36" W77°12'56"	39.14	-77.22	UDP			WIFI	No Sim	50.76.16.181:81	
12/16/2022 15:52:10	12/16/2022 15:49:10	12/16/2022 15:52:10	TinMDNetTest	US201Dev1	N39°8'36" W77°12'56"	39.14	-77.22	N39°8'36" W77°12'56"	39.14	-77.22	UDP			WIFI	No Sim	50.76.16.181:81	
12/16/2022 15:58:53	12/16/2022 15:55:34	12/16/2022 15:58:53	TinMDNetTest	US201Dev1	N39°8'36" W77°12'56"	39.14	-77.22	N39°8'36" W77°12'56"	39.14	-77.22	UDP			WIFI	No Sim	50.76.16.181:81	
12/16/2022 16:11:28	12/16/2022 16:07:52	12/16/2022 16:11:28	TinMDNetTest	US201Dev1	N39°8'36" W77°12'56"	39.14	-77.22	N39°8'36" W77°12'56"	39.14	-77.22	UDP			WIFI	No Sim	50.76.16.181:81	



# Automated Script Samples

- **Scheduler –**

- Run SuperScript(1) at 9am
- Stop SuperScript(1) at 159pm
- Run SuperScript(2) at 2am
- Stop SuperScript(1) at 559pm
- Run SuperScript(1) at 6pm
- Stop SuperScript(1) at 859am

- **Superscript –**

- Start SiteScript(1), SiteScript(2), SiteScript(3)
- Pause 20 min (run time)
- Stop SiteScript(1), SiteScript(2), SiteScript(3)
- Pause 5 min (off time)
- Start SiteScript(4), SiteScript(2)
- Pause 30 min (run time)
- Stop SiteScript(4), SiteScript(2)
- Pause 3 min (off time)



Thank you