Intrusive Network Voice Quality Testing (VQT)

GL Communications Inc.

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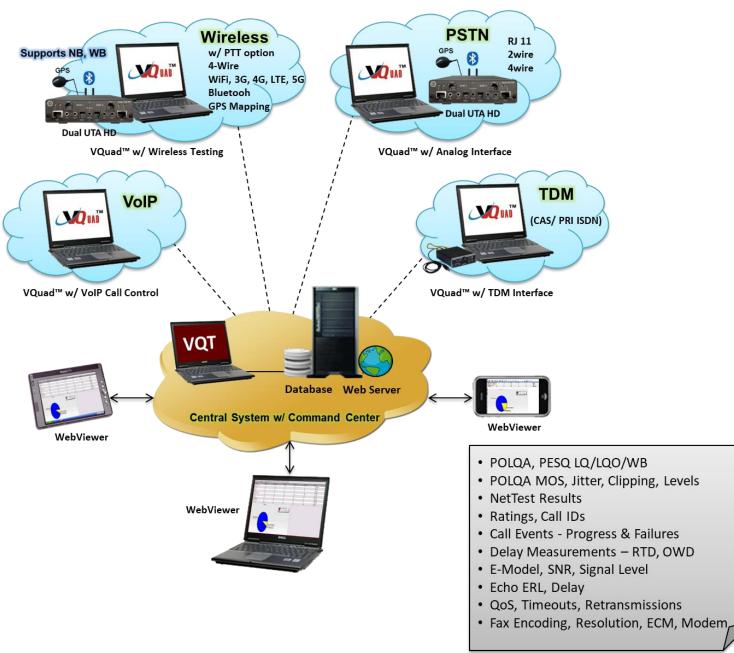
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- Other Solutions for Intrusive VQT



Network Topology





Hardware Platforms



vMobile™



Dual UTA HD



VQuad[™] mTOP[™] Rack





VQuad[™] Probe HD

System Highlights

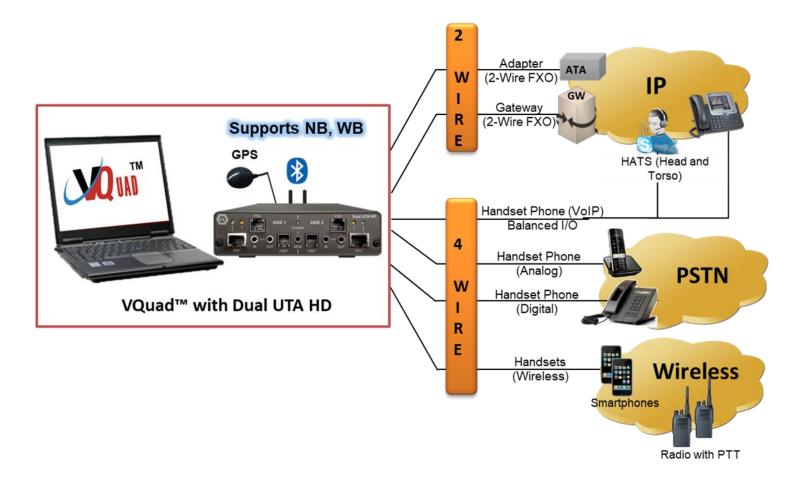
- VQuad[™] uses the File Monitor to transfer all degraded voice files automatically the VQT for measurement and analysis
- The VQuad[™] and VQT results are automatically transferred to the Central Database via TCP/IP
- If the Connection fails, the results are saved to local database until the connection 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



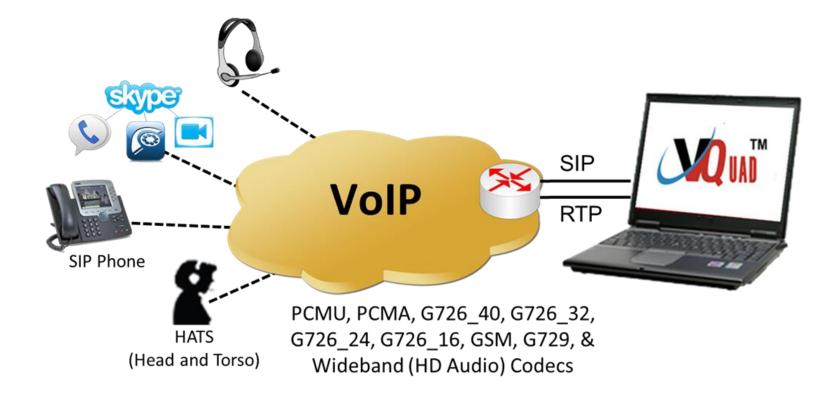
Automated QoS Testing of Analog Network



- 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



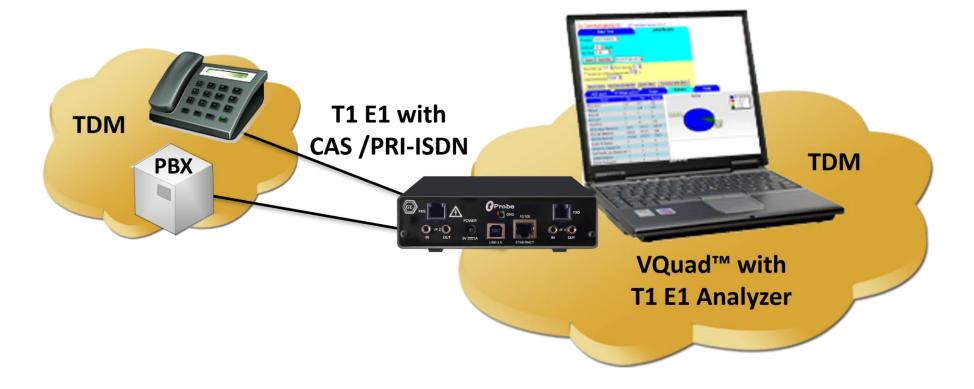
Automated Testing of VoIP (SIP) Interface, Digital VoIP Phones, VoIP Softphones



- 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

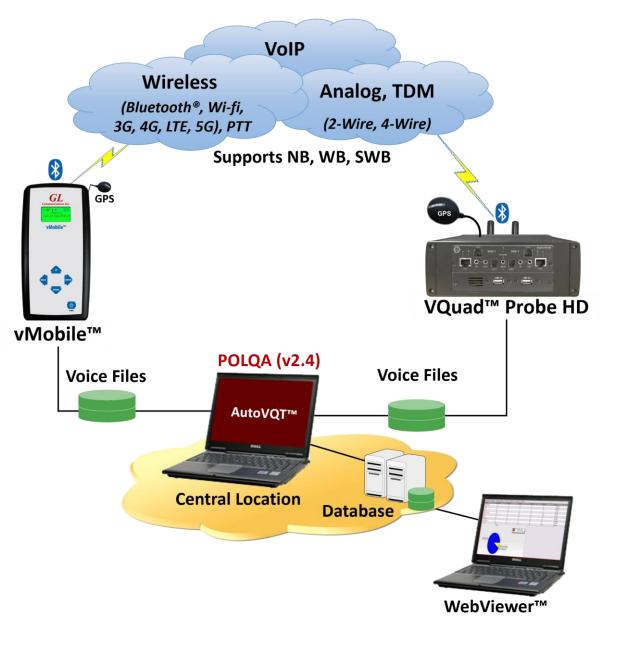


Voice Quality Testing (VQT)



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





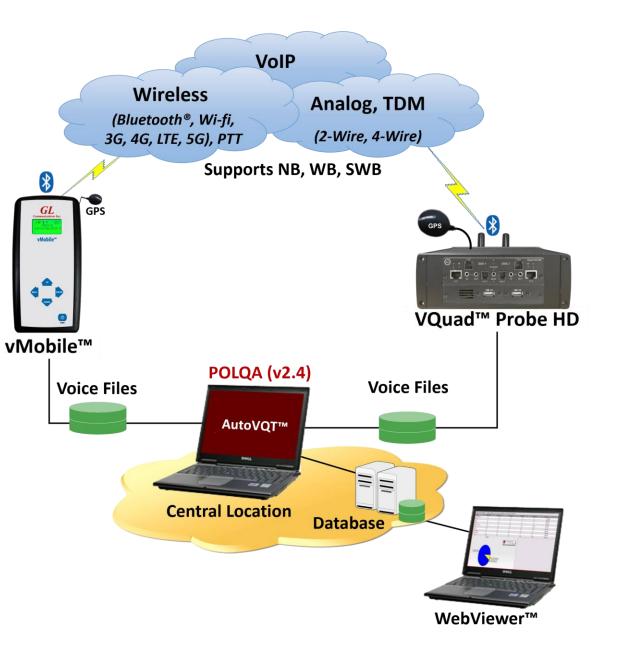
Voice Quality Test Software

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POLQA EMODEL	3.21 62.06						POLQA	4.18	1.02	3.56
				P.862.1	2.7		EMODEL	84.44	8.71	69.3
PESQ	2.9	Befere	nce Surface				PESQ	3.5	0	2.96
PESQ LQ	2.59	h		A	1.1	6.11	PESQ LQ	3.51	0	2.82
PESQ LQO	2.68		14 1		1. 1. 1. 1 .		PESQ LOO		0	2.9
PESQ WB	N/A			المتعارفان والمتعادية			PESQ WB	0	N/A	N/A
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PSOM+ MOS	3.49	0.00	0.80	1.60 2.4	3.20	4.00		0.04		3.36
				1.00 2.14	0.20	4.00	PSQM+	3.81	1	0.00
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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

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

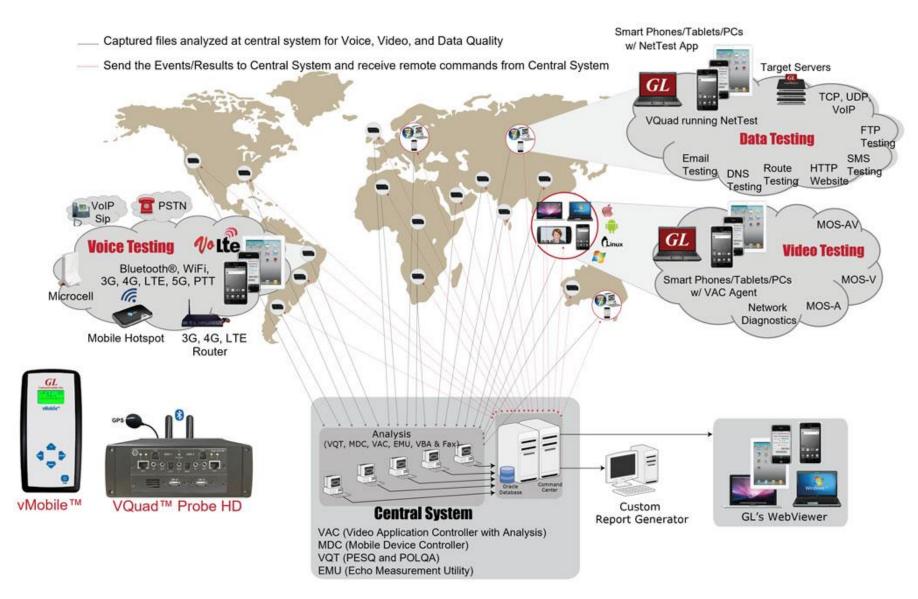
File Monitor Utility					×
oout					
Connected	Dest IP:	192.168.1.	152		
Timestamp	Event				
8/6/2014 10:54:01 AM 8/6/2014 10:54:02 AM 8/6/2014 10:54:03 AM 8/6/2014 10:54:04 AM 8/6/2014 10:54:06 AM 8/6/2014 10:54:07 AM 8/6/2014 10:54:08 AM ◀	Send File - male1() Send File - file1	2-1)_201402 2-1)_201402 2-1)_201402 2-1)_201402 2-1)_201402	13160448_C 13161554_C 13165236_C 25182413_C)_Balai)_Balai)_Balai)_PTT\	
File Transfe	r Count:	34			
Destination IP	(Primary):	192.168.1.1	09	•]
Destination IP	(Secondary 1):	192.168.1.1	52	•]
Destination IP	(Secondary 2):	122.181.13	5.187	•]
Destination IP	(Secondary 3):	192.168.1.4	.4	•]
Source/Des	tination Folder:	C:WQT_De	graded	- 2	
🗖 Delete aft	er transfer	File Type:	×.×	•	
Start		S	top		



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



VQT WebViewer™





VQT WebViewer[™] Records

🚳 GL Wa	ebviewe	r							Refresh 🕝 🔒 admi
Results 👻	Call Eve	ents Status	s & Statistics 👻	Re	eports 🚽	, Load	Filters:Selec	t Filter	▼ OFF Live Updates: 5 sec ▼
Call Events between 0	7/12/2023 03:00:2	6 and 07/12/2023 1	5:00:26 (Last 12 Ho	urs)					
Date & Time	Standard 10 Min	nutes 1 Hour 12 Ho	urs 24 Hours Toda	ay Yesterda	ay 7 Day	s 1 Month 6 Mont	hs		
Timestamp Type 🛛	Quad / vMobile Time	stamp 👻							
Event ID Filter	ontains "	•							
Apply									
Actions Record	ds Per Page: 2	200 ~							
VQuad Call Timestamp Timestamp	VQuad Call ID	VQuad Device ID	VQuad GPS	Latitude L	.ongitude	Call Control Event	Call Type Originating	Call Type Terminating	VQuad Event ID
07/12/202307/12/2023 15:00:12 15:00:21	FXOPOLQATEST	Device1	N12°55'35" E077°36'05"	12.93 7	77.6	RingBack	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P\$Dial
07/12/202307/12/2023 15:00:12 15:00:21	FXOPOLQATEST	Device1		12.93 7	77.6	PDD event	PSTN	PSTN	O EVODOLOATECT, Davident, 20220712150021-00
07/12/202:07/12/202:			E077º36'05"						O_FXOPOLQATEST_Device1_20230712150021;PS
15:00:12 15:00:21	FXOPOLQATEST	Device1		12.93 7		DTMF Digits Detected	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;PS
		Device1 Device1	N12°55'35" E077°36'05"		77.6		PSTN PSTN	PSTN	
15:00:12 15:00:21 07/12/202:07/12/2023 15:00:11 15:00:21 07/12/202:07/12/2023	FXOPOLQATEST		N12°55'35" E077°36'05" N12°55'35" E077°36'05"	12.93 7	77.6	Detected DTMF Digits			O_FXOPOLQATEST_Device1_20230712150021;P59;D
15:00:12 15:00:21 07/12/202307/12/2023	FXOPOLQATEST	Device1	N12°55'35" E077°36'05" N12°55'35" E077°36'05" N12°55'35" E077°36'05"	12.93 7 12.93 7	77.6	Detected DTMF Digits Detected DTMF Digits	PSTN	PSTN	O_FXOPOLQATEST_Device1_20230712150021;P\$9;Di
15:00:12 15:00:21 07/12/202:07/12/2023 15:00:11 15:00:21 07/12/202:07/12/2023 15:00:11 15:00:21 07/12/202:07/12/2023	FXOPOLQATEST FXOPOLQATEST FXOPOLQATEST	Device1 Device1	N12°55'35" E077°36'05" N12°55'35" E077°36'05" N12°55'35" E077°36'05" N12°55'35" E077°36'04"	12.93 7 12.93 7 12.93 7	77.6	Detected DTMF Digits Detected DTMF Digits Detected	PSTN	PSTN PSTN	O_FXOPOLQATEST_Device1_20230712150021;P59;Di O_FXOPOLQATEST_Device1_20230712150021;P58;Di O_FXOPOLQATEST_Device1_20230712150021;P54;Di
15:00:12 15:00:21 07/12/202:07/12/2023 15:00:11 15:00:21 07/12/202:07/12/2023 15:00:11 15:00:21 07/12/202:07/12/2023 15:00:09 15:00:21 07/12/202:07/12/2023	FXOPOLQATEST FXOPOLQATEST FXOPOLQATEST FXOPOLQATEST	Device1 Device1 Device1	N12°55'35" E077°36'05" N12°55'35" E077°36'05" N12°55'35" E077°36'05" N12°55'35" E077°36'04" N12°55'35" E077°36'04"	12.93 7 12.93 7 12.93 7 12.93 7 12.93 7	77.6 77.6 77.6 77.6	Detected DTMF Digits Detected DTMF Digits Detected DialTone	PSTN PSTN PSTN	PSTN PSTN PSTN	O_FXOPOLQATEST_Device1_20230712150021;P59;Di O_FXOPOLQATEST_Device1_20230712150021;P58;Di O_FXOPOLQATEST_Device1_20230712150021;P54;Di O_FXOPOLQATEST_Device1_20230712150021;P5Dial

• Accessible remotely via browser based clients

Communications

Database stores the real-time and historic data collected

Voice Quality Statistics

Results 👻	Reports	•		Load Filters:Select Filter												
/QT-PESQ Results between 11/09/2022	05:21:05 and 05/09/2	2023 05:21:05 (L	ast 6 Mont	ths)												
Date & Time Standard 10 M	finutes 1 Hour 12 H	ours 24 Hours	Today Yes	sterday 71	Days 1 Month	6 Months										
Timestamp Type VQuad / vMobile Timestam	np 🐨															
Event ID Filter Contains																
Apply																
	00 🗸															
entrons v necords rei ruge.			_	_	_		-	_	_	_	_	_	_	_	_	_
VQuad Call VQuad Call ID Timestamp Timestamp	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)	CPESQ Mir Offset (ms)	Numbe All Clippin
3/27/202:03/27/202:GLRobFaxVQTTest 5:34:34 15:26:14	RobFXO2		39.14	-77.22	fem1		3.71	5	3.79	3.83		0	661.45	661.5	661.38	0
3/27/202:03/27/202:GLRobFaxVQTTest 5:34:23 15:26:14	RobFXO1		39.14	-77.22	fem1		3.34	4.7	3.26	3.33		0	618.52	618.62	618.5	0
3/27/202103/27/2021GLRobFaxVQTTest 5:34:11 15:26:14	RobFXO2		39.14	-77.22	fem1		3.37	4.7	3.31	3.37		0	648.1	648.12	648	0
3/27/202:03/27/202:GLRobFaxVQTTest 5:34:00 15:26:14	RobFXO1		39.14	-77.22	fem1		3.37	4.7	3.32	3.38		0	625.02	625.12	625	0
3/27/202:03/27/202:GLRobFaxVQTTest 5:33:49 15:26:14	RobFXO2		39.14	-77.22	fem1		3.38	4.7	3.32	3.38		0	648.85	648.88	648.75	0
3/27/202:03/27/202:GLRobFaxVQTTest 5:33:38 15:26:14	RobFXO1		39.14	-77.22	fem1		3.39	4.8	3.35	3.4		0	606.4	606.5	606.38	0
3/27/202:03/27/202:GLRobFaxVQTTest 5:33:26 15:26:14	RobFXO2		39.14	-77.22	fem1		3.37	4.7	3.31	3.37		0	743.5	743.62	743.38	0



Network Status

No	ode Conn	ected	🕑 - No	de Connected ar	nd Runnir	ng Scripts	0-	Node Disc	onnected	😑 - No	de Out of se	ervice				
PC		lame	Version	VQuad Name	Latitude	Longitude	Devices Count	IP Address		Central IP Addresses		Location	n Dual UTA			
		-23	V10.8 Release	Raga	12.93	77.6	7	AUTO GET LOCAL IP		PRIMARY IP		Fixed	Firmware version: 6/23/21 v72 Serial number: 157412			
	O ROBT	OWER		RBICHOFFTESTPC			6	USE THIS AS		PRIMARY		Fixed	Firmwar	e version	: 6/23/21 v7	2 Serial number: 157214
	Device Type	Device I		Quad Device So	Script		Statu	S Call Status	Call Type		vice & Start ables	Start/ Scri		Script Status	Actions	í
D	uFxo	RobFX01	Test	Schedule1						Variables		Stop		2	Ø	1
D	uFxo	RobFXO2	VQu	ad Fax Emulation_F	FXOAnswer	Call				Variables		Stop		9	ď	
N	etTest	PCNetTes	st VQuad Fax Emulation_FXOAnswe	FXOAnswer	rCall		IDLE		Variables		Star	nt 🖉		ď	1	
N	etTest	MDNetTe Acer	DNetTest- userEventTest_Control				IDLE		Variables		💿 Star		0	Ø		
NetTest		VQNetTes	st-5 PCN	-5 PCNetTest				IDLE		Variables		Star	nt ⊘ 🗹		C	
N	etTest	MDNetTe	st-GS VAC	Test1				IDLE		Variables		⊙ Star		0	Ø	

• Displays status of all the VQuad[™] probes, Mobile Devices, VQT, and File Monitor application status, also the

VQuad[™] device script running status

Communications

NetTest Results

@ G	LW	ebvie	wer version	6.0								R		💄 admir			
Re	esults 🔻		Call Event	s Sta	tus & Statistics	•	R	eports 👻		Load	Filters: _Select	ilter		•	OFF	Live Updates: 59	• Off
witch to Mo	bielnfo>>			94/27/2023 01:47:31	_	oply											
Date & Tin Timestam Event ID F Appy	p Type	Standard VQuad / vMo Contains	10 Minutes 1 H oblie Timestamp *	iour 12 Hours 24 H	ours Today Yest	rrday 7 Da	ys 1 Mon	th 6 Months									
Sort By:	Test Faile		Dipload Out of	Order (Packets) AS													
Device Timestamp 1 (Eind)	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 Failes
1/04/202: 2:52:12		11/04/2022 12:52:12	ManualNetTest	RobG8	N39°8'36" W77°12'56"	39.14	-77.22				TCP					50.76.16.181:81 50.76.16.181:81	
1/04/202: 3:14:22		13:14:22	ManualNetTest	RobG8	N39°8'36" W77°12'56"	39.14	-77.22				TCP					50.76.16.181:81 50.76.16.181:81	
0/28/202:1 0:36:10 2			ManualNetTest	GLIndiaMoto5GPho	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	
1/02/202:1 9:25:33 1			ManualNetTest	GLIndiaMoto5GPho	(N12º55'36" E77º36'4"	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	ManualNetTest	GLIndiaMoto5GPho	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	
1/02/202:1 1:19:26 1			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 50.76.16.181:81	
1/17/202:1 0:00:34 2			ManualNetTest	5GPhone2India	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	
2/16/202:1 5:39:29 1			ManualNetTest	Zhi5g	N39°8'36" W77º12'56"	39.14	-77.22	N39°8'36" W77º12'56"	39.14	-77.22	UDP			WIFI	No Sim	50.76.16.181:81	
	12/16/202	12/16/2022	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	
2/16/202:1 5:52:10 1			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	
2/16/202:1 5:58:53 1			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	
2/14/20214	2/16/202	12/16/2022	TinMDNetTest	US201Dev1	N39°8'36" W77°12'56"	39.14	-77.22	N39°8'36" W77º12'56"	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

