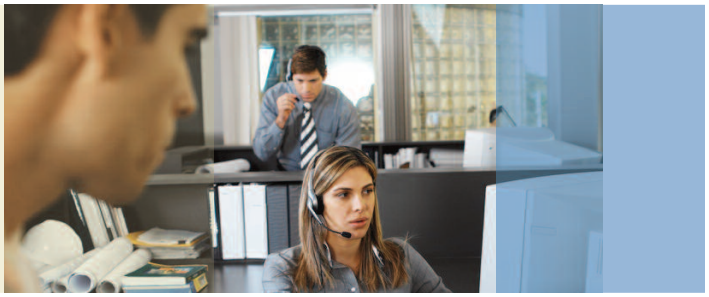


Speech and DTMF Agent

Make Your Customer's Experience a Priority

Verify the health of your network by testing all the essential voice quality and RTP measurements to proactively identify issues and ensure QoS.

- One test agent measures over 60 key call-quality measurements
- Initiate calls with Analog Loop Start, PRI, SIP, or MGCP signaling
- Uses the ITU-T PESQ algorithm and the MCI Labs' statistics-based VQES algorithm
- Reference-quality measurements that allows for benchmarking of competing technologies and services

Identify Network Issues Before Your Customers Start to Complain

Tektronix's Speech & DTMF test agent for PowerProbe® service level test probes provide a complete user-perceived quality assessment for calls placed over VoIP, TDM, and cellular networks. For accuracy and consistency, speech quality is measured using standards-based voice-quality algorithms, providing MOS, echo, volume, noise, and delay measurements.

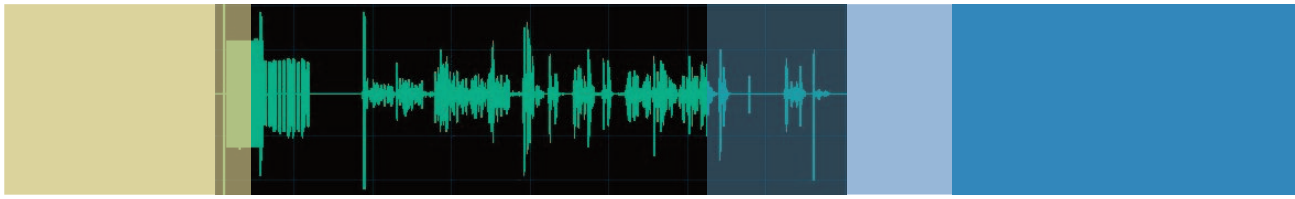
Validate your network's ability to transmit DTMF and Fax tones and evaluate call connectivity with an extensive range of connection status and network timer metrics.

For field testing applications, the award-winning PowerProbe 30 VoIP responder is ideal as a far-end test destination. Tests are easily controlled by any web-enabled portable device including handheld testers and smart phones. GSM phones can control the tests through SMS messages.

The DirectQuality® web-based OSS easily automates complex test plans to provide network-wide service quality monitoring and reporting. It easily is integrated into existing operational support and fault-management systems to bring service-level visibility to all of your business processes.

Features & Benefits	Applications
▪ Measures key call-quality metrics such as MOS, Delay, and Echo ▪ Identify one-way audio problems ▪ Evaluate codec performance ▪ Call progress metrics ▪ DTMF and Fax tone testing	▪ Core-to-hub (mesh) testing ▪ Hub-to-edge QoE testing ▪ Day-of-install and field testing with inexpensive responders ▪ Long-term monitoring and pro-active fault detection ▪ Provisioning and troubleshooting

Tektronix® Communications



Tektronix DirectQuality Service Level Test Automation

Speech & DTMF Performance

Summary View | Detailed View | QoS Analysis View | Test Call View | Chart View | Show report specs

Test calls: 14

Service Level Class: Best Practice Apply

Show minimal and maximal values

Origin: Canada

Destination	Carrier	Chart	CCR	Speech				Clipping	Frame Muting	Noise	Delay	Tone Detection
				MOS LQ	MOS VQES	P(UDI)	Power	Overall		WBN/ Comfort	Roundtrip Delay (RTD)	DTMF Overall
			%	(1-5)	(1-5)	%	dBm	%	%	dBm	ms	%
Canada	DIRECT	View	33.33	4.34	4.42	3.1	-24	0	0	21	121	100
	NONE	View	100	4.04	4.22	7.0	-22	0	0	18	1	100
Summary - Canada		View	42.86	4.24	4.35	4.4	-23	0	0	20	81	100
Germany	DIRECT	View	0	-	-	-	-	-	-	-	-	-
	NONE	View	100	3.77	3.78	27.1	-31	0.3	0.6	23	229	50.0
Summary - Germany		View	33.33	3.77	3.78	27.1	-31	0.3	0.6	23	229	50.0

Critical | Major | Minor | Warning | Excellent

Tektronix

Measurements performed by PowerProbe service level probes.

Summary View of Test Results From DirectQuality's web-based OSS

Characteristics

Speech Quality

- PESQ MOS
- VQES MOS
  - Listening and Conversational quality MOS measures speech quality in terms of end-user perception using a scale from 1 (worst) to 5 (best)
- R Factor
- Speech Power, Loss & Distortion

Noise

- C-Message Noise
- Wideband Noise
- Noise Gain
- C-Notch Noise Gain
- Signal-To-Noise Ratio

DirectQuality supports two remote test interfaces:

- PocketDQ™ Software for Web-Enabled Devices
- SMSDQ™ Software for SMS-Enabled Devices

DirectQuality Web-Based OSS: This server centralizes test plans with predefined Pass/Fail criteria, stores results, and offers advanced reporting & trending.

Integrates easily with existing OSSs through SNMP alarms or the GatewayDQ™ API.

Wireless, cable RF, IP, or Dial-up

Technicians can remotely start a test to the PowerProbe 30 using an ordinary wireless device such as a cell phone or PDA using either a text (SMS) or Web-based interface.
When the tests are complete, results are shown on the device.

Network Edge Testing

Mobile / VoIP / PSTN

Network Core

Wireless, CATV, xDSL, FTTx, or PSTN line

PowerProbe 30 Responder

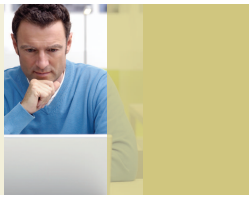
Core to Hub Mesh Testing

Network Hub

PowerProbe 6000 or PowerProbe 500 runs the Speech and DTMF Test Agent by placing test calls to other PowerProbe units strategically located in the network, to measure more than 60 metrics in less than a minute.

IP Management Traffic

Test Architecture for the Speech and DTMF Test Agent



Destination	Carrier	Chart	Test Calls		CCR	Post Dial Delay (PDD)	Speech					Clipping			Hangover		Frame Muting	Noise		Echo		Delay	Tone Detection		
			Attempts	Answered			MOS LQ	MOS VQES	P (UDI)	Power	Loss	Overall	Events	Avg. Dur.	Events	Avg. Dur.		WBN/ Comfort	C-Message Noise	Echo Path Loss (EPL)	Echo Path Delay (EPD)	Roundtrip Delay (RTD)	DTMF Overall	Fax CNG	Fax CED
			Calls	Calls	%	sec	(1-5)	(1-5)	%	dBm	dB	%		ms		ms	%	dBrn	dBrnC	dB	ms	ms	%	%	%
Canada	DIRECT	View	6	2	33.33	2.0	4.34	4.42	3.1	-24	4.2	0	0	0	1	170	0	21	18	NP	NP	121	100	100	100
	NONE	View	2	1	100	0.8	4.04	4.22	7.0	-22	6.7	0	0	0	0	0	0	18	14	NP	NP	1	100	100	100
Summary - Canada		**View**	**8**	**3**	**42.86**	**1.4**	**4.24**	**4.35**	**4.4**	**-23**	**5.0**	**0**	**0**	**0**	**1**	**113**	**0**	**20**	**16**	**NP**	**NP**	**81**	**100**	**100**	**100**
Germany	DIRECT	View	4	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	NONE	View	2	2	100	6.3	3.77	3.78	27.1	-31	3.8	0.3	7	3	1	45	0.6	23	20	NP	NP	229	50.0	50.0	50.0
Summary - Germany		**View**	**6**	**2**	**33.33**	**6.3**	**3.77**	**3.78**	**27.1**	**-31**	**3.8**	**0.3**	**7**	**3**	**1**	**45**	**0.6**	**23**	**20**	**NP**	**NP**	**229**	**50.0**	**50.0**	**50.0**

Create Reports by origin, destination, city, region, or breakout for any testing period for network monitoring, troubleshooting, and trending

Echo
- Path Loss & Delay

Voice Transmission
- Detect speech clipping problems caused by Voice Activity Detectors (VADs) using Front-End and Back-End Clipping measurements, and analyze the impact of silence suppression by measuring Hangover events.
- Frame Muting Ratio
- Comfort Noise
- Clipping Events (Front-End, Back-End, & In-Between)
- Clipping Ratio (Front-End, Back-End, & In-Between)
- Average Clipping Duration (Front-End, Back-End, & In-Between)
- Hang-Over Events
- Average Hang-Over Time

RTP Statistics
- Packets Sent & Received
- Packet Loss, Bursts, & Gaps
- Packets Out of Order & Discarded
- RTCP Reporting

Jitter
- Average Jitter
- Jitter Buffer Size
- Jitter Buffer Usage

Delay
- Voice Path Delay
- Round-Trip Delay

Summary View | Detailed View | QoS Analysis View | Test Call View | Chart View | Show report specs

Test calls: 14 **Service Level Class:** Best Practice Apply

Origin: Canada

Node ID	Phone Number	Date and time	Overall	Connection Status	Network Timers	Speech Quality	VoIP Transmission	Voice Path Delay	Echo	Noise	VF Response	DTMF Detection	Fax Tone Detection	Test Plan
	011498924425600	2008-08-26 10:14	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5787
	011498954672926	2008-08-26 02:33	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5783
1234	14693304463	2008-08-25 16:20	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5772
1234	14693304463	2008-08-25 16:30	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	5773
1234	5143805525	2008-08-25 16:16	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	5771
	5143737962	2008-08-22 16:13	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5741
	5143805527	2008-08-21 10:34	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5730
	498954672926	2008-08-27 02:58	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5785
	498954672926	2008-08-27 03:08	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5785
	498954672926	2008-08-28 02:58	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5785
	498954672926	2008-08-28 03:08	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5785
	011498924425600	2008-08-26 10:14	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5787
	011498954672926	2008-08-26 02:33	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5783
1234	14693304463	2008-08-25 16:20	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5772
1234	14693304463	2008-08-25 16:30	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	5773
1234	14693304463	2008-08-25 16:21	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5772
1234	5143805525	2008-08-25 16:16	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	5771
	5143737962	2008-08-22 16:13	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	5741

In the QoS Analysis View, User-Defined Service Level Classes are Used to Present Results in Highly-Identifiable Pass / Fail Categories

Frequency Response
- Loss (1100Hz, 2100Hz)
- RSL (1100Hz, 2100Hz)

DTMF Detection & Validation
- 0 to 9, *, #

Fax Tone Detection
- CNG Tone Detection & Duration
- CED Tone Detection & Duration

Network Timers
- Dial Tone Delay
- Post Dial Delay
- Billing Duration
- Call Duration

Connection Status
- Complete Call Progress Analysis is performed for each test call according to Tektronix's exclusive Enhanced E.180 algorithm.
- Call Disposition Code
- PRI Cause Number & Location
- MGCP Return Code
- SIP Return Code

NOTE: Test measurement availability varies according to the network protocol the PowerProbe is used with.

Industry-Standard Speech Quality Algorithms

The Speech and DTMF agent incorporates standards-based VQES and PESQ algorithms that provide quality measurements that are ideal for the benchmarking of competing technologies and services.

VQES Algorithm

Monitors the end-to-end quality of your voice services using MCI Labs' statistics-based Voice Quality Evaluation System (VQES) algorithm. It calculates VQES MOS and Unsatisfied User Ratio, as well as conducting a full connectivity performance analysis.

PESQ Algorithm

Assesses the end-to-end quality of voice services using the ITU-T PESQ algorithm, to implement the PESQ Listening Quality MOS, frame muting for packet-loss detection, distortion, and voice clipping.

DirectQuality Test Management

Advanced Test Automation

DirectQuality provides complete service level test automation from test call generation to Quality of Service (QoS) troubleshooting. With DirectQuality (DQ), users can schedule tests at any hour or initiate on-demand testing at customer premises.

Color-coded Service Levels

Our Web-based OSS features color-coded, user-defined service level thresholds for reporting, alarming, and analysis. Service violations can be forwarded to fault management systems via SNMP or email alerts can be sent to one or more individuals.

Business-level QoS Reports

DirectQuality provides a set of business-driven report templates with high-level and drill-down views.

About Tektronix:

Tektronix Communications provides network operators and equipment manufacturers around the world an unparalleled suite of network diagnostics and management solutions for fixed, mobile, IP, and converged multi-service networks.

This comprehensive set of solutions support a range of architectures and applications such as LTE, fixed mobile convergence, IMS, broadband wireless access, WiMAX, VoIP, and triple play, including IPTV.

For Further Information:

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs, and other resources to help engineers working on the cutting edge of technology.

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