SIP Loopback VoIP Testing

Reduce Truck Rolls Through Remote Fault Isolation with the SIP Loopback Test Agent

- Remote fault detection reduces truck rolls
- True user-perceived speech quality (MOS, R-factor) measured using the actual voice payload
- Complete VoIP quality assessment including call volume, noise, distortion, clipping, DTMF transparency, and call connectivity performance
- Reference-quality measurements that allows for benchmarking of competing technologies and services
- Compatible with firewall / NAT implementations

Proactively Test your VoIP Service to Improve Customer Satisfaction

Tektronix' SIP Loopback Test Agent can monitor and troubleshoot VoIP service quality as perceived by subscribers by remotely testing to SIP end devices. No field test equipment is required. This test provides over 60 VoIP QoS measurements that allow operators to test their VoIP service delivery, proactively monitor their end-subscriber's service, troubleshoot, and isolate VoIP issues throughout the service life cycle.

VoIP Service Delivery

A remote loopback test can be performed on the VoIP end device to create a “birth certificate” that confirms the service is ready to go.

Proactive Monitoring

Use proactive loopback testing to cover your full subscriber base to verify that any changes to your network are having no impact on your end-subscriber’s service as compared to the day it was installed.

Troubleshooting and Fault Isolation

With probes deployed at key network segments, isolate network faults by performing loopback tests to intermediary points throughout the network.

Return on Investment

The reduction of customer service calls due to proactive testing and faster resolution of issues can more than pay for the DirectQuality® system.

Features & Benefits

- Measures key call-quality metrics such as MOS, Clipping, DTMF transparency, echo, and Noise
- Enables market-wide quality reporting
- Remotely validate endpoint performance and remotely isolate inside wiring issues to lower OPEX

Applications

- Core to door QoE testing without field test equipment
- Verify subscriber connectivity unobtrusively before and after network modifications
- Long-term monitoring and pro-active fault detection
- Codec performance evaluation

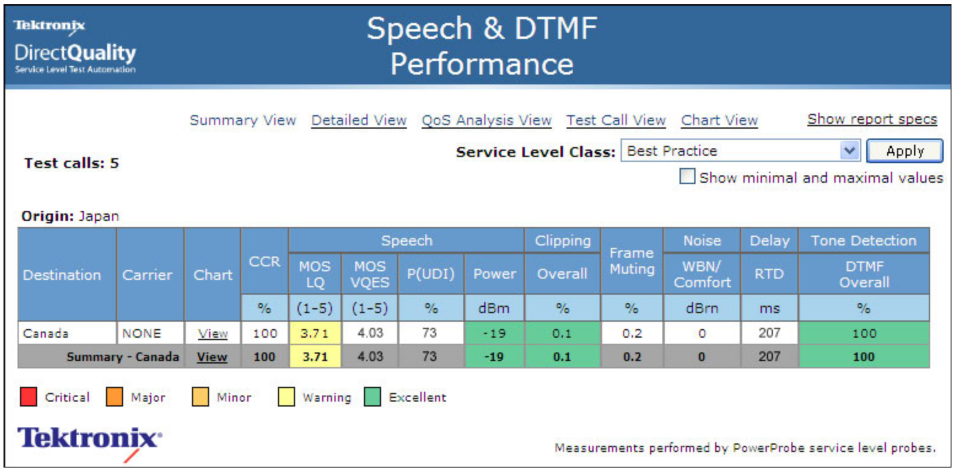
Tektronix® Communications

True Voice-Path Testing

Tektronix' loopback tests conduct measurements of true user-perceived service quality. This allows you to identify and resolve problems before your subscribers know about them.

Using a widely used SIP Loopback implementation, Tektronix can perform cost-effective, remote tests to the customer premises with Tektronix PowerProbes that are deployed in key network core or hub site locations. The Speech & DTMF Loopback Test Agent on the PowerProbes can perform tests to SIP-Loopback enabled devices such as IP Phones, Softphones, ATAs, MTAs, and intermediary devices that can terminate VoIP calls.

These end devices can act as a packet or audio reflector. The packet reflector will assess media transmission performance over the VoIP network to the subscriber's premises. The audio loopback feature tests the device's internal circuitry (including the codec) to evaluate the true user-perceived speech-quality, including the impairments caused by the codec's D/A & A/D speech conversion and compression.


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: 5

Service Level Class: Best Practice Apply

Show minimal and maximal values

Origin: Japan

Destination	Carrier	Chart	CCR	Speech				Clipping	Frame Muting	Noise	Delay	Tone Detection
				MOS LQ	MOS VQES	P(UDI)	Power	Overall		WBN/ Comfort	RTD	DTMF Overall
			%	(1-5)	(1-5)	%	dBm	%	%	dBrn	ms	%
Canada	NONE	View	100	3.71	4.03	73	-19	0.1	0.2	0	207	100
Summary - Canada		View	100	3.71	4.03	73	-19	0.1	0.2	0	207	100

Critical Major Minor Warning Excellent

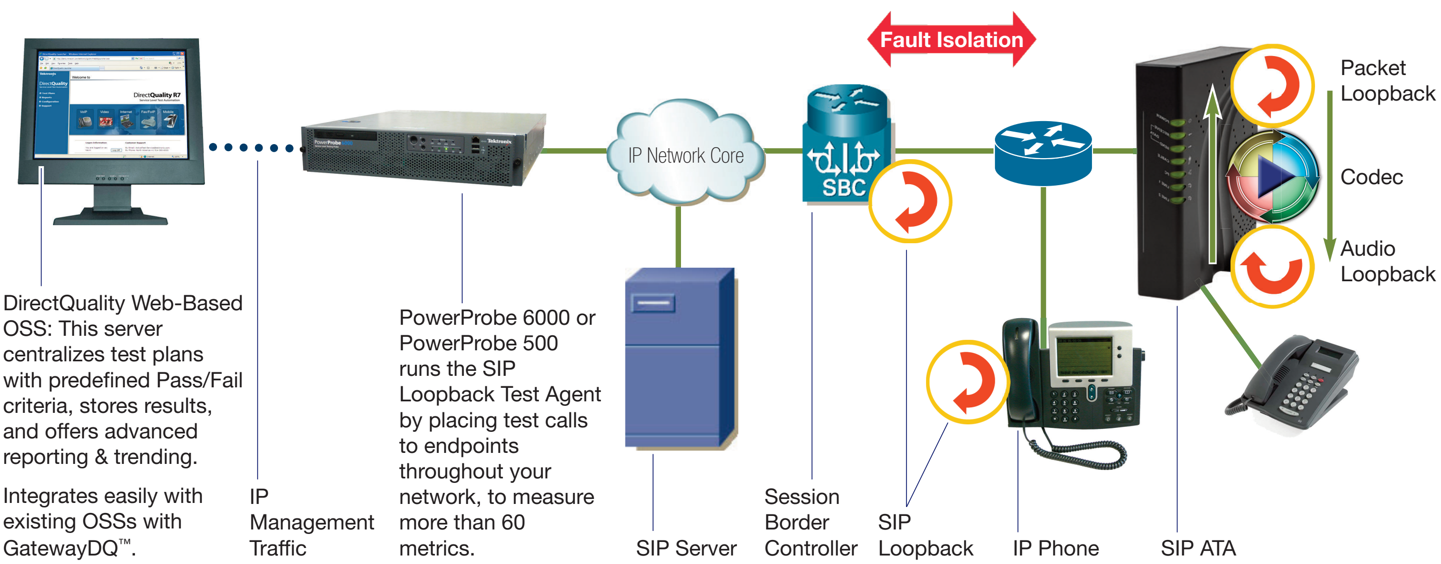
Tektronix

Measurements performed by PowerProbe service level probes.

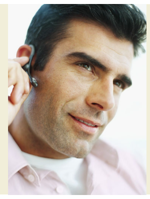
Summary View of Test Results From DirectQuality's web-based OSS

Network Fault Isolation with the SIP Loopback Test Agent

Remotely isolate distribution and access network faults that occur between an intermediary point (for example, a Session Border Controller) and another SIP end device served by the same branch by performing a loopback test to each device with our SIP Loopback Test Agent as shown below.



Network Architecture for SIP Loopback VoIP Testing



Characteristics

Speech Quality
- PESQ LQ MOS
- VQES MOS
- R-Factor (CQ and LQ)
- Speech Power, Loss & Distortion

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

Voice Transmission
- 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, Burst, & Gaps
- Packets Out of Order & Discarded
- RTCP Reporting

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

Delay
- Round-Trip Delay

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

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

Origin: Japan

Destination	Carrier	Chart	Test Calls		CCR	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-Msg.	EPL	EPD	RTD	DTMF Overall	Fax CNG	Fax CED
			Calls	Calls	%	sec	(1-5)	(1-5)	%	dBm	dB	%		ms		ms	%	dBrn	dBrnC	dB	ms	ms	%	%	%
Canada	NONE	View	3	3	100	0.1	3.71	4.12	73.2	-19	-3.9	0.1	2	1	1	24	0.2	0	0	0	<1	182	100	100	100
Summary - Canada		**View**	**3**	**3**	**100**	**0.1**	**3.71**	**4.12**	**73.2**	**-19**	**-3.9**	**0.1**	**2**	**1**	**1**	**24**	**0.2**	**0**	**0**	**0**	**<1**	**182**	**100**	**100**	**100**

Origin: USA

Destination	Carrier	Chart	Test Calls		CCR	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-Msg.	EPL	EPD	RTD	DTMF Overall	Fax CNG	Fax CED
			Calls	Calls	%	sec	(1-5)	(1-5)	%	dBm	dB	%		ms		ms	%	dBrn	dBrnC	dB	ms	ms	%	%	%
Canada	NONE	View	2	2	100	0.1	2.84	3.65	52.5	-11	-6.0	29.4	2	500	0	0	29.6	0	0	>90	<1	1501	50.0	50.0	50.0
Summary - Canada		**View**	**2**	**2**	**100**	**0.1**	**2.84**	**3.65**	**52.5**	**-11**	**-6.0**	**29.4**	**2**	**500**	**0**	**0**	**29.6**	**0**	**0**	**>90**	**<1**	**1501**	**50.0**	**50.0**	**50.0**

Critical Major Minor Warning Excellent

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

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: 8 **Service Level Class:** Best Practice Apply

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
	"sip:600002@192.158.168.102:5060;user=phone"	2008-11-18 14:33	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	240
	"sip:600002@192.158.168.102:5060;user=phone"	2008-11-18 14:35	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	240
	"sip:600002@192.158.168.102:5060;user=phone"	2008-11-18 14:36	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	240
	"sip:600001@192.158.168.102:5060;user=phone"	2008-11-18 13:46	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	241
	"sip:600001@192.158.168.102:5060;user=phone"	2008-11-18 14:13	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	241
	"sip:600001@192.158.168.102:5060;user=phone"	2008-11-18 14:15	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	241
	"sip:600001@192.158.168.102:5062;user=phone"	2008-11-18 15:00	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	241
	"sip:600001@192.158.168.102:5062;user=phone"	2008-11-18 15:01	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	241

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DirectQuality report generated on **2008-11-18 16:41:06**
Measurements performed by PowerProbe service level probes.

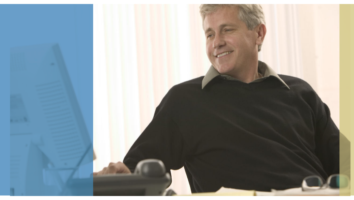
In the QoS Analysis View, User-Defined Service Level Classes are Used to Present Results in Highly-Identifiable Pass / Fail Categories

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

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

Connection Status
- Call Disposition Code
- SIP Return Code
- Answer Seizure Ratio (ASR)
- Call Completion Ratio (CCR)
- Call Loss Ratio (CLR)
- Network Effectiveness Ratio (NER)
- Answer Bid Ratio (ABR)
- Negotiated Media

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



Benchmark Competing Technologies 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 Web-Based OSS

Advanced Test Automation

DirectQuality anticipates measurement requirements and will generate and execute testing plans based on your QoS objectives. Automate test plans or start tests on-demand.

Color-Coded Service Levels

DirectQuality simplifies the monitoring of service faults by displaying results using user-definable Service Level Classes. Service violations can be forwarded to fault management systems via SNMP.

Business-level QoS Reports

DirectQuality provides a set of business-driven report templates with high-level and drilldown 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.

Please visit www.tektronixcommunications.com

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