



LISTEN INC

APPLICATION NOTE

Voice Over IP Telephone Testing

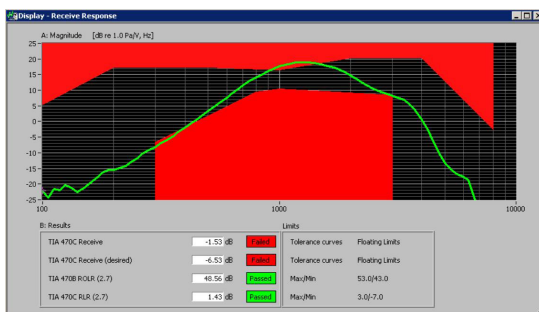
System Overview

With SoundCheck, you are no longer constrained by the limitations of proprietary hardware-based systems for testing Voice over IP (VoIP) telephones. SoundCheck is an easily configurable, Windows®-based system, well suited to both R&D and high speed Production testing.

SoundCheck's powerful measurement algorithms allow you to perform comprehensive tests to national and international standards. Developing test sequences is fast and simple, due to SoundCheck's unique point-and-click interface. Some industry standard tests, for example, Calculation of Loudness Loss Ratings are pre-programmed into the software. Test data and results can be exported to other programs for additional processing and generating test reports in standardized formats. In addition, SoundCheck can easily integrate with existing test programs that utilize ActiveX controls or National Instruments LabVIEW™.

Features and Benefits

- Assignable security levels
- One-button operation for running a suite of tests
- Easy to modify test limits, test parameters, and sequences
- Control other programs & devices
- Data import and export
- Barcode control
- Open system architecture
- Non-proprietary hardware
- SIP and H.323 protocols supported
- Compare results automatically to defined standards or in-house tests
- Full statistical analysis



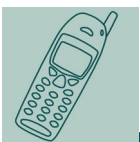
Receive ROLR & RLR at Reference Volume

One-button Calibration

The entire measurement chain, including transducers, audio amplifiers, and sound sources, are easily calibrated by simply clicking one button in SoundCheck. An external acoustic calibrator is used to calibrate the measurement microphone, which then can be used to calibrate the mouth simulator. The magnitude of the Send stimulus is equalized for a flat response and SoundCheck will automatically correct for the phase.

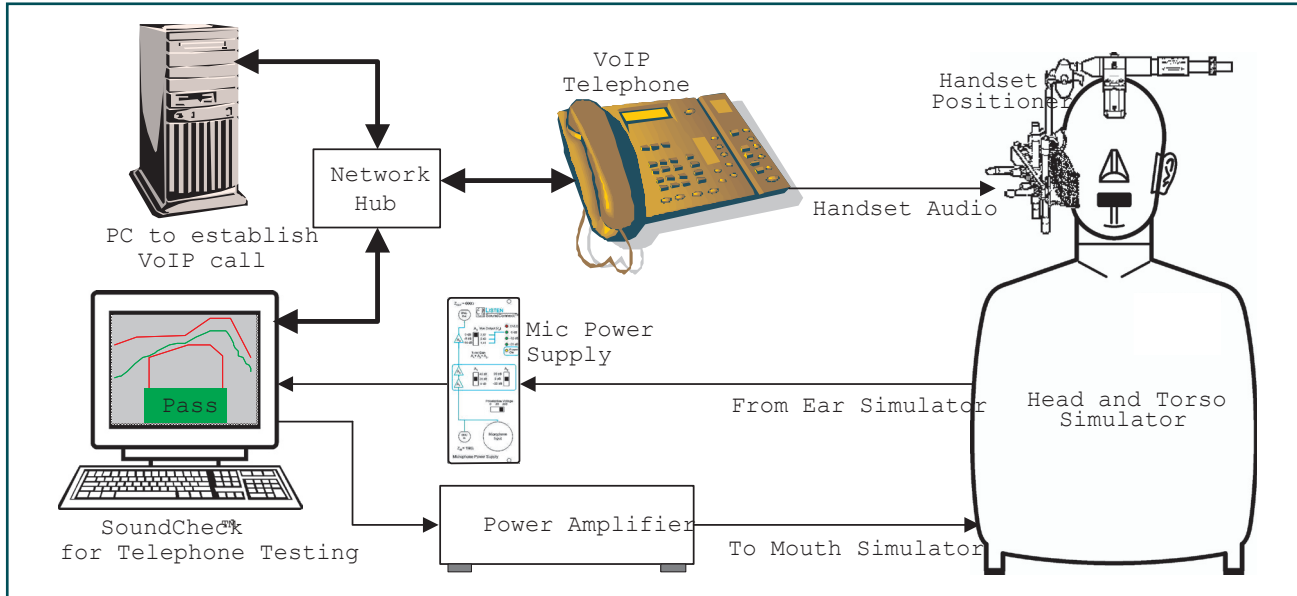
Application-specific Test and Measurement Modules – SoundWare™

SoundWare modules enable you to configure a system for your particular application. Common modules used in telephone testing include the Signal Generator, Multimeter, Oscilloscope, Spectrum (FFT), and Real Time Analyzer (RTA). For real-time, "hands-on" investigation of telephone components, the Signal Generator can play a sine wave, a speech signal or any Windows® WAV file at a calibrated output level. The telephone's response can then be analyzed in the time and frequency domain using the



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Typical System Configuration



A typical VoIP telephone test system consists of the SoundCheck Electroacoustic Test Software, Telephone Test Module, and Real Time Analyzer Module when testing using artificial voices or other speech signals, Test Head with Mouth Simulator and Artificial Ear (or HATS), microphone power supply, and Telephone Interface.

Post-processing

Post-processing modules allow measurement of Attack and Release time of Voice Activity Detectors, loudness ratings, (e.g. ROLR, RLR, etc.), as well as block arithmetic operations and applying any weighting to measured results (e.g. Psophometric, C-message, etc.).

Limits

For a conformance test, the limits are preset according to the relevant standards. For other tests, response limits can easily be created from a measured response by offsetting the curve in frequency, amplitude, or time. Limits can also be generated statistically or imported from other applications.

Industry Standard Tests

TIA-810A & 920 Transmission Requirements for Narrowband Voice over IP and Voice over PCM Digital Wireline Telephones (Type 3.3 ear simulator required) including:

Handset Technical Requirements (RTA option required for some tests) including Frequency Response, Loudness Ratings (SLR, RLR, STMR), Handset Noise, Handset Distortion and Noise, Weighted Terminal Coupling Loss*, Stability Loss (Included, using sine wave and white noise signals*), Packet Voice Latency (Advisory)

Headset Technical Requirements including Headset Frequency Response, Headset Loudness Ratings, Headset Noise, Headset Distortion and Noise, Weighted Terminal Coupling Loss*

Handsfree Technical Requirements (Advisory)

. Test signal may be pulsed noise, continuous noise, or all three. Mouth simulator (ITU-T P.51) and free-field microphone are supported. Test method is according to IEEE 1329. Tests include Handsfree Frequency Response, Handsfree Loudness Ratings and Receive Volume Control, Handsfree Noise, Handsfree Distortion and Noise, Weighted Terminal Coupling Loss*, Stability Loss

Evaluating audio performance of DSP algorithms

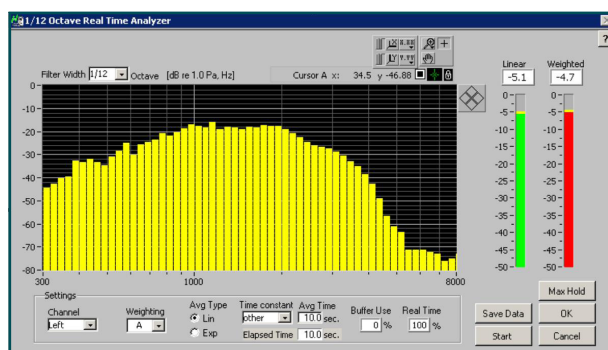
Measurement of directional characteristics

Equivalent input noise

Ringer Sound pressure level

Sine, noise, and speech stimuli

* - RTA option required



Receive on HATS using P50 Speech

