

Malden Electronics

Speech Performance Solutions



**The
REFERENCE
for Speech
Performance
Assessment**

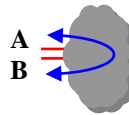
Product Overview

Overview

Malden Electronics offers a range of solutions for Speech Performance Assessment. These fall into two categories:

Intrusive speech quality assessment, where a “test call” is made in order to evaluate the performance of the telephony network. This type of testing can be classified according to where the test instruments are connected to the network under test:

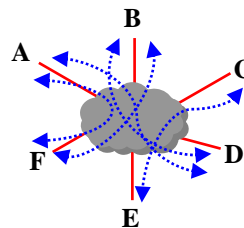
- At a single location where both ends of the call are terminated:



- Point to point, between distant (or mobile) locations:



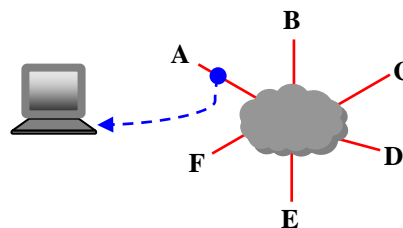
- Any point to any point in a multi-location network:



Non-intrusive speech quality assessment, where a “test call” is not required because live calls are monitored. This type of testing may be:

- Based on analysis of transmitted and received speech signals
- Based on analysis of packet statistics in VoIP networks

Non-Intrusive



Which Solution?

The appropriate solution depends very much on the assessment objectives, which might include benchmarking of legacy network performance, vendor comparison, troubleshooting, establishment/verification of mutually acceptable performance for SLA purposes, acceptance testing, etc. Malden's solutions are scalable from one or two instruments up to say 125 distributed instruments with central control and results management.

Comprehensive

To obtain the most comprehensive understanding of speech transmission performance it is necessary to run intrusive tests between the handset ports of telephone terminals, thus evaluating as closely as possible the user's experience of speech quality. This is important because many factors, including the performance of the terminal device (telephone, gateway, etc.), influence the user's experience, and 'end-to-end' measurement is the only way to take these factors fully into account. The Digital Speech Level Analyser (DSLAs) has high quality analogue ports which connect to PSTN/PBX lines, the handset ports of telephone instruments, including IP phones or cell phones, or at four-wire level.

Live Traffic

Non-intrusive techniques clearly offer the advantage that they act on live telephony traffic and do not necessarily require test calls to be established. On the other hand, these methods require various assumptions to be made about network and transmission parameters and they are therefore inherently less accurate than intrusive methods. Non-intrusive techniques generally cannot make an accurate measurement of delay, since they are connected to the network at a single location.

Detailed Analysis

Intrusive techniques are preferred for detailed analysis, for benchmarking and for performance validation. They may also be usefully employed in all other applications where precision is important, where there is access to both end-points of the telephony channel, and the additional traffic load is not problematic.

Monitoring

Non-intrusive methods are preferred in monitoring applications and where tests are necessarily made at or near one end-point of the telephony channel. In general, non-intrusive testing can be used once stable network operation has been established, to monitor and record changes in performance over time and against load variations.

**Intrusive Testing:
First choice for
Accuracy and
Detailed analysis**

**Non-Intrusive
Testing:
First choice for
Monitoring and
Ease of Deployment**

Specific Requirements

Intrusive Test

Local

**Local/
Remote**

**System
Enhancements**

**VoIP
Virtual
Terminal**

Speech Quality Assessment Application

Solution

Single location, e.g. laboratory

DSLAII with PESQ

Point to point, including mobile

Two DSLAII's

Any point to any point

MultiDSLAI system

Any telephony network where analogue access to traffic is available

DSLAII with P.563 metric

VoIP network

VoIP Monitor Professional

Malden Electronics' products are used in a wide variety of applications throughout the telecommunications industry. We are always pleased to discuss specific requirements and recommend appropriate solutions

A single DSLAI performs tests between two IP phones, or between a PBX extension and an IP phone, for example. The DSLAI system employs the PESQ metric (ITU-T Rec. P.862) to predict Mean Opinion Score (MOS) and measure delay and delay variation (jitter). PAMS and PSQM options are available as well. Other important measurements include speech and noise levels and peak signal level. The optional Performance Examiner (PE) module provides a wealth of additional speech performance graphs and data, notably an analysis of front-end and back-end clipping and hangover time - essential if the codecs used employ voice activity detection (VAD).

Two DSLAI's are used to perform tests between geographically distant locations. Pairs of complementary test scripts are supplied which provide handshaking between the two units, using either speech or DTMF signals transmitted over the network under test.

The scope of intrusive assessment solutions using DSLAI is further enhanced by the use of VoIP Virtual Terminal and ISDN BRI options, analysis tools and MultiDSLAI configurations:

A "VoIP Virtual Terminal" (VVT) can be used at strategic network locations to emulate a SIP or H.323 phone. The VVT is a software application which is placed at a node of the VoIP network and controlled by the DSLAI user interface application. Tests performed between a physical terminal and a VVT can help to localise speech performance problems by effectively segmenting the speech transmission path.

**ISDN
BRI
Port**

An **ISDN BRI port** can be included in the DSLA system, in the form of a PCMCIA or PCI card and control software. This effectively adds ISDN BRI connectivity under control of one of the DSLA channels, so that speech performance tests may be performed, for example, between an ISDN line and an IP telephone.

**Analysis
Tools**

Tools are available for analysis of DTMF signals, for speech filtering and equalisation and for detailed analysis of speech performance. The latter option, Performance Examiner, provides essential information to codec or DSP developers and for system integrators.

MultiDSLA

A MultiDSLA configuration includes up to 125 or more nodes which can routinely establish test calls under central control. Nodes can be ISDN BRI, VVT or DSLA channels. Calls involving IP phones can be automated in a Cisco environment or in other environments if the IP phone terminals support remote control.

**Non-Intrusive
Test**

The VoIP Monitor Professional tool makes speech quality predictions based on packet statistics and (calibrated) assumptions about codec, gateway and IP phone performance. VoIP Monitor Professional is a stand-alone Windows application with a clear and concise user interface and comprehensive display, analysis, results logging and alarm capabilities.

**Packet
Analysis**

The ITU-T algorithm published as Recommendation P.563 will perform non-intrusive analysis of analogue speech signals. This is being integrated into the DSLA system for use as a non-intrusive tool, or in conjunction with intrusive methods.

**Analogue
Signal
Analysis**

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