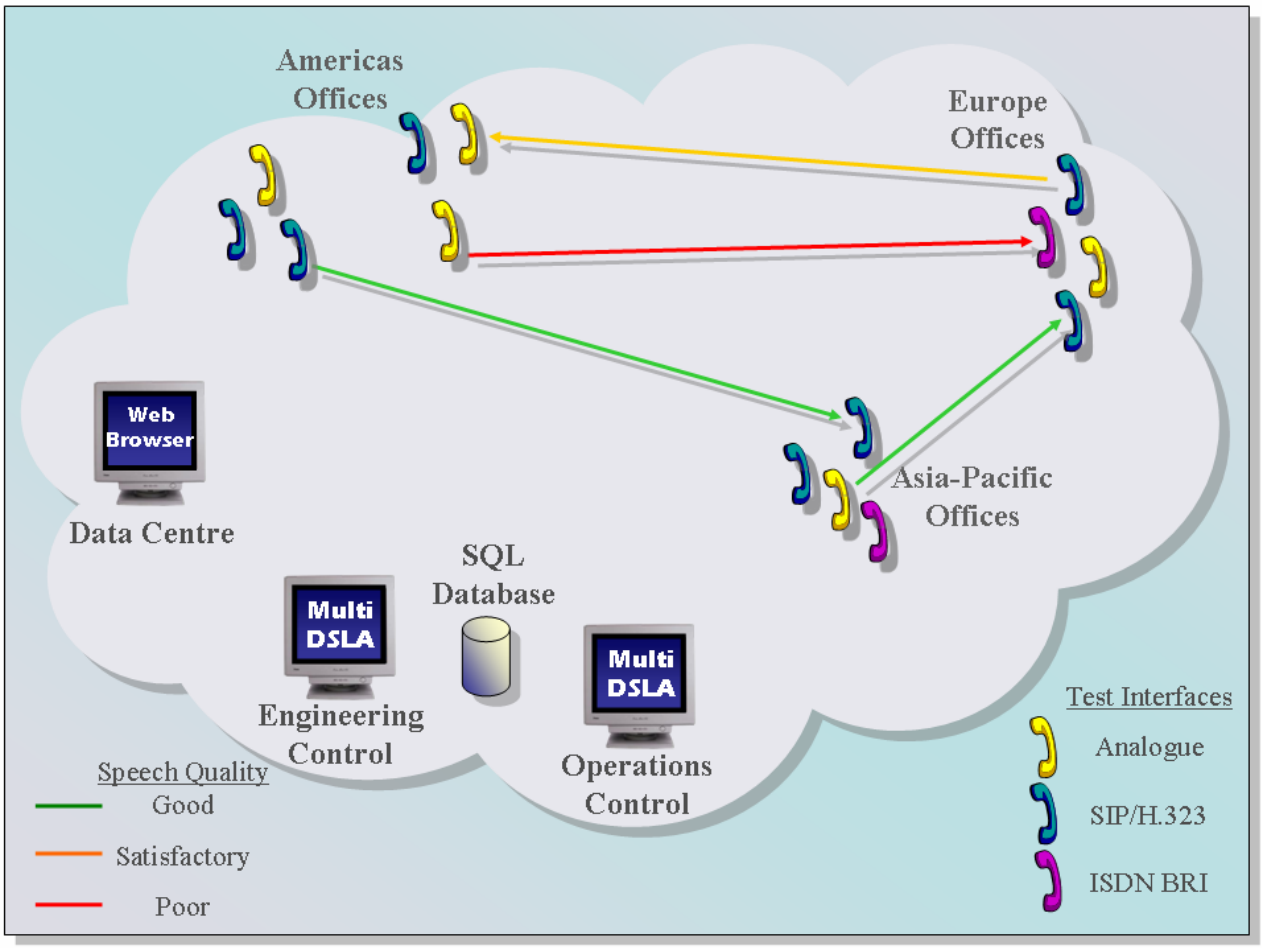
MultiDSLA



Measuring Network Performance

The Business Case for Network Performance Measurement

MultiDSLA is a highly scalable solution for the measurement of network speech transmission performance to meet the needs of Corporate Enterprises, Network Operators, Service Providers, System Integrators and Equipment Developers.

MultiDSLA is a versatile system which combines powerful network-wide testing with simple to use management tools. For the first time, the Network Manager has the tools to assess voice network performance which truly represent users' experiences in large or small networks by delivering objective performance data.

MultiDSLA sets up calls and makes measurements between any end points in the voice network. Tests occur according to a pre-defined schedule or on demand with a simple to use graphical representation of the network. Comprehensive speech performance testing has never been this quick, simple and free of test design errors.

Voice communications systems delivering poor or erratic quality of service can have a significant negative impact on corporate image, customer satisfaction and employee productivity.

Voice/data convergence, packet transmission techniques and the use of compression codecs can all bring cost benefits which are too easily lost when performance is not optimised. **MultiDSLA** equips you to manage Quality of Service, powerfully and effectively.

Trusted Malden Electronics measurement know-how is now delivered in a versatile system which combines powerful network-wide testing with simple-to-use management tools. For the first time, the Network Manager has the power to identify voice network performance parameters which truly represent *users' experiences*. Users know when they are not satisfied with quality of service but often cannot articulate usefully about the speech quality they experience.

MultiDSLA is a revolution in voice network management which delivers objective performance data.

- Modular, scalable architecture
- Fast set-up and deployment
- Top-level management reporting with web browser access
- Full detail drill down to core measurements and analysis
- Meaningful *real world* assessment of performance
- Dedicated or shared control
- Simple integration into existing management systems

Product Overview

MultiDSLA – a new generation of network and equipment test systems incorporating the best features of the two channel DSLA and adding many new capabilities.

MultiDSLA offers unrivalled ease of use and will perform the most complex test processes.

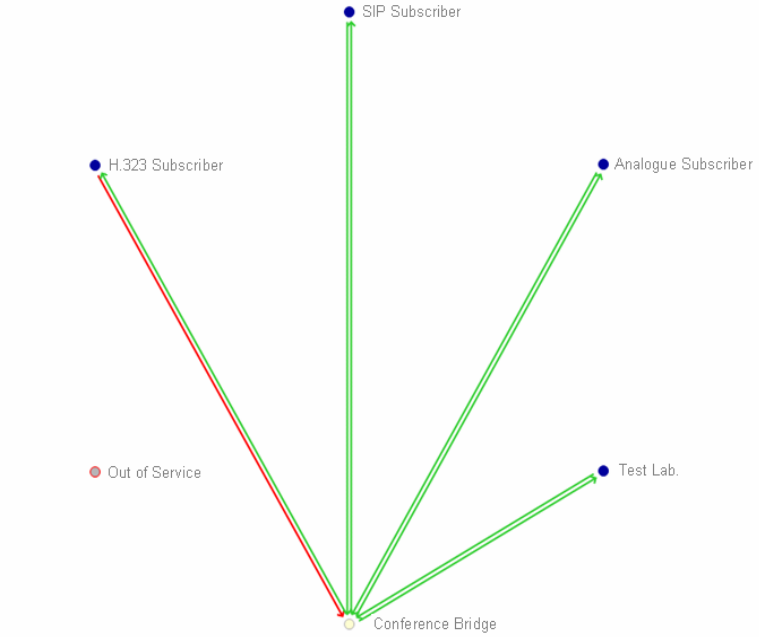
- Controls many endpoints or nodes simultaneously including DSLA channels, VoIP Virtual Terminal and ISDN BRI nodes
- Measurements can include uncontrolled endpoints such as Conference Bridges, PBX and IVR systems
- Generates any speech at any level through any node
- Measures speech level, noise, delay and speech quality
- Generates and analyses DTMF sequences
- Summarises Results and drills down to the details of a single measurement
- Completely characterises network or device performance
- Sophisticated Test Manager controls the automation of network testing for different users
- Task Editor creates and configures tests

Test Methodology

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 getting as close as possible to 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 (DSLAII) has two high quality analogue ports which connect to PSTN/PBX lines, the handset ports of telephone instruments, including IP phones, or at four-wire level. Distributing DSLAIIs around the network, under the control of the **MultiDSLA** application, offers the best available measure of end-user experience.

A VoIP Virtual Terminal (VVT) can be used at strategic network locations as a reference SIP or H.323 phone. The VVT is a software application which is placed at a node in the VoIP network and controlled by **MultiDSLA.**

Tests performed between a physical terminal and a VVT can help to localise speech performance problems by effectively segmenting the speech transmission path. Calls between VVT's can track performance changes in the infrastructure.



MultiDSLA brings a new concept in the evaluation of Conference Bridge performance. Many calls can be placed from the different types of nodes to the Bridge. Automatically, the speaker node rotates through each node with all the other nodes listening and measuring. The results build confidence in the Conference Bridge capability to support network translation from SIP to analogue, ISDN to H.323.

Tools for the analysis of DTMF signals, for speech filtering and equalisation and for detailed analysis of speech performance are part of system. The Performance Examiner provides essential information to codec and DSP developers as well as network integration engineers.

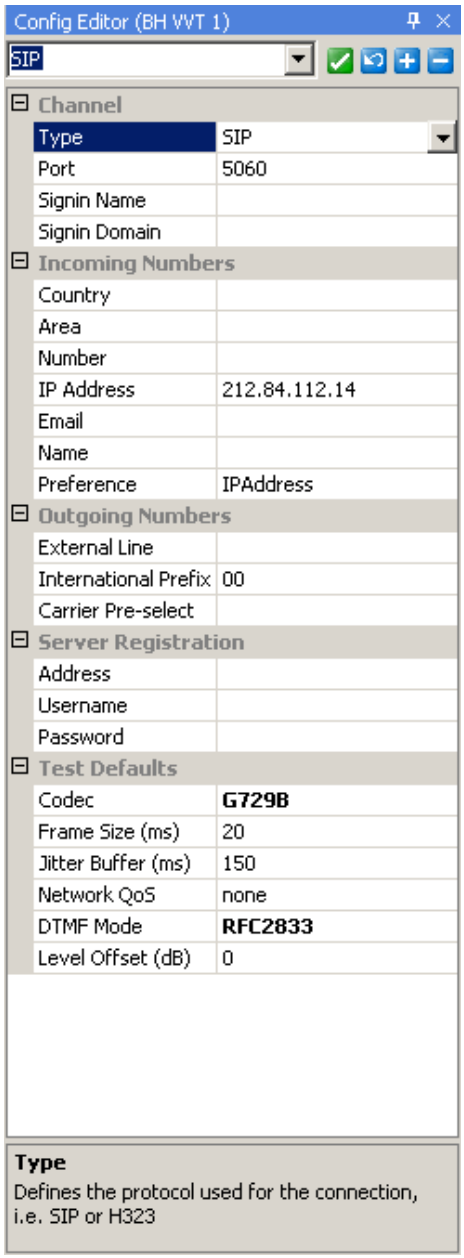
The Minimum Network Test System for VoIP comprises a DSLA and a pair of VVTs. Calls between DSLA channels, perhaps connected via an IP Phone handset, will correlate well with the end user experience. Calls between VVTs yield useful data about the capability of the network to support speech traffic under various load conditions. Calls from VVT to a DSLA segment the network to help identify problems and assess the effectiveness of solutions.

A more complex configuration might include ten DSLAs and 20 VVTs. Distributed around key sites in the Enterprise; these nodes are constantly testing and reporting the network performance. Configurable alarms identify when and where problems are emerging. Results analysis yield service level data to help control costs.

Alternatively, the more complex configuration can be employed in the development laboratory or System Integrator test facility to assess the performance of new designs, software releases or vendors. Evaluation of Conference Bridge performance, simulating many participants with different access networks, is simply achieved in the **MultiDSLA** user interface. Analysis of results by codec or access network is easily prepared.

MultiDSLA will scale to support many nodes. The limitation is only in the processing power of the PCs running the application, SQL server and Metrics Processor. A large Enterprise network might include 200 sites around the world with one or more nodes at each site. Several **MultiDSLA** applications can reserve access to the nodes for different purposes at different times. Key operations personnel can override reservations and take over resources to address immediate issues. Day-to-day measurement programmes continue as background tasks providing assurance that service level agreements are being met and that end-users continue to experience good quality communications. Trend reports, by node or by group of nodes, show the onset of service deterioration in a particular area before it becomes a crisis. Detailed analysis and focused testing will help fault diagnosis, repair and service restoration.

Initiating a Test



In its simplest form, a quick test is initiated when the user draws lines between the nodes on a screen. The test can be quick or lengthy, immediate or deferred, isolated or repeated. The user is prompted to specify the test process. Tests of great complexity can be defined in a few clicks of a mouse.

The **MultiDSLA** SQL database holds detailed information about each node in the network. The node information defines the network access to that node, so that when the user initiates a test the called node data is used to set up the call from the calling node.

One node can have many different configurations, for example; SIP or H.323, several codecs and various jitter buffer sizes for a VVT node; local and international telephone number information, handset and IP phone number for a DSLA node.

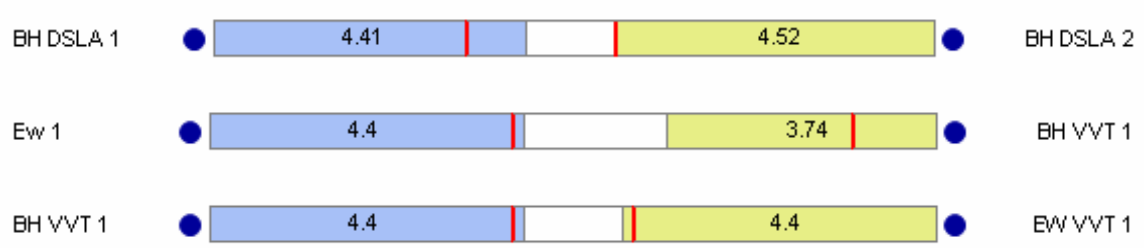
Support for Conference Bridge evaluation includes simultaneous multiple network access definition along with user defined access code, PIN and waiting periods.

Results

MultiDSLA provides a comprehensive set of tools for the generation, management, display, remote viewing, logging, summary and detailed analysis of results.

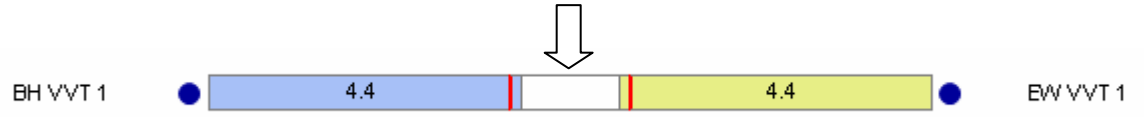
Users have widely varying priorities for results.
Developers typically require a critical and detailed view of many aspects of speech performance - this is provided by the **MultiDSLA** graphical results presentation and further enhanced by the Performance Examiner option.

Network operators typically require a statistical analysis, with emphasis on patterns of performance over different periods.



MultiDSLA allows the user to configure results presentation to meet specific requirements, selecting from a range of options for logging, setting limits, handling exceptions and generating alarm messages. Summary, Exception, Connection and Trend Reports are immediately available within the application or remotely over any convenient IP connection.

The new Perceptual Expectation Gap™ view of the speech quality between end points offers a convenient way to compare performance across different network technologies or against Service Level Agreement requirements.



Alarms

Parameters which can be assessed include listening quality, speech level, noise level, delay, delay variation and echo, as well as user-defined measures such as “post-dial delay”. Thresholds can be set so that an “exception” occurs when a measurement is above or below a specified threshold. Exceptions are noted in the results database and can be reviewed for a selected range of nodes and a specified period of time.

The **MultiDSLA** user may define any number of alarms. Each alarm may specify up to three exceptions, a number of violations, a time interval and the node(s). An alarm can be signalled to the user by an automatic email transmission, and/or an SNMP message.

Alarms may be reset manually or automatically. Automatic reset occurs when the system considers that the alarm condition has been cleared. The alarm is then allowed to fire again when the alarm conditions are next met.

Managing and Planning Tests

MultiDSLA incorporates an advanced Test Manager. This is automatically programmed to initiate tests immediately or at regular intervals. Tests can be planned by users at particular times of day or at some frequency of recurrence out into the future. The **MultiDSLA** will reserve the resources and will start the tests even if the original user is no longer logged on to the system.

Resource reservation conflicts are flagged as soon as the Test Manager schedules the user’s plan. The hierarchical user structure permits key users, such as Operational staff, to override less important user reservations.

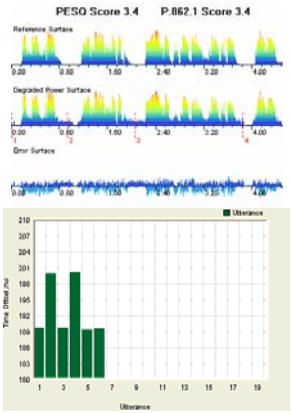
Creating New Tests

The Task Editor creates and modifies the test processes so that different parameters of the network can be investigated more thoroughly. Connection Check, Quick Quality Check, Full Quality Check and Engineer Evaluation Tasks are included in the **MultiDSLA** application. These can be easily modified in the Task Editor to develop variations that will better characterise some aspect of network or equipment performance.

Pedigree & History

Originally launched in 1997 to meet the needs of the 'voice over data' revolution, the DSLA has been continuously developed and enhanced, evolving into DSLAII, a state of the art measurement system for speech performance assessment. The specialisation of Malden Electronics in this field has enabled it to respond rapidly to customers' requirements, resulting in a system of unparalleled precision, capability and flexibility. It has become the reference measurement system for many organisations in applications ranging from core technology development to network operations. **MultiDSLA** combines this same measurement technology with a very powerful set of management tools.

DSLA is used in the research, development, acoustic and test laboratories of telecommunication equipment manufacturers, supporting development and testing of VoIP, GSM, UMTS, DECT, TETRA/TETRAPOL and VoDSL terminals, media gateways, echo cancellers, integrated access devices, PBX equipment and telephone switches. DSLA is used in product evaluation and system selection laboratories as well as in the installation, maintenance and Quality of Service (QoS) departments of network operators and service providers.



DSLA measures the mean active speech level according to ITU-T P.56 and performs ITU-T P.862 (PESQ) objective speech quality scoring plus improved MOS prediction according to ITU-T P.862.1.

Malden Electronics' technology enables the DSLA to generate speech signals at any defined level, and to measure mean active speech level, noise level, peak signal level and activity factor. In addition to speech level measurements and speech quality scores, DSLA offers key speech performance indicators in numerical and graphical form, essential for the analysis of distortions in the degraded voice signal caused by noise, codec distortion, voice activity detector (VAD) performance or network impairments such as delay, packet loss, jitter buffer behaviour and echo. **MultiDSLA** brings a new technique - the Perceptual Expectation Gap™ - to users to help understand the way different communications paths exceed or fall short of Service Level Agreements and design objectives.

Telephone, Handset and 4-wire Balanced analogue interfaces are incorporated into the two-channel DSLA terminal. These can be used alone or in conjunction with a variety of optional digital interfaces including ISDN BRI and SIP/H.323 test agents, providing a measurement capability between many types of physical and virtual network end points.

Specifications and Features

PC minimum specification:
1.4GHz Pentium Processor, 512MB memory, 1024 x 768 screen resolution, 10M Ethernet, Windows XP Professional

System Configuration

Test Nodes and Devices

DSLAII: Two analogue Nodes
VVT: H.323/SIP Reference Soft Phone. Windows 2000/XP application. One Node.
ISDN BRI: Windows 2000/XP application. Two Nodes.
Phantom Node: Network Device with no **MultiDSLA** control and no measuring point. Used to represent IVR, PBX and Conference Bridge.

System Scaling

Nodes: 100's (depending on number of simultaneous tests required)

Controller (**MultiDSLA** User Interface application): – 1-32.

MS SQL Database: Can be configured to reside on the **MultiDSLA** Controller PC or on an independent server.

Remote Report Access: Access from any number of remote PC's via web browser.

Minimum Network Test System (supports two simultaneous tests): DSLAII, 2 x VVT, User Interface with PESQ, Performance Examiner, DTMF Analysis, Equaliser, Codec Library, Remote Report Access

Pre-defined Tests

Connection Test – confirms the presence of a speech path between two Nodes.

Quick Quality Check – runs two speech quality tests in each direction.

Full Quality Check – assesses speech quality through several tests in each direction using a wide range of speech sounds and measures delay.

Engineer Evaluation –performs a thorough speech quality test using a wide range of speech sounds at different levels and measures delay.

Reports – available locally through the Controller and remotely via a web browser interface.

In all reports the user can select the Nodes and time interval of interest

Summary - Histogram representation of principal measurements, with Pass/Fail indication

Exceptions – Listing of measurements which have exceeded user-defined thresholds

Connections – Graphical presentation of MOS and delay measurements between nodes, showing the Expectation Gap™.

Trend - Histogram representation of principal measurements showing trends over time.

Main Control System Utilities

Test and Reservations Manager – schedules and runs tests, reserves Nodes and flags conflicts.

Alarms Manager – sets alarm conditions and generates alarm outputs.

User Management – maintains a hierarchical password structure to set priorities and permissions.

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