Malden MultiDSLA

A new generation of network and equipment test system delivering professional standards of measurement across a wide range of applications.

The Business Case for Network Performance Measurement

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 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.

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
• Local and remote operation
• 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 analogue, VoIP, ISDN BRI and PRI 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
• Can be controlled remotely with MultiDSLA Remote User - see separate leaflet

WHAT IS IT?

A professional test system which measures the end-to-end user experience of any telephone system.

Outstanding performance/cost ratio
Short learning time
Flexible and scalable architecture
Unattended or manual operation
Wide range of applications

MultiDSLA

Multi-node
+ Multi-test
+ Multi-user
= Scalable for any application

BENEFITS

MultiDSLA provides reliable standards-based data for:

Service Level Agreements (SLA)
Fault-finding / diagnostics
Benchmarking
Trend monitoring

From the laboratory to the network, from high-level performance statistics to detailed diagnostics: MultiDSLA is the trusted solution for all speech performance requirements.

MultiDSLA is a 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 in a way which truly represents users’ experiences in large or small networks.

LAB
• Interactive test creation
• Fully flexible test design
• Highest accuracy
• Extensive analysis
• Immediate feedback
• Scenario testing
• Test automation

ENTERPRISE
• Management Reports
• Unattended operation
• Small learning curve
• Alerts on problem
• Standard tests
• Affordable and scalable
• NMS integration

NETWORK
• NMS integration
• Central scheduling
• Central maintenance
• Multi-tier user support
• Quick and easy to use
• Web reports

ON THE ROAD
• GPS for location and synchronisation
• Low power requirement
• Interface to cell phones
• Support for missing control network

MANUFACTURING
• Repeatable testing
• No training to run a test
• Database of all tests
• End of day reports
• TCL/Perl/Python remote access control
Applications

MultiDSLAs are in use throughout the world for evaluating speech transmission performance. These are just some application examples:

- **Terminal development**
- **Network element development**
- **VoIP, cellular, TDM, analogue: all transmission technologies**
- **Regression testing**
- **SIP Phone test bed**
- **Conference bridge testing**
- **Wireless handset comparison**
- **UMA performance and handover analysis**
- **Speech quality optimisation in all speech networks**
- **Vendor selection**
- **Enterprise SLA validation**
- **Speech quality/load evaluation**
- **Echo simulation and cancellation analysis**
- **Drive test GSM**
- **Competitive comparison of cellular networks or terminals**
- **Drive test PMR/Tetra**
- **Train communications**
- **Codec evaluation**
- **DSP performance measurement**

**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 (DSLAI) 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 DSLAIs around the network, under the control of the MultiDSLAl application, offers the best available measure of end-user experience.

A VoIP Virtual Node (VN) can be used at strategic network locations as a reference SIP or H.323 phone. The VN is a software application which is placed at a node in the VoIP network and controlled by MultiDSLAl. Tests performed between a physical terminal and a VN can help to localise speech performance problems by effectively segmenting the speech transmission path. Calls between VN’s can track performance changes in the infrastructure.

MultiDSLAl 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 handling multiple codecs, protocols and analogue connections.

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 Examinier 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 VN’s. Calls between DSLA channels, perhaps connected via an IP Phone handset, will correlate well with the end user experience. Calls between VN’s yield useful data about the capability of the network to support speech traffic under various load conditions. Calls from a VN to a DSLA segment the network to help identify problems and assess the effectiveness of solutions.

A 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 MultiDSLAl user interface. Analysis of results by codec or access network is easily prepared.

MultiDSLAl 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 MultiDSLAl 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 detection, 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, single 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 MultiDSLAl 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 VN 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.
Objective measurement technologies

Objective speech quality testing is one of the few truly generic measurement technologies in telecommunications. From codec development to enterprises and from core technology providers to service providers - indeed wherever speech signals are processed or transmitted - the measurement of speech performance is essential.

User focus

Traditional measurements relate to concepts which are obscure to the user - examples are speech bandwidth and packet loss. These mean nothing to the average telephone user and may not even be relevant to the user's experience in making a telephone call. By contrast, MultiDSLA's objective speech quality measurement focuses on what is important to the human being, using the Mean Opinion Score (MOS) scale of 1 to 5 which expresses how users perceive speech quality:

1 - Bad
2 - Poor
3 - Fair
4 - Good
5 - Excellent

Tests made to and from the very edge of the network - where the user sits - ensure that the measurements really do represent the user experience.

Extremely sensitive

It is important to realise that the MOS scale is not limited to integer values. MultiDSLA returns values to two decimal places and so indicates even very small variations in performance - variations which individually may not even be noticeable but which may prove to be significant.

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.

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 cut 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 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 and 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.

DSLAs are 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 installa-
THE NEED FOR HIGH QUALITY TEST INTERFACES

The concept of “end-to-end” measurement of speech performance carries with it the ideal of “perfect” test terminals, introducing no noise, distortion or delay. Whist a perfect test terminal cannot be achieved it is important to get as close as possible, since any degradations introduced by the terminals will affect the accuracy of measurement.

MEASUREMENTS

Key performance indicators include:
- Speech quality score (ITU-T Rec. P.862 PESQ, narrow- and wide-band models)
- Received speech level (ITU-T Rec. P.56)
- Received noise level
- Echo level
- Delay and delay variation
- Post-dial delay
- Jitter, RTP & RTCP
- Packet loss, RTP & RTCP
- DTMF performance
- Call success rate
- Conformance to Service Level Agreement values (SLA)

Specifications and Features

PC minimum specification:
- 1.4GHz Pentium Processor, 512MB memory, 1024 x 768 screen resolution, 10M Ethernet, Windows XP Professional, Windows Server 2003, Windows Vista Business or Ultimate (2GB memory recommended for Vista)

System Configuration

Test Nodes and Devices

DSLAII: Handset and Telephone Line ports. Two analogue Nodes.
ISDN PRI: Windows 2000/XP/Vista application. 30 Nodes (E1), 24 Nodes (T1).
Phantom Node: Network Device with no MultiDSLA control and no measuring point. Used to represent IVR, PBX and Conference Bridge.

Support for VN


System Scaling

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

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

Remote User Access: Access from remote PC’s via web browser - see MultiDSLA Remote User leaflet.

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

Supported Standards

ITU-T P.56
ITU-T P.862, 862.1, 862.2

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 and echo.

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.