Agilent RouterTester

IS-IS Protocol Software

E7856A

Technical Datasheet

Agilent's ISIS Protocol Software provides realistic Internet-scale routing simulation for comprehensive verification and stressing of routers and networks.

- Testing data and control plane technologies
- Functional and stress testing
- Wire speed traffic generation
- Packet capture and measurement
- Multi-protocol environments

Agilent Technologies

Key Features

- Simulate real-world environments
- IS-IS Traffic Engineering
- Reliable LSP flooding
- Flexible, Powerful Scripting
- Realistic Internet-scale routing simulation

Product Overview

The IS-IS Protocol Software provides unprecedented realism to protocol testing by emulating and measuring the impact of dynamically flooded Link State changes on the forwarding performance of a gigabit or terabit router. The IS-IS Traffic engineering extensions are also supported for MPLS testing; this enables you to propagate traffic engineering information into your network.

By emulating IS-IS sessions, the IS-IS Protocol Software builds a realistic autonomous system around the router or network under test. Any number of Link States with a flexible range of attributes can be flooded into the router (or network) under test, building immense and complex forwarding tables within these devices.

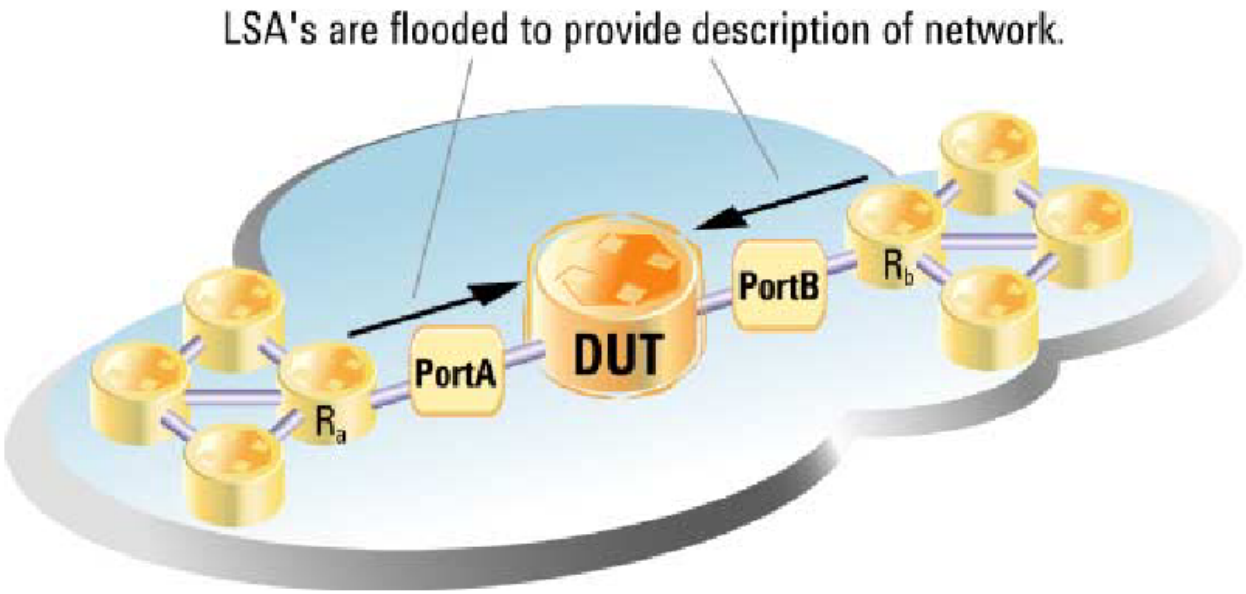
Typical test scenario

A typical test scenario is shown below

- Network topologies are simulated behind ports A & B
- LSPs are sent from Router A into the device under test (DUT)
- Router B verifies that the device under test correctly floods the routes to Router B
- Router A can send information destined for a point behind Router B. It is then possible to test that the DUT has learned the new routing information.

With RouterTester you are able to verify forwarding capabilities:

- You can also follow this test up with sending traffic at wire speed and can measure the forwarding performance including throughput, latency and loss.



Product Features

Simulate real-world multi-protocol environments

By offering a comprehensive range of control protocols the QA Robot and Router Tester enables you to simulate real-world routing conditions. LSPs can be inserted and withdrawn to simulate dynamic topology changes. This presents rapidly changing routing criteria to the system under test, allowing you to examine the ability of the DUT to calculate routing and forwarding tables under high stress conditions. Also, using a combination of multiple interface cards, our BGP-4 and OSPF Software and various TCP, UDP and HTTP traffic generation can be configured to simulate complex real-world conditions.

IS-IS Traffic Engineering

The IS-IS Protocol Software is equipped with the IS-IS Extensions for Traffic Engineering to work within your MPLS domain. This enables you to run the tests to ensure that the traffic engineering attributes, generated by your simulated router, are being propagated throughout your network correctly and efficiently.

Reliable LSP flooding

A single LSA or a complete LSA database can be continuously flooded to simulate network instabilities, rigorously stressing the ability of a router to forward packets during link state changes.

Topologies can be updated and expectations set up to verify that appropriate routes are selected based on the applied stimulus. Failures or successes can be reported for a series of test scenarios. Proper interaction of Level-1 and Level-2 routers, generation of reachable address information and associated routing may be exercised and verified.

Flexible, Powerful Scripting

Automated scripts are quickly created using the Tcl/Tk and QBOL scripting environments. With only a few lines of code, thousands of networks are easily advertised from simulated peers on any or all ports.

Realistic Internet-scale routing simulation

Thousands of ISIS nodes can be simulated behind every port at the same time as sending and receiving traffic, allowing you to automatically establish and maintain adjacencies for a large number of neighboring nodes on a broadcast sub-network.

Additional Capabilities of the RouterTester

The RouterTester expands the test capabilities of the QA Robot by providing the wire-speed traffic generation required when measuring the forwarding performance and functionality of IP routers.

Generate wire speed traffic

The RouterTester with IS-IS emulation provides unprecedented realism to router testing by emulating and measuring the impact of dynamically flooded link-state packet changes on the forwarding performance of a gigabit or terabit router. Working in conjunction with the IP performance application, the data forwarding performance of a router can be measured while simultaneously flooding LSAs to it. The ability of a router to withstand LSA flooding as well as the time it takes for a router to converge on new routes can be precisely measured. How much user data is lost when a link is taken up and down? By benchmarking a network or router using more realistic tests, a router will function and perform reliably, when deployed in an operational network.

Protocol Conformance Suites

An optional IS-IS conformance test suite is also available. This test suite will test for compliance to the relevant IETF RFCs and internet-drafts.

Online Help

An extensive online help system provides complete descriptions and detailed usage instructions. Dialog-level context-sensitive help provides rapid access to the relevant sections of the online help. A technology reference section provides a complete library of background information pertaining to gigabit and terabit router performance testing.

Applicable Standards:

- IS-IS: ISO/IEC 10589: IS-IS intra domain routing protocol
- IP Extensions: IETF RFC-1195: Use of OSI IS-IS for Routing in TCP/IP and Dual Environments
- IS-IS Traffic Engineering Extensions: Draft_ietf_isis_traffic_02.txt

Acronyms

API	Application Programming Interface
ASBR	Autonomous System Boundary Router
CIDR	Classless Inter Domain Routing
GUI	Graphical User Interface
IETF	Internet Engineering Task Force
IP	Internet Protocol
LSA	Link State Advertisement
LS	Link State
LSA	Link State Authorization
LSP	Link State Packet
NBMA	Non-Broadcast Multi Access
NLRI	Network Layer Reachability Information
OSPF	Open Shortest Path First
POS	Packet Over SONET/SDH
RFC	Request for Comments
SDH	Synchronous Digital Hierarchy
SUT	System Under Test
SONET	Synchronous Optical Network
TE	Traffic Engineering
Tcl	Tool Command Language
Tclsh	Tool Command Language shell
TCP	Transmission Control Protocol
Tk	Toolkit
TLV	Type-Length-Value objects

Technical Specifications

This section contains the features of the IS-IS Protocol Software that are accessible using the GUI and Tcl/TK scripting environment. Simple point and click actions enable you to dynamically change the environment being tested. Also, for our power users we have included features accessible using the QBOL language.

	QA Robot	RouterTester
Adjacency Capacity	Up to 230 adjacencies per port	
Router types supported	Level-1, Level 1/2 and Level 2 Only	
Messages Supported	IIH (LAN and Point-to-Point), CSNP, PSNP, LSP, ISH	
Network Type Supported	Point-to-Point, Broadcast and NBMA	

User Defined header generation (IIH, CSNP, PSNP, LSP, ISH)

IS-IS Packet Headers are generated automatically for each simulated router. The user for the automatically generated IIH, CSNP, PSNP, ISH and LSP packets may assign the following parameters.

	QA Robot	RouterTester
Area list	Hex String	
System ID	6 bytes or IP Address	
MAC address	6 bytes	
Pseudonode ID	Optional, <0-255> default 1	
Local circuit ID	Optional, <0-255> default 255	
Priority	Optional, <0-127> default 0	
Metrics	Optional default metrics; delay, expense, and error <0-63>, default value 1 for default metrics, 0 for all other metrics	
Max Area Addresses	Optional, <0-255> default 0	
Adjacency Hold Time	Optional, <0-255> default 20 seconds	
Maximum LSP Age	Optional, <0-65,535> default 1200 seconds	
Protocols Supported	Optional, hex string, default absent	
IP Address List	Optional, default absent	-
IP Reachability	Optional, IP Address List, default absent	-
Link Authentication	Optional, default absent	-
Area Authentication	Optional, default absent	
Domain Authentication	Optional, default absent	

*Key fields are mandatory and have special significance for verification of variable length fields.

Adjacency Initiation

IS-IS adjacencies are established and maintained with the following control parameters. All fields are optional, with the indicated defaults. All fields are optional, with the indicated defaults.

	QA Robot	RouterTester
Capability	L1, L2, L2-only, default L2	
IIH Interval	0-255, default 5 seconds	
Designated router IIH Interval	0-255, default 1 second	
Minimum LSP generation interval	Default 30 seconds	
Maximum LSP generation interval	Default 900 seconds	
LSP transmit interval	Default 5000 ms	
CSNP interval	Default 10,000 ms	
PSNP interval	Default 2 seconds	
Zero age duration	Default 60 seconds	

LSP Insertion/Verification

Header Fields

Programmatically specified LSPs may be inserted into the tester database and flooded to the SUT at any time. The following PDU header fields may be specified for any inserted LSP. The database may be verified at any time for the presence of LSPs using the same format used for insertion.

	QA Robot	RouterTester
Type	*Key Field, Level 1, Level 2	
Remaining Lifetime	Optional, <0-65,535> default 960 seconds	
Sequence Number	Optional, <0-4, 294,967,296> default 1	
Protocol Discriminator	Optional, <0-255> default 0x83	
Header Length	Optional, <0-255> Default 27	
Version/Protocol Extension	Optional, <0-255> default 1	
ID Length	Optional, <0-255> default 6	
Version	Optional, <0-255> default 1	
Reserved Header Field	Optional, <0-255> default 0	
Maximum Area Addresses	Optional, <0-255> default 0 (3 addresses)	
PDU Length	Optional, <0-65,535> default calculated	
Source ID	*Key Field, 6 bytes or IP Address	
Pseudonode ID	*Key Field, <0-255>	
LSP Number	*Key Field, <0-255>	
Checksum	Optional, <0-65,535> default calculated	
P_ATT_DBOL_ISTYPE	Optional, default set by type	

LSP Insertion/Verification Variable Length Fields

Verification of variable length fields can take advantage of LSP aggregation according to the Key Fields (defined in the table above) in the LSP Header. In this manner, the aggregate LSP database of a system under test can be examined, rather than looking exclusively at single LSPs.

	QA Robot RouterTester
Area List	Optional, hex string, default absent
L2 designated IS	Optional, 6 bytes or IP Address, default absent
IS neighbour list	Optional, list of 6 byte ID's or IP Address, default absent
ES neighbour list	Optional, list of 6 byte ID's of IP Address, default absent
Prefix neighbour list	Optional
Protocols supported	Optional, hex string, default absent
IP address list	Optional, code, type, password, default absent
Authentication information	Optional, code, type, password, default absent
Internal Reachability Information	Optional, IP Address List, default absent
External Reachability Information	Optional, IP Address List, default absent
Inter-domain routing information	Optional, hex string, default absent
TLV Field	Optional, repeated expression, default absent
Router ID TLV	Type 134
Extended IP Reachability	Type 135
Extended IS Reachability	Type 22

Dynamic Capabilities

The following parameters can be changed at run time to dynamically alter the characteristics of an established adjacency or to keep a given entry in the LSP database alive.

QA Robot RouterTester
IIH Interval
Circuit type
Area address assignment
MAC address assignment
Priority
Auto LSP generation enable
Auto update inserted LSP
Set database overload bit

State Verification

The following adjacency states may be verified for both the IS-IS Protocol Module State Machine or for a given neighbour

QA Robot RouterTester
Up Normal
Up Designated Router
Wait Normal
Wait Designated Router
Initializing
Down

Statistics

Statistics can be displayed and saved for running sessions independently for Level 1 and Level 2 connections. Update intervals can be specified in seconds, with a minimum of one second. Numerical, graphical and snapshot save to file representations are available.

Inbound/Outbound Statistics		
	QA Robot	RouterTester
Circuit Type	Broadcast or Point-to-Point	
Status	Current Link State (down, init, 2-way, exstart, exchange, loading and full)	
Hello PDU Count	Number of Hellos	
Dbd In/Out Count	Number of Dbd	
LSP In/Out Count	Number of Router LSA transactions	
CSNP In/Out Count	Number of Network LSA transactions	
PSNP In/Out Count	Number of Summary-3 LSA transaction	

Global Statistics		
	QA Robot	RouterTester
LSP Database Size	Number of currently stored LSPs	
Statistic	Definition	

Statistics

Statistics can be displayed and saved for all types of LSAs of a running session. Update intervals can be specified in seconds, with a minimum of one second. Numerical, graphical, and snapshot save to file representations are available.

Inbound/Outbound Statistics		
	QA Robot	RouterTester
Circuit Type	Broadcast or Point-to-Point	
Status	Current Link State (down, init, 2-way, exstart, exchange, loading and full)	
IP Address	Router IP Address	
Hello Count	Number of Hellos	
Dbd In/Out Count	Number of Dbd	
Router LSA In/Out Count	Number of Router LSA transactions	
Network LSA In/Out Count	Number of Network LSA transactions	
Summary-3 LSA In/Out Count	Number of Summary-3 LSA transactions	
Summary-4 LSA In/Out Count	Number of Summary-4 LSA transactions	
External LSA In/Out Count	Number of External LSA transactions	

Global Statistics		
	QA Robot	RouterTester
LSA Database Size	Number of currently stored LSAs	
Invalid Frames	Count of HDLC frames received with an address field or control field not equal to the preset values, or length too short (i.e. less than or equal to 8 octets)	

Agilent's RouterTester system

Agilent's RouterTester system offers a powerful and versatile test platform to address the evolving test needs of metro/edge platforms, core routers and optical switches. RouterTester provides Network Equipment Manufacturers and Service Providers with the industry's leading tools for wire speed, multiport traffic generation and performance analysis of today's networking devices.

Warranty and Support

Hardware Warranty

Agilent warrants all RouterTester and QA Robot hardware against defects in materials and workmanship for a period of 3 years from the date of delivery. Agilent further warrants that the RouterTester and QA Robot hardware will conform to specifications. During the warranty period, Agilent will, at its option, repair or replace the defective hardware. Services provided under this warranty will normally require return of the hardware to Agilent.

Software Warranty

Agilent warrants all RouterTester and QA Robot software for a period of 90 days. Agilent warrants that the software will not fail to execute its programming instructions due to defects in materials and workmanship when properly installed and used on the hardware designated by Agilent. This warranty only covers physical defects in the media, whereby the media is replaced at no charge during the warranty period.

Software Updates

With the purchase of any new RouterTester system Agilent will provide 1 year of complimentary software updates. At the end of the first year you can enroll into the Software Enhancement Service (SES) for continuing software product enhancements.

Support

Technical support is available throughout the support life of the product. Support is available to verify that the equipment works properly, to help with product operation, and to provide basic measurement assistance for the use of the specified capabilities, at no extra cost, upon request.

Ordering Information

To order and configure the test system consult your local Agilent field engineer.

United States:

Agilent Technologies
Test and Measurement Call Center
P.O. Box 4026
Englewood, CO 80155-4026
1-800-452-4844

Canada:

Agilent Technologies Canada Inc.
2660 Matheson Blvd. E
Mississauga, Ontario
L4W 5M2
1-877-894-4414

Europe:

Agilent Technologies
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P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(31 20) 547-2323
United Kingdom
07004 666666

Japan:

Agilent Technologies Japan Ltd.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
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Latin America:

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www.agilent.com/comms/RouterTester

Specifications subject to change
December 13, 2002.
5980-2062E, Rev E

Agilent Technologies