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Agilent RouterTester

Powered by QA Robot Technology



GbE/4 (SX/LX) Test Module

E7904/7914A

Technical Datasheet

- **Four 1 Gb Ethernet interfaces per test module**
- **Generates and analyzes IP and MPLS packets at up to wire speed**
- **Multi-access networks are emulated using RouterTester's emulation software (BGP-4, OSPF, IS-IS, RIP, RSVP-TE, LDP, CR-LDP)**
- **Realistic Internet-scale routing simulation of BGP-4, OSPF and IS-IS for the comprehensive verification and stressing of routers and networks**
- **IEEE 802.1 p and Q VLAN tag capability**
- **Multi-user remote access**
- **Comprehensive layer 2 and layer 3 capture and analysis/decode tools**

Agilent Technologies

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Product Overview

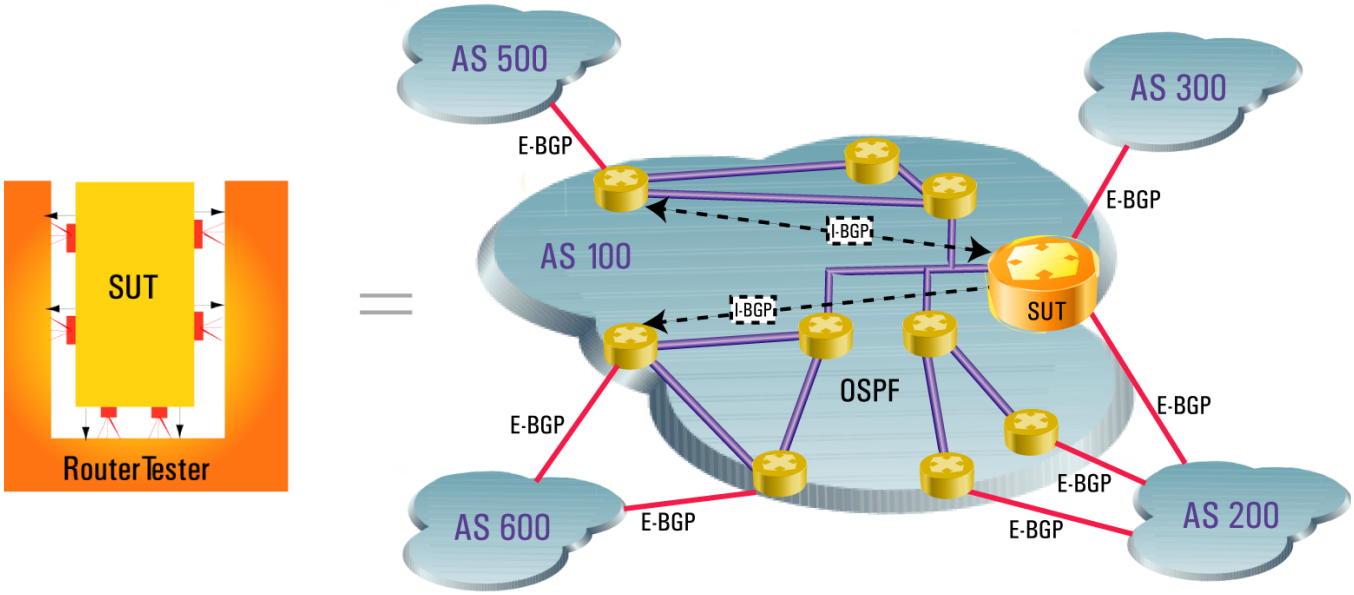
The RouterTester's ability to emulate multiple E-BGP, I-BGP, OSPF and IS-IS sessions creates a realistic network cloud around the System under Test (SUT), providing unprecedented realism to router testing.

Any number of routes with a flexible range of attributes can be advertised into the router (or network) under test, building immense and complex forwarding tables within these devices, which will stress the data forwarding abilities of the router under test.

Working in conjunction with the IP performance application, the data forwarding performance of a router can be measured while simultaneously advertising and withdrawing routes. The ability of a router to withstand route flap "storms" as well as the time it takes for a router to converge on new routes can be precisely measured. Questions such as "How much user data is lost when a route changes?" can be answered. By benchmarking a network or router with realistic tests, a router will function and perform reliably when deployed in the real world.

When using the Gigabit Ethernet module on RouterTester, multi-access networks can be simulated, allowing the creation of multiple peer sessions, making it possible for the data forwarding ability of the Router under test to be measured on an Ethernet segment.

The RouterTester GbE/4 Test module has four 1Gb 1000-base-SX/LX optical interfaces. Each full-duplex port can generate IP packets encapsulated within an Ethernet frame and analyzes received frames in real-time at up to wire speed. Up to 32 modules can be utilized in a single system, providing an unparalleled Internet-scale test solution.



RouterTester can simulate a realistic autonomous system around a router under test

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Product Features

Routing Emulation software

RouterTester emulates the entire core routing protocols that are currently used in networks, enabling a realistic network cloud to be created around the router under test. Working in conjunction with the IP performance software, data forwarding performance is measured while routes are added and removed.

Provides rapid configuration of network addresses

Network addresses are easily defined through the graphical user interface. The user can assign a specific route/routes over a single prefix or automatically assign a number of routes evenly over a range of prefixes. The BGP-4, OSPF and IS-IS Attributes can be easily manipulated to generate 'preferred' and 'alternative' routes.

IP Analysis Software

Each Gigabit Ethernet Port comes with 64 MB of line rate capture. Capture can be started and stopped manually or automatically based on specific events, pattern matches, thresholds or error conditions, allowing the RouterTester's off-line analysis tools to investigate the packets of interest. IP Analysis comes with an extensive suite of protocol decodes (including BGP-4, OSPF, IS-IS).

Statistics

While network instabilities or a route advertisements/withdrawals are simulated, IP packet measurements are monitored using RouterTester's comprehensive and real-time L2 and L3 statistics. Jumbo frames up to 8096 bytes are supported.

IEEE 802.1p and Q VLAN Support

The 1 GbE module also includes support for 802.1p and Q VLAN tagging. With the VLAN enhancements, up to 4095 channels can be emulated on a RouterTester 1 GbE. More than simply inserting a 32-bit VLAN tag between a frame's header and payload, the testing of peering protocols such as E-BGP is also supported over a VLAN channel.

On the transmit side, support is provided for up to 4095 VLAN IDs and up to 8 priority levels. Tags may be inserted explicitly by the user, or automatically by the traffic generator. Mixed tagged and untagged traffic may also be transmitted.

VLAN specific statistics are available in real-time on port, stream, and VLAN-ID bases. Statistics are provided for both transmitted and received VLAN traffic.

Flexible, Powerful Scripting

Automated scripts are quickly created using RouterTester's Tcl/Tk scripting environment. With only a few lines of code, thousands of networks are easily advertised from simulated peers on any or all of RouterTester's ports.

QBOL Support

QBOL Scripts previously developed for the Agilent Technologies QARobot are fully portable to RouterTester.

Protocol Conformance Suites

Conformance test suites are available to ensure compliance to the relevant IETF RFCs and Internet-drafts.

Multi User Remote Access

RouterTester can be controlled via the local system controller, or multiple sessions can be controlled remotely from any PC attached to a corporate LAN.

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.

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Technical Specifications

System Specifications

Physical Interface

Connector	• 4 duplex SC connectors
Optical Interface	• SX Multi-mode – 850 nm receiver – 850 nm Class 1 laser – compliant with specifications for IEEE 802.3z Gigabit Ethernet • LX Single-Mode – 1310 nm receiver – 1310 nm class 1 laser – compliant with specifications for IEEE 802.3z Gigabit Ethernet
Input Sensitivity	• –18.5 dBm (min)
Average Output Power	• –9.5 dBm (min)

Interface operation modes

Terminal	• Transmit and receive interfaces operate independently. Allows line "monitor" mode via optical splitter
Transmit loop-back	• Transmitted data is electrically looped back to the receive interface. The optical receive interface is disabled in this mode
Autonegotiation	• Not supported

Measurement System

Result Types	• Cumulative: measurements are reported from the start of the measurement interval • Sampled: measurements are reported from the most recently completed sampling interval
Measurement Interval	• Range: 1 second to 7 days
Sampling Interval	• Range: 1 second to 1 hour
Measurement Clock	• 10 ns resolution • +/- 0.5 ppm/year clock drift • 3 ppm max. difference between systems
Module Synchronization	• All measurements are synchronized across all modules within the test system

Negative Testing Frames Transmit (Single shot only)

Runt (Ethernet Frame size)	• 9 to 63 bytes
Jumbo (Ethernet Frame Size)	• Up to 65,535 bytes

Real-time Statistics

Real-time Ethernet receive statistics

Frames received	• Count of all frames received, including FCS errors, aborted and invalid frames
Pattern Match	• Count of frames matching specified fields in Ethernet header
Octets received	• Counts of all octets received
Oversize frame	• Count of all frames > 1,528 bytes that were received
MAC control frames	• Count of all MAC control frames received
FCS errors	• Count of all frames received with an invalid FCS
Short frames	• Count of all frames < 64 bytes that were received
Jumbo frames	• Count of all frames received with length between 1528 and 8096 bytes
VLAN frames (octets)	• Count of all VLAN frames (octets) received

Real-time Ethernet transmit statistics

Frames transmitted	• Count of all frames transmitted
VLAN frames (octets)	• Count of all VLAN frames (octets) transmitted

Layer 2 capture/decode

Capture Control	• Trigger, precapture and postcapture against L2 header fields
Encapsulations	• MAC, SAP, SNAP with and without VLAN Tag
Decodes	• VLAN tag, GMRP, GVRP

Mechanical Specifications

Size	• 441 mm (width) x 390 mm (depth) x 44 mm (height)
Weight	• 4.8 kg
Supply voltage	• 100 - 240 Volts AC
Supply frequency	• 50- 60 Hz
Power consumption	• 100 watts maximum
Input current	• < 3.0 amps RMS, measured at 85 VAC
Input protection	• Non-user serviceable, internally located 5 amp, anti-surge AC input line fuse
Inrush current	• 35 amps peak (Vin = 230 VAC, one cycle, 25° C) • current internally limited by thermistor
Power factor	• 0.95 W/VA (per EN61000-3-2)
Rear connectors	• Ethernet: – RJ-45 clock line connectors (input/output) – SMA event lines (input/output) – Twin BNC external trigger (input/external trigger) • Output – BNC

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Front panel LED indicators

Power	• Green when module has power
Status	• Yellow to indicate module start-up • Green to indicate that a test application is running • Red to indicate a module error
Module	• Numerical module indentifier

Port LED indicators

Link	• Green when a valid optical receive signal is detected
Tx	• Green when an Ethernet Frame is transmitted
Rx	• Green when an Ethernet Frame is received

Environmental Operating Conditions

Operating temperature	• 0^{o} C - 55^{o} C
Storage temperature	• -40^{o} C - 70^{o} C
Humidity	• 50% to 95% relative humidity from 25^{o} C - 40^{o} C

Regulatory Compliance

Electrical (Electromagnetic Compliance -EMC)

- As per EN 61326-1:1997: Electrical equipment for measurement control and laboratory use.

Emission standards

- CISPR 11:1992 + A2: 1996 (electrical disturbance): Limits and methods of measurements of electromagnetic disturbance characteristics of industrial, scientific and medical radio frequency equipment. This equipment meets Group 1, Class A limits.
- EN 61000-3-2:1995 / IEC 1000-3-2:1995, Section 2:Limits for harmonic current emissions.
- EN61000-3-3: 1994 / IEC 1000-3-3:1994, Section 3: Limitation of voltage fluctuations and flicker.

Immunity standards

- EN 61000-4-2:1997 / IEC 1000-4-2:1995, Section 2: Electrostatic discharge test.
- EN 61000-4-3:1995 / IEC 1000-4-3:1995, Section 3: Radiated electromagnetic field test.
- EN 61000-4-4:1995 / IEC 1000-4-4:1995, Section 4: Electrical fast transient/burst test.
- EN 61000-4-5:1995 / IEC 1000-4-5:1995, Section 5: Surge immunity test.
- EN 61000-4-6:1996 / IEC 1000-4-6:1996, Section 6: Radiated electromagnetic field test.
- EN 61000-4-8:1993 / IEC 1000-4-8:1993, Section 8:Power frequency magnetic field immunity test.
- Electrical (safety)
- CSA22.2 No. 1010.1, NRTL/C, EN 61010-1:1993 + A2: 1995/IEC 1010-1:1990 + A1: 1992 + A2: 1995 Safety requirements for electrical equipment for measurement, control and laboratory use.
- Optical (Safety)
- Complies with IEC 825/CDRH Class 1, and 21 CFR 1040 - Class 1 Laser Products

Applicable Standards

Optical Transmitter and Receiver	• IEEE-802z Gigabit Ethernet

IP over Ethernet/MAC Layer Specification

Address Resolution Protocol	• IETF RFC 826 An Ethernet Address Resolution Protocol (ARP)

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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
European Marketing Organisation
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,
Tokyo 192-8510, Japan
Tel: (81) 426-56-7832
Fax: (81) 426-56-7840

Latin America:

Agilent Technologies
Latin American Region Headquarters
5200 Blue Lagoon Drive, Suite #950
Miami, Florida 33126
U.S.A.
Tel: (305) 269-7500
Fax: (305) 267-4286

Asia Pacific:

Agilent Technologies
19/F, Cityplaza One, 1111 King's Road,
Taikoo Shing, Hong Kong, SAR
Tel: (852) 3197-7777
Fax: (852) 2506-9233

Australia/New Zealand:

Agilent Technologies Australia Pty Ltd
347 Burwood Highway
Forest Hill, Victoria 3131
Tel: 1-800-629-485 (Australia)
Fax: (61-3) 9272-0749
Tel: 0-800-738-378 (New Zealand)
Fax: (64-4) 802-6881

www.agilent.com/comms/RouterTester

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