Agilent RouterTester

10G/1 Test Module

E7903A/E7913A

Technical Datasheet

- **Enables realistic testing of Gigabit and Terabit routers with OC-192c POS or 10GBASE-W interfaces, throughout development and deployment**
- **Maximizes return on investment, via dual-standard operation**
- **Protects investment and ensures migration path, using a flexible FPGA-based design**
- **Generates and analyzes IP and Ethernet packets at 10Gb/s line rates**
- **Provides functionality and interoperability assurances for:**
  - **SONET/SDH interfaces**
  - **PPP/HDLC interfaces**
  - **10GBASE-EW (and -LW) interfaces**

Agilent Technologies

Product Overview

By benchmarking a network or router with realistic tests, carriers and equipment manufacturers can be assured that the router will function and perform reliably when deployed in the real world. By using RouterTester to characterize the tight interaction that exists between a router control-plane and data-plane, performance limits can be uncovered.

RouterTester's ability to emulate multiple E-BGP, I-BGP, OSPF , IS-IS and MPLS-TE sessions at 10Gb/s line rate creates a realistic 'network cloud' around the System Under Test (SUT), providing unprecedented realism to testing.

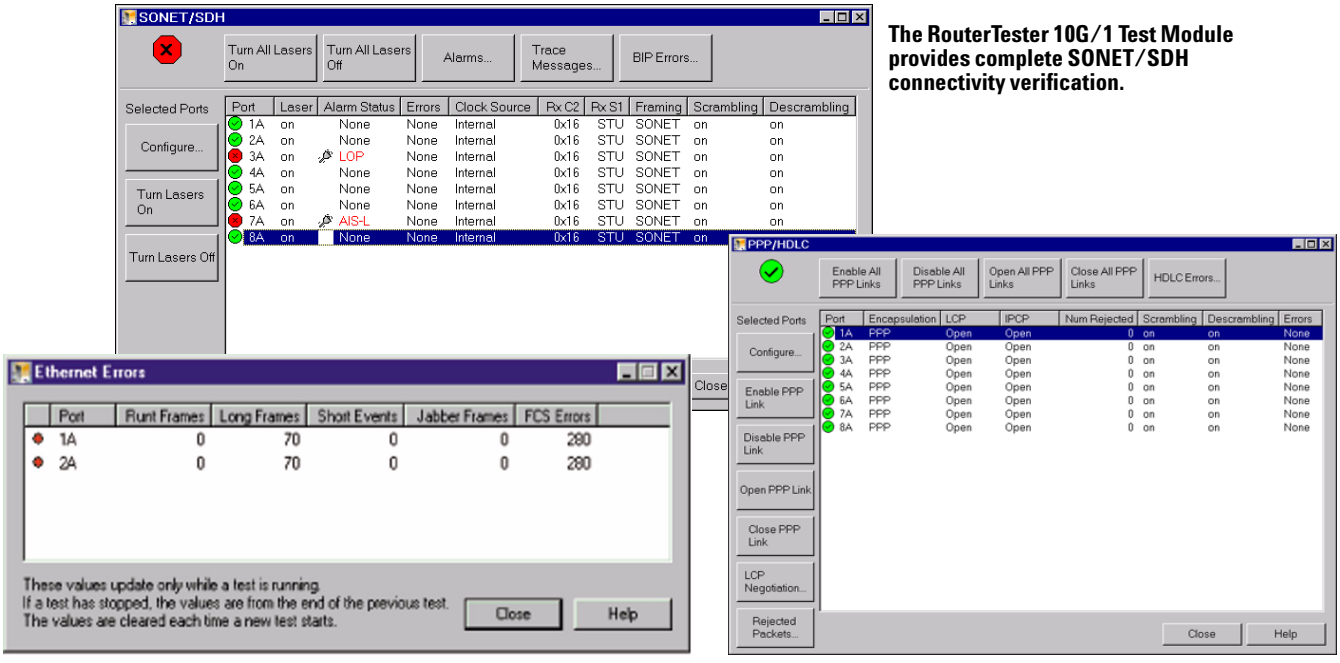
Any number of routes with a flexible range of attributes can be advertised into the router or network under test, building immense and complex forwarding tables within these devices, which will stress the data forwarding abilities of the router under test.

Working in conjunction with the RouterTester 'IP Performance' application, the data forwarding performance of a router can be measured at full line rate while simultaneously advertising and withdrawing routes. The time taken for a router to converge on new routes can be precisely measured, along with the amount of data lost during this 'route flap' process.

Comprehensive transmit and receive statistics at the IP layer, Link layer and Physical layer are available in real-time, tabular and graphical formats. PCS indicators such as block lock and selected bit error counts are also available.

The powerful 'IP-Analysis' application enables off-line data-capture, analysis, graphing and decodes, such that erratic or transient behavior can be diagnosed.

The RouterTester 10G/1 test module has one full-duplex optical port. Each port can generate suitably encapsulated IP packets. Up to 32 modules can be utilized in a single system, providing an unparalleled 'Internet-scale' test solution.



The RouterTester 10G/1 Test Module provides complete SONET/SDH connectivity verification.

Rapid Ethernet and PPP/HDLC verification through the user interface.

Product Features

Dual-standard

The 10G/1 module assumes either an OC-192c / STM-64c POS / SDH or an Ethernet 10GBASE-W mode via a software download at system configuration time. This maximizes the potential of the test equipment and also protects the investment by providing a feature migration path. The dual-standard capability is included in the E7850A 'IP Performance' application which must be ordered with the 10G/1 Module.

(a) Packet Over SONET/SDH

The RouterTester 10G/1 module supports Packet over SONET/SDH, encapsulating IP packets using PPP in HDLC-like framing (as per RFC 1662). It will also support Cisco's HDLC encapsulation of IP packets. The Link Control Protocol (LCP) and IP Control Protocol (IPCP) are supported for parameter negotiation and IP address discovery.

(b) 10GBASE-W (WAN Serial)

The RouterTester 10G/1 module supports the now ratified IEEE 802.3ae standard. Clause 50 of the draft standard describes the WAN Interface Sublayer (WIS), which makes provision for 10Gb/s Ethernet streams to be mapped directly to STS-192c / VC-4-64c streams at the PHY level without the need for higher layer processing.

Wire Speed Transmission and Analysis

In POS mode, all frames can be transmitted and received at up to wire speed, with a minimum of one HDLC flag octet between frames. IP packets can be transmitted and analyzed at up to approximately 25 million packets per second, per port, for packet forwarding performance measurements such as throughput and latency.

In Ethernet mode, all frames can be transmitted with an average IFG of 12 octects, and received with a minimum IFG of five octets as per the IEEE 802.3ae specification. IP packets can be transmitted and analyzed at up to approximately 19 million packets per second, per port, for packet forwarding performance measurements such as throughput and latency.

Synchronized Multi-port Measurements in Real-time

All transmitted packets can be instrumented with a sequence number and transmit timestamp, allowing accurate packet loss and latency measurements. All modules are synchronized via a common distributed clock signal. Comprehensive transmit, receive and error statistics at the IP layer, link layer and physical layer are thus available in real time across all test ports.

SONET/SDH, PPP/HDLC and Ethernet Verification

In order to verify the state of the physical layer, the RouterTester 10G/1 Test Module reports all SONET/SDH alarms and error conditions. Statistics and errored seconds are counted and reported for alarms and BIP errors. At the SONET/SDH interface, access is provided to generate alarms, to manipulate the automatic protection switching bytes (K1/K2), section and path trace messages (J0/J1), and synchronization byte (S1).

To measure the performance of IP encapsulation using PPP in HDLC-like framing, a set of transmit and receive statistics are accumulated. Aborted frames, invalid frames and frames with FCS errors are also counted.

To measure the performance of IP encapsulation using Ethernet framing, a set of transmit and receive statistics are accumulated. Invalid FCS frames, oversize frames and runt frames are also counted.

Routing Emulation Software

RouterTester emulates all the 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 advertised and withdrawn.

Comprehensive and tightly integrated MPLS-TE capability operating at full line rate is also supported. This includes the three essential requirements to properly test MPLS-TE:

(a) Automatic IGP protocol emulation (OSPF or IS-IS, with traffic engineering extensions) to advertise a simulated network topology

(b) Signaling protocol emulation (RSVP-TE) to dynamically establish Label Switched Paths (LSPs)

(c) Ability to send labeled packets on dynamically established paths

Data Capture via 'IP Analysis' Software

Each 10G/1 contains 256MB of line-rate capture RAM Capture can be started and stopped manually or triggered automatically, based on specific events, pattern matches, thresholds or error conditions. This allows the RouterTester's off-line analysis tools to investigate the packets (POS mode), or Ethernet frames (10GBASE-W mode), as well as graphically display the results. The IP Analysis application includes an extensive suite of protocol decodes (including BGP-4, OSPF, IS-IS).

Protocol Conformance and Automation Test Suites

Conformance test suites are available to ensure compliance to the relevant IETF RFCs and Internet-drafts. Automation test suites such as RFC2544 are also available.

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, and customised test scripts are easily developed.

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.

IEEE 802.1Q VLAN Support

The 10G/1 module also includes support for 802.1Q VLAN tagging. With the VLAN enhancements, up to 4095 channels can be emulated on a RouterTester 10G/1. 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 basis. Statistics are provided for both transmitted and received VLAN traffic.

The 10G/1 VLAN functionality is the same as that on the GbE/4 module operating under release 5.x software

Online Help

An extensive online help system provides complete descriptions and detailed usage instructions for every component of RouterTester. 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.

Technical Specifications

System Specifications

The 10G/1 can be factory configured to support either a 1550nm or 1310nm physical interface. Note product part numbers below:

E7913A 1310nm Physical Interface (10GBASE-LW)

Connector	• 1 x simplex SC female connector per Tx, Rx
Optical interface	• 1310 nm single-mode PIN based receiver • 1310 nm Class 1 single mode DFB laser • Compliant with: – Telcordia Technologies GR-1377-CORE (Issue 5, Dec. 1998 - SR-1 short reach OC-192 interface), and – ITU-T G.691 (March, 1999) – IEEE Draft 802.3ae/D5.0
Input sensitivity	• –12.0 dBm (min)
Maximum input power	• 0 dBm
Launch distance	• 2,000 m
Average output power	• 0 dBm (max), –4.0 dBm (min)
Safety	• Class 1 laser • Compliant with: – IEC 60825-1 (2001)

E7903A 1550nm Physical interface (10GBASE-EW)

Connector	• 1 x simplex SC female connector per Tx, Rx
Optical interface	• 1550 nm single-mode PIN based receiver • 1550 nm Class 1 single mode EML laser • Compliant with: – Telcordia Technologies GR-1377-CORE (Issue 5, Dec. 1998 - IR-2 intermediate reach OC-192 interface), and – ITU-T G.691 (March, 1999) – IEEE Draft 802.3ae/D5.0
Input sensitivity	• –14 dBm (min)
Maximum input power	• –1.0 dBm
Launch distance	• 40,000 m
Average output power	• -1 dBm (min), +2 dBm (max)
Safety	• Class 1 laser • Compliant with: – IEC 60825-1 (2001)

Interface operation modes

Terminal	• Transmit and receive interfaces operate independently
Transmit loop-back	• Transmitted data is electrically looped back to the receive interface. The optical receive interface is disabled in this mode
Transmit clock source	• The transmit clock source can be: – Internally generated, – Recovered from the received SONET/SDH signal, or – Generated by an external transmit reference clock

External Transmit Reference Clock

Connector	• Male SMB connector
Nominal Frequency	• 622.08 MHz
Offset range	• +/- 20ppm
Specification	• 0 dBm (nominal) terminated in 50 ohm to ground input (6dBm maximum)

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

SONET/SDH/WIS Layer Specifications

Operating modes	(See module operation modes for detail) • Terminal (normal) • Transmit loopback

Framing Formats

SONET	• STS-192c as per ANSI T1.105.02 1995 and Telcordia Technologies GR-1377-CORE (Issue 5, Dec.1998 - SONET OC-192 Transport System Criteria)
SDH	• STM-192c as per ITU-T Rec. G.707 1996

Scrambling

Frame synchronous scrambler ($x^7 + x^6 + 1$)	• On • Off

Section/Regenerator Section Overhead Octet Generation

A1, A2	• Set to 0xF628 (for all STS-Ns/STM-Ns)
J0/Z0	• In Section Growth mode (Default), J0 = 1 and each Z0 octet set based on position in the STS-N frame (e.g. $Z0_2$=2,... $Z0_{192}$ = 192 for STS-192c) • In Section Trace mode, J0 set to 16 byte message (ASCII string, CRLF terminated), Z0 octet as per Section Growth definition above
B1	• Automatically calculated
E1, F1, D1...D3	• Unused, set to zero
Undefined octets	• Unused, set to zero

Line/Multiplexer Section Overhead Octet Generation

H1...H3	• Automatically calculated, including concatenation indicators
B2	• Automatically calculated (for all STS-Ns)
K1/K2	• User-definable 16 bit field, default zero
D4...D12	• Unused, set to zero
S1	• Least significant 4 bits can be set to predefined values, default zero
Z1, Z2	• Unused, set to zero
M1	• Automatically calculated
E2	• Unused, set to zero
All Other Line Overhead Octets	• Unused, set to zero

Path Overhead Octet Generation

J1	• Can be set to a 64 byte message (ASCII string, CRLF terminated
B3	• Automatically calculated
C2	• Automatically calculated as per framing and scrambling format, or user defined
G1	• Path REI bits are automatically calculated (count of errors from B3); path RDI bits are set as per alarm generation
F2 H4 Z3 (SONET)/F3 (SDH) Z4 (SONET)/K3 (SDH) Z5 (SONET/N1 (SDH)	• Unused, set to zero

Alarms

Alarm detection	• Alarm conditions are detected in real-time • Current alarm status is indicated on the user interface and front panel LEDs • Alarm events are reported in a trace log during the measurement interval • Number of errored seconds is reported per alarm type (count of 1s intervals in which the alarm is detected at least once)
Alarm generation	• Alarm conditions can be invoked, one type at a time
SONET alarm types	• LOS • LOF • OOF • LOP • AIS-L • RDI-L • AIS-P • RDI-P
SDH alarm types	• LOS • LOF • OOF • LOP • MS-AIS • MS-RDI • AU-AIS • AU-RDI

Error monitoring

Section BIP-8 (B1) errors Line BIP-8 (B2) errors Path BIP-8 (B3) errors Line REI (M1) errors Path REI (G1) errors	• Number of occurrences reported • Number of errored seconds reported • Error rate

Overhead Octet Real-Time Decode

Automatic Protection Switching (APS) octets (K1/K2)	• Received 16 bit value is displayed in hex
Synchronization status (S1) value Path signal label (C2) value	• Received octet values are decoded for display
Section trace (J0) message	• Trace messages are decoded and displayed as 16 byte strings (ASCII text, CRLF terminated)
Path trace (J1) message	• Trace messages are decoded and displayed as 64 byte strings (ASCII text, CRLF terminated)

Link Layer Specifications

OC-192c POS Framing

Encapsulation	IP datagrams are encapsulated using: • PPP in HDLC-like framing, as per IETF RFC 1662, or • Cisco HDLC (Ethertype protocol field)
FCS	• 32 bit FCS length • Negotiated between test port and device under test
Frame spacing	• Frames can be transmitted continuously with a minimum one flag octet between frames

PPP	• Supports the Link Control Protocol and the IP Control Protocol • Rejected packets are counted by protocol type • Configurable parameters: • Restart Timer (default 3 seconds) • Max-terminate (default 2) • Max-configure (default 10) • Max-failure (default 5) • LCP negotiation parameters: • Maximum-Receive-Unit (default 1500) • Magic-Number (default is randomly chosen) • FCS (32 bit supported only) • IPCP negotiation parameters: • IP Address
Scrambling/ Descrambling	• $1 + X^{43}$, after HDLC framing. • Scrambling can be enabled or disabled
Minimum frame size	• 13 octets for HDLC, so as to encapsulate a minimum PPP frame size of 6 octets • 29 octets for IP, so as to encapsulate a minimum-IP frame size of 20 octets

HDLC Real-Time Transmit Statistics

Frames transmitted	• Count of total frames transmitted
Maximum frames transmitted	• The maximum sample value measured during the current measurement interval

HDLC Real-Time Receive Statistics

Frames received	• Count of all HDLC frames received, including FCS errors, aborted frames and invalid frames
Maximum frames received	• The maximum sample value measured during the current measurement interval
FCS errors	• Count of HDLC frames received with an invalid FCS
Aborted frames	• Count of HDLC frames that end with the frame abort sequence 0x7D 0x7E
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)

10GBASE-W Framing

	• Fully compliant with IEEE 802.3ae/D3.0
PCS Encapsulation	• Real time 64b/66b
MAC Encapsulation	• Ethernet II (DIX) • IEEE 802.3 LLC SNAP • IEEE 802.3 LLC SAP
FCS	• 32 bit FCS length
Negative Test Frames (Transmit)	• FCS errored • Runt (Ethernet Frame Size < 64 bytes) • Long (Ethernet Frame Size > 1518 bytes, with up to 65,535 bytes payload)

PCS Indicators

Block Lock	• Indicates when the PCS has acquired/lost block lock
High Bit Error	• Indicates when the PCS has detected 16 or more bit errors within a 125us timing window
Local Fault	• Indicates when the PCS is receiving a local fault indication
Remote Fault	• Indicates when the PCS is receiving a remote fault indication
Bit Error Count	• Count of bit errors received over a measurement interval
Bit Errored Seconds	• Count of seconds in which bit errors have been detected
Block Error Count	• Count of block errors received over a 100ms period
Block Errored Seconds	• Count of seconds in which block errors have been detected

Ethernet Real-Time Transmit Statistics

Tx Ethernet Frames	• Frames successfully transmitted, including broadcast frames and multicast frames. Not including long frames or FCS errored frames.
Max Tx Ethernet Frames	• Maximum "Tx Ethernet Frames" transmitted during a sampling interval
Tx Ethernet Octets	• A count of data and padding transmitted in "Tx Ethernet Frames".
Max Tx Ethernet Octets	• Maximum "Tx Ethernet Octets" transmitted during a sampling interval
Tx Ethernet Throughput (Mb/s)	• Rate at which Ethernet payload was sent in a sampling interval
Max Tx Ethernet Throughput (Mb/s)	• Max rate which Ethernet payload was sent during a sampling interval
VLAN Frames	• Count of VLAN Frames received
VLAN Octets	• Count of VLAN Octets received

Ethernet Real-Time Receive Statistics

Rx Ethernet Frames	• Frames successfully received, including broadcast frames and multicast frames. Not including long frames or FCS errored frames.
Max Rx Ethernet Frames	• Maximum "Rx Ethernet Frames" received during a sampling interval
Rx Ethernet Octets	• A count of data and padding received in "Rx Ethernet Frames".
Max Rx Ethernet Octets	• Maximum "Rx Ethernet Octets" received during a sampling interval
Rx Ethernet Oversize Frames	• A count of well-formed frames received that exceed 1518 octets (excluding framing bits, but including FCS octets)[3]

Rx Ethernet Runt Frames	• A count of frames which have an Octets count less than 64
Rx Ethernet Invalid FCS Frames	• A count of received frames that do not pass the FCS check. (Excludes long or short frames)
Rx MAC Control Frames	• A count of MAC Control frames received
Rx Ethernet Tput (Mb/s)	• Rate at which Ethernet payload was received in a sampling interval
Rx Jabber Frames	• Received frames more than 1518 octets in length with a FCS error[3]
VLAN Frames	• Count of VLAN Frames received
VLAN Octets	• Count of VLAN Octets received

Mechanical Specifications

Module Details

Size	• 441 mm (width) x 390 mm (depth) x 88 mm (height)
Weight	• 7.0 kg
Supply voltage	• 85 to 264 Volts AC only
Supply frequency	• 47 to 63Hz
Power consumption	• 363 watts maximum
Input current	• Less than 4.5 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

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 identifier
Laser	• Red when output laser is on
Signal	• Green when a valid optical receive signal is detected (opposite of LOS condition) • Flash green when External clock reference is not detected
LOF/LOP	• Yellow when a Loss of Frame or Loss of Pointer condition exists at the receiver
AIS/RDI	• Yellow when a Line/MS AIS, Line/MS RDI, Path AIS or Path RDI condition exists at the receiver
Tx	• Green when a HDLC frame or Ethernet frame is transmitted. Does not indicate integrity of the transmitted SONET SPE.
Rx	• Green when a HDLC frame or Ethernet frame is received. Indicates integrity of the SONET SPE and HDLC framing.

Environmental Operating Conditions

Operating temperature	• 0^{o} C to 45^{o} C
Storage temperature	• -40^{o} C to 70^{o} C
Humidity	• 50% to 95% relative humidity at 5^{o} C to 40^{o} C

Regulatory Compliance

Electrical (Electromagnetic Compliance - EMC)

- As per EN 61326-1:1997 + A1:1998 / IEC 61326-1:1997 + A1:1998 Electrical equipment for measurement, control and laboratory use
- EMC Directive 89/336/EEC (including 93/68/EEC)

Immunity standards

- EN 61000-4-2:1995 / IEC 61000-4-2:1995 + A1:1998, 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 61000-4-11:1994 / IEC 1000-4-11:1994, Section 11: Voltage dips, short interruptions, voltage variations immunity test

Emission standards

- CISPR 11:1990 / EN 5501:1991 (electrical disturbance): Limits and methods of measurement 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
- EN 61000-3-3:1994 / IEC 1000-3-3:1994, Section 3: Limitation of voltage fluctuations and flicker

Electrical (safety)

- IEC 61010-1:1990 + A1:1992 + A2 :1995 / IEN 61010-1:1993 + A2:1995, Canada: CSA C22.2 No. 1010.1:1992 (including amendment 2: 1997: Safety requirements for electrical equipment for measurement, control, and laboratory use
- Low voltage directive 73/23/EEC

Optical (safety)

- Complies with IEC 825/CDRH Class 1, and 21 CFR 1040 - Class 1 Laser Products

Applicable Standards

Optical transmitter and receiver	• Telcordia Technologies GR-1377-CORE (Issue 5, Rev. 2, Dec. 98 - SR short reach / LR long reach OC-192 interface specification) • SDH STM-64c as per ITU-T Rec. G.691 (March, 1999) • IEEE Draft 802.3ae/D5.0
SONET/SDH	• SONET STS-192c as per Telcordia Technologies GR-1377-CORE (Issue 5, Rev. 2, Dec. 98 - SR short reach / LR long reach OC-192 interface specification) • SDH STM-64c as per ITU-T Rec. G.707 (March, 1996)
Packet Over SONET/SDH	• IETF RFC 2615, PPP over SONET/SDH
PPP/HDLC	• IETF RFC 1662, PPP in HDLC-like Framing
Link Control Protocol	• IETF RFC 1661, The Point-to-Point Protocol (PPP)
IP Control Protocol	• IETF RFC 1332, The PPP Internet Protocol Control Protocol (IPCP)
Address Resolution Protocol	• IETF RFC 826 An Ethernet Address Resolution Protocol
IP IEEE 802 Networks	• IETF RFC 1042

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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.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
1-877-894-4414

Europe:

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07004 666666

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www.agilent.com/comms/RouterTester

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