

Agilent RouterTester

Optical Control Plane Analysis Software

E5170A

Technical Datasheet



The Agilent E5170A Optical Control Plane Analysis Software allows developers of Intelligent Optical Internet devices and networks to capture and decode optical control plane protocols across multiple ports.



Agilent Technologies

Key Features

- **Accelerate the development and integration of O-UNI and GMPLS optical control plane software**
- **System testing of optical switches, wavelength routers, Terabit IP routers, MSPPs, ATM switches, and SONET/SDH ADMs**
- **Interoperability testing to the emerging industry specifications**
- **Service Provider evaluation of Intelligent Optical Network technologies and products**
- **Trouble-shooting of core optical networks during network installation, maintenance, and field service**

Product Overview

New signaling and routing protocols are adding intelligence to the evolving all-optical network core. When additional bandwidth is needed, optical network edge devices such as IP routers and Multi Service Provisioning Platforms request the dynamic provisioning of optical circuits across a mesh of optical switches.

Agilent's Optical Routing Test Solution is the world's first test solution specifically designed to help make Intelligent Optical Internet products and networks reliable, robust, and scalable.

The Agilent E5170A Optical Control Plane Analysis Software is the cornerstone of Agilent's Optical Routing Test Solution. It offers comprehensive real-world testing of the optical control plane, allowing developers of Intelligent Optical Internet devices and networks to:

- Capture and decode optical control plane protocols across multiple ports
- Capture and analyze APS, BLSR and other proprietary protection and restoration protocols

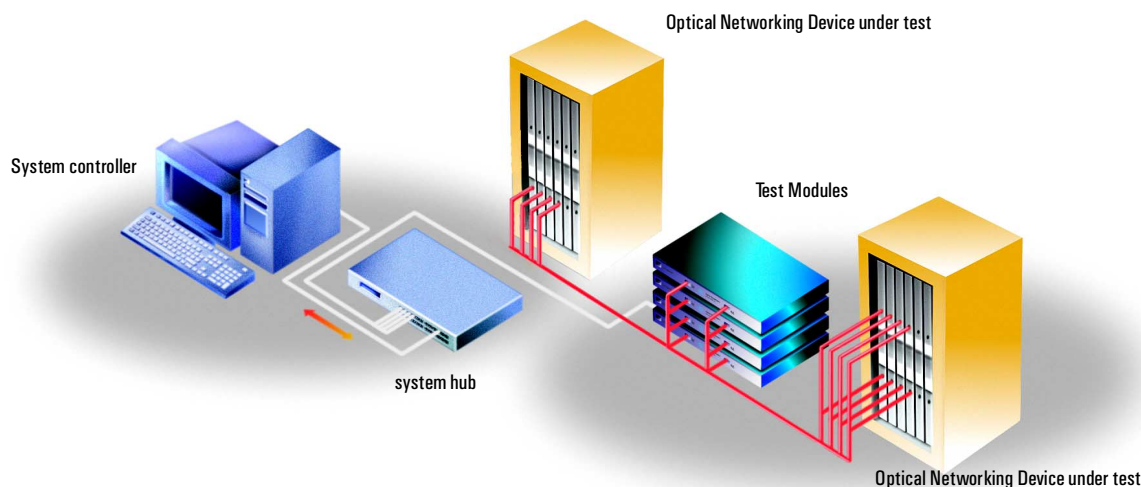
Both standard and proprietary protocols can be tested "in-band", encapsulated

over SONET/SDH Transport Overhead bytes.

This tool provides powerful capture control, decode and analysis capabilities, enabling you to:

- Capture protocol transactions and investigate interworking issues in detail
- Trigger and filter on different protocol events
- View detailed protocol decodes, including industry-standard optical control plane protocols

Multi-layer protocol decodes of captured data can be used to drill-down and thoroughly understand and debug protocol interactions in the Intelligent Optical Network



The system controller manages up to 32 test modules

Product Features

In-band protocol analysis

A user-configured TOH mask allows almost any of the SONET/SDH TOH bytes to be defined as the "in-band" control channel. Protocol messages detected within the "in-band" control channel are captured and comprehensively decoded up through the protocol layers. Developers can quickly identify problems at any layer of the protocol stack.

- Bit-oriented HDLC decoding
- Supports PPP, LAPD or pure HDLC layer 2
- Configurable SONET/SDH selection
- Select any combination of TOH bytes as the control channel
- Line/Section DCC, and Extended Line/Section DCC support

Out-of-band protocol analysis

Control Plane messages can be transported between optical network devices via an Ethernet interface, defined as "out-of-band" control channel. "Out-of-band" support is provided on the Gigabit Ethernet interface. Control plane messages detected on the "out of band" channel are captured and comprehensively decoded up to the message layer.

Multiport synchronized capture

SONET/SDH Transport Overhead (TOH) bytes can be captured and correlated across multiple ports. Bidirectional protocol exchanges are displayed with each packet accurately timestamped. All capture ports are synchronized to a common clock, enabling you to view message exchanges in correct sequence, debug protocol timing problems and correlate message flows through a network.

- Line rate capture of up to 4 GB of captured data
- Time correlated across up to 64 ports

Comprehensive optical decodes

An extensive range of protocols can be decoded, including the industry-standard and evolving optical control plane protocols

- GMPLS protocols - includes extensions to RSVP-TE, CR-LDP, and OSPF
- LMP protocols
- OIF UNI Signaling protocols
- ODSI Q-UNI protocols, including Signaling, Address Registration, and Service Discovery message sets
- OSRP - Optical Signaling and Routing Protocol

Protocol implementations can be checked for errors during development and system testing, and interoperability problems can be located easily. Field Service engineers are able to rapidly trouble-shoot core optical networks.

Hex protocol decodes

Unknown protocols, unrecognized messages and incorrectly-formed message elements are displayed in hexadecimal. This enables faults to be isolated during development and equipment evaluation. Proprietary protocols and extensions to industry-standard protocols are also shown as hexadecimal, enabling rapid development and deployment of new and revised protocols.

Raw TOH byte Capture

Users can define a set of bytes from the SONET/SDH Transport Overhead bytes to be captured and displayed in their "raw" form:

This is ideal for:

- Debugging Layer 2 HDLC framing problems
- Analyzing SONET/SDH protection and restoration schemes, including APS, BLSR, and proprietary schemes.

Pattern matching, triggering and filtering

Up to 8 hardware pattern matchers can be configured to filter or trigger on fields in a message. View only messages of interest by filtering against a pattern, or trigger the capture system to start or stop capturing when a pattern match has been detected.

Capture can be started or stopped either manually or by a start or stop trigger. When capture is set to cyclic mode, the stop event will center in the capture buffer, allowing you to analyze events both before to and after the trigger. Capture triggers enable rapid isolation of faults, as well as synchronization with external events.

Compatible with RouterTester P48/2, 10G/1 and Gigabit Ethernet Test Modules

Analyze bi-directional protocol flows with a single dual-port test module. Stack multiple test modules together to view protocol flows through a network. All test modules are controlled from a single system controller. A single synchronized timing source allows captured data from all modules to be time correlated.

Tcl API

The Tcl (Tool Command Language) based API enables the user to create automated test sequences to set up and control data capture, retrieve and analyse captured data.

GMPLS support

Traffic engineering extensions to both of the MPLS protocols (RSVP-TE and CR-LDP) are fully supported. As more GMPLS and LMP protocols evolve, Agilent will update this application with the latest protocol messages and TLVs (Type-Length-Value encodings). In the interim, proprietary extensions are decoded and displayed in hexadecimal, and developers can program proprietary messages using the Tcl API.

Proprietary Emulation Interface (PEI)

Developers can test their control plane prototypes in an Ethernet environment before integrating to the target platform. PEI provides a method for translating optical control plane messages between the in-band SONET/SDH DCC and out-of-band Ethernet. This functionality is currently supported on the RouterTester P48/2 and 10G/1 Test Modules. There are two flavours; PEI by Routing and PEI by Tunneling. For more information on the implementation of these two modes refer to "The Proprietary Emulation Interface (PEI) - Translating between in-band and out-of-band" Technical Note.

Off line analysis

Capture data can be saved to disk for later analysis. Previously captured data can be loaded and viewed off-line using a stand-alone PC.

Field engineers can capture events and email the capture file to an engineering team for further analysis.

Online help

An extensive online help system provides complete descriptions and detailed usage instructions for every component of this application. Dialog-level context-sensitive help provides rapid access to the relevant sections of online documentation. A technology reference section provides a complete library of background information pertaining to optical control plane testing.

Technical Specifications

Control Channel Mask

The control channel mask is used to identify octets from the SONET/SDH Transport Overhead (TOH) that are used for transporting "in-band" Optical Control Plane messages. Once defined, the test module concatenates selected octets together into a synchronous channel, decodes HDLC frames, and passes them to the capture system for further analysis.

Mask Dimensions:	144 x 9 (OC-48/STM-16c) 3 x 9 (OC-192c/STM-64c)
TOH Bytes Available	Any byte in the Section and/or Line Overhead for all STS (OC-48c/STM-16c) Any byte in the Section and/or Line Overhead for the first STS (OC-192c/STM-64c)

HDLC Receiver

HDLC Decoder	Bit Synchronous HDLC as per ISO/IEC 3309 Fifth Edition 1993-12-15
Frame Check Sequence	16 bit FCS
Maximum Channel Rate:	20.032 Mb/s (OC-48c/STM-16c) 1.04 Mb/s (OC-192c/STM-64c)

Protection Channel Mask

The protection channel mask is used to identify octets from the SONET/SDH Transport Overhead (TOH) that are to be used for transporting protection and restoration messages. These octets are captured without processing, making it suitable for coded HDLC capture. Selected overhead bytes from each captured frame are grouped, timestamped, and stored in capture memory.

Mask Dimensions:	144 x 9 (OC-48c/STM-16c) 3 x 9 (OC-192c/STM-64c)
TOH Bytes Available	Any byte in the TOH for all STS (OC-48c/STM-16c) Any byte in the TOH for the first STS (OC-192c/STM64c)s
Maximum Capture Rate:	82.944 Mb/s OC-48c/STM-16c 1.728 Mb/s OC-192/STM-64c

Capture System

Capture Depth	64MB per OC-48c/STM-16c port 256MB per OC-192c/STM64c port
Capture Rate	Line rate capture of all packets
Timestamp Accuracy	125us

Capture Triggers

Actions	Capture triggers can be used to Start Capture, Stop Capture, or generate an external trigger
Pattern	Up to eight 128 octet-wide pattern matchers, with variable offset, can be used to generate a capture trigger
Module	An external trigger input can be used as a trigger

Pattern Library

Patterns are used for triggers and capture filters. A pattern editor is provided for creating or modifying patterns at the bit level or by protocol field values. Patterns are either pre defined or user-defined.

Pattern	(128 octets)
Mask	(128 octets)

Capture Modes

Single Shot	Stops capturing if buffer fills
Cyclic	Automatically centers stop trigger packet in capture buffer

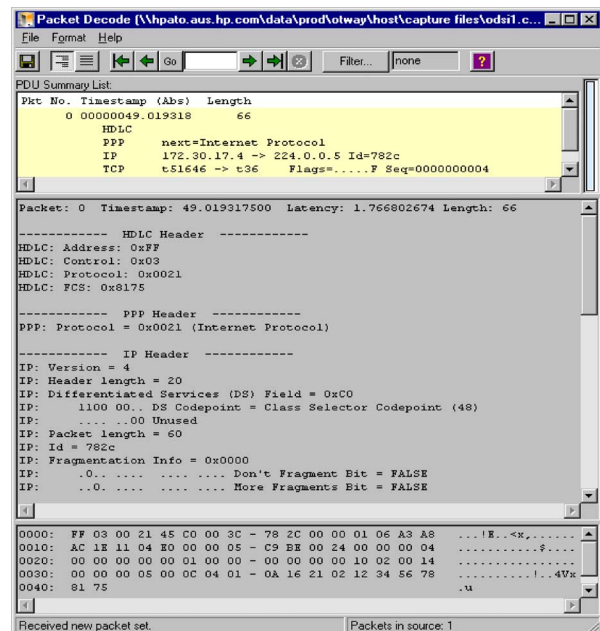
Capture Control

Captures can be started or stopped manually via triggers

Start Capture	(Stop triggers are active)
Start triggered capture	(Start and Stop triggers are active)
Stop Capture	(Immediate Stop)

Packet Decode Viewer

Many protocol decode windows can be opened on one or more capture buffers or files to allow comparative analysis of the data. Each packet decode window shows protocol decodes from a single source (port or file). Both summary and detailed decode views are provided. The summary view shows a brief decode for a window of 100 packets from the capture source. Navigation controls allow rapid movement of the window to anywhere in the capture data.



Protocol Decode window

Decode Summary format options

Mode	Multi-line/single line
Port number	On/Off
Packet number	On/Off
Packet length	On/Off
Timestamp	Absolute/Relative/Interval/Off
Latency	On/Off
Time resolution	µs/ns
Status flags	On/Off

Detail Format modes

Protocol decode
Hex

Navigation controls

First page
Last page
Previous page
Next page
Goto packet number

Filters

Analysis filters can be defined and applied to select only packets of interest and reduce the volume of decode data.

Data Export

Entire capture buffers or selected packet ranges can be saved to disk for later offline analysis. Tabular data can be exported in comma-separated value (CSV) format via the windows clipboard. Protocol decode data can also be selectively exported via the clipboard. Graphs can be printed (in color) to any installed printer.

Decoded Protocols

Cisco	EIGRP	Enhanced IGRP
	IGMP	RFC 2236; Internet Gateway Routing Protocol
	IGMPv2	RFC 2236; Internet Group Management Protocol
	IGRP	Internet Gateway Routing Protocol
IETF - VoIP	MGCP	Media Gateway Control Protocol
	SAP	Session Announcement Protocol
	SDP	Simple Gateway Control Protocol
	SGCP	Session Description Protocol
	SIP	Session Initiation Protocol
IETF - VoIP	H.248	MEGACO IETF MEGACO WG. Voting: Feb '00, ITU-T H

ITU-T
VoIP

H.225.0 Version 2**H.225.0 Version 3
H.235**

H225V3WCM5/99
Security and encryption for H.323
ITU-T H.235 (2/98)

H.245 Version 1

Call Control for H.323 ITU-T H.245
(1996)

H.245 Version 2

Call signaling for H.323 logical
channels; ITU-T H.245 (1997)

H.245 Version 3

Call signaling for H.323 logical
channels; ITU-T H.245 (1998)

H.245 Version 5

Control Protocol for Multimedia
Communication; H245V5WCM16/99

H.261

Video CODEC used in H.323; ITU-T
H.261

H.450.1

Call control for supplementary
services; ITU-T H.450.1 (Sept. 1997)

H.450.2

Call transfer supplementary service
for H.323; ITU-T H.450.2 (Sept. 1997)

H.450.3

Call diversion supplementary service
for H.323; ITU-T H.450.3 (Sept. 1997)

Q.931 (H.225.0 V1)

Signaling for H.323; ITU-T H.225.0
(1996)

RAS (H.225.0 V1)

Registration, Admission, Status for
H.323; ITU-T H.225.0 (1996)

RTCP

Real-time Transport Control Protocol;
RFC 1889

RTP

Real-time Transport Protocol; RFC
1889, RFC 1890

SUN

MOUNT

Mount

NFS Version 2

Network File System; RFC 1094

NIS

Network Information Services

PMAP

Port Mapper

RPC

Remote Procedure Call; RFC 1057

RSTAT

RSTAT

TCP/IP

ARP

Address Resolution Protocol;
RFC 826

ATM ARP**BGP**

Border Gateway Protocol; RFC 1577

BGP-4

Border Gateway Protocol RFC 1771
Multi Protocol Extensions for BGP-4
RFC 2283
Autonomous System Confederations
for BGP RFC 1965
BGP Route Reflection, An alternative
to full mesh IBGP RFC 1966
BGP Communities Attribute RFC 1997
Capabilities Advertisement with
BGP-4 RFC 2842 -
draft-ietf-idr-bgp4-cap-neg-06
Capabilities Label Information in
BGP-4 draft-ietf-mpls-bgp4-mpls-04

CR-LDP

Constraint-Based LSP Setup using
LDP draft-ietf-mpls-cr-ldp

BOOTP

BOOT Protocol; RFC 951

DHCP

Dynamic Host Configuration Protocol

DISP

Dispatching for SNMP; RFC 2572

DNS

Domain Name Service; RFC 1035

DVMRPv3

Distance Vector Multicast Routing
Protocol; Draft v3-08exp8/99

EGP

Exterior Gateway Protocol; RFC 904

Finger

Finger User Information; RFC 1196

FTP

File Transfer Protocol; RFC 959

GGP

Gateway to Gateway Protocol;
RFC 823

GMPLS

GMPLS Signaling
draft-ietf-mpls-generalised-signaling-
xx

Optical Control Plane Analysis Software

TCP/IP (cont.)	GMPLS RSVP	GMPLS extensions to RSVP draft-ietf-mpls-generalised-rsvp-te-xx	TCP/IP (cont.)	PIM-DM	Protocol Independent Multicast - Dense Mode; Draft v2-dm-00
	GMPLS CRLDP	GMPLS extensions to CR-LDP draft-ietf-mpls-generalised-cv-ldp-xx		PIM-SM	Protocol Independent Multicast - Sparse Mode; RFC 2362
	GMPLS OSPF	GMPLS extensions to OSPF draft.kompella.ospf.gmpls.extension xx		RARP	Reverse Address Resolution Protocol; RFC 903
	GTP	General Packet Radio Service (GPRS) Tunnelling Protocol; ETSI EN 301 347 V7.1.1 (2000-01)		REXEC	Remote Exec
	HTTP	Hypertext Transfer Protocol		RIP	Routing Information Protocol
	HTTP 1.1	Hypertext Transfer Protocol Version 1.1		RIP-2	Routing Information Protocol version 2
	ICMP	ICMP Router Discovery Protocol; RFC 1256		RLOGIN	Remote Login; RFC 1282
	ICMP IRDP	Internet Control Message Protocol; RFC 792		RLPR	Remote Print
	ICMPv6	Internet Control Message Protocol version 6, RFC 1885		Routed	Route daemon Protocol; RFC1993
	IP	Internet Protocol; RFC 791		RSHELL	Remote Shell
	IP-SEC	IP-Security Authentication Header; RFC 2402, RFC 2406-9		RSVP	Resource Reservation Protocol; RFC 2205
	RSVP-TE	Extensions to RSVP for LSP Tunnels draft-ietf-mpls-lsp-tunnel-05		RSVP-TE	Extensions to RSVP for LSP Tunnels draft-ietf-mpls-rsvp-lsp-tunnel-05
	IPinIP	Minimum IP Encapsulation; RFC 2004		RWHO	Remote Who; RFC 954
	IPv6	IP Version 6; RFC 1883, RFC 1884		SMB	Server Message Block
	LDAP	Lightweight Directory Access Protocol; RFC 1777		SMTP	Simple Mail Transport Protocol; RFC 821
	LPP	ISO Presentation Services on top of TCP/IP; RFC 1085		SNMP	Simple Network Management Protocol; RFC 1157
	LDP	Label Distribution Protocol draft-ietf-mpls-cr-ldp-03		SNMP-2	Simple Network Management Protocol version 2
	MBGP	Multiprotocol BGP; RFC 2283		SNMP-3	Simple Network Management Protocol version 3; RFC 2271-4
	MIP	Mobil IP; RFC 2002, RFC 2344 and extensions		SNMPv2c	Simple Network Management Protocol Hybrid; RFC 1905
	MOSPF	Multicast OSPF; RFC 1584		TCP	Transport Control Protocol; RFC 793
	MPLS	MPLS Bundle draft.kompella.mpls.bundle.xx		TDS	SyBase Tabular Data StreamSyBase TDS 5.0 Reference
	NetBIOS	NetBIOS		TELNET	Telnet; RFC 854
	NTP	Network Time Protocol; RFC 1119		Teradata	NCR Teradata; NCR,1995
	ODSI	Optical Domain Services Interconnect Coalition ODSI Signaling Protocol ODSI Control Protocol		TFTP	Trivial File Transfer Protocol; RFC 873
	OIF	UNI RSVP Based Upon OIF 2001.152,3,4 document		TIMED	Time Daemon Protocol
	OSPF	Open Shortest Path First; RFC 2328 The OSPF NSSA Option RFC 1587 The OSPF Opaque LSA Option RFC 2370 OSPF with Digital Signatures RFC 2154 QoS Routing Mechanisms and OSPF Extensions RFC 2676 OSPF for IPv6 RFC 2740 Traffic Engineering Extensions to OSPF draft-katz-yeung-ospf-traffic-01 Traffic Engineering Extensions to OSPF Summary LSA draft-fujita-ospf-te-summary-00		TNS	Oracle Transparent Network Substrate Oracle Version 6
	OSRP	Optical Signaling and Routing Protocol		UDP	User Datagram Protocol; RFC 768
				XTP	Xpress Transfer Protocol; XTP Forum Rev. 4 March 1, 1995
				XWIN	X-Windows
			WAN	L2TP	Layer 2 Tunnelling Protocol
				PPP	Point to Point Protocol

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

All RouterTester and QA Robot hardware is warranted against defects in materials and workmanship for a period of 3 years from the date of shipment.

Software Warranty

All RouterTester and QA Robot software is warranted for a period of 90 days. The applications are warranted to execute and install properly from the media provided. 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 system controller 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:

Agilent Technologies
European Marketing Organisation
P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(31 20) 547-2323

United Kingdom
07004 666666

Japan:

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www.agilent.com/comms/RouterTester

