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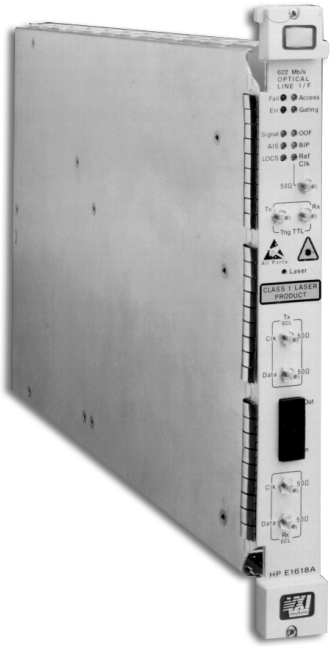
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622 Mb/s Optical Line Interface

Agilent Technologies Broadband Series Test System

E1618A



The Agilent E1618A 622 Mb/s Optical Line Interface (LIF) is a single slot, single port (1 Tx/ 1 Rx) VXI module for the BSTS that provides access to OC-12c/STM-4c devices.

Product Features

- Full-rate 622 Mb/s SONET/SDH generation and analysis
- SONET/SDH transport overhead building, generation, error injection, capture, and save/load
- Alarm generation and detection
- BIP error injection and detection
- Payload pointer stressing
- Trace message generation & capture
- Automatic REI alarm generation
- Graphing and logging of real-time statistics for correlation of multiple measurements
- Tcl and C-scripting automated test environment (UPE)
- Optical and Electrical 622 Mb/s interfaces
- Works with the E1609A 0-622 Mb/s ATM Stream Processor for 2-slot full rate 622 Mb/s ATM traffic testing
- Access to the Agilent E4209B Cell Protocol Processor for signalling and higher layer test (directly or via the Agilent E1609A)

The Agilent Technologies E1618A 622 Mb/s Optical Line Interface provides OC-12c (SONET STS-12c and SDH STM-4c) access to the system under test via SC optical connectors. The LIF is a singe-mode device that can also be used with multi-mode systems when the appropriate attenuator is fitted.

Functionality includes alarm and error generation and detection, as well as extensive testing of line, section, and path overheads.

Payload pointer testing includes pointer stressing and measurement of both loss of pointer synchronization and pointer values. Section and path trace messages can be generated and captured in 16 and 64 byte formats.

External triggers can be used to synchronize transmitter or receiver events to other test equipment or network devices.

All user documentation is provided online, in a web-based format that can be accessed and searched using a web browser.

You can connect the Agilent E1618A LIF directly to the Agilent E4209B Cell Protocol Processor (CPP) for a cost effective signalling test solution at 622 Mb/s.

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Key Features

SONET/SDH Transport Overhead

Create and generate line, section, and path overheads, set invalid values and inject errors to test the limits of system and network performance. You can save the overhead bytes that you build to disk, and reload them to repeat your tests.

Received line, section, and path overheads are displayed and updated once every second. You can take a snapshot and save the captured overhead bytes to disk for further analysis.

Alarms, Errors, and Correlation of Statistics

You can generate SONET/SDH alarms and inject errors to test fault recovery performance and check that your network operation is robust. Bit errors can be simulated by inverting the section, line, and path (B1/B2/B3) bytes.

To help you find and analyze faults, alarms are monitored, and common alarms and indications such as LOF (loss of frame) are also displayed on the front panel using LEDs. Transmission performance can be quantified by counting BIP errors and other metrics, such as the number of seconds of alarm condition occurring during the measurement period.

Real-time statistics, such as received 8 kHz frame count or SPE count, can be measured and logged to disk. These measurements can be reported as errored seconds, event counts, or as error ratios.

Multiple statistics can be graphed simultaneously and updated in real-time, allowing you to correlate statistics to help find the reason for a fault or performance degradation.

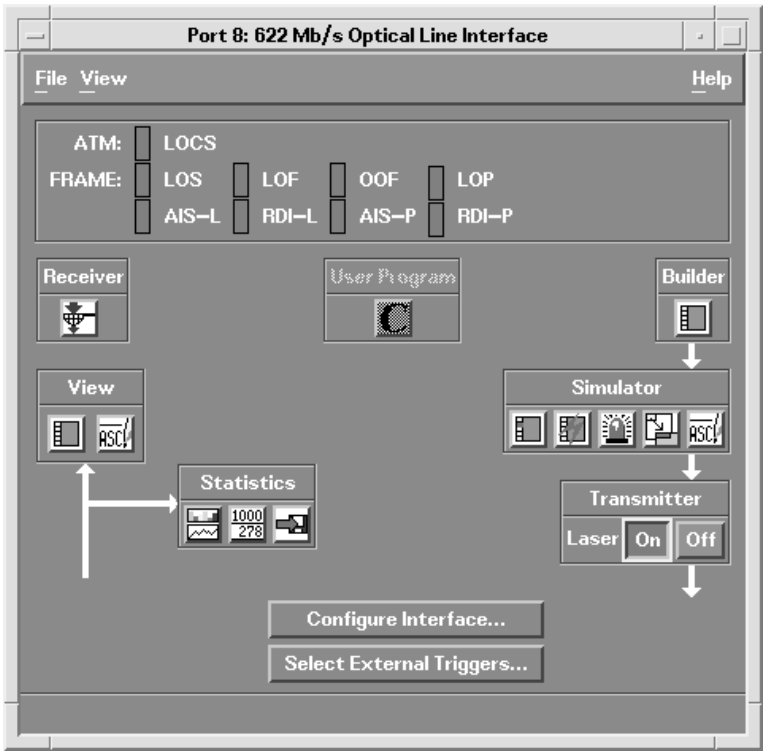


Figure 1: The main control panel for the E1618A.

Payload Pointer

Payload pointer testing includes:

- pointer movement generation
- pointer stressing using invalid values
- detection and measurement of loss of pointer synchronization (LOP)
- real-time measurement of both transmit and receive pointer values

Trace Messages

To help you trace a service or a fault through your network, section and path trace messages can be built and generated in both 16 and 64 byte formats. You can also capture trace messages and view them in either format.

ATM

When ATM cells are generated or received through the line interface, SONET/SDH frame scrambling and descrambling can be enabled or disabled, and single-bit ATM header error correction can be selected.

ATM real-time measurements, such as Bad Header counts and Loss of Cell Synchronization seconds, can be graphed and correlated with physical layer statistics.

User Programming Environment

An Application Programming Interface (API) is provided to enable you with the tools to develop regression tests and automated test suites. Test programs can be built in the industry-standard environment of "C" and Unix. For remote system testing, scripts and user interfaces can be rapidly developed in Tcl/Tk.

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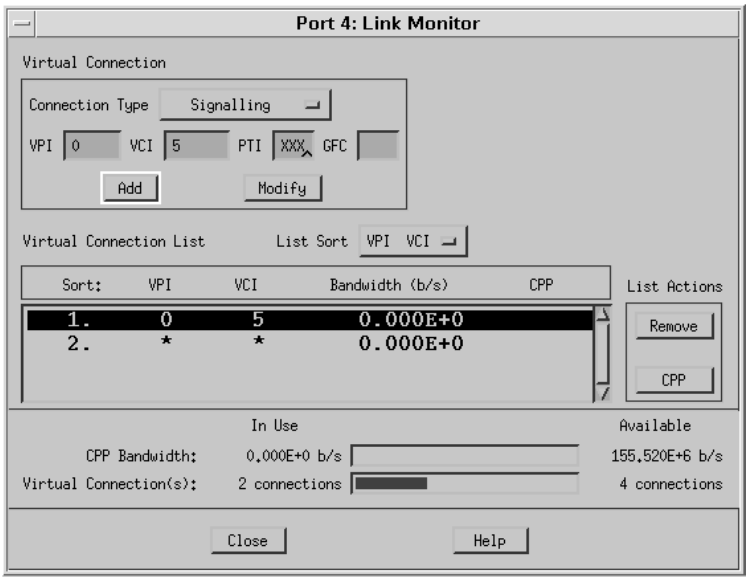


Figure 2: The link monitor of the E1618A 622 Mb/s Optical Line Interface which can be used to pass up to 6 channels to the CPP (E4209B).

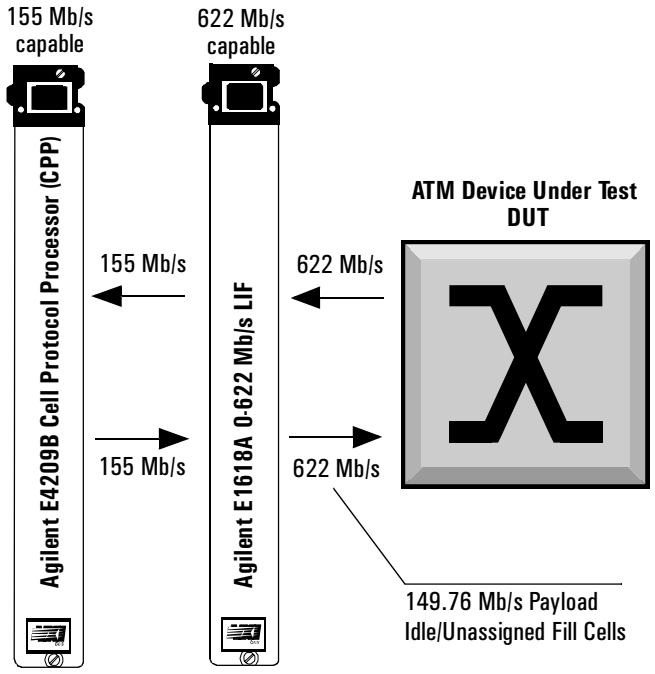


Figure 3: Passing cells to and from the Agilent E1618A 622 Mb/s LIF to the Agilent E4209B CPP.

Higher Layer Analysis

The E1618A LIF shares the BSTS 155 Mb/s cell bus. Modules like the Agilent E4209B CPP, Agilent E4219A ATM Network Impairment Module, and Agilent E6270A OAM Protocol Tester are capable of 149.76 Mb/s generation, impairment and analysis.

The Agilent E4209B CPP can be used to generate up to 149.76 Mb/s of user-defined traffic via the 155 Mb/s BSTS cell bus both in and out of the E1618A 622 Mb/s LIF. Likewise, when receiving full-rate 599.04 Mb/s ATM traffic, you can specify up to 6 channels that can be passed to the E4209B CPP via the Link Monitor (as shown in figure 2) as long as the sum of the bandwidth does not exceed 149.76 Mb/s.

Web-Based Online Documentation

Learning to make the most of an analyzer has never been easier, thanks to the web-based online documentation and context-sensitive help. Occasional users will benefit from the ability to browse and search for a particular feature, and the ability to bookmark a useful reference page. Frequent users are already linking their test plans with protocol specifications and with our task-based help to bring their products and services to market more rapidly.

Configuration and Use With Other BSTS Modules and Applications

Testing OC-12c/STM-4c devices completely and rigorously is why the Agilent BSTS is so popular with equipment manufacturers and service providers worldwide.

In addition to the Agilent E1618A, there is a suite of products available on the BSTS that tailored for your test requirements.

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The following BSTS products can be used in conjunction with the E1618A:

- Agilent E1609A 0-622 Mb/s ATM Stream Processor - for full-rate 622 Mb/s traffic generation and analysis
- Agilent E4209B Cell Protocol Processor (CPP) - to enable SVC-based test scenarios at OC-12c/STM-4c
- Agilent E6270A OAM Protocol Tester - to provide up to 155 Mb/s OAM PM/RM analysis over an OC-12c/STM-4c link
- E4219A ATM Network Impairment Emulator - to impair cell streams up to 149.76 Mb/s over an OC-12c/STM-4c link

The following software products running on the E4209B can also be used:

- Agilent E4214B UNI Signalling Test Software
- Agilent E4215B LAN Protocols Test Software
- Agilent E4217B NNI Signalling Test Software
- Agilent E4223A ATM Policing & Traffic Characterization Software
- Conformance test suites



Figure 4: The Agilent E1609A ATM Stream Processor.

Agilent E1609A 0-622 Mb/s ATM Stream Processor

The Agilent E1609A is a product that takes the BSTS traffic generation and analysis capability to a higher level; removing the shortcomings of the CPP's traffic generation implementation. The Agilent E1609A provides:

- full-rate 622 Mb/s generation and analysis
- generation of ATM and AAL-5 user-defined payloads on up to 16,384 VCs.
- real-time ATM and AAL-5 statistics
- real-time, multi-channel ATM layer QoS
- shaped traffic generation on multiple streams

Legend of Module Abbreviations

LIF	Agilent E1618A 622 Mb/s Line Interface
CPP	Agilent E4209B Cell Protocol Processor
ASP	Agilent E1609A 0-622 Mb/s ATM Stream Processor
OPT	Agilent E6270A OAM Protocol Tester

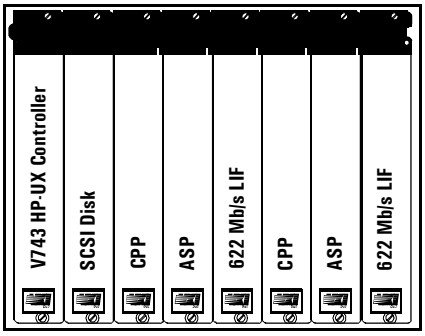


Figure 5: Dual Port SVC Testing with full rate 622 M/s traffic generation.

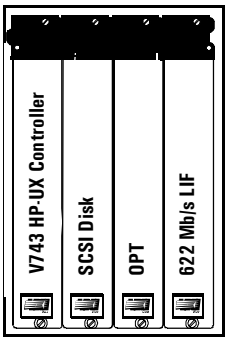


Figure 6: Single Port OAM testing over an OC-12c/STM-4c link.

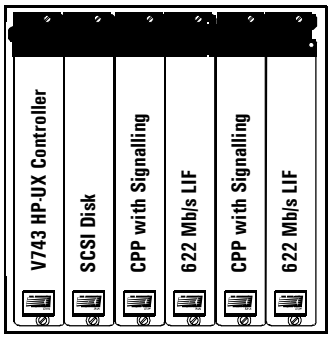


Figure 7: Typical configuration for dual port signalling testing over OC-12c/STM-4c.

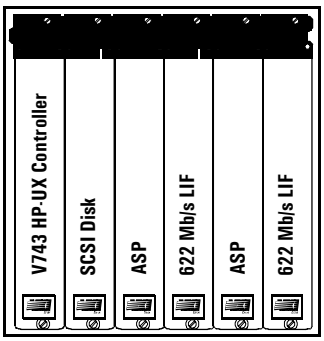


Figure 8: Dual Port PVC testing with full rate 622 Mb/s traffic generation.

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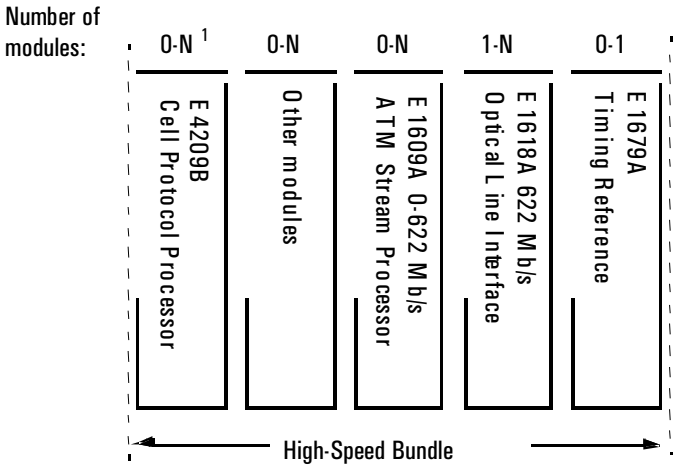


Figure 9: From E1609A ASP software release 1.1, multiple CPP modules can be used to monitor the same traffic received on the low-speed 155 Mb/s cell bus, and to generate and inject traffic onto the low-speed bus up to the bus bandwidth limit of 155 Mb/s (which represents an ATM cell bandwidth of 149.76 Mb/s).

Total Number of Consecutive Modules

The E1618A 622 Mb/s Optical Line Interface and E1609A 0-622 Mb/s ATM Stream Processor (ASP) modules communicate via a high-speed 622 Mb/s cell bus. Up to 3 consecutive modules can operate on the high-speed cell bus.

Traffic generated from the CPP and other modules on the low-speed bus takes precedence over traffic generated from the E1609A ASP. This enables signalling, higher-layer, and variable-rate traffic to be generated from the CPP while using the E1609A ASP to fill the remaining link bandwidth.

Figure 9 illustrates valid module configurations for the E1618A.

The “high-speed bundle” may be placed adjacent to additional high-speed bundles and to other modules, up to the limits of the chassis.

Your local Agilent field engineer will help you select the best test system configuration to meet your needs. Since the Agilent Broadband Series Test System is a flexible and modular ATM/B-ISDN test platform, you can maximize the return on your test equipment investment by selecting a chassis, line interfaces, dedicated hardware modules, and test software that suit your specific needs. Remember that you can always add extra software or modules at any time.

Adapters available for multimode and singlemode systems and connector alternatives

The singlemode E1618A 622 Mb/s Optical Line Interface has SC transmit and receive connectors hardmounted into the VXI card. The majority of OC-12c/STM-4c interfaces on switches today support singlemode transmission and terminate using SC connectors. However, there are some configurations that continue to use the FC/PC and ST type connectors and may also support multimode transmission.

Unlike other BSTS optical line interface cards, it is not possible to remove the optical connector and replace it with the desired type, instead, an adapter and/or attenuator is required. The following list describes the new kits available for the E1618A.

- E5137A SC Attenuator Kit
  Contains one SC 10dB attenuator for customers who need a multimode SC solution.

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Warranty & Support Options

Hardware

All BSTS hardware components are warranted for a period of 3 years. Products must be returned to an authorized Agilent service center for service.

Software

Agilent Broadband Series Test System software and firmware products are supplied on transportable media such as disk, CD-ROM or integrated circuits. The warranty covers physical defects in the media, and defective media is replaced at no charge during the warranty period. When installed in an Agilent Broadband Series Test System, the software/firmware media has the same warranty period as the product.

Product Numbers

E1609A	0-622 Mb/s ATM Stream Processor (ASP)
E1618A	622 Mb/s Optical Line Interface (LIF) with SC Connectors
Opt # UHV	ST Connectors
Opt # UHW	FC/PC Connectors
Opt # UK6	Calibration Certificate
E1537A	
Opt # UHV	ST Connectors
Opt # UHW	FC/PC Connectors
E4200B	BSTS Form-7 Transportable Chassis
E4210B	BSTS Form-13 Mainframe Chassis
E4209A/B	Cell Protocol Processor (CPP)
E5137A	SC Multimode Attenuator

Ordering Information

E4200/E4210B #040

622 Mb/s Real-Time ATM Analyzer Bundle (E1609A, E1618A)

E4200/E4210B #140

622 Mb/s Real-Time ATM Protocol Test Bundle (E4209B, E1609A, E1618A)

E4200/E4210B #140

622 Mb/s Real-Time ATM Protocol Test Bundle (E4209B, E1609A, E1618A)

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SONET/SDH Layer Specification

Formats

Framing Formats

SONET	• STS-12c as per ANSI T1.105 and Telcordia GR-253-CORE (Issue 1, Dec. 94)
SDH	• STM-4c as per ITU-T Re G.708/G.709, 1993

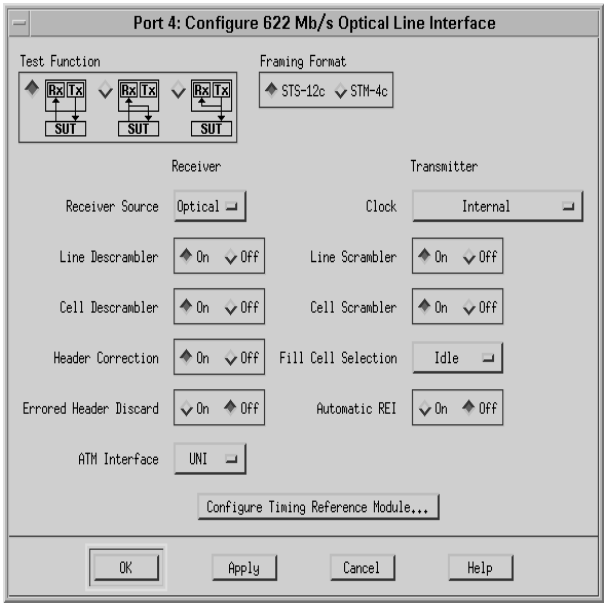
Scrambling

SONET	• Frame synchronous scrambler as per ANSI T1.105 and Telcordia GR-253-CORE (Issue 1, Dec. 94)
SDH	• STM-4c as per ITU-T Rec G.708/G.709, 1993.

Overhead Data

SONET/SDH Overhead Generation

J0/Z0	Offset 1 • SONET & SDH: reserved for section trace as required; otherwise default value of 01H Offsets 2 – 4 • SONET: incrementing pattern • SDH: default value of 01H Offsets 5 – 12 • SONET & SDH: user-definable
B1, B2, B3	• Automatically calculated
M1/Z2	• User-definable Line/MS REI value
H1, H2, H3	• Set SPE/AU4 pointer bytes to any fixed value as per Telcordia GR-253-CORE and ITU-T G.708/G.709 (with or without NDF)
Pointer Movement	• Single increment/decrement • NDF flag set operation • Pointer value > 782
G1	• User-definable Path RDI alarm using 3-bit format as per ANSI T1.105 and ITU-T G.708/G.709 • User-definable Path REI value
K1, K2	• User-definable value (default 00H)
Trace Operation	• Section (J0) and path trace (J1) can be generated in both 16 and 64 byte formats
Other Overhead Bytes	• All programmable bytes will default to 00H • All bytes can be programmed using the overhead viewer



SONET/SDH Overhead Receiver Function

Trace Capture	• Section (J0) and path (J1) trace can be captured in both 16 and 64 byte formats
TOH Capture	• Single snap shot of line and section overhead bytes
POH Capture	• Single snap shot of path overhead bytes

Link Control

Network Interface	• Select UNI or NNI
Fill Cells	• Select idle (default) or unassigned.

Alarm Generation and Error Injection

Alarm Operating Modes (applies to all alarms)

Applicable Modes	• Full duplex • Transmit loopback (near end loopback)

SONET/SDH Alarm Generation

SONET Alarms	Control
AIS-L	• On/Off
RDI-L	• On/Off
AIS-P	• On/Off
RDI-P	• On/Off; selectable defect type

SDH Alarms	Control

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MS-AIS	• On/Off
MS-RDI	• On/Off
Path-AIS	• On/Off
Path-RDI	• On/Off; selectable defect type

REI Error Injection

REI-P	• Single injection of REI-P value (1-8)
REI-L	• Simple on/off with value 01-60H
Report	• REI-L and REI-P can be set based on receiver line and path BIPs

Frameword Error Injection

A1	• Injection of 76H — first offset only — single-bit error
Error State	• On/Off

BIP Error Injection

Section	• On/Off BIP error injection by inverting B1 byte
Line	• On/Off BIP error injection by inverting B2 bytes
Path	• On/Off BIP error injection by inverting B3 byte

Measurements

Measurement System

Result Types	• Cumulative: Measurements since the start of the measurement period • Latched: Measurements during most recent completed measurement period
Result Formats	• Count (C) • Ratio (R) • Seconds (S)
Accuracy of Counts	• < =1% for counts < 1000 • < =0.1% for counts > = 1000
Accuracy of Ratios	• < =0.1% for counts > = 1000
Measurement Period	• Range: 1 second to 3 days • Resolution: 1 second

Measurements are sampled every 100 milliseconds and accumulated over the user-specified measurement period. Results from the most recent complete measurement period are retained.

SONET/SDH Real-Time Measurement

B1 Errors (C, R, S)	• Section/RS-BIP errors detected
B2 Errors (C, R, S)	• Line/MS-BIP errors detected
B3 Errors (C, R, S)	• Path BIP errors detected
REI-L/MS-REI (C, R, S)	• SONET: REI-L errors counted • SDH: MS-REI errors counted
REI-P (C, R, S)	• REI-P errors counted
LOS (S)	• Loss of Signal
OOF (S)	• Out of Frame • Based on condition of first A1 byte and first four bits of the first A2 byte in each frame
AIS-L/MS-AIS (S)	• SONET: AIS-L condition detected • SDH: MS-AIS condition detected
RDI-L/MS-RDI (S)	• SONET: RDI-L condition detected • SDH: MS-RDI condition detected
LOP (S)	• Loss of Pointer synchronization
Tx Pointer	• Current transmit pointer value
Rx Pointer	• Current receive pointer value
AIS-P (S)	• AIS-P condition detected
RDI-P (S)	• RDI-P condition detected and defect decoded
Rx Frame Count (C)	• Counts 8 kHz frames
Rx SPE Count (C)	• Counts SPEs

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ATM Layer Specification

ATM Characteristics

Transmit Functions

This module cannot generate ATM cells on its own — a companion module, such as the E1609A 0-622 Mb/s ATM Stream Processor, is required.

SONET/SDH framing is provided for ATM cells generated from other modules.

ATM Header	• Unmodified
ATM Payload	• Unmodified
Cell Scrambling	• Select on/off

Receive Functions

HEC	• Cell delineation (ITU-T I.432, RA-NWT-001112)
Cell Descrambling	• Select on/off
Header Correction	• Select on/off • Correction On: Single-bit errors are corrected and error-free cells are accepted • Correction Off: All cells are accepted
Overflow Indication	• Drop overflow (DOVL) alarm measurement and front panel indication
Idle / Unassigned Drop control	• Default: cells not passed to CPP

Output Filters

Number of filters	• 6
Pattern match fields for filter	• GFC (UNI mode only): single value or “any”. • VPI: single value or “any”. • VCI: single value or “any”. • PTI: bit mask and bit value (3 bits) or “any”
Default Values	• All VPI=“any”, VCI=“any” • Signalling channel: VPI=0, VCI=5 • OAM F4 Segment: VPI=”any”, VCI=3 • OAM F4 End-to-End: VPI=”any”, VCI=4 • OAM F5 Segment: VPI=”any”, VCI=”any”, PTI=100 • OAM F5 End-to-End: VPI=”any”, VCI=”any”, PTI=101

Low Speed Cell Bus Control

Bandwidth	• Cells from the 155 Mb/s cell bus can be inserted into an ATM bandwidth of 149.76 Mb/s • Cells from the link can be passed to the cell bus at rates of up to 149.76 Mb/s to modules placed to the left of the Agilent E1618A.

Measurements

ATM Real-Time Measurements

Total Received Cell Bandwidth	• Total utilized cell bandwidth (C)
Total Received Cell Count	• Total received cell count (C)
Bad Headers	• HEC Errors (C, R) • Defined as 2 or more bit errors with Header Correction On • Defined as 1 or more bit errors with Header Correction Off
Corrected Headers	• Correctable HEC Errors (single-bit errors) (C, R) • Only valid with Header Correction On
LOCS	• Loss of Cell Synchronization status (S)
Inserted Cell BW	• Mean bandwidth of cells inserted from add bus.
Inserted Cell Count	• Count of cells inserted from add bus (C).

ATM Receive Filter Measurements

Number of Filters	• 6
Received Average Cell Bandwidth per filter	• Bandwidth averaged over integration period.
Received Peak Cell Bandwidth per filter	• Greatest bandwidth received within a 100mS period.
Receive Cell Count per filter	• Cumulative cell count over the integration period.
Drop Cell Count	• Actual drop cell count accumulated over the integration period.
Drop Cell Bandwidth	• Actual drop cell bandwidth averaged over the integration period.
Drop Overflow Errored Seconds	• Number of seconds during the integration period when there was at least one cell lost due to the drop overflow condition.

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Dynamic Measurements

Total bandwidth passed to cell bus (to CPP)	• The bandwidth of ATM cells based on the BSTS cell bus (less than 149.76 Mb/s)
Channel Average Cell Bandwidth	• Selected channel cell bandwidth averaged over last complete 1 second period. • Up to 6 channels simultaneously

Electrical Specification

Input and Output

Optical Receiver

Input	• 1310 nm single mode PIN based receiver • Complies with Telcordia GR-253-CORE (Issue 1, Dec. 94) and ITU-T G.957 (07/95) intermediate reach specifications
Sensitivity	• –28 dBm (min)
Connector	• SC (standard) • FC-PC and ST adaptors available

Optical Transmitter

Output	• 1310 nm Class 1 single mode laser • Complies with Telcordia GR-253-CORE (Issue 1, Dec. 94) and ITU-T G.957 (07/95) intermediate reach specifications • Optical 10 dB attenuators available (multimode).
Average Output Power	• –8.0 dBm (max)
Connector	• SC (standard) • FC-PC and ST adaptors available
Safety	• Complies with IEC 825/CDRH Class 1
Operation	• Laser can be switched on/off • Default condition at power on: Off

Operating Modes

Full Duplex (Terminal Mode)	• Independent transmitter and receiver operation
Receive Loopback (Far End Loopback)	• Received signal is retransmitted without modification • Provides a passive monitor function
Transmit Loopback (Near End Loopback)	• Transmit signal is electrically looped back to the receiver • Enables monitoring of generated traffic

Transmit Clock Selection

Internal Clock	• Stratum 3
Timing Reference Module	• E1679A
Recovered Clock	• Includes jitter reduction
External Clock Input (front panel)	• SMB connector

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Backplane Trigger Lines	• ECL0/1

Electrical Interface

Reference Clock	• Connector Type: SMB bulkhead receptacle input • Specification: 0 dBm (nominal) terminated in 50 ohm to ground input • Signal: Clock at 622.08 MHz (nominal) • Duty Cycle: 50+/–5%
External Trigger Tx	• Connector Type: SMB bulkhead receptacle • Output Levels: TTL source • Output Impedance: 50 ohm
External Trigger Rx	• Connector Type: SMB bulkhead receptacle • Output Levels: TTL source • Output Impedance: 50 ohm
Serial Clock and Data Inputs/Outputs	• Connector Type: SMB bulkhead receptacle • Input/Output Levels: 10E Series ECL • Output: 50 ohm termination to –2 V required • Input: 50 ohm termination to –2 V provided • Compatible with existing Agilent Broadband Series Test System and Series 90 modules

Triggers

Nominal Pulse Width	• 25 ns
Trigger Types	• Level: Level active for the event • Pulse: Pulsed on the event

Transmit Triggers

AIS-L	• Line AIS (Level)
RDI-L	• Line RDI (Level)
AIS-P	• Path AIS (Level)
RDI-P	• Path RDI (Level)
Laser On/Off	• Transmit laser state (Level)
BIP Insert	• Single BIP insertion (Section, Line, and Path) (Level)
Tx Frame Sync	• SONET/SDH frame synchronization pulse (Pulse)
Cell inserted	• Cell inserted from add bus (Pulse).

Receive Triggers

AIS-L	• Line AIS (Level)
RDI-L	• Line RDI (Level)
AIS-P	• Path AIS (Level)
RDI-P	• Path RDI (Level)
LOS	• Loss of Signal (Level)
LOP	• Loss of Pointer (Level)
OOF	• Out of Frame (Level)
LOF	• Loss of Frame (Level)
Rx Frame Sync	• SONET/SDH frame synchronization pulse (Pulse)
LOCS	• Loss of Cell synchronization (Level) • Minimum asserted period of 125 ms (synchronized to frame)
Match cell received	• Match cell received (Pulse)
Drop Overflow	• Buffer overflow condition (Pulse)

Mechanical Specifications

VXI Module

Size	• 1 slot C-size VXI card
Weight	• 2.0 kg nominal
Power Dissipation	• 50 Watts (max)
Backplane Connectors	• P1, P2
Addressing	• Logical and servant addressing

Front Panel LED Indicators

Failed	• Red during self-test • Off upon successful completion of self-test
Error	• Red upon detection of software error • Application software is notified and responds as appropriate
Access	• Green during VME bus access by another device
Gating	• Green during each statistical measurement period • Off for 0.1 second per measurement period
Signal	• Green during detection of valid receive signal
LOF	• Yellow during LOF or OOF condition
AIS	• Yellow during L-AIS or P-AIS alarm
BIP	• Yellow during detection of SBIP, LBIP or PBIP error

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LOCS	• Yellow during Loss of Cell Synchronization (unable to delineate cells)
Ref Clk	• Yellow during detection of valid clock signal with Tx External Clock selected
Laser	• Red while transmit laser source is enabled

Environmental Operating Conditions

Operating Temperature	• 0°C to 45°C • Jitter transfer specification maintained over the range 10°C to 45°C
Storage Temperature	• –40°C to 70°C
Humidity	• 0% to 95% relative humidity from 25°C to 40°C

Regulatory Compliance

Environmental/Regulatory Testing

This module conforms to the following environmental/regulatory tests:

- EN55011 Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific, and medical radio frequency equipment
- CSA22.2 No. 1010.1, EN61010-1, UL3111-1 Safety requirements for electrical equipment for measurement, control, and laboratory use
- IEC801-2 Electromagnetic Compatibility for Industrial process measurement and control equipment, Part 2: Electrostatic discharge requirements
- IEC801-3 Electromagnetic Compatibility for Industrial process measurement and control equipment, Part 3: Radiated electromagnetic field requirements
- IEC801-4 Electromagnetic Compatibility for Industrial process measurement and control equipment, Part 4: Electrical fast transient/burst requirements
- 21CFR, IEC825 FDA Laser Classification, European Laser Safety
- ETM757 Temperature Tests, ETM758 Humidity Tests
- ETM754 Thermal Profile Mapping, ETM761 Altitude Tests

Shock and Vibration

ETM759 Vibration	• Operational Functional: Class B2 Random Vibration • Survival, Swept Sine: Class B2 Swept Sine • Survival, Random Vibration: Class B2
EMT760 Shock	• End Use Handling: Class B2 • Transportation Environment: Type 1
ETM Package Performance	• Vibration: Swept Sine Type 1 • Random Vibration • Impact: Type 1

Applicable Standards

ATM Cells	• ITU-T I.361 B-ISDN ATM layer specification1995 • HEC delineation: ITU-T I.432, TA-NWT-001112
SONET/SDH Frames	• SONET STS-12c: ANSI T1.105 and Telcordia GR-253-CORE (Issue 1, Dec. 94) • SDH STM-4c: ITU-T Re G.708/G.709, 1993
Optical Transmitter and Receiver	• Telcordia GR-253-CORE (Issue 1, Dec. 94) and ITU-T G.957 (07/95) specifications for intermediate reach systems at 1310 nm • If any conflict between the two standards exists, then ANSI T1.105.1996 is used • Safety: IEC 825/CDRH Class 1

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Acronyms

AAL	ATM Adaptation Layer
ABR	Available Bit Rate
AIS	Alarm Indication Signal
ANSI	American National Standards Institute
API	Application Programming Interface
ASP	E1609A 0-622 Mb/s ATM Stream Processor
ATM	Asynchronous Transfer Mode
BIP	Bit Interleaved Parity
BISDN	Broadband Integrated Services Digital Network
BSTS	E4200/E4210 Broadband Series Test System
BW	Bandwidth
CBR	Constant Bit Rate
CLP	Cell Loss Priority
CPP	E4209B Cell Protocol Processor
CRC	Cyclic Redundancy Check
DOVL	Drop Overflow
ECL	Emitter Controlled Logic
FIFO	First In First Out
GCRA	Generic Cell Rate Algorithm
GFC	Generic Flow Control
HEC	Header Error Check
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
LANE	Local Area Network Emulation
LED	Light Emitting Diode
LOCS	Loss of Cell Synchronization
LOF	Loss of Frame
LOP	Loss of Pointer
LOS	Loss of Signal
MS	Meta Signalling
NDF	New Data Flag
NNI	Network Node Interface and Network-to-Network Interface
OAM	Operations, Administration and Maintenance
OC-12c	Optical Carrier Level 12 Signal Concatenated
OOF	Out of Frame
OPT	E6270A OAM Protocol Tester
PDU	Protocol Data Unit
POH	Path Overhead
PTI	Payload Type Identifier
PVC	Permanent Virtual Circuit
QoS	Quality of Service
RDI	Remote Defect Indication
REI	Remote Error Indication
Rx	Receive
SDH	Synchronous Digital Hierarchy
SMB	Subminiature Type B
SONET	Synchronous Optical Network
SPE	Synchronous Payload Envelope
ST	Segment Type
STM	Synchronous Transfer Mode
STM-4c	Synchronous Transfer Mode Level 4 Signal Concatenated
SVC	Switched Virtual Circuit
Tcl	Tool Command Language
Tk	Graphical User Interface Toolkit for Tcl
TOH	Transport Overhead
TTL	Transistor-Transistor Logic
Tx	Transmit
UNI	User Network Interface
VBR	Variable Bit Rate
VC	Virtual Channel
VCI	Virtual Channel Identifier
VME	Versa Module Eurocard
VP	Virtual Path
VPI	Virtual Path Identifier
UBR	Unspecified Bit Rate

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