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Agilent Technologies

Agilent Advisor - ATM/WAN

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Significant New Enhancements

- All BERT applications in one common GUI for the following interfaces: V-Series, J5457A-High Speed V-Series, J2294D, J2296D, J2298D, J4646A, J4647A, J4648A and J4649A
- E1/T1 Interfaces: J3759A/B (E3/T3), J3762B (HSSI) Includes a new 4000-byte user defined pattern
- Protocol Distribution Application: Network, transport, and application layer protocol statistics over Frame Relay, HDLC and PPP.
- SLIP: The SLIP application allows Serial Link IP analysis within the Advisor WAN application architecture. Capture filter, display filter, searching, decodes and stats are supported. All file operations are supported. Supported interfaces are “legacy” Advisor V series interfaces ONLY when a new T1/E1 D series module is installed. It will not work with J5457A High Speed V-Series module.
- AAL5 CRC Statistics: The ATM application counts AAL5 CRC errors. Errors are counted on a per VP/VC basis

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ATM/WAN Testing Made Easy

To install or troubleshoot an ATM or WAN link, it is necessary to test for many things: physical errors, equipment interoperability, ATM cell congestion, and even LAN traffic problems. The Agilent Advisor offers integrated ATM, WAN, and LAN protocol analysis capabilities, along with bit error ratio testing (BERT), stimulus/response measurements, and statistical analysis capability - everything required to get a good look at the physical layer, ATM/MAC layer, and all of the upper protocol layers.

In addition, the Agilent Advisor can test ATM quality of service (QoS) with contract conformant traffic and can check live traffic for conformance to a traffic contract (policing). For Frame Relay, the Agilent Advisor can verify that Service Level Agreements are met.

No matter what the traffic level, the Agilent Advisor will capture every cell or frame on full-duplex network connections. It monitors non-intrusively and decodes ATM or WAN data at full line rate. Further, it can simulate traffic from either direction within a connection. In addition, it can process previously captured data from its capture buffers or from a file for retransmission. The analyzer not only captures traffic when the network is working - it provides information when the network is broken - when it is needed the most.

Key ATM Features and Functionality

The Agilent Advisor provides the following powerful ATM features and functions:

- Handles ATM testing rates from 1.5 Mb/s to 622 Mb/s; ATM Interfaces including T1/E1, J2, E3/T3, STM-1/OC-3, STM-1e/EC-3, STM-4/OC-12, ATM25 (25.6 Mb/s UTP-3/5) and UTP155 are available as plug-in modules or undercradles
- Auto-discovers up to 1024 Virtual Channels on all ATM interfaces except J2 (up to 4096 on the STM-4/OC-12 interface) and gathers statistics on each
- Analyses protocols including full rate capture with capture and display filtering and searching (e.g. set the capture filter to capture only ATM streams carrying IP traffic with specific IP addresses)
- Monitors, captures data, and decodes upper and lower layer protocols in real time
- Decodes and logs statistics for LAN encapsulated protocols over ATM, including Voice over IP decodes: H.323 series, IETF series (SIP, MGCP, SGCP, MEGACO), ITU-T T.38
- Finds Errors in capture file or buffer
- Decodes AAL-1, AAL-2, AAL-3/4, AAL-5
- AAL-1 5 CRC statistics
- Decodes Frame Relay over ATM
- Decodes ATM UNI, NNI (B-ISUP, B-ICI) and PNNI signaling
- Decodes IMA Control Protocol (ICP) cells
- Real-time and post-processing User Assisted LAN over ATM
- Emulates ATM UNI signaling – check call set-up procedures
- Emulates ELAN Join (LANE)
- Generates user-defined cell traffic from a cell table
- Retransmits captured traffic which has been copied and pasted to the cell table, modified (e.g. VPI-VCI and/or embedded IP addresses changed); the HEC and AAL-5 CRC-32 are automatically recalculated
- Generates ATM ICMP Echo (PING)
- Generates and analyses OAM cells
- Tests ATM QoS performance to the ITU-T O.191 standard – measures cell loss, cell delay, cell delay variation, cell misinsertion and cell errors
- Generates ATM traffic shaped to traffic contracts
- Polices ATM traffic to traffic contracts
- Tests simultaneously on two different or similar ATM interfaces
- Tests simultaneously with other technologies (e.g. Frame Relay, Ethernet)
- Tests physical frame layer and cell layer bit error ratios (BER)
- Measures optical power
- Pulse amplitude measurement on T1, E1, E3, T3 and STM-1e/EC-3 ATM interfaces

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Key WAN Features and Functionality

The Agilent Advisor provides the following powerful wide area network (WAN) features and functions:

- WAN testing speeds from 50 b/s to 155 Mb/s
- Packet over SONET/SDH (PoS) analysis (IETF and Cisco)
- Built-in all major WAN interfaces into the instrument mainframe, including V.10/V.11, V.24/V.28/RS-232C, V.35, V.36/RS-449/422/423/530, X.21
- V-Series interface support up to 8.192 Mb/s
- Interfaces, including ISDN Basic Rate Interfaces (BRI) S/T/U and Primary Rate Interfaces (PRI), E1/T1 and E3/T3 Cells and Frames, Packet over SONET/SDH HSSI, DDS 4-wire, and High Speed V-Series (V.35, RS-449 and X.21 to 8.192 Mb/s) are available as slide-in modules
- Full-featured testing capability for all common WAN technologies, including Frame Relay, PPP (Sync, Async), ISDN, X.25, HDLC, SMDS, SNA, Async, Bisync, ATM DXI, and more
- Monitoring, data capturing, and decoding for upper and lower layer protocols in real time
- Decodes LAN encapsulated protocols over WAN, including Voice over IP decodes: H.323 series, IETF series (SIP, MGCP, SGCP, MEGACO), ITU-T T.38
- Real-time and post-processing User Assisted LAN over Frame Relay and HDLC, PPP, ATM, DXI capture/display filtering and searching
- Find Error in capture file or buffer
- Comprehensive bit error ratio testing (BERT)
- Asynchronous and Bisynchronous monitor and traffic generation
- Frame Relay analysis Voice and Fax over Frame Relay (FRF.11) decodes
- Auto LMI detection and decoding for ANSI, ITU-T or original LMI
- Auto LAN encapsulation over Frame Relay detection for RFC 1490/2427, Ethertype, FRF3.1, and RFC 2684/1483
- Service Level Agreement measurements according to FRF.13
- LMI Expert analysis
- CIR Measurements in all Frame Relay DLCIs
- Tests simultaneously on two WAN interfaces
- Tests simultaneously with other technologies (e.g. ATM, Ethernet)
- Signal Level measurement on T1, E1, E3, and T3
- SLIP Measurement

Key General Features and Functionality

The Agilent Advisor provides the following additional features and functions:

- Other technologies covered include 10/100 Ethernet, Gigabit Ethernet, Token Ring, FDDI, RTP QoS, VoIP and more
- LAN/WAN/ATM/VoIP under one handle
- Real-time counters and triggers, with logging and CSV export capabilities of statistics to disk
- Line-status monitoring
- Commentators
- Absolute, Delta and Relative Time
- User bytes (skip bytes between layers)
- Enhanced decode view with HEX to detail correlation
- True multi-tasking capability with user friendly full 32 bit Microsoft Windows® user interface, so that monitoring, decoding, statistical analysis, and stimulus/response tests can be executed simultaneously
- Context-sensitive on-line Help with measurement and troubleshooting guides, acronym list, index and glossary
- Agilent Software Upgrade Subscription Service to keep users up-to-date on the latest software enhancements
- Highly portable economical package featuring a rugged based PC with full keyboard, large active color display and pointing device

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LAN over WAN, and LAN (over WAN) over ATM

Encapsulated LAN data is automatically extracted and decoded by the Agilent Advisor including complex encapsulated protocols. For unique encapsulation schemes, the user may specify the offset as well. Nearly 300 decodes exist for layer 3 and above; these are common to all underlying technologies (LAN, WAN and ATM).

The Agilent Advisor provides an off-line LAN Expert Analysis tool. The off-line LAN Expert Analysis allows the user to examine Ethernet, Fast Ethernet, Gigabit Ethernet, ATM or WAN (HDLC or Frame Relay) encapsulated LAN frames on an Agilent Advisor or personal PC without Agilent Advisor hardware.

The comprehensive set of protocol decodes include all of today's popular Protocol Stacks:

- TCP/IP
- AppleTalk
- Banyan
- DECnet
- IBM/SNA
- Novell
- ISO
- SUN
- XNS
- Cisco
- 3Com
- H.323 series, T.38
- SIP, MGCP,SGCP, MEGACO
- W-CDMA

Commentators

Powerful "Commentators" follow state-based protocols and can provide warnings and alerts when unusual message sequences are detected.

Real-time Filtering

The Agilent Advisor now offers real-time IP and WAN filtering at rates up to 155Mb/s. This allows the user to isolate and analyze LAN and Frame Relay traffic taking place on an ATM circuit or LAN traffic taking place on a Frame Relay circuit.

The real time filtering function gives users application-level, LAN-centric troubleshooting on their ATM or Frame Relay network, thus allowing them to observe specific traffic types for potential problems on the network. The user can even filter by IP source and/or destination address. IP traffic encapsulated in Frame Relay that is additionally encapsulated over ATM can also be analyzed. This feature maximizes valuable buffer space for optimal data collection of targeted LAN traffic since the filtering takes place before data capture.

In addition to capture filtering performed in hardware, the Agilent Advisor is able to gather counts of events such as cells or frames within the defined criteria of the filters. Powerful display (post-capture) filtering and search functionality allows the user to drill down further for troubleshooting purposes.

For more details concerning these features, refer to the corresponding technical sections within this document.

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Enhanced decode view

The decode view is user configurable by 'right clicking' in the summary view. The decode view has a very user-friendly, 'one-line' and 'multi-line' read out in the summary view. Also, the decode view offers "hex to detail mapping" by highlighting an element in the detailed view, the corresponding hex element is highlighted in color in the 'Hex' section of the decodes. The reverse is also true.

The Agilent Advisor also has powerful, user-configurable 100ns resolution time-stamp options as follows:

- **Delta** — shows the time interval between adjacent cells or displayed filtered frames.
- **Relative** — shows the time difference between critical events and other cells in the traffic flow; for example, if a ping is considered time-zero, cells which arrived before or after will be time-stamped with their relative corresponding arrival time.
- **Absolute** — displays events with date and time with a resolution of 100 nanoseconds.

Color mapping of the protocol layers in the decode view distinguishes each of the layers in the data flow for easy identification, thus simplifying protocol analysis.

Acquisition Systems

There are two acquisition systems for ATM and WAN: the J2300E Agilent Advisor mainframe and the J2900A High Speed undercradle.

J2300E Agilent Advisor Mainframe

The J2300E mainframe comprises the acquisition system for all ATM and WAN plug-in modules plus the V series interfaces, connectors for which are present on the body of the mainframe. For LAN measurements such as Ethernet 10/100/1000, Token Ring and FDDI, LAN undercradles can be attached to the J2300E.

In addition, the mainframe includes a full PC running the Microsoft® Windows98® operating system on a 400 MHz processor, 256 MB of RAM, a built in keyboard with pointing device, a Super VGA active color display, dual PCMCIA card slots, stereo speakers and the usual printer and serial ports. The PC is used to control the mainframe acquisition system and the acquisition system in any attached undercradle, and to collect and post process results. With the new 400MHz PC processor and larger momory, post capture filtering and searches are significantly faster than before, saving valuable troubleshooting time.

Note that the PC is not used for real-time processing of measurements – this is all done in the acquisition system and plug-in modules. This allows the PC to handle multiple tasks such as the Dual Simultaneous Analysis feature which involves the simultaneous control of the mainframe acquisition system and attached undercradles, as discussed later.

J2900A High Speed Undercradle

The J2900A undercradle is similar in function to the J2300E mainframe except that it has no built in PC but relies upon the PC contained in the J2300E ATM/WAN or J3446E LAN mainframes to control it and to collect and post process results. It accepts all ATM and WAN plug-in modules.

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Dual Simultaneous Analysis

The Agilent Advisor has the ability to test at two different interfaces and technologies simultaneously, e.g. E1 Frame Relay and E3 ATM, DS3 Frame Relay and 10/100 Mb/s Ethernet, ATM25 and OC-3 ATM, etc. This functionality allows the user to test interworking in mixed technology environments (see the Application Note 1346 for details on this kind of testing).

In order to perform dual simultaneous analysis, combinations of an Agilent Advisor mainframe (J2300E or J3446E) and an undercradle (J3444A or J2900A) is required, the mainframe and undercradle being each supported by an application (LAN, WAN or ATM) running on the PC embedded in the mainframe. Note that the applications do not have to be different so, for example, a J2300E Agilent Advisor mainframe fitted with a J2900A High Speed undercradle could each be fitted with the same type of ATM or WAN interface and run simultaneously – e.g. two J3766A ATM25 interface modules.

The following table shows the combination of supported mainframes, undercradles, interfaces and technologies.

Table 1 Hardware Support

			J2300E Mainframe														J3446E Mainframe
			WAN only						ATM/WAN			ATM only					
			V Series	High Speed V-Series J5457A	DDS 4-wire J2908A	HSSI J3762A J3762B	ISDN BRI J2904B J2905B	ISDN PRI J4646A J4647A J4648A J4649A	T1 J2294D J2298D	E1 J2294D J2296D J2298D	E3/DS3 J3759B	J2 J2911A	ATM25 J3766A	STM-1/ OC-3 J2912B	UTP155 J2913B	STM-1e/ EC-3 J2914A	LAN Ethernet Fast Ethernet
J2900A Undercradle	WAN only	High Speed V-Series J5457A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		DDS 4-wire J2908A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		HSSI J3762A J3762B	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		ISDN BRI J2904B J2905B	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		ISDN PRI J4646A J4647A J4648A J4649A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
	WAN/ATM	T1 ATM/WAN J2294D J2298D	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		E1 ATM/WAN J2294D J2296D	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		E3/DS3 J3759B	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	☒	⌘	⌘	⌘	⌘	⌘	⌘
	ATM only	J2 J2911A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		ATM25 J3766A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		STM-1/OC-3 J2912B	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		UTP155 J2913B	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		STM-1e/EC-3 J2914A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
Undercradles		622Vu ATM J3763A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		Fast Ethernet J3444A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		Ethernet J2306A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		Token Ring J2307A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		Ethernet/TR J2309A/B	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
		FDDI J2524A	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘

⌘	Yes, combination supported
☒	No, combination not supported

Note: The supported operating temperature range for Dual Simultaneous Analysis is 5°C to 30°C (41°F to 86° F).

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ATM Testing

The Agilent Advisor supports the following interface types for ATM Testing:

E1*	T1*	ATM25
E3*	T3*	155UTP
STM-1*	OC-3*	J2
STM-1e*	EC-3*	
STM-4	OC-12	

* These interfaces also support WAN testing (see the WAN Testing section)

The following sub-sections deal with all layers of testing, starting at the upper layers and working down to the physical layer.

Service Layer ATM Testing

Decoding

In addition to the nearly 300 encapsulated LAN decodes common to LAN, WAN and ATM in the Agilent Advisor, ATM specific protocols decoded include:

- LAN over Frame Relay (RFC 2427/1490) over ATM (FRF.5)
- LAN over ATM (RFC 2684/1483)
- Classical IP and ARP over ATM (RFC 2225/1577)
- Ethernet and Token Ring LAN Emulation (ATM Forum LANE 1.0 & 2.0)
- MPEG-2
- UNI Signaling (ATM Forum UNI 3.0, 3.1, 4.0)
- NNI Signaling (B-ISUP (ITU-T Q.2761 – Q.2764) and B-ICI)
- ILMI (Integrated Local Management Interface)
- ATM Forum PNNI 1.0 signaling and routing
- IP Switching (Ipsilon):
  - -IFMP (RFC 1953)
  - -IFMP-C (RFC 1987)
  - -GSMP (RFC 1954)
- Fore Switch Signaling: SPANS
- ATM Forum MPOA
- Newbridge VIVID (MPOA)

Simulation

The Agilent Advisor is able to simulate upper layer traffic either by the use of pre-defined messages, e.g. ATM encapsulated ICMP-echo (PING), through the development of user defined cell sequences. Or, more conveniently, by copying and pasting previously captured traffic to the cell table and editing it, as appropriate (see ATM Cell Generation in a later section).

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ATM Adaptation Layer (AAL)

The Agilent Advisor provides decodes for AAL-1 through AAL-5. Decodes are also included for AAL-2 Common Part Sublayer (AAL-2 CPS to ITU-T I.363.2) and AAL-2 Service Specific Segmentation and Reassembly sublayer (AAL-2 SSSAR to ITU-T I.366.1). Note: AAL-1 & AAL-2 decodes are not currently supported at 622 Mb/s. The Decode screen in figure 1 depicts an AAL-2 sublayer.

AAL – 1

Fields decoded:

CSI
Sequence number
CRC
Parity
Payload

Errors detected and displayed:

ATM SDU not 48 bytes long
Invalid sequence number
Invalid parity
Invalid CRC-3

AAL – 2

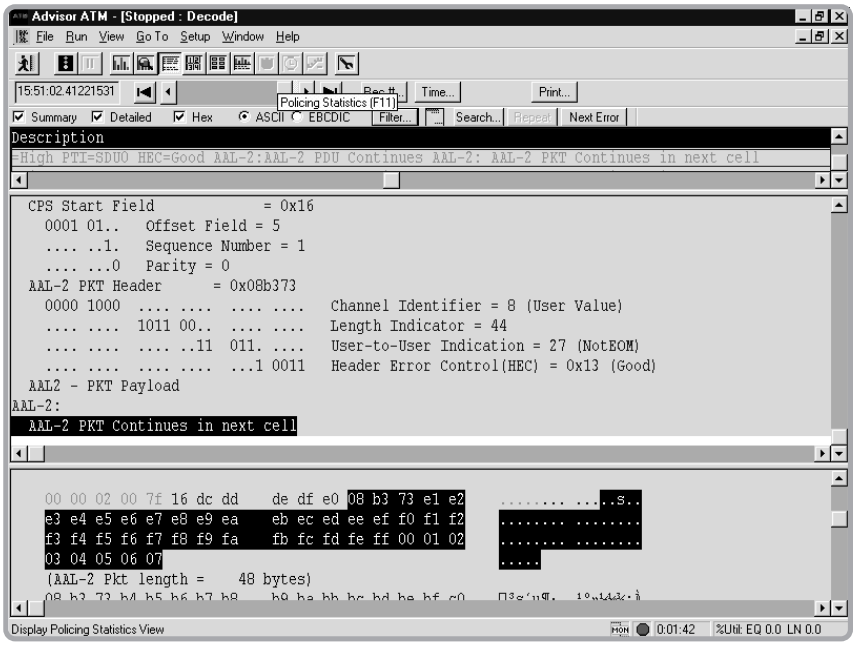


Figure 1: CPS (Common Part Sublayer).

CPS (Common Part Sublayer)

Fields decoded:

CPS-PDU start field (STF)
- OSF (Offset field)
- SN (Sequence number)
- P (Parity)

CPS-Packet (one or more)
CPS- Packet Header (CPS-PH)
- CID Channel identifier
- LI Length Indicator
- UUI (User to user indication)
- HEC

CPS-Packet Payload (CPS-PP)
CPS-INFO
Padding

Errors detected and displayed:

STF Parity error
STF Sequence number error
Number of octets expected in the CPS packet does not match with the STF field
Error in the OSF value (>=48)
Error in HEC
Length of received packet is incorrect.
Errors in reassembly.
Invalid value in UUI

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SSTED (Service Specific Transmission Error Detection) Sublayer

Fields decoded:	Errors detected and displayed:
SSTED-PDU Payload SSTED-PDU Trailer - SSTED-UU (User-User indication) - Reserved - CI (Congestion Indication) - LP (Loss Priority) - Length - CRC	SSTED-PDU of length 8 or less has been received Incorrect length value of the SSTED-PDU Error in CRC

Note: The AAL-2 Service Specific Segmentation and Reassembly (SSSAR) sublayer has, of course, been implemented below the SSTED sublayer but its decode is not shown explicitly (the SSTED layer decode is sufficient)

AAL – 3-4

Fields decoded:	Errors detected and displayed:
Reassembly of segments for upper layer decoding Decode of CPCS layer (CS-PDU) Check for segmentation errors in the decode, such as • Missing BOM or EOM • Btag/Etag mismatch • Check and flag of CRC-10 errors: - MID - BOM - COM - EOM - Btag - Etag	ATM SDU not 48 bytes long Invalid SAR sequence number Invalid SAR length indicator Invalid SAR CRCR protocol simulation CPCS common part indicator = 0 CPCS buffer allocation size is less than the actual data size CPCS begin tag = end tag CPCS length is larger than the buffer allocation size SAR payload length is less than the CPCS header length SAR Payload length is less than CPCS trailer length

AAL – 5

Fields decoded:	Errors detected and displayed:
Re-assembly of segments for upper layer Decode of CPCS layer (CS-PDU) Check and flag of CRC-32 errors Display filtering on SDU type	ATM SDU not 48 bytes long Invalid SAR segment type CPCS CPI=0 AAL-5 CRC-32 AAL-5 CRC statistics Not an AAL-5 PDU

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ATM Layer

Up to 1024 virtual channels are auto-detected on all ATM interfaces up to 155 Mb/s, except J2. For each auto-discovered virtual channel, the following statistics are collected:

- Maximum and instantaneous utilization (%)
- Total cells and octets (count)
- Maximum, instantateous and average throughput (kb/s)
- Header ("HEC") errors (count)
- CLP status (0 or 1)

At the 622 Mb/s ATM interface, up to 4096 VCs are auto-discovered.

Data within the ATM layer is captured in a cell-based buffer. Capture of ATM cells occurs at full line speed up to 622 Mb/s into a data buffer. Each cell is stamped with a 100 ns resolution time stamp and at rates up to 155Mb/s. The display is user customizable - absolute, relative to a specific event, or 'delta,' representing the time change from one cell to the next, and a field indicating whether the HEC was erroneous.

Display filtering of cells can be based on any of the header fields and also on many common types of embedded protocols. OAM cells can be monitored exclusively or with other data traffic for detailed analysis. Selective capture can be done using pre-written quick test scripts or user-defined capture filters.

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ATM Capturing, Filtering and Searching

Capture Filters and Counters

Hardware counters and filters allow the user to select cells or AAL5 PDUs to bring into the capture buffer. Even on a lightly loaded network, at ATM speeds it does not take long to fill a data capture buffer. With data filtering, the user can zero in on exactly the data the user needs to see. The filters examine every cell in real time as it appears on the network. Since the filtering is done in the hardware, nothing is missed, and the performance of the measurements and user interface are not compromised.

Up to twelve hardware filters and counters can be enabled simultaneously and, additionally, any two of the filters can be enabled to capture all the cells that contain AAL5 PDUs. Flexible and user assisted menus can be used to define specific filters, counters, and triggers based on protocol headers (see figure 2). Examples include ATM, LAN over ATM (to RFC 2684/1483), Frame Relay (FRF.5), LAN over Frame Relay over ATM (to RFC 2427/1490 and FRF.5 simultaneously), and Classical IP and ARP over ATM (RFC 2225/1577). Filter and counter criteria can be used to start/stop the data capture and to center the data in the buffer, the user can see what led up to an event and what followed it. Filter criteria may also be used to ignore or store the data.

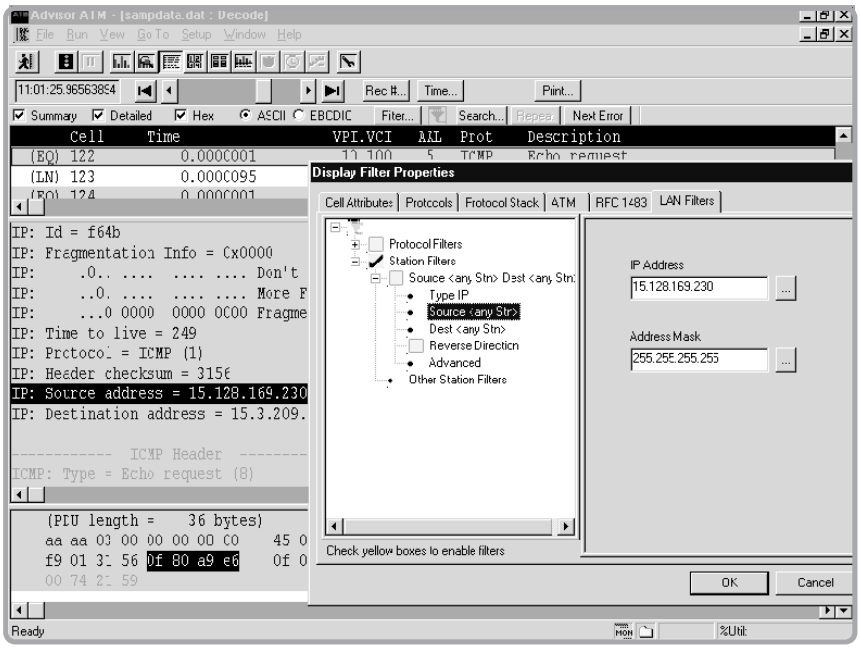


Figure 2: ATM Filter/Counter Properties.

Filters are also used as counters to specify statistical measurements based upon any part of the ATM header or payload on the line (network) side, the equipment (user) side of the link, or both. The counter and filter results provide the following:

- Number of cells that met the filter criteria
- Percentage of cells out of the total busy (assigned) cells on the line
- Percentage of bandwidth these cells occupied
- Throughput in kb/s of these cells
- Throughput in cells per second of these cells

Whatever filters or connectors the user selects or creates, the results are automatically grouped in real time.

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The following filters are provided, but others are easily created to incorporate several variations. Specific interface configurations and traffic generation cell tables can be saved along with filter configurations:

- IP address filtering
- ILMI filtering
- OAM filtering
- Protocol distribution filtering
- VP.VC filtering

Display Filters and Searching

Display filtering and searching lets the user search through collected data to find specific IP addresses, values for protocol fields, or conversations on specific bi-directional virtual connections (by VPI-VCI). The display filters provide the flexibility to select protocol attributes or specific protocols from a checklist, and the power to filter on any bit, byte or characteristic, such as protocol. For example, filtering can be preformed on OAM traffic without having to know any of the protocol specifics.

Post-processing lets the user quickly zoom in on selected criteria, from the traffic passing between specific devices to individual conversations. Post-processing allows the user to:

- Search through the data by record or by time stamp
- Search for events or strings
- Filter on protocols
- Verify event-to-event timing
- View protocol errors
- Print a range of cells or the entire buffer
- Export data in CSV (comma separated variables) format
- Analyze statistics based on the buffered data

ATM Cell Generation

An ATM cell editor can build a *cell table* of up to 255 user defined or previously captured cells that can then be transmitted onto the network. Editing functions include the following:

- Add
- Edit
- Delete
- Copy
- Insert

Windows keyboard commands are also supported – Ctrl-c, Ctrl-v, Ctrl-x, etc. Sequences of captured cells (e.g. an AAL-5 PDU) can be copied and pasted to the cell table; the resulting cell table contents can be edited/modified (e.g. to change the VPI-VCI or to change embedded IP addresses) and the HEC and AAL-5 CRC recalculated, as appropriate, prior to transmission.

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During the time that the cell table is not being sent, the Agilent Advisor will send idle or unassigned cells. *Send Control* allows the contents of cell table to be sent once or repetitively, or for AIS or idle cells to be sent. The peak cell rate (PCR) of the cell table based traffic can be set from zero to the following maximum values, all of which are 100% utilization for that interface. Also, for ease of entry, a percent of utilization can be entered, such as 50% in place of the cells per second value.

- 353,207 cells per second for STM-1/OC-3, STM-1e/EC-3 and UTP155
- 104,268 for DS3 HEC
- 96,000 cells per second for DS3 PLCP
- 80,000 for E3 HEC
- 72,000 for E3 PLCP
- 59,111 for ATM25 with X8 8kHz timing reference
- 59,259 for ATM25 without X8 8kHz timing reference
- 14,491 cells for J2
- 3,623 cells for DS1
- 4,528 cells for E1

To generate OAM cells, the user can use *quick tests* that include F4 and F5 segment or end-to-end cells with user-defined VPI[-VCI] values, they are transmitted from the traffic generator. To generate cell errors, modify the *quick tests* to add corrupted cells to the cell table.

The fields of the generated ATM cell header can be specified as follows:

- VPI values from 0 to 255 (UNI), or 0 to 4095 (NNI)
- VCI values from 0 to 65,535
- GFC values from 0 to 15 (UNI only, not applicable in NNI)
- PTI values from 0 to 7
- CLP values of 0 or 1
- HEC can be set to good (automatically calculated), bad, or user defined.

The generated ATM cell payload can be defined in hex, decimal, ASCII, or "don't care." Errors can be inserted on any bit within any byte of the payload.

ATM Quality of Service (QoS) and Policing Tests

The Agilent Advisor has the ability to do various real-time tests and measurements to check the performance of ATM networks. These fall into two main categories – policing and traffic contract shaped test cell generation, really mirror images of each other. In the case of policing, the Agilent Advisor monitors live traffic and measures conformance to the traffic contract. Test cell generation allows test traffic shaped to a traffic contract to measure the network's ability to deliver the promised QoS, i.e. is the network meeting its SLA (service level agreement) obligations?

Policing, traffic shaping and traffic contract measurements
One of the most important premises of the deployment of ATM networks is the ability to maintain a given level of QoS within the public ATM network. ATM networks protect themselves by policing incoming traffic to check its conformance with pre-determined traffic contract parameters. Some cells may have to be discarded or "tagged" (marked to low priority) in order to protect the traffic of other users of the ATM network.

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When customer traffic exceeds or 'violates' its contracted *peak cell rate* (PCR), taking into account its *cell delay variation tolerance* (CDVT), cells may be discarded or tagged; when it exceeds the *sustainable cell rate* (SCR) parameters, taking into account its *maximum burst size* (MBS) allowances, cells may be discarded or tagged (cell loss priority (CLP) bit changed to 1), depending on the type of traffic contract. When congestion occurs in the core network, low priority cells (CLP = 1) are discarded first by core ATM switches before the cells of normal priority (CPL = 0). Policing enables networks to assure a consistent quality of service within the core network, preventing the overall network performance to be degraded by an individual user.

The Agilent Advisor's policing measurement feature is a real time measurement that checks a virtual connection's conformance to the traffic contract at the ingress to the public network; this could be a virtual channel connection or virtual path connection. The user specifies the traffic contract type (e.g. VBR.3/SBR3) and parameters (PCR, CDVT, SCR and MBS) for the virtual connection and the Agilent Advisor counts the non-conforming test cells and delivers a non-conformance count and non-conformance ratio for active traffic on the network. This measurement would be used typically to check a user's traffic either side of the boundary to the public network when quality of service is suspect (the user experiences unexpected levels of cell loss). If the user traffic entering the network does not conform, the network cannot be blamed for the resulting poor QoS.

Traffic Contracts Supported

As shown in figure 3, the user may specify one of the following types of traffic contract to determine how many cells in the virtual connection are conforming or non-conforming:

CBR.1/DBR/UBR.1: GCRA(1/PCR_{0+1}, $CDVT_{0+1}$)

VBR.1/SBR1: GCRA(1/PCR_{0+1}, $CDVT_{0+1}$), GCRA(1/SCR_{0+1}, BT_{0+1}), no tagging

VBR.2/SBR2: GCRA(1/PCR_{0+1}, $CDVT_{0+1}$), GCRA(1/SCR_{0}, BT_{0}), no tagging

VBR.3/SBR3: GCRA(1/PCR_{0+1}, $CDVT_{0+1}$), GCRA(1/SCR_{0+1}, BT_{0+1}), tagging supported

(note that in this notation, subscripts "0" and "1" means high and low priority cells respectively, so "0+1" means all cells; note also that BT (burst tolerance) is derived from the MBS, PCR and SCR values)

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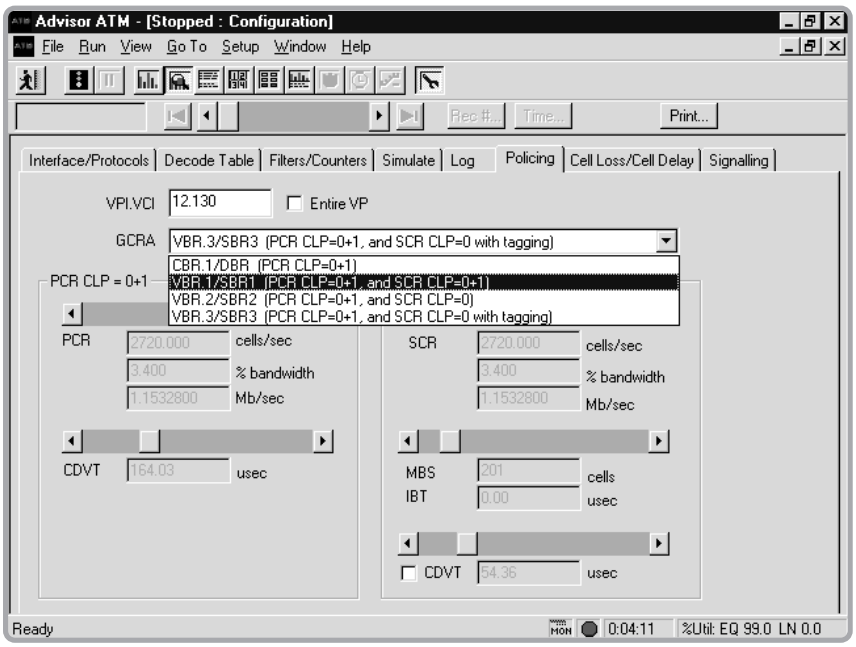


Figure 3: Traffic Configuration.

Shaping of test cell traffic and background traffic

There are two sides to any contract and ATM traffic contracts are no exception. If the user traffic keeps to its contract obligations then the network should deliver the quality of service it guarantees in the traffic contract. This is usually specified in terms of cell loss and added cell delay variation, etc.

The Agilent Advisor is able to measure ATM layer QoS by generating test traffic shaped to meet the traffic contract in terms of PCR, CDVT, SCR and MBS; it also allows users to choose the standardized "Generic List" values for the parameters. The test traffic comprises test cells which conform to ITU-T Recommendation O.191 which specifies the test cell and the methodology for measuring ATM layer QoS parameters specified in ITU-T Recommendations I.356 and I.357, and the ATM Forum's Traffic Management Specification version 4.1. Measurements made by the Agilent Advisor are as follows:

Cell Loss Ratio
Cell Misinsertion Rate
Cell Error Ratio
Cell Delay Variation
Mean Cell Transfer Delay
Minimum Cell Transfer Delay
Maximum Cell Transfer Delay
Severely Errored Cell Block Ratio
Availability Ratio
Transmitted Cells
Non-Conforming Cells
Tagged Cells

Test traffic can be sent and received by the same Advisor for local testing or it can be sent by one Advisor and received on the other side of the network by another. Each Agilent Advisor on either end of a connection, can source test traffic in the opposite direction on the same bi-directional virtual connection and, at the same time, analyze traffic from the other; each Advisor is configured to source traffic conforming to the traffic contract for that direction of the virtual connection; such connections are often asymmetrical. As conforming test traffic is entering the network, any cell loss or cell delay variation detected on the far side of the network must be caused by the network itself; this can be compared with the SLA requirement to check that the network is complying with its side of the agreement. The Advisor is also capable of generating same link background traffic (on other virtual connections).

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For more details about policing and shaping, see the ATM QoS White Paper.

Test Cells

The ITU-T Recommendation O.191 specifies a test cell and a methodology for using it to determine ATM QoS measurements, as defined in ITU-T Recommendation I.356 and I.357. The ATM Forum references I.356 in its Traffic Management 4.1 specification.

The O.191 test cell has a standard header for any user channel (any VCI above 31 is allowed). The payload has a number of special fields which allow the QoS measurements to be made: there is a 32 bit "sequence number" field for measurements of cell loss (ratio) and cell misinsertion (rate); there is a 32 bit time stamp (with 10ns granularity in the least significant bit) for cell delay and cell delay variation measurements, and the entire payload is error checked by a CRC-16 for measurements of cell error. In addition, the entire payload is scrambled to ensure that all bits of the payload are exercised so that memory-based switch fabrics can be tested for "stuck" bits.

Because the O.191 test cell and the methodology for its use are standardized, O.191 conformant test equipment from different vendors can inter-operate. Results should be consistent between equipment from different vendors. However, proprietary extensions are permitted, and Advisors working together (one at each end of a virtual circuit) can detect when the network has tagged (market to low priority, i.e. CLP = 1) a cell, which was sent at normal priority (CLP = 0); these events are counted.

ATM Signaling and Call Placement

While permanent virtual circuits (PVCs) have dominated the ATM world thus far, switched virtual circuits (SVCs) are increasing in utilization. Due to this growth, it is necessary to have confidence in SVCs set up and troubleshooting when the unexpected happens.

The Advisor includes UNI signaling emulation, ILMI address registration and LANE emulation to provide connectivity testing. The signaling and call placement feature supports ATM Forum UNI 3.0, 3.1 and 4.0. The Advisor can emulate the user or network side of the UNI. In addition, the user can specify and edit the information elements (IEs) placed on Call Connect messages that specify what type of SVC to bring up. Figure 4 shows the configuration for call signaling while figure 5 displays the results.

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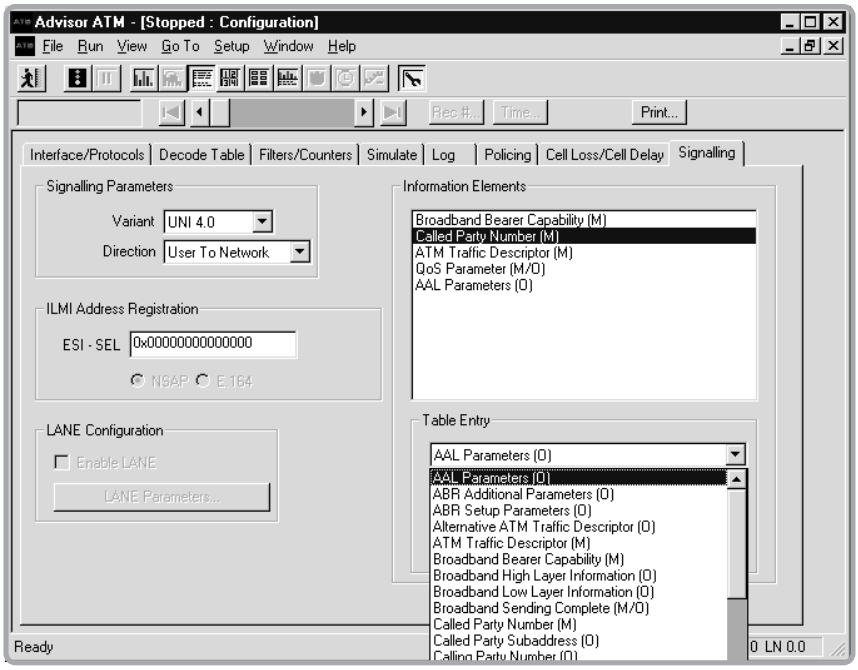


Figure 4: Signaling Configuration.

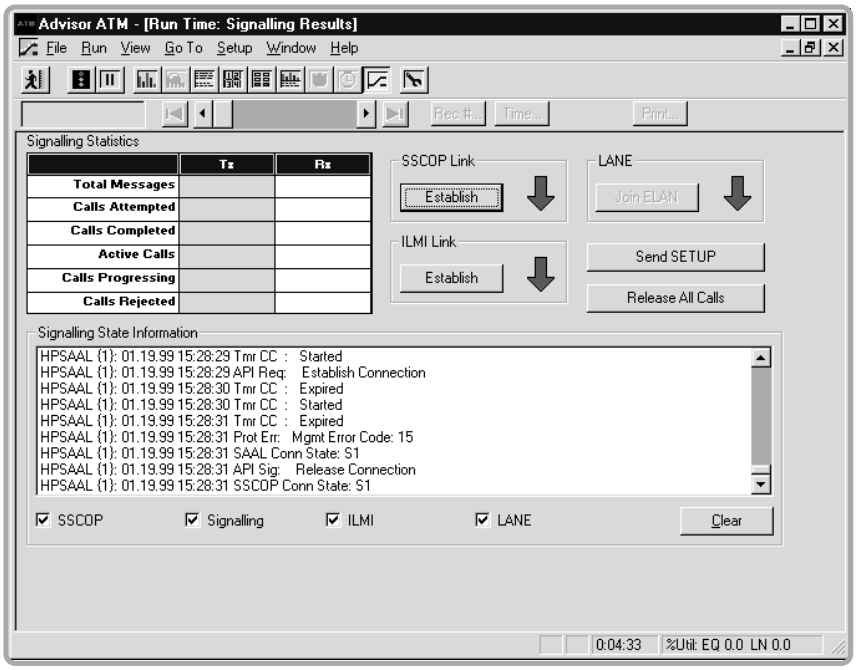


Figure 5: Signaling Results.

Physical Layer

Inverse Multiplexing for ATM (IMA)

The Advisor can now decode IMA Control Protocol cells. These ICP cells are sent regularly on each E1 or T1 in an IMA Link Group in order to manage the IMA process. The ability to decode and display these physical layer cells helps troubleshooters identify IMA configuration problems.

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Bit Error Ratio Testing (BERT)

Often problems on the network can be attributed to the transmission medium. The Advisor has a powerful, built-in bit error ratio test capability that performs not only frame-based BERT (SDH/SONET-level), but also cell-based BERT, in which the bit patterns are carried in the payload of the ATM cell.

- Testing Patterns: 1111, 1010, 1100
- PRBS: 2^{15}-1, 2^{20}-1, 2^{23}-1
- User defined - one octet (8 bits)

Optical Power Measurements

In addition to full ATM analysis, the STM-1/OC-3 ATM interface has a built-in optical power meter that allows the user to check power levels with an accuracy of +/- 0.5 dBm. This measurement capability has the ability to be performed using the same interface on an optical fiber carrying STM-4c/OC-12c, even though the interface does not otherwise operate at 622Mb/s.

Signal Strength Pulse Amplitude Meter

In addition to full ATM analysis, the Agilent Advisor E1/T1 and E3/T3 cells and frames interfaces and STM-1e/EC-3 ATM interfaces have a built-in pulse amplitude signal strength power meter that allows users to check pulse amplitude levels with a resolution of +/- 1 dBm. The dynamic range is between +6 dBmV and –40 dBmV.

Line Status

The operation of the physical interface is often critical in determining the cause of network problems. Therefore, the Advisor also tracks errors at the physical layer. Counts of error and alarm events are recorded on the display for both the line (network) and equipment (user) side. The time of the last occurrence of a particular event is recorded as well. Events are saved in the buffer and can be logged to disk.

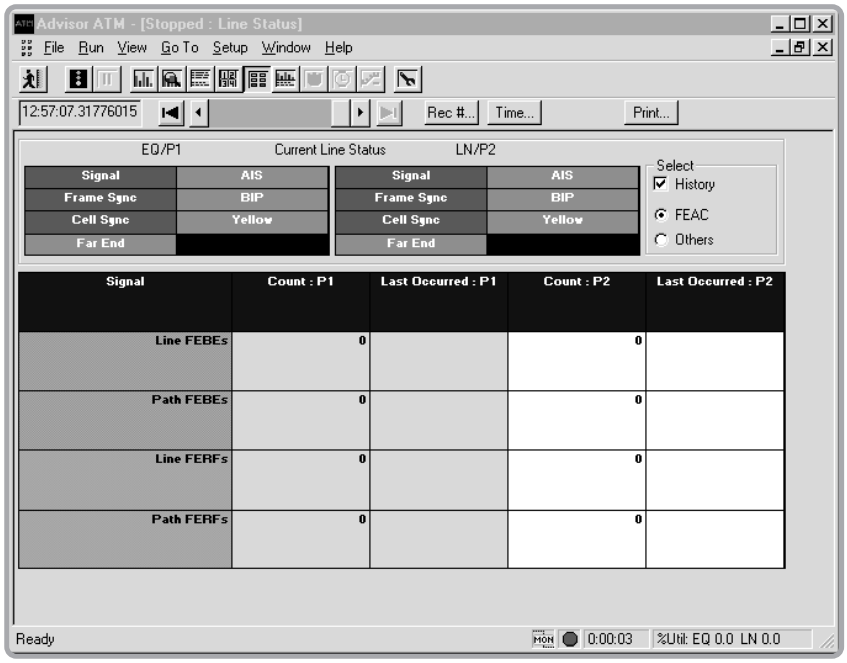


Figure 6: Line Status.

Line status is displayed in real time and is shown in figure 6. All of the events listed below are saved in the buffer and counted in the line status display. These events may be logged to disk. The current status of critical parameters (marked with an asterisk (*)) is also displayed in large green or red boxes in the line status display, for easy, at-a-glance viewing.

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ATM Testing (continued)

T1/DS1

Loss of signal (LOS) (*)
Loss of frame (LOF) (*)
Loss of PLCP sync (LOPS) (*)
AIS (*)
RAI/Yellow (X-bits) (*)
Bi-polar violations
ESF CRC errors
Line code violation (B8ZS)
Frame slips
Frame bits
One's density
Excess zero's
Loss of Cell Delineation (*)
Pulse Amplitude

E1

Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
Line code violations (HDB3)
RAI (FERF) (*)
AIS (*)
CRC-4 errors (if CRC-4 is selected)
Frame alignment error
Loss of Cell Delineation (*)
Pulse Amplitude

J2

Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
Line code violations (HDB3)
RAI (FERF) (*)
Payload AIS (*)
CRC-4 errors (if CRC-4 is selected)
Loss of Cell Delineation (*)
High Bit Error Ratio

ATM25

Loss of Signal (*)
Loss of Synchronization (*)
Timing sync frequency
Invalid Symbol
Short Cell

E3

Loss of signal (LOS) (*)
Loss of frame (LOF) (*)
BIP-8
Line code violations (HDB3)
Payload type mismatch
REI (FEBE)
RDI (FERF)
AIS (*)
Loss of cell sync (LOCS) (*)
Pulse Amplitude

T3/DS3

Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
RDI (Yellow) (X-bits) (*)
AIS (*)
Line code violations (B8ZS)
REI (FEBE)
Idle (*)
P1/P2 parity errors
C-bit parity errors
PLCP sync loss (*)
PLCP Yellow (*)
PLCP BIP
PLCP FEBE
FEAC (*)
FEAC DS3 line
FEAC loss of signal/HBER
FEAC loss of frame
FEAC AIS
FEAC idle
FEAC service failure
FEAC no service failure
FEAC common equipment failure
FEAC line loopback activate
FEAC line loopback de-activate
Pulse Amplitude

STM-1/STM-1e/OC-3/EC-3

Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
Loss of Pointer (LOP)
B1, B2, B3 BIP errors
Summary BIP error (*)
Label mismatch
MS-REI/REI-L (Line FEBE)
REI/REI-P (Path FEBE)
MS-RDI/RDI-L (Line/FERF)(*)
MS-AIS/AIS-L (*)
RDI/RDI-P (Yellow)
AIS/AIS-P
Summary Far End (RDI/RDI-P or REI/REI-P) (*)
Loss of Cell Delineation (LCD) (*)
Remote
Optical power (STM-1/OC-3)
Pulse Amplitude (STM-1e/EC-3)

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ATM Testing (continued)

UTP155

Loss of signal (LOS)(*)
Loss of frame (LOF)(*)
Loss of pointer (LOP)
B1, B2, B3 BIP errors
Summary BIP error (*)
Label mismatch
MS-REI/REI-L (Line FEBE)
REI/REI-P (Path FEBE)
MS-RDI/RDI-L (Line FERF) (*)
MS-AIS/AIS-L (*)
RDI/RDI-P (Yellow)
AIS/AIS-P
Summary Far End (*)
Loss of Cell Delineation (LCD) (*)
Remote

STM-4c/OC-12

Loss of Signal (LOS)
Loss of Frame (LOF)
Loss of Pointer (LOP)
Out of Frame (OOF)
MS-RDI/RDI-L (Line/FERF)
MS-AIS/AIS-L
RDI/ RDI-P (Yellow)
AIS/AIS-P
MS-REI/REI-L (Line FEBE) and counts
REI/REI-P (Path FEBE) and counts
Label mismatch
Loss of Cell Delineation (LCD)
B1, B2, B3 BIP error counts
BIP error indication
Optical power (Using STM-1/OC-3 module)

ATM Network Vitals

Vitals provides real-time statistics of network conditions that provide a statistical picture of what is happening on the ATM links. Working simultaneously with decodes, filters, and other measurements, the Vitals feature interprets data traffic as it occurs. This feature can be used to identify network problems or to assist the user in optimizing the configuration of network components and software.

Values in the Vitals display are presented in tabular form and are cumulative from the start of a test. An exception is instantaneous utilization, which is also displayed in graphical format for a quick look at overall usage of the network. Vitals data are provided for both the network and the subscriber sides of the connection.

T1/DS1

Average utilization in %
Instantaneous utilization in %
Maximum utilization %
Total cells received
Idle cells received
Busy cells received
HEC errors received
Bi-polar violations
ESF CRC errors
Frame slips
Frame bits
One's density
Excess zero's

E1

Average utilization in %
Instantaneous utilization in %
Maximum utilization %
Total cells received
Idle cells received
Busy cells received
HEC errors
Code violations
CRC-4 errors
Frame alignment errors

J2

Average utilization in %
Instantaneous utilization in %
Maximum utilization %
Total cells received
Idle cells received
Busy cells received
HEC errors
Line code violations
CRC-45 errors

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ATM Testing (continued)

ATM25
Average utilization in %
Instantaneous utilization in %
Maximum utilization %
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header ("HEC") errors

E3
Average utilization in %
Instantaneous utilization in %
Maximum utilization %
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header ("HEC") errors received
Code violations
REI (FEBE)
RDI (FERF)
BIP-8
Label mismatches

T3/DS3
Average utilization in %
Instantaneous utilization in %
Maximum utilization %
Total cells received
Idle cells received
Busy cells received
HEC errors received
Line code violations
DS3 FEBE
P1/P2 parity
C-bit parity
PLCP BIP8
PLCP FEBE

STM-1/STM-1e/OC-3/EC-3
Average utilization in %
Instantaneous utilization in %
Maximum utilization %
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header ("HEC") errors received
Line code violations
MS-REI/REI-L (Line FEBE)
REI/REI-P (Path FEBE)
MS-AIS/AIS-L
AIS/AIS-P
Loss of Cell Delineation (LCD)

UTP155
Average utilization in %
Instantaneous utilization in %
Maximum utilization %
Total cells
Idle/unassigned cells
Busy (assigned) cells
Header ("HEC") errors
Line code violations
MS-REI/REI-L (Line FEBE)
REI/REI-P (Path FEBE)
MS-AIS/AIS-L
AIS/AIS-P
Loss of Cell Delineation (LCD)

STM-4/OC-12
Auto-discovery of up to 4,095 VCs
Instantaneous utilization in % per VC
Peak % of total bandwidth per VC
Total cells received per VC
Header ("HEC") errors received

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WAN Testing

All major WAN interfaces, including V.10/V.11, V.24/V.28/RS-232C, V.35 and V.36/ RS-449/422/423 are already built into the instrument mainframe; X.21 (with J2277A external cable – V.36/RS-449 to DB15) and RS-530 (with external cable J2278A – V.36/RS-449 to DB25) are also available. A separate High Speed V-Series module with V.35, RS-449 and X.21 interfaces are available to supports speeds up to 8.192 Mb/s. Other WAN interfaces, including ISDN basic rate interfaces (BRI) S/T/U and primary rate interfaces (PRI), E3/DS3, E1/T1, OC-3/ STM-1, STM-1e/EC-3, HSSI, DDS 4-wire, are available as slide-in modules or as undercradles.

- Monitoring of LAN data over WAN and ATM is a standard feature. Real-time monitoring of network conditions is a powerful testing capability to dig deeply into the data if necessary.
- The Agilent Advisor is a multitasking instrument; therefore users can perform any of the active stimulus/response tests while the analyzer simultaneously monitors their effect on the network.
- Another powerful tool of the Advisor is traffic generation; it allows the transmission of virtually any type of message or frame onto the network.
- To provide statistical information about the data on the network, the Agilent Advisor analyzes every frame and count user definable events. A number of counters have been pre-defined.
- The Advisor is equipped with standard Bit Error Ratio Testing (BERT) and is capable of generating BERT patterns onto V-series, T1, E1, E3, or DS3 WAN links.

It does not matter if testing needs are for Frame Relay at E3/DS3 or HSSI speeds or for low speed links, such as Async and Bisync, the Advisor provides all of this functionality under one single handle solution.

Unmatched WAN Solutions

WAN testing solutions are provided from the easy-to-use main Windows® user interface:

- Network Line Vitals
- Packet over SONET/SDH Statistics
- Frame Relay DLCI Statistics
- Frame Relay SLA Measurement
- Frame Relay CIR Policing
- Frame Relay LMI Expert
- LAN over Frame Relay, HDLC and PPP Protocol Distribution
- Top Talker Statistics
- Ping Generation
- X.25 LCN Statistics
- Decode View
- Filters/Counters Statistics
- Full bandwidth traffic generation
- Line Status
- Simulation for retransmission of captured data and user defined simulation
- ISDN B-channel call tracking Expert
- SLIP Measurement

WAN Analysis Capabilities

The Advisor provides real-time and post-processing Layer 2 and Layer 3 analysis capabilities for:

- Packet over Sonet/SDH
- Frame Relay
- PPP (Sync, Async)
- ISDN
- X.25
- HDLC
- ATM DXI
- SMDS (optional)
- SNA
- V5.1/V5.2
- Async and Bisync

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Packet over SONET/SDH

As well as being a core network technology, Packet over SONET/SDH (PoS), also sometimes known as HDLC over SONET/SDH, is becoming an access technology at 155 Mb/s, used as an alternative to ATM.

The Agilent Advisor supports analysis of the two main variants of PoS:

- IETF PPP in HDLC-like frames over SONET/SDH (both the current and obsolete versions with version auto-detect and manual over-ride)

- Cisco HDLC over SONET/SDH

These are supported in the standard Agilent Advisor PPP and HDLC applications which also support other interfaces. Full rate capture of frames down to 7 bytes in length is provided, and full higher-layer decodes are available, including those for 3G and Mobile-IP. These and other decodes are also available over ATM and Ethernet, providing the Advisor with the most extensive 3G analysis capability under one handle

Additionally, the Advisor allows the user to measure:

- Physical Layer Statistics (see figure 7)
  - –optical power / electrical pulse amplitude
  - –SONET/SDH alarms

- Link Layer

  - – Avg Util (%)
  - – Inst Util (%)
  - – Max Util (%)
  - – Min Util (%)
  - – Total Frames (count)
  - – Total Octets (count)
  - – Avg Thru (kbps)
  - – Inst Thru (kbps)
  - – Max Thru (kbps)
  - – Min Thru (kbps)
  - – Abort frames (count)
  - – Short Frames (count)
  - – FCS Errors (count)

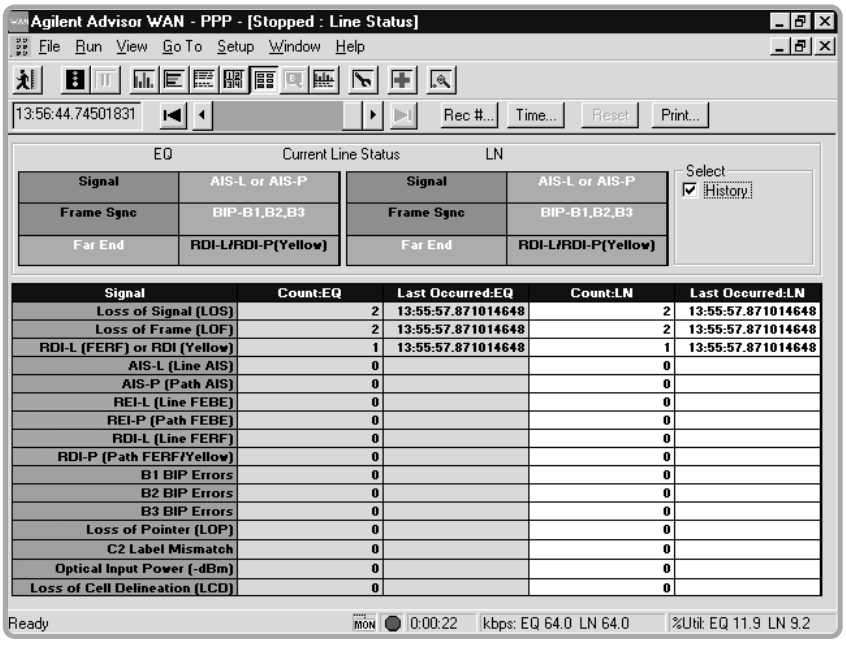


Figure 7: Line Status Measurement.

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Frame Relay

No matter how complex the testing needs are, the Agilent Advisor with interfaces such as the T1, E1, E3/T3, or the HSSI lets the user test and troubleshoot complex WAN environments to solve WAN access and internetworking problems quickly.

The Agilent Advisor provides extensive real-time and post-processing test capabilities for the Frame Relay protocol according to the following recommendations:

- ITU-T Q.933 Annex A
- ANSI T1.617 Annex D
- Original Frame Relay consortium

The Advisor with its extensive Frame Relay testing capabilities allows the user to test:

- Physical Interface
- Physical Layer
- Link Layer
- LMI Signaling
- LMI/PING Responses
- DLCI Assignments
- CIR
- Data Transfer
- Protocol Distribution
- SLA

These basic verification techniques are general approaches to WAN analysis and troubleshooting that are accepted in the industry because of their systematic appeal and proven effectiveness.

Committed Information Rate (CIR) Measurement

CIR is one of the most important features for Frame Relay Management. CIR is a contract between the Service Provider and a User. This contract allows both parties to exchange information under controlled traffic conditions. CIR is the rate expressed in bits per second (bit/s) where the network agrees to transfer information under normal conditions. This rate is measured over the measurement interval Tc. The default value of Tc is 1 second. Figure 8 depicts a typical CIR measurement.

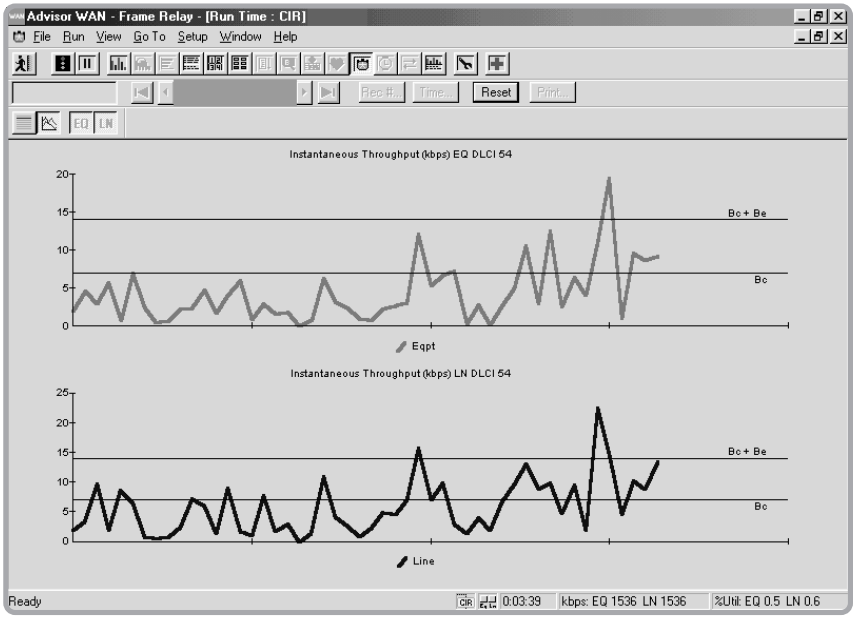


Figure 8: CIR Measurement.

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- The Agilent Advisor performs CIR monitoring for Frame Relay activity in real time. The analyzer provides useful customer information such as:
- Statistical traffic activity per DLCI in graphical and tabular form comparison of real traffic activity per DLCI against a fixed CIR value CIR
- Statistics in bits, frames and percentage per DLCI for:
  - -Non discardable traffic DE=0
  - -Below the Bc (Committed Burst).
  - -Discard Eligible traffic DE=1
  - -EIR (Excess Information Rate) Statistics in bits per second, frames per second, and percentage per DLCI for:
  - -Traffic below Bc (CIR)
  - -Traffic above the Bc, but below the sum of Bc+Be.
  - -Traffic above the sum of Bc+Be.
- Ability to modify the Bc and Be parameters in post processing mode to play different CIR scenarios.
- Store statistics for further analysis in the Agilent Reporter.

Service Level Agreement (SLA) Measurement

Another aspect of the Frame Relay service that often needs to be tested is provisioning as defined by the CIR (Committed Information Rate). Figure 9 depicts a typical SLA measurement.

Note: This measurement is sometimes called Service Level Agreement (SLA) testing or Service Level Definitions (see the Frame Relay Forum FRF.13 implementation agreement).

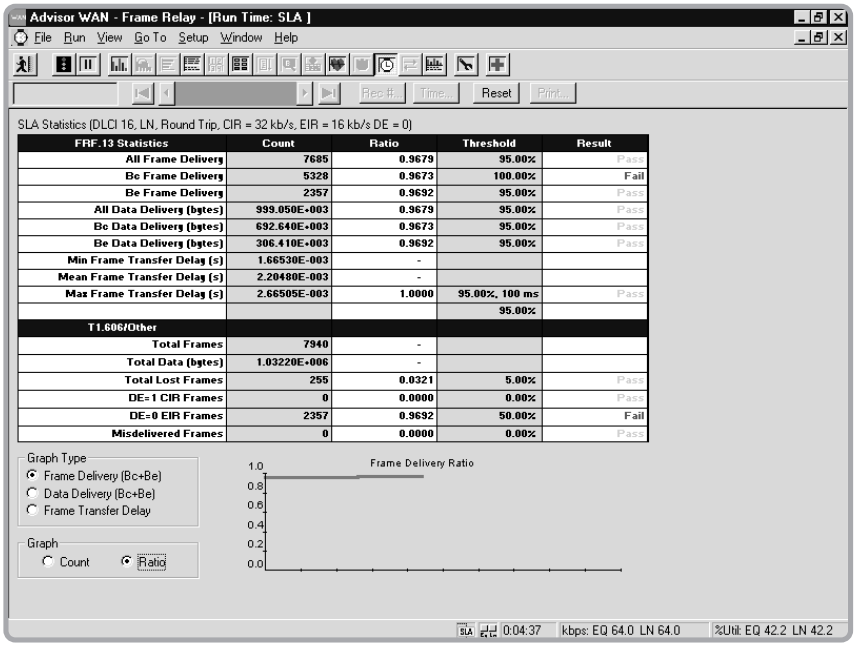


Figure 9: SLA Measurement.

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Frame Relay (continued)

The Advisor transmits controlled packets into the network according to an established traffic contract between the user and the network, defined by the Frame Relay Forum FRF.13. This application characterizes the reliability of the Frame Relay Network by simulating user traffic and optional background traffic.

There are three possible configurations:

- Transmission of traffic between two advisors connected from end to end
- Physical network loopback utilizing only one Agilent Advisor
- Generation of IP-ICMP requests from the Agilent Advisor to a network device

This test runs with LMI emulation off or on for the following options:

- UNI-User (CPE) Emulation
- UNI-Network (Switch) Emulation
- NNI Emulation (bi-directional polling)

The following FRF.13 statistics are provided:

- All Frames delivered
- Bc Frames delivered
- Be Frames delivered
- All Data delivered
- Bc Data delivered
- Be Data delivered
- Min, Mean, and Max Transfer Delay
- Availability

The following T1.606 statistics are provided:

- Total Frames
- Total Data
- Total Lost Frames
- Misdelivered Frames
- DE=1 CIR Frames. Frames marked for possible discard by switch
- DE=0 EIR Frames. Frames that should have been marked for discard but weren't.

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Frame Relay LMI Expert

Frame Relay LMI Expert is an application that automatically detects Frame Relay conditions in the network. A typical display for the LMI Frame Relay LMI Expert is depicted in figure 10. The application automatically identifies which standard (ANSI, ITU-T or Original LMI) the network is running.

- The following LMI statistics are provided to perform a practical Frame Relay troubleshooting, based on ANSI T1.617, ANSI T1.618, ITU-T Q922 and Q933:
- Monitor Frame Relay Sequence Numbers and report missed sequences
- Monitor FULL Status (N391) Polling Cycles
- Monitor Status Enquiry messages (T391) counters
- Monitor PVC Full Status messages and maintain Full Status summary Tables for:
  - Active / Inactive PVCs
  - Present / New PVCs
  - Deleted / Not deleted PVCs
  - Monitor error conditions according to Q.933 Annex A, paragraph A.5
  - T392 timers and thresholds
  - N392 and N393 counters and thresholds

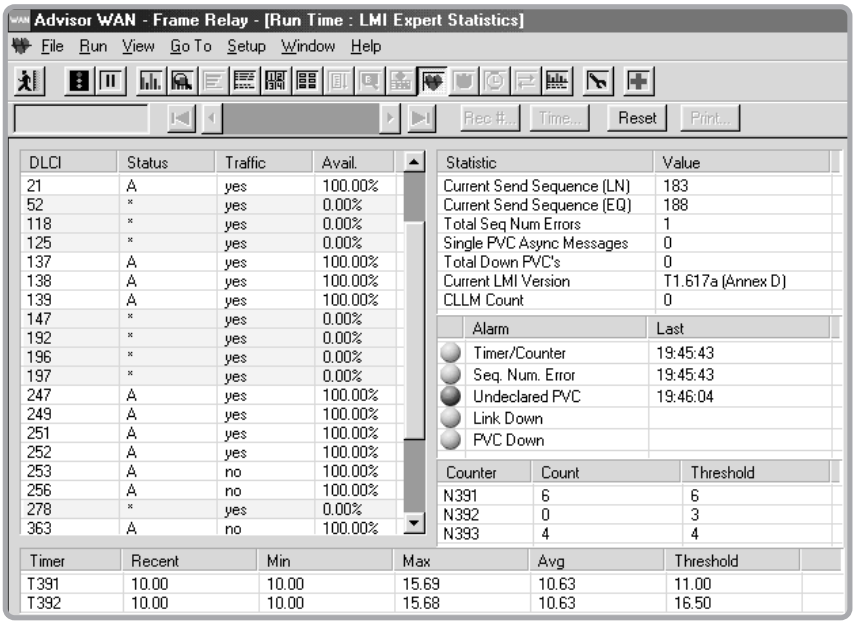


Figure 10: LMI Expert Statistics.

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DLCI Statistics

The Agilent Advisor captures all the Frame Relay frames on the link and performs an automatic study of all the possible DLCIs (1024). This application tracks the most relevant information of each of the virtual channels in the network. A complete network condition analysis is performed on all the PVCs present on the link.

The DLCI Measurement displays both the CPE and the Network statistics:

- Throughput in kb/s
- Frame Distribution
- Byte Distribution

The following values are provided for both the Line (Network) side and the Equipment (User) side:

- Max. and inst. utilization (%)
- Max., inst. and avg. throughput in kb/s
- Total octets (bytes)
- Total frames/packets
- Short frames/packets
- DE
- FECN
- BECN

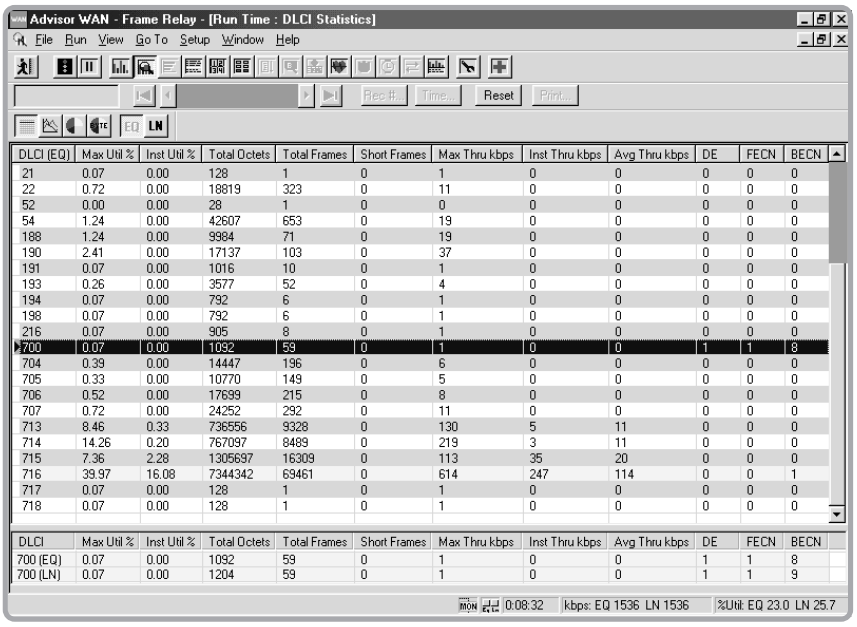


Figure 11: DLCI Statistics Table.

DLCI Statistics allows graphing the throughput of a particular PVC in the network to visually determine traffic patterns as seen in figure 11, 12a and 12b. With this application, the user can isolate the traffic of a specific PVC from the rest of the link traffic.

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Frame Relay (continued)

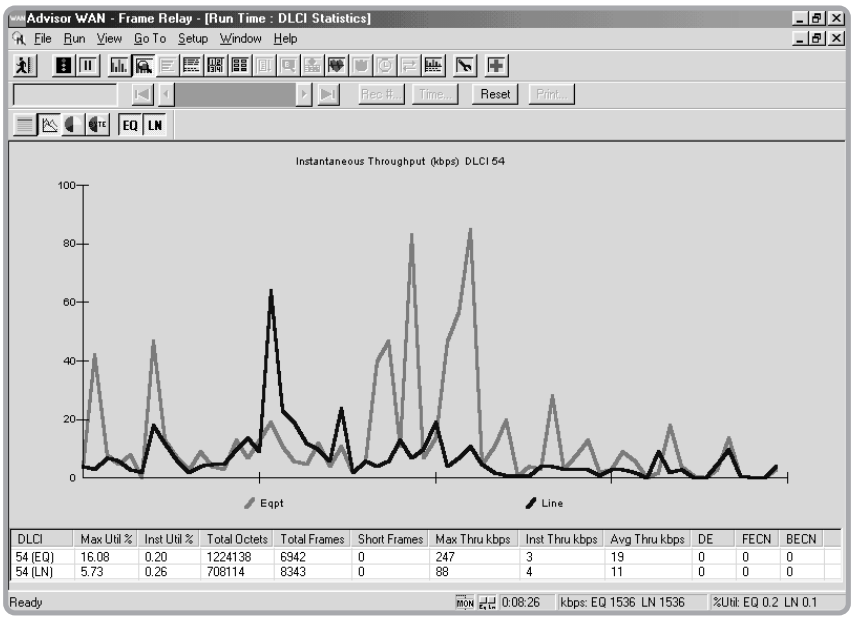


Figure 12a: DLCI Statistics.

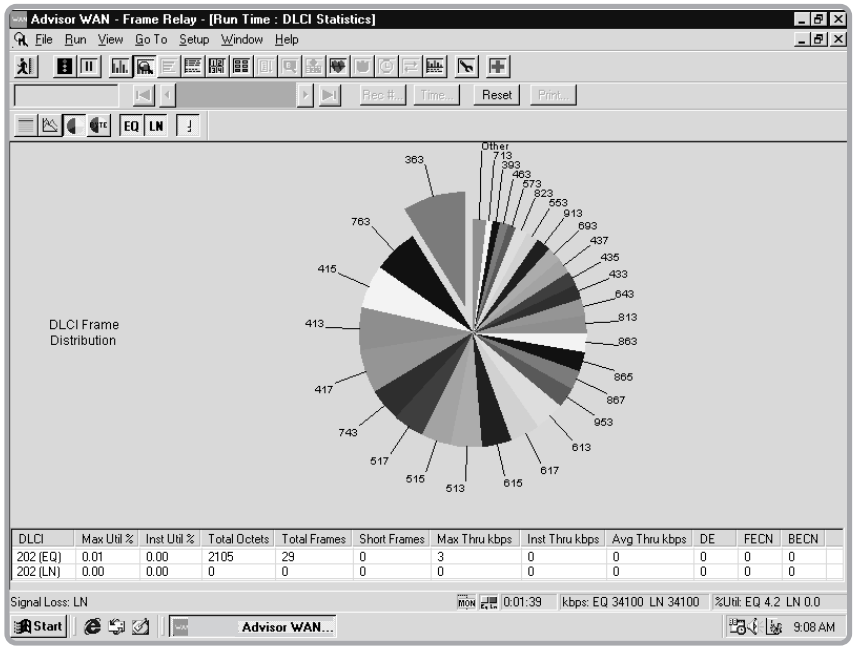


Figure 12b: DLCI Statistics.

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Frame Relay Line Vital Statistics

Network Vital Statistics provide real-time measures of network conditions to present a statistical picture of what is happening on the network links as depicted in figure 13. Working simultaneously with decodes, filters and other measurements the Vital Statistics feature interprets data traffic as it occurs. This feature can be used to identify network problems or to assist the user in optimizing the configuration on network components and software. Vital Statistics are gathered in intervals of 1-second. Values may also be logged to disk.

Values in the Vital Statistics display are presented in tabular form and are cumulative from the start of a test. Instantaneous utilization is displayed in graphical format for a quick look at overall usage of the network. The following values are provided for both the Line (Network) side and the Equipment (User) side:

- Max., min., and avg. utilization (%)
- Max., min., inst., and avg. throughput in kb/s
- Total octets (bytes)
- Total frames/packets
- Short frames/packets
- Abort frames/packets
- FCS errors

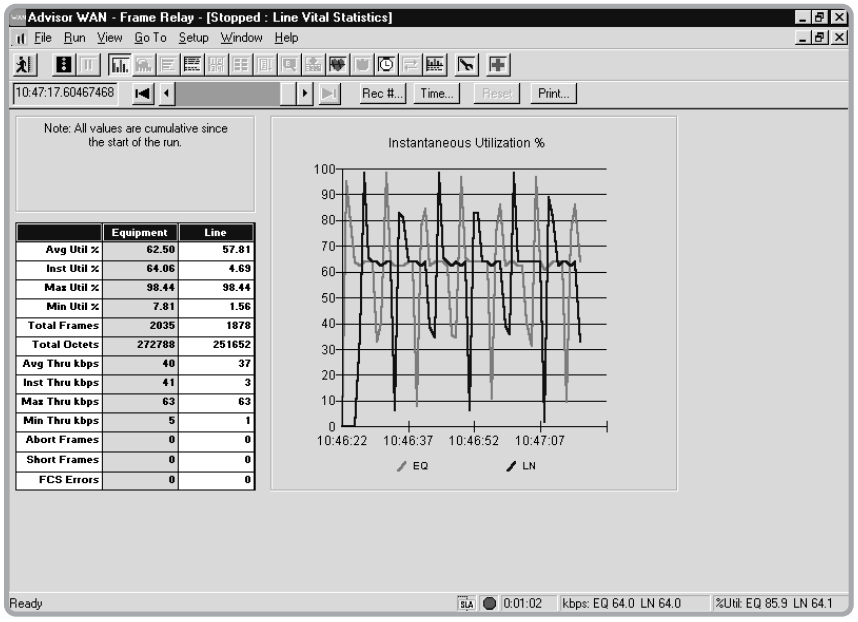


Figure 13: Line Vital Statistics.

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Top Talkers

Top Talkers determines which IP and IPX users consume the most Frame Relay bandwidth. With the Agilent Advisor, 256 top talkers are identified. Figure 14 depicts a typical top talker screen.

The following values are displayed:

- Sorted IP and IPX source and destination statistics
- Traffic identified as DTE or DCE (CPE or Network)
- Throughput in kb/s
- Frame rate and percentage (%) utilization

Samples from 2 seconds to 24 hours
Specified periods by hours, minutes and seconds
Updated measurement results every 2 seconds

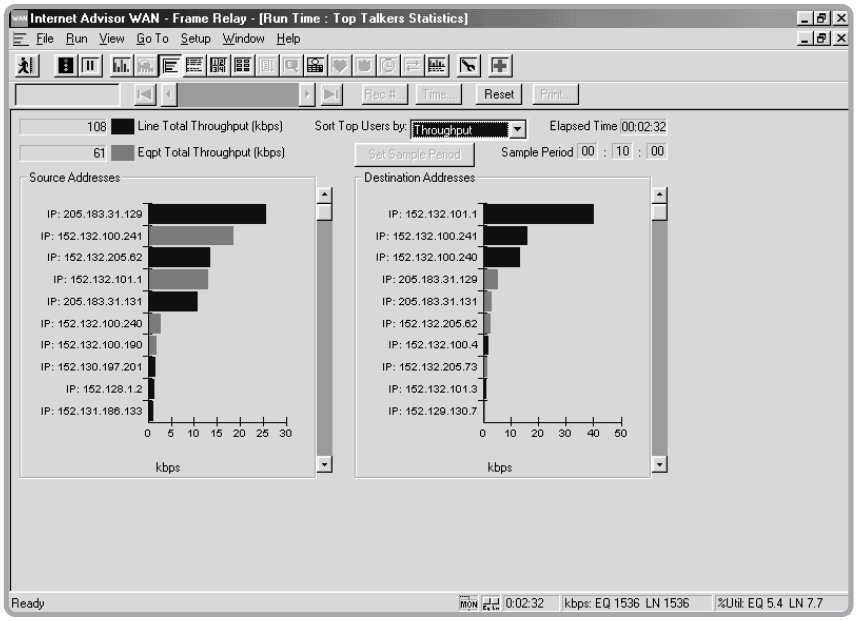


Figure 14: Top Talkers.

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LAN Protocol Distribution

The Protocol Distribution application displays the traffic running in the network and categorizes it by Network Layer, Transport Layer or Application Layer. This is also present in the HDLC and PPP applications.

The display, as shown in figure 15, contains a table showing utilization, frames (total), bytes (total), frames/sec, and bytes/sec. The network protocols are sorted by the displayed statistic.

The Protocol Distribution pie chart graph can be configured to display the following parameters:

- %Utilization
- Frames
- Bytes
- Frame/Sec
- Bytes/Sec

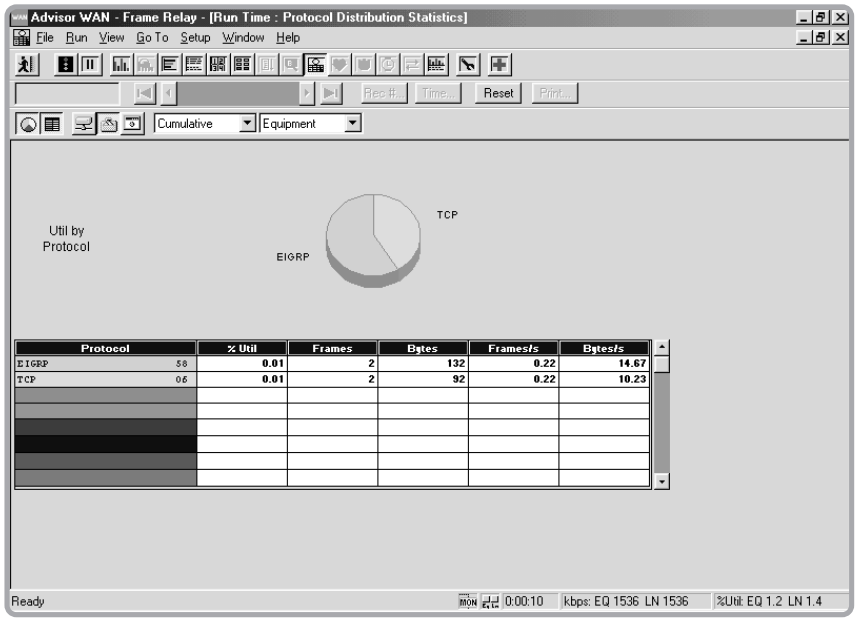


Figure 15: Protocol Distribution.

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LAN Commentators and Expert System

Powerful "Commentators" follow state-based protocols and can provide warnings and alerts when unusual message sequences are detected. This is an expert analysis application that extracts LAN information from the Frame Relay frame and performs an intelligent analysis, detecting warnings and alarms of erroneous events in the user traffic. A typical Expert Analyzer screen is depicted in figure 16.

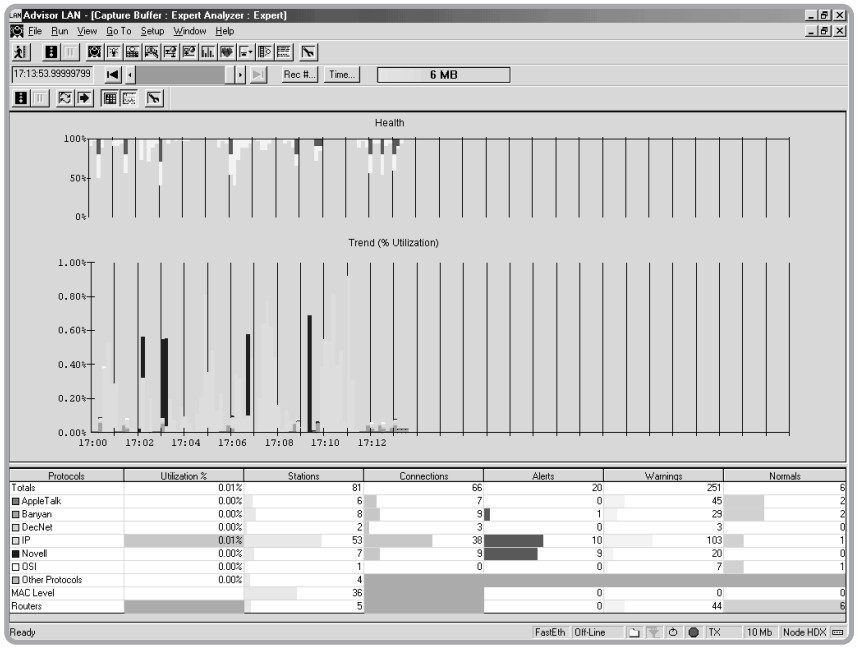


Figure 16: Expert Analysis

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Decodes

The Agilent Advisor provides the ability to decode correlated Frame Relay network traffic with its enhanced decode view. Decodes can be configured to see: Summary of the frame, detailed decode of the frame, and a hex representation of the frames as depicted in figure 17.

The analyzer decodes and displays the following fields and protocols:

- DLCI, DE, FECN, BECN, E/A and FCS
- Auto LMI detection and decoding for ANSI T1.617 Annex D, ITU-T Q.933 Annex A, original LMI
- Consolidated Link Layer Management (CLLM) messages, found on DLCI 1007.
- Multi-Protocol over Frame Relay (Network Layer)
- The Frame Relay applications will decode the multi-protocol encapsulation over Frame Relay automatically according to RFC-1490, RFC-2427, Ethertype or FRF.3.1, CLLM, and Annex G (X.25 over Frame Relay).
- Voice over Frame Relay (VoFR) monitoring FRF.11
- Committed Information Rate according to ANSI T1.606a

Double clicking on a field in the Detailed Pane of the decode Window will cause the appropriate fields in the Hex decode pane to be inverse highlighted giving the user greater analysis capabilities in the decode view.

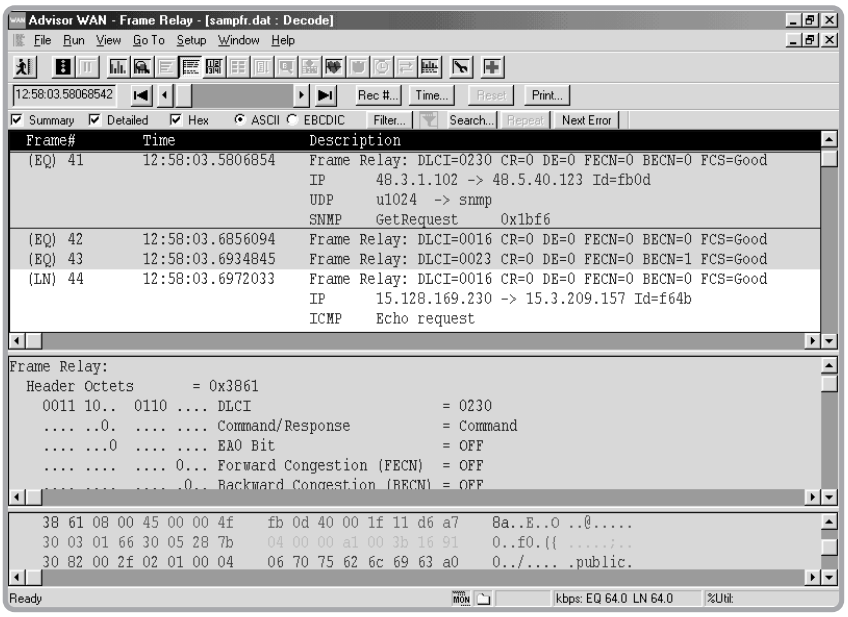


Figure 17: Decodes

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Real-time Capturing, Filtering and Searching

The Agilent Advisor now offers real-time IP and WAN filtering at rates up to 155Mb/s (up to DS3 for Frame Relay). This allows the user to isolate and analyze LAN and Frame Relay traffic on an ATM circuit or LAN traffic taking place on a Frame Relay circuit.

The real time filtering function provides application-level, LAN-centric troubleshooting on ATM or Frame Relay networks, thus allowing users to observe specific traffic types that may be causing trouble on the network. The user can filter by IP source and/or destination address for IP traffic encapsulated in Frame Relay, and additionally encapsulated in ATM. This feature maximizes valuable buffer space for optimal data collection of targeted LAN traffic, since the filtering takes place before data capture.

In addition to capture filtering performed in the hardware, the Agilent Advisor is able to gather counts of events such as cells or frames that meet the filtering criteria. More details of these features are given in technology specific sections in this specification.

Powerful filtering and search functionality allows the user to drill down further for troubleshooting purposes when post-processing data from a capture buffer or file. The same graphical user interface is used for pre and post filtering.

Capture Filters and Counters

Hardware counters and filters allow the user select frames to bring into the capture buffer. A typical Filters and Counters screen is depicted in figure 18. The Agilent Advisor will capture every frame, no matter what the traffic level, and that is exactly what is needed.

Up to 16 hardware data filters can be enabled simultaneously or individually turned on or off. A flexible and user-friendly menu helps the user define specific filters, counters, and triggers:

- Up to 16 hardware data filters (both sides of the network)
- Enabled simultaneously or individually
- Flexible, user-friendly menu for protocol specific filter and counter setup
- Several user selectable actions for triggers
- Filter up to 64 bytes into the frame

Filter/Counter Statistics are available in Graphical and statistical view of the network based on setup filters/counters:

Graph type:
- Bar
- Pie

Mode
- Instantaneous
- Cumulative

Graph
- % of frames

Throughput (frame/s)

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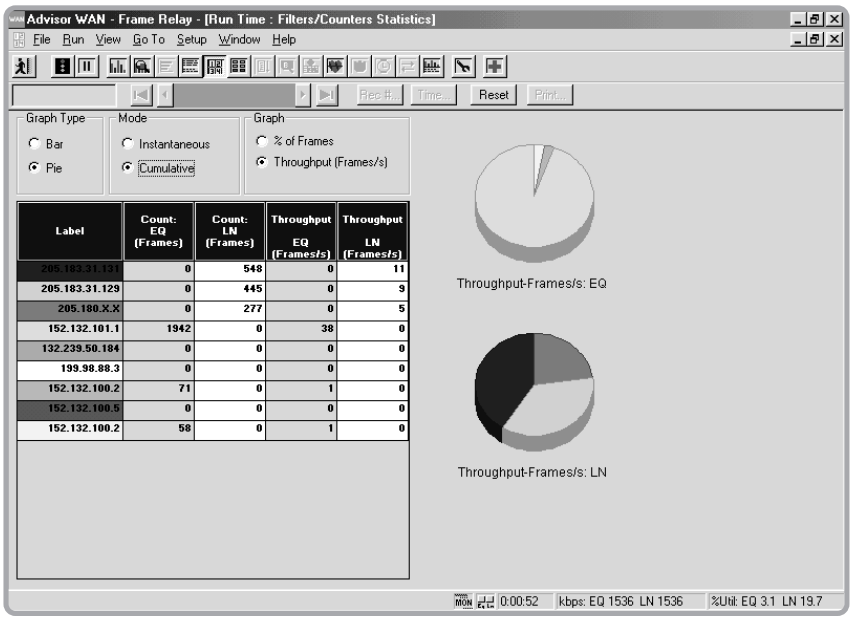


Figure 18: Filters and Counters

Display Filters and Searching

Display filtering and searching lets the user search through collected data to find specific IP addresses, values for protocol fields, or conversations on specific bi-directional virtual connections (by DLCI). The display filters provide the flexibility to select protocol attributes or specific protocols from a checklist, and the power to filter on any bit, byte or characteristic, such as protocol. For example, anyone can filter on Annex D without having to know any of the protocol specifics.

Post-processing allows the user quickly zoom in on selected criteria, from the traffic passing between specific devices to individual conversations. With post-processing, the user can do the following:

- Search through the data by record or by time stamp
- Search for events or strings
- Filter on protocols
- Verify event-to-event timing
- Search and view protocol errors
- Print a range of cells or the entire buffer to printer or ASCII file
- Export data in CSV (comma separated variables) format
- Analyze statistics based on the buffered data

User Assisted LAN over Frame Relay Filtering

The User Assisted LAN over Frame Relay allows the user to perform LAN filtering and searching on LAN nodes, Layer 3 protocols, and IP source and destination addresses as depicted in figure 19.

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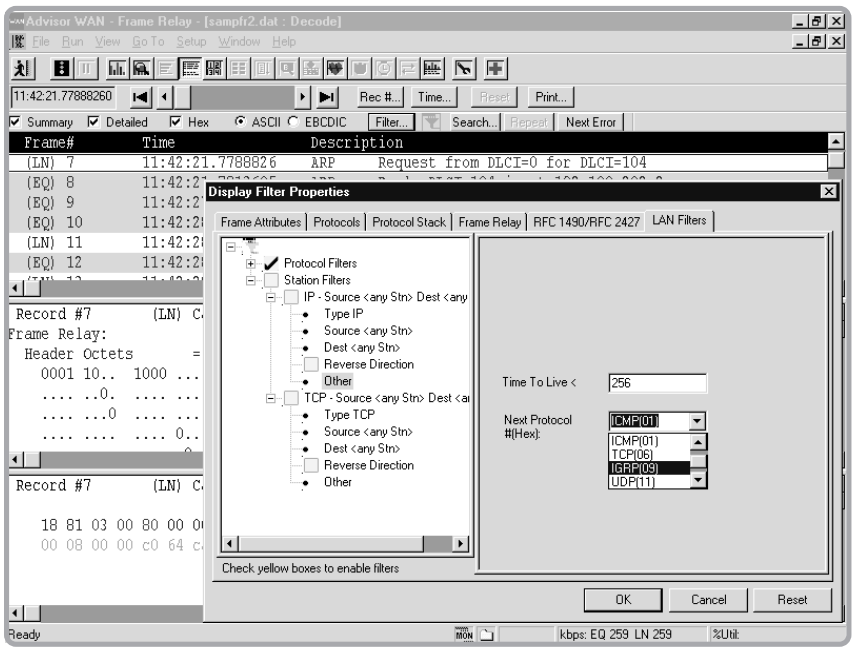


Figure 19: Filter Properties

VoFR and FoFR Decodes and Filtering

The Agilent Advisor supports Voice and Fax over Frame Relay decodes and filtering based on the Frame Relay Forum FRF.11 - Voice over Frame Relay Implementation Agreement.

The Advisor Voice over Frame Relay solution provides decodes, as depicted in figure 20 for the headers of the different transfer syntax, such as:

- G.729 CS-ACELP
- G.728 LD CELP
- G.723.1 MP-MLQ
- G.726/G.727 ADPCM
- G.711 PCM

Note: Voice compressed data is only shown in Hex format

The VoFR decodes provide extensive information for the primary payload. Three basic types of primary payloads are utilized:

- encoded voice payloads
- encoded FAX payloads
- data payloads

The VoFR decodes provide detail information for the Sub-frame Format Sub-channel Identification (CID) and the different Annexes of the VoFR FRF.11 Implementation Agreement.

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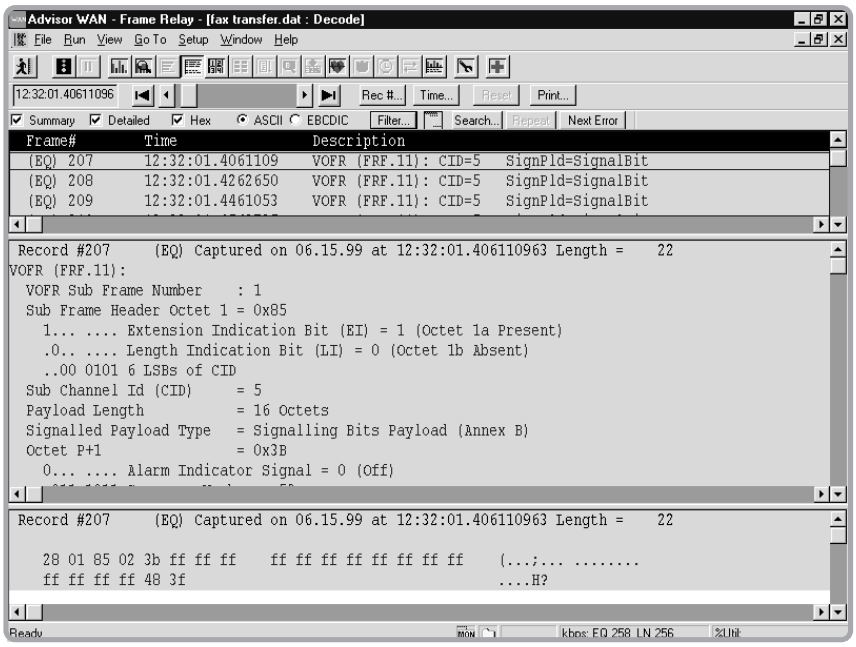


Figure 20: Voice over Frame Relay Decode

Simulation

Because the Agilent Advisor is a multitasking instrument, the user can perform any of the active stimulus/response tests while the analyzer simultaneously monitors the tests effect on the network.

The Agilent Advisor WAN provides a series of pre-written and pre-configured test routines; the user can easily write others. Test scripts can be customized and saved as a new test to build a library of powerful test sequences tailored to the user's individual applications.

LMI Emulation

Emulation is understood in the Frame Relay Industry as the testing capability of a test device to replace either side of the network and provide the functions of the replaced side. This implies the implementation of appropriate state machines, which allow the tester to interact according to protocol standards.

The Agilent Advisor provides the following emulation capabilities according to the Frame Relay Forum Implementation Agreements FRF.1.1 and FRF.2.1 and ITU-T Q.933 Annex A.

- UNI-User (CPE) Emulation
- UNI-Network (Switch) Emulation
- NNI Emulation (bi-directional polling)

The UNI-User (CPE) emulation implies unidirectional polling from the User or Customer Premise Equipment (CPE) to the Network (Switch).

The UNI-Network (Switch) emulation implies unidirectional replies from the Network (Switch) to polling from the User or Customer Premises Equipment (CPE).

The NNI emulation implies bi-directional polling from Network to Network. (NNI).

The simulation application allows transmitting ICMP PING Requests to the network as well as the ability for sending a capture buffer to the network.

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Frame Relay (continued)

Frame Relay UNI-User (CPE) Emulation
The UNI-User emulation follows the Frame Relay Forum Implementation Agreement FRF.1.1 and ITU-T Q.933 Annex A. The UNI-User emulation supports the following Standards in the following order:

- ITU-T Q.933 Annex A
- ANSI T1.617 Annex D
- Original Frame Relay Consortium (Original LMI)

The UNI-User emulation supports the following setups:

- FULL Status Polling Cycles (N391) in the range from 1 to 10 polling cycles, with an N391 default value of 6 polling cycles.
- Status Enquiry messages (T391) counters, in the range from 1 to 60 seconds, with a T391 default value of 10 seconds.

Frame Relay UNI-Network (Switch) Emulation
The UNI-Network emulation follows the Frame Relay Forum Implementation Agreement FRF.1.1 and ITU-T Q.933 Annex A. The UNI-Network emulation supports the following Standards in the following order:

- ITU-T Q.933 Annex A
- ANSI T1.617 Annex D
- Original Frame Relay Consortium (Original LMI)

The UNI-Network (Switch) emulation supports the following PVC Full Status report message setups for up to 500 different PVC-DLCIs in a table format:

- Active / Inactive PVCs
- Present / New PVCs
- Deleted / Not deleted PVCs

Frame Relay NNI Emulation
The NNI emulation follows the Frame Relay Forum Implementation Agreement FRF.2.1 The NNI emulation supports the following Standards in the following order:

- ITU-T Q.933 Annex A
- ANSI T1.617 Annex D
- Original Frame Relay Consortium (Original LMI)

The NNI emulation supports the following setups:

- FULL Status Polling Cycles (N391) in the range from 1 to 10 polling cycles, with an N391 default value of 6 polling cycles.
- Status Enquiry messages (T391) counters, in the range from 1 to 60 seconds, with a T391 default value of 10 seconds.

The NNI emulation supports the following PVC Full Status report message setups for up to 317 different PVC-DLCIs in a table format:

- Active / Inactive PVCs
- Present / New PVCs
- Deleted / Not deleted PVCs

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Frame Relay Ping

A PING test verifies whether a route exists to any given IP address as depicted in figure 21.

The Agilent Advisor provides static ping measurement capabilities by sending IP-ICMP echo requests and then waiting for the ICMP echo reply from the destination address.

The ping tests run with LMI emulation off or on for the following options:

- UNI-User Emulation
- UNI-Network Emulation
- NNI Emulation (bi-directional polling)

The test supports the following Frame Relay Standards:

- ITU-T Q.933 Annex A
- ANSI T1.617 Annex D
- Original Frame Relay Consortium (Original LMI)

PING without LMI can be selected
PING configuration selections are:

- Destination IP address
- Source IP address
- Layer 2 address or DLCI
- Number of ICMP data bytes (range between 1 and 1400)
- Number of requests
- Continuous or select between 1 and 9999 requests and specify time-out (from 1ms to 10000ms)
- Encapsulation Ether type and RFC 1490/RFC 2427

Simulate mode can be either DTE or DCE

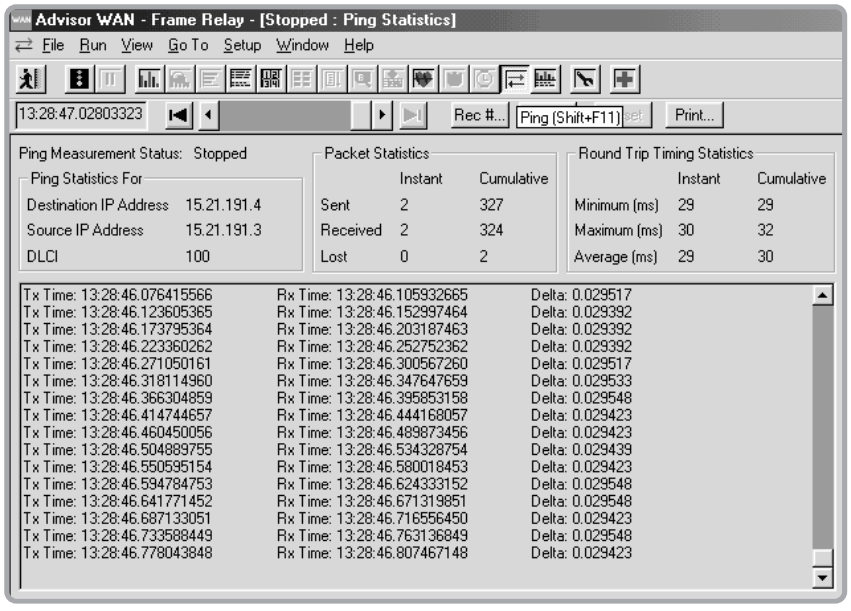


Figure 21: PING Measurement

Buffer Retransmission

The Agilent Advisor can capture a data file and then retransmit the frames back to the network to replicate any particular network condition.

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Frame Relay (continued)

Traffic Generation

The Agilent Advisor WAN has powerful and flexible traffic generator capabilities. Virtually any type of message or frame can be transmitted onto the network.

- Transmit a frame once, a specific number of times, or continuously transmit previously captured frames
- Emulation supported Frame Relay (Annex D, Original LMI, and Annex A)
- Maximum traffic generation rate 100% of available bandwidth allowed by protocol specifications
- Line speeds 300 b/s to 52 Mb/s
- Traffic generation protocols supported HDLC/SDLC, Frame Relay and X.25
- Frame lengths allowed 4 bytes (address, control and FCS) to 9216 bytes per frame
- Specify traffic rates by:
  - 1% to 100 % utilization
  - interframe flags
  - frames per second (30,000/sec)
  - interframe delay (milliseconds)
- Maximum measured line rate 99%
- Maximum number of different frames allowed 20
- Define up to 4 different blocks, each having different traffic levels and patterns
- Use Quick Tests for commonly used message types
- Interfaces supported V.24/V.28/RS-232C, V.35, V.36/RS-449/422/423/530, X.21, T1, E1, HSSI, and DS3
- Clock source DTE/equipment, DCE/Line, internal, or recovered (50 b/s to 52 Mb/s)
- Full bandwidth, channelized (DS1), fractional (DS0) on DS3 traffic generation

Line Status

The operation of the physical interface is often critical in determining the cause of network problems. Therefore, the Agilent Advisor tracks errors at the physical layer, and stamps the information with a 1 ms time stamp. Counts of error and alarm events are recorded on the display for both the line (network) and equipment (user) side. The time of the last occurrence of a particular event is recorded as well. Events are saved in the buffer and can be logged to disk. Figure 22 depicts a typical Line Status view.

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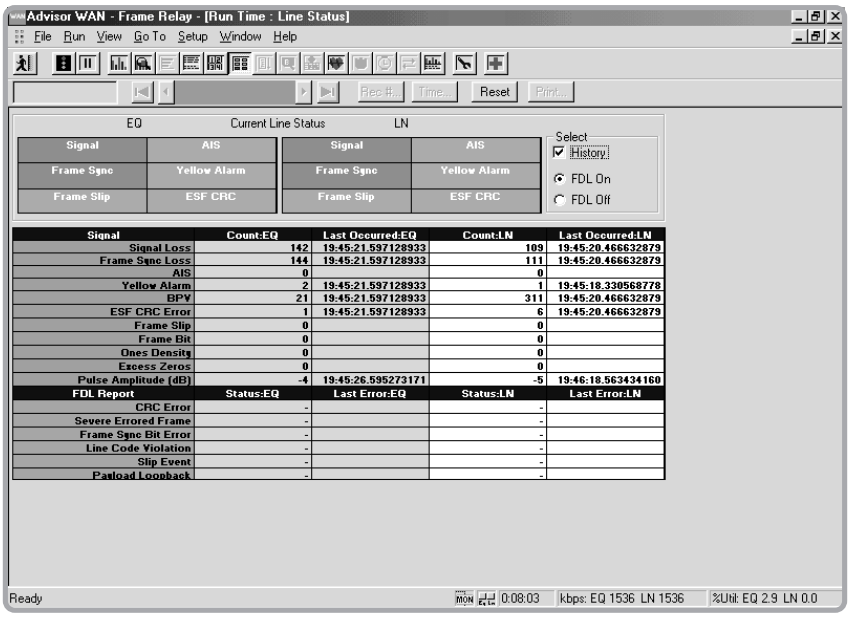


Figure 22: Line Status

Line status is displayed in real time. All of the events listed below are saved in the buffer and counted in the line status display. These events may be logged to disk. The current status of critical parameters (marked with an asterisk (*)) is also displayed in large green or red boxes in the line status display, for easy, at-a-glance viewing.

Included in this application is a power meter of pulse amplitude measurement (signal strength) for detecting weak signal conditions, which can cause transmission errors.

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Frame Relay (continued)

T1/DS1

Loss of signal (LOS) (*)
Loss of frame (LOF) (*)
Loss of PLCP sync (LOPS) (*)
AIS (*)
RAI/Yellow (X-bits) (*)
Bi-polar violations
ESF CRC errors
Line code violation (B8ZS)
Frame slips
Frame bits
One's density
Excess zero's

E1

Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
Line code violations (HDB3)
RAI (FERF) (*)
AIS (*)
CRC-4 errors (if CRC-4 is selected)
Frame alignment error

E3

Loss of signal (LOS) (*)
Loss of frame (LOF) (*)
BIP-8
Line code violations (HDB3)
Payload type mismatch
REI (FEBE)
RDI (FERF)
AIS (*)

T3/DS3

Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
Remote/Yellow (X-bits) (*)
AIS (*)
Line code violations (B8ZS)
FEBE
Idle (*)
P1/P2 parity errors
C-bit parity errors
PLCP sync loss (*)
PLCP Yellow (*)
PLCP BIP
PLCP FEBE
FEAC (*)
FEAC DS3 line
FEAC loss of signal/HBER
FEAC loss of frame
FEAC AIS
FEAC idle
FEAC service failure
FEAC no service failure
FEAC common equipment failure
FEAC line loopback activate
FEAC line loopback de-activate

Signal Strength Pulse Amplitude Meter

In addition to full WAN analysis, the Agilent Advisor E1/T1 and E3/T3 interfaces have a built-in pulse amplitude signal strength power meter that allows users to check pulse amplitude levels with a resolution of +/- 1 dBm. The dynamic range is between +6 dBmV and –40 dBmV.

Bit Error Ratio Testing (BERT)

Often problems on the network can be attributed to the transmission medium. The Agilent Advisor has a powerful, built-in bit error ratio test capability. For a complete description of this functionality, please refer to the section on BERT later in this document.

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Frame Relay (continued)

Configuration

Depending on the interface and application the configuration lets the user select entries and options for:

- Interface/Protocols
- Decode table (protocol routing through decodes)
- Filters/Counters
- Log
- Simulate
- Full traffic generation

Auto-configuration for T1 and E1 interfaces is available.

Auto-configure T1 (physical layer)
Auto-determine

- Line Code (AMI or B8ZS)
- Framing (ESF, D4, T1DM or Unframed)
- Receiver mode (Monitor Bridged, Monitor terminated, or Monitor Jack)

Auto-configure E1 (physical layer)
Auto-determine

- Line Code (HDB3 or AMI)
- Framing with CRC-4, without CRC-4, or Unframed
- Receiver mode (Monitor Bridged, Monitor Terminated, or Monitor Jack)

Auto LMI in Decode Routing (link layer)
Auto LMI recognition will automatically detect the type of LMI on the Frame Relay link.

Decoding of the correct LMI version will take place automatically for the following standards:

- ITU-T Q.933 Annex A
- ANSI T1.617 Annex D
- Original Frame Relay Consortium (Original LMI)

The Frame Relay application will decode the Consolidated Link Layer Management (CLLM) messages, found on DLCI 1007.

Auto Multi-protocol over Frame Relay (network layer)

The Frame Relay applications will decode the multi-protocol encapsulation over Frame Relay automatically according to RFC-1490, RFC-2427, Ethertype or FRF.3.1, CLLM.

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ISDN

A Fully Integrated Monitoring, Simulation, and BERT Solution

Isolate basic and primary rate ISDN problems with the multitasking Microsoft Windows-based ISDN software solutions from the Advisor.

The Advisor is a multi-protocol, multi-interface protocol and performance analyzer that connects to any ISDN interface: basic rate S/T and U, as well as primary rate.

Complete, real-time ISDN decodes with summary and detailed displays and extensive D-channel statistics quickly isolates network problems.

The Advisor supports 18 different ISDN switch and country variants; extensive decodes on the user data channel allow LAN interconnect problems to be solved quickly.

Key Features

- Solve problems quickly using Advisor's many pre-written tests and its intuitive user-interface
- Verify the integrity of the link to carry data with complete bit error ratio testing (BERT) on a B-channel while simulating on the D-channel
- Check network connectivity with pre-written simulation tests
- Monitoring
  - Decode D and B channels
  - Full data capture for the S/T, U and T1 or E1 interfaces
  - B-channel voice and data call tracking Expert
  - Improved post-process filtering for the ITU-T Q.931 decodes
  - Easy D- or B-channel monitoring for ISDN troubleshooting
  - Decode and filter GR-303 Timeslot Management Channel (TMC)
  - Decode GR-303 Embedded Operations Channel (EOC)
- Simulation
  - Call Placement
  - Full data simulation capability for the S/T, the U, and T1 or E1 interfaces
- ISDN Bit Error Ratio Testing
  - Run BERT on a B-channel while simulating on the D-channel
- Loopback BERT bits or patterns
- Statistical analysis of B and D channel activity
- All interfaces supported
  - Basic Rate (S/T and U)
  - Primary Rate (T1 and E1)

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ISDN Test Capabilities

A typical B Channel Tracking display is depicted in figure 23.

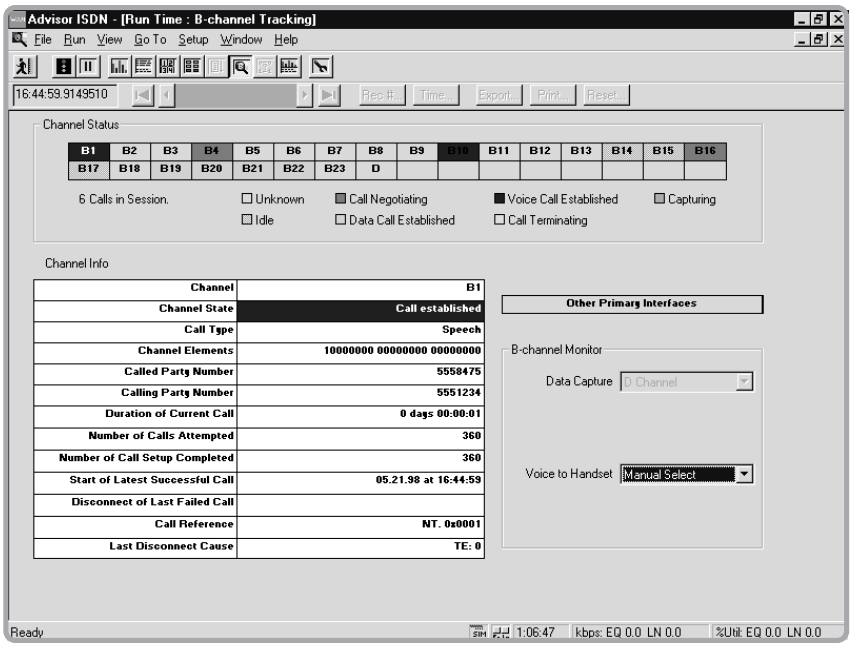


Figure 23: B Channel Tracking

- Complete decode of ISDN D- and B-channel real-time; Line Vitals, Channel Statistics, Filter/Counter Statistics, Line Status, Summary and Detailed displays available.
- Complete level 1 information state analysis, Q.921 (LAP-D) and Q.931 information elements.
- All major Q.931 variants, including ETSI, NI-1 and 18 other signaling decodes from the major switch manufactures and countries.
- Full X.25 decode on the D-channel
- Monitor and decode LAN traffic encapsulated in ISDN
- Decode Frame Relay, PPP, X.25 and HDLC on the B-channel
- Supports B1+B2 (128 kb/s) monitoring
- Verify connectivity and provisioning with pre-written call placement scripts
- Check the integrity of the link to carry traffic with complete BERT testing on a B-channel while simulating on the D-channel
- Q.931 message type statistics; log statistics to disk to catch intermittent problems
- Extensive B-channel traffic statistics: Channel State, Call type, Channel Elements, Called Party Number, Calling Party number, Duration of Current Call, Number of Calls Attempted, Number of Call Setup Completed, Start of Latest Successful Call, Disconnect of Last Failed Call, Call Reference, Last Disconnect Cause
- Test on BRI passive bus networks; one product to access any point in the network
- B-channel Expert activity monitor tracks voice and data usage on all B-channels
- Multi-link PPP dual channel monitor and decodes
  Log statistics to disk for a complete record of B-channel activity over time

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ISDN Monitoring Specifications

D-channel Protocols

Layer 2: LAPD per ITU-T Recommendation Q.921. SAPI 0 signaling, SAPI 16 X.25 packet and SAPI 63 LAPD management procedures supported.

Layer 3: Q.931 variants

ITR6	ITU-T	QSIG
AT&T4ESS	DMS-100	Siemens
AT&T5ESS	ETSI	SwissNet
AT&TNI-1	JT-Q931	Televerket
Australia	NI-1	VN3
Bellcore	NI-2	VN4

B-channel protocols

WAN: LAP-B, X.25 Blue Book 1988, HDLC, SDLC, synchronous, async and multi-link PPP and LCP, Frame Relay (ANSI T1.606, ITU-T I.233, ANSI T1.617 Annex D, F & G, RFC 1490/RFC 2427, ITU-T Q.933, NTT), SNA, and SNAP. These can encapsulate any of the following LAN decodes:

- **LAN over WAN**: 802.2, 802.3 and 802.5 MAC layer
- **TCP/IP**: IP, TCP, UDP, RIP, OSPF, ICMP, SNMP, BOOTP, EGP, NETBLT, RFCNB, SUNRPC and TFTP
- **Novell**: IPX, IPXFILE, IPXRIP, IPXSAP
- **DECNet**: DNA, MOP XNS (IDP, SPP, RIP)
- **AppleTalk**: AARP, AEP, ALAP, ATP, DDP, RTMP, ZIP
- **3Com**: NetBIOS
- **IBM**: SNA (FID0, FID2, FID4, RU, RH, Data Sense), NetBIOS, SMB
- **VoIP**: H.323 series, IETF series (SIP, MGCP, SGCP, MEGACO)
- **Fax over IP:** T.38

ISDN Post Processing and Analysis

The ISDN Advisor's capture can be used for post-processing analysis. Post-processing display filters quickly zooms in on selected criteria, from the traffic passing between specific devices to individual conversations. With post-processing the user can:

- Search through the data by record or by time stamp
- Search for events, specific types of frames, or frames associated with a calling or called number.
- Verify event-to-event timing
- View protocol errors
- Print the current display or the entire buffer
- Export data to other programs
- Analyze statistics from the buffer data

A user will spend less time searching through frames, and more time solving problems.

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Simulation and Emulation

Easy to use pre-written call placement scripts allow users to simply enter the called number and start testing connectivity as well as BERT over the B-channel to verify link integrity quickly.

Simulation script editor can be used to modify pre-written tests or create new ones. Simulate new devices, stress-test the network by placing multiple calls simultaneously, or customize test scenarios to meet specific requirements of the network.

The simulation script editor can also be used to modify and create simulation scripts for other WAN applications.

Searching and Triggering

- On frame type — user defined, information, supervisory, unnumbered, RR, RNR, REJ, SABME, UI, DISC, DM, UA, FRMR, and XID.
- On SAPI — call control SAPI 0, Q.931 SAPI 1, X.25 SAPI 16, layer 2 management SAPI 63, or user definable any SAPI value from 00 hex to FF hex.
- On TEI value — enter any Hex value.
- On LAP-D — command or response bit or poll/final bit and good, bad, or abort FCS.
- On Q.931 — message types.

Statistics

Maximum, instantaneous, and minimum utilization as percent, maximum, instantaneous, minimum, and average throughput in kb/s; total octets, data segments, total frames, bad FCS's, abort frames, and short frames.

- Pre-written statistics counters:
- Message types — counts most Q.931 message types
- D Channel Frames — counts
- D-channel frames (LAP-D, Q.931, and X.25)
- LAPD frame counts
- X.25 packet counts
- Disconnect causes

Note: All counters are user modifiable. Sixteen counters are available for TE and 16 for NT. All pre-written tests for PRI assume call reference length of 2 bytes; BRI tests assume a call reference length of 1 byte.

Timing Measurements:
Time stamp resolution 100 ns. Display time stamp with date.

Bus Configuration:
Point-to-point or passive bus connections

Quickly Verify Call Placement Specifications

The Advisor's ISDN simulation, call placement BERT testing, and numerous pre-written call placement scripts make verifying the proper operation of ISDN basic rate and primary rate circuits quick and easy.

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BRI – Basic Rate Interface Simulation / Call Placement Specifications

Simulate:
- TE (terminal equipment),
- NT (network termination), or
- LT (line termination)

Emulation:
- LAP-D and partial Q.931

Bus Configuration (for S/T interfaces):
- Point-to-Point, Short Passive Bus and Extended Passive Bus
- Handset Support - A-law and m-law on B1 or B2

Receiver Mode:
- Terminated or Bridged

BERT Channel:
- B1 - 56 kb/s or 64 kb/s
- B2 - 56 kb/s or 64 kb/s
- B1 and B2 - 112 kb/s or 128 kb/s
- B1 (B2 Looped) - Full Duplex (B1 transmit to B2 receive, B2 receive to B2 transmit, B2 transmit to B1 receive)
- B2 (B1 Looped) - Full Duplex (B2 transmit to B1 receive, B1 receive to B1transmit, B1 transmit to B2 receive)
- B1 transmit to B2 receive
- B2 transmit to B1 receive

TE Simulation Tests:
- Place voice call
- Place 56 kb/s data call
- Place 64 kb/s data call
- Place BERT call
- B1 to B2 BERT Call - Place call and run a loopback BERT B1 to B2
- Answer call

NT Simulation Tests:
- Place voice call
- Place 56 kb/s data call
- Place 64 kb/s data call

Pre-written simulation test support:
- ETSI, NI-1, JT-Q.931, ITU-T, AT&T 5ESS, AT&T NI-1, DMS-100,
- 1TR6, VN4, Siemens, and Australia

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PRI – Primary Rate Simulation and Call Placement Specifications

Simulate:
TE (terminal equipment) or
NT (network termination)
Emulation:
LAP-D and partial Q.931
Transmit Clock:
Recovered from line or internal/equipment In
Receiver Mode:
Terminated or bridged
Line Codes:
AMI, B8ZS, HDB3
Framing Types:
ESF, D4, G.704 alternate framing with or without CRC-4, fractional; channel (any multiple) 56 kb/s or 64 kb/s
Handset Support:
A-law and m-law
Receiver Mode:
Terminated or Bridged
BERT Channel:
Select any B channel or Fraction
TE Simulation Tests:
Place voice call
Place 56 kb/s data call
Place 64 kb/s data call
Place BERT call
Answer call - Answer a call and run end-to-end BERT
NT Simulation Tests:
Place voice call
Place 56 kb/s data call
Place 64 kb/s data call
Pre-written simulation tests support:
ETSI, NI-1, JT-Q.931, ITU-T, AT&T 5ESS, AT&T 4ESS, AT&T NI-1, DMS-100, 1TR6, VN4, Siemens, and Australia

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X.25

X.25/HDLC Decodes

The Advisor WAN provides real-time decoding capability for all three layers of the X.25 protocol according to ITU-T X.25-1988. The following fields are decoded and displayed:

- LAPB address, frame type, P/F, N(s), N(r), and FCS
- X.25 GFI, LCN, packet type, P(s), and P(r)
- called and calling addresses
- facility fields
- diagnostic, reset, and restart cause codes and explanations

X.25 LCN Statistics

Displays first 32 LCNs (all data stored to capture buffer).

Display for each individual LCN:

- Graph of instantaneous throughput
- Number of frames in pie chart graphic.
- Packet length distribution as a percent and total count.

X.25 Test Scripts

- DCE and DTE network cell
- DCE and DTE subscriber call
- Traffic generation
- X.25 Call Placement Scripts
  - Mode:
    * Simulate DTE or DCE
  - Select:
    * Network call or subscriber call
    * logical channel number
    * calling and called number
  - Emulation:
    * Level 2 and partial Level 3

PPP (Point to Point Protocol)

The Advisor WAN provides decode capability for synchronous, asynchronous, and multi-link PPP.

The maximum speed for asynchronous PPP is 115.2 kb/s. The following fields are decoded and displayed:

- HDLC header-address, frame type and FCS
- PPP header-protocol ID and CP code
- LCP
- NCP/NSCP, including IPCP, IPXCP, CCP, NetBIOS CP
- PAP
- CHAP
- Multi-link PPP dual channel monitor and decodes
- TCP tunneling
- Top Talkers
- LAN protocol distribution
- Van Jacobsen compression

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SMDS (Optional)

The Advisor WAN provides run-time and post processing display of the following decodes according to Bellcore TR-TSY-00772, 00773 and 00774 specifications:

- Layer 1 PLCP
- Layer 2 PDU
- Layer 3 SMDS header

The following encapsulated protocols are decoded:

- Frame Relay
- X.25
- HDLC
- IP
- SNAP

ATM DXI

ATM DXI monitoring on V.24/V.28/RS-232C, RS-449/V.36, V.35, T1, E1, E3, DS3, HSSI

V5.1/V5.2 Monitoring

V5.1 and V5.2 are interface standards defined by the European Telecommunication Standard Institute (ETSI) for interfaces between an Access Network (AN) and the Local Exchange (LE). The Advisor WAN provides V5.1/V5.2 monitoring capabilities.

- Layer 2 LAPV
- Layer 3

SLIP

The Serial Link Internet Protocol (SLIP) monitoring application allows Serial Link IP analysis (see figure 24).

The following functionalites are supported

- Capture filter
- Display filter
- Searching
- Decodes
- Statistics

Note: This functionality can only be used with the V-Series interfaces in the mainframe, not with the High Speed V-Series interface J5457A. One of the J229XD T1/E1 modules needs to be inserted when using this SLIP application.

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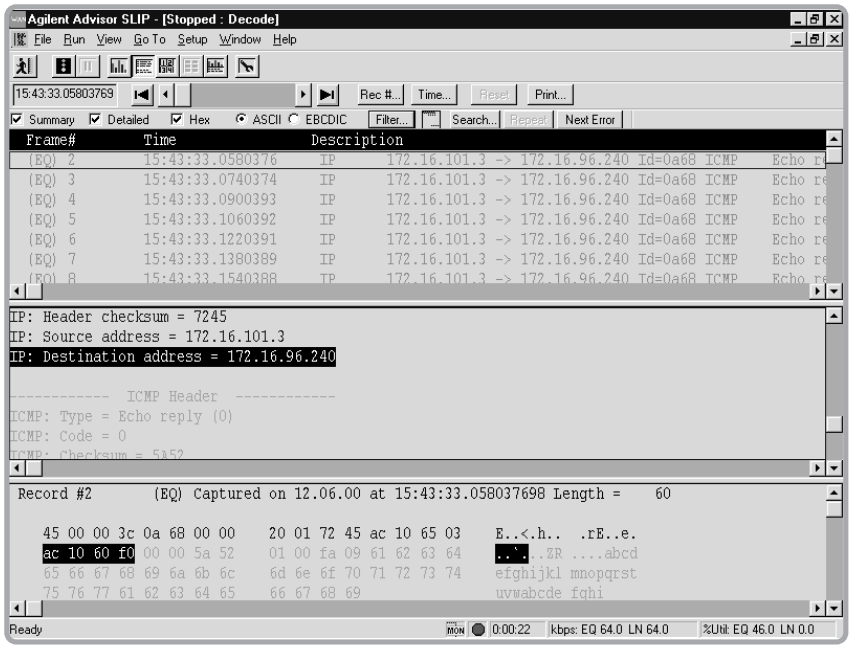


Figure 24: SLIP application decode view.

Async/BiSync Protocol Measurement

The Agilent Advisor provides Windows based Character Oriented Protocol (COP) Analysis. The Agilent Advisor Async/Bisync is an integrated hardware package and software application designed to decode and generate asynchronous and synchronous Character Oriented Protocol. It is designed specifically to operate on the V-Series interfaces of the Agilent Advisor, including:

- RS-232 / V.2
- RS-449 / V.36
- V.35
- RS-530 (When used with J2278A)

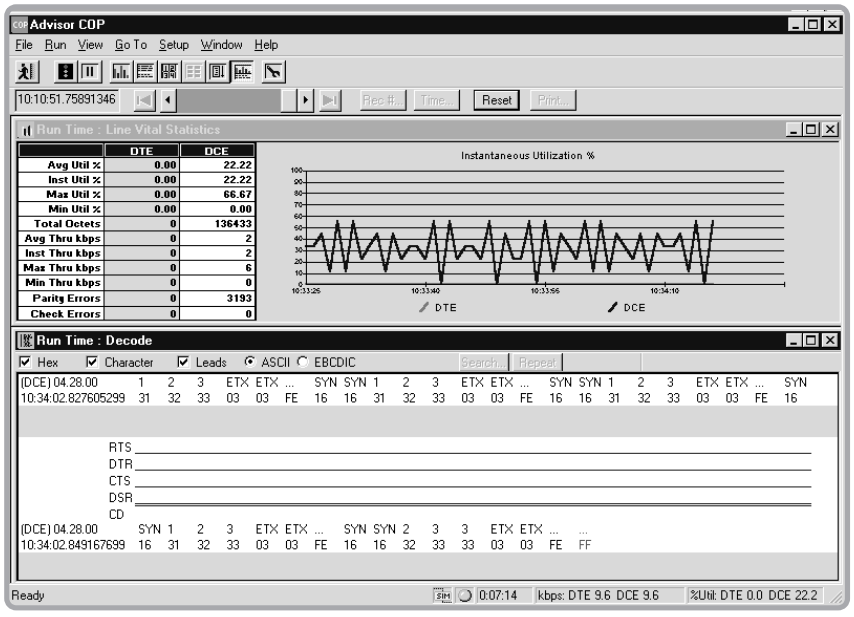


Figure 25: Async/BiSync Application

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Async/BiSync Protocol Measurement (continued)

A typical Async/BiSync Protocol Application is depicted in figure 25. The application runs in Windows operating environment to show data in ASCII or EBCDIC format, the lead states, time and date stamps and error conditions. The software can be configured for a specific application through a configuration menu, including the capability to define control and transparent characters, and set CRC and LCR error schemes. Filtering and triggering are supported, as is a simulation script language.

This application shows data in ASCII or EBCDIC format so the user can see the status of the physical line, utilization percentages, octets, throughput, and error/data events.

The application allows the user to configure:

Baud rate	50 to 256,000 bits per second
Bit order	LSB, MSB
Error check	None, LRC, CRC16
Character type	ASCII-8, ASCII-7, EBCDIC
Character framing	Async, Sync, Monosync, Bisync
Parity	Even, Odd, Ignore
Synchronization on Transparent Characters	one or two characters
Drop Synchronization	Do not drop, Drop after n characters
Start and Stop error checking	

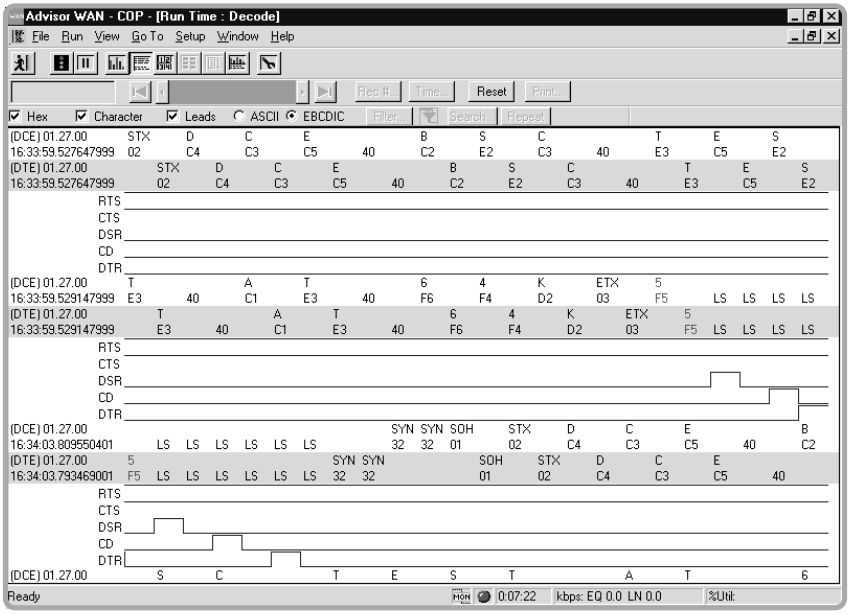


Figure 26: COP decodes.

Filters and Counters

The Async/BiSync (COP) application allows the user to set up filters and counters for specific capture patterns, as seen in figure 26. This filters and counters can be used to detect specific traffic conditions in the network.

Simulation

The user can simulate common network processes and devices. A simulation script language interface helps the user to quickly create custom simulation tests for the user's unique measurement needs. A typical COP simulation is depicted in figure 27.

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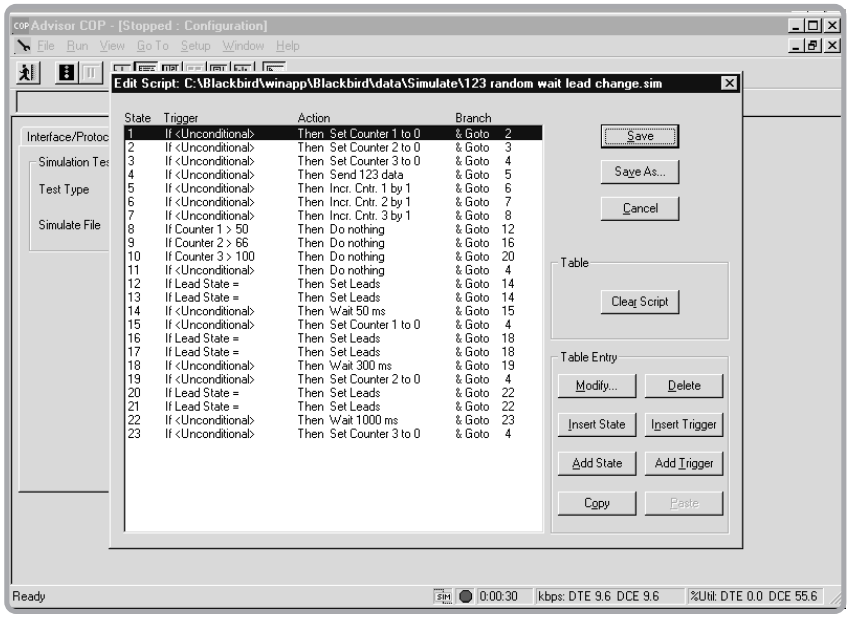


Figure 27: COP Simulation

Post-Process Analysis

Any traffic or statistics that are gathered by the Agilent Advisor can be held in its capture buffer or saved to file for later analysis. The user can print statistics and decoded characters, and print the information or export to an ASCII file.

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Physical Layer Testing
Line Status Statistics

The operation of the physical interface is often critical in determining the cause of network problems. Therefore, the Advisor WAN tracks errors at the physical layer. Signal events are recorded on the display for both the line (network) side as well as the equipment (subscriber) side.

Line status is displayed in real time (with 1 second resolution) All the events listed below are saved in the buffer and counted in the line status display.

These events may be logged to disk. Critical parameters marked with an asterisk (*) are also displayed in large green or red boxes in the line status display, for easy, at-a-glance viewing.

Available measurements:

T1/DS1

Loss of signal (LOS) (*)
Loss of frame (LOF) (*)
Loss of PLCP sync (LOPS) (*)
AIS (*)
RAI/Yellow (X-bits) (*)
Bi-polar violations
Signal Strength Meter
ESF CRC errors
Line code violation (B8ZS)
Frame slips
Frame bits
One's density
Excess zero's

E1

Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
Line code violations (HDB3)
RAI (FERF) (*)
Signal Strength Meter
AIS (*)
CRC-4 errors (if CRC-4 is selected)
Frame alignment error

E3

Loss of signal (LOS) (*)
Loss of frame (LOF) (*)
BIP-8
Line code violations (HDB3)
Payload type mismatch
REI (FEBE)
RDI (FERF)
AIS (*)

T3/DS3

Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
Remote/Yellow (X-bits) (*)
AIS (*)
Line code violations (B8ZS)
FEBE
Idle (*)
P1/P2 parity errors
C-bit parity errors
PLCP sync loss (*)
PLCP Yellow (*)
PLCP BIP
PLCP FEBE
FEAC (*)
FEAC DS3 line
FEAC loss of signal/HBER
FEAC loss of frame
FEAC AIS
FEAC idle
FEAC service failure
FEAC no service failure
FEAC common equipment failure
FEAC line loopback activate
FEAC line loopback de-activate

HSSI

Data: SD
Data: RD
Status DCE ready: TA
Status DCE ready: CA
Loopback:
  A: CA
  B: LB
  C: LC
Test mode: TM
Clocks:
  ST: (from DCE)
  RT: (from DCE)
  TT: (from DTE)

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BERT (Bit Error Ratio Testing)

On many occasions problems on the network can often be attributed to the transmission medium. Although the physical medium may be good for normal data transmission, it may not be able to handle high-speed WAN data. That is why the Advisor WAN has a powerful, built-in BERT (bit error ratio tester).

BERT Specifications for T1, E1, ISDN PRI T1 and E1, DS3, E3, HSSI, ISDN BRI S/T/U, DDS 4-Wire, V-Series and High Speed V-Series

Transmit and receive framed and unframed bit patterns over single fractional or full bandwidth channels for T1, E1, DS3, E3, ISDN primary rate interface (PRI) T1 and E1, basic rate interface (BRI) S/T/U:

- B1 or B2 at 56 or 64 kb/s point-to-point B1 + B2 at 112 or 128 kb/s
- point-to-point
- B1 with B2 looped full duplex
- B2 with B1 looped full duplex
- Patterns:
  PRBS: 63, 511, 2047, 4095 2^{15}, 2^{20}, 2^{23}
  3 in 24, 1 in 8 (1:7), 2 in 8
  all 1's, all 0's, 1010...(1:1)
  DDS1, DDS2, DDS3N, DDS4N, DDS5N, DDS6N, DDS3R, DDS5R, DDS V54LPDN, DDS/V54LPUP, OCT53, OCT54, OCT55, OCT55V2, OCT72, OCT96, OCT120, and user defined patterns up to 996 bytes in hex or text

  4000 byte user defined pattern (Only supported in the new modules E1/T1 J2294D, J2296D, J2298D, J4646A, J4647A, J4648A, J4649A, E3/T3 J3759A/B and HSSI J3762B)

  Standard pattern exception for E1:
  2^{23} and 2^{15} inverted per ITU-T O.151, 2^{20} (ITU-T O.153
- Block length:
  511 bits, 1000 bits, 2047 bits
- Duration:
  10^5 through 10^9 bits
  5, 10, 15 min.; 1, 4, 12, 24 hrs.; continuous
- Data rate:
  User definable from 50 b/s to 2.048 Mb/s
- Error insert rate:
  10^2 through 10^7 or single error
- Error insert type:
  Frame, Logic, BPV (Frame and BPV on T1 interface only)
- BERT results include:
  Bit and block count
  Bit and block errors
  Bit error ratio
  Errored second
  Error free seconds
  Percent error free seconds
- Log Results:
  Disk
- G.821 statistics — both in quantity and in percentage:
  Available time
  Errored seconds
  Degraded minutes
  Severely errored seconds
  Unavailable time

Notes: BERT results can be logged at user-defined intervals and duration with each log entry carrying a real-time stamp with 100 ns resolution.

T1 standard loopback commands are generated and processed to simulate a CSU (channel service unit).

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ISDN BERT Specifications

Patterns:
63, 511,2047, 4095, 2^{15}-1, 2^{20}-1, 2^{23}-1, QRSS, All 1's, All 0's, 10101010(1:1) and any user defined pattern
User defined pattern can be hex or text up to 64 bytes in length
Standard pattern exception for ETSI-E1: 2^{23}-1 and 2^{15}-1 inverted per ITU-T O.151
Test Duration:
5, 10, 15 minutes, 1, 4, 12, 24 hours, or continuous
Error insert type:
Logic, BPV, and frame
Error insert rate:
1 in 10^3, 1 in 10^4, 1 in 10^5, 1 in 10^6, 1 in 10^7
BERT Results:
Errored seconds
Errored free Seconds
Percent error free seconds
Total bits received count
Total bit errors
Bit error ratio
G.821 Statistics:
available time
errored seconds
degraded minutes
severely errored seconds
unavailable time
Logging:
All BERT results may be logged to the hard drive at intervals from 1 minute up to 999 hours.
Additional T1 BERT results:
Total BPVs
ESF CRC errors
Frame bit errors
Frame slips
Additional E1 results:
Total BPVs
CRC errors
Frame bit errors

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BERT (continued)

T1 interface indication:
Loss of signal, frame sync, B8ZS detect, BPV, ESF CRC errors, framing bit errors, frame slip, pulse density violation, yellow/remote alarm.
E1 interface indication:
Loss of signal, frame synch, like code violation, BPV, CRC-4 bit errors, frame alignment signal, far end block error, remote alarm, AIS/all 1's.

Cell BERT for E1/T1, E3/DS3, STM-1/0C-3, STM-1e/EC-3, ATM25 and UTP155

1111, 1010, 1100, 2^{15}-1, 2^{20}-1, 2^{23}-1
User defined: one octet (8bits)
Duration:
Continuous or user definable from 1 minute to 1000 hours
Errors:
Logic, Code, Frame, P1/P2 bit parity FEBE, FEAC
Error insert rate:
Programmable from 10^3 to 10^9

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Module Support

Table 2 Interface Application Support

		Interface																						
		V Series	High Speed V-Series J5457A	DDS 4-wire J2908A	HSSI J3762A	HSSI J3762B	ISDN BRI J2904B (S/T)	ISDN BRI J2905B (S/T/U)	ISDN PRI T1 J4648A J4649A	ISDN PRI E1 J4646A J4647A	T1 J2298B J2299B	E1 J2293B J2294C J2296B J2297B	E1/T1 J2294D J2298D	E1 J2296D	J2 J2911A	E3/DS3 J3759A	E3/DS3 J3759B	ATM25 J3766A	STM-1 OC-3 J2912A	STM-1 OC-3 J2912B	STM-1e EC-3 J2914A	UTP155 J2913A	UTP155 J2913B	STM-4c OC-12 J3763A J3764A J3765A
	Currently Available	⌘	⌘	⌘	☒	⌘	☒	⌘	⌘	⌘	☒	☒	⌘	⌘	⌘	☒	⌘	⌘	☒	⌘	⌘	☒	⌘	Except J3765A
ATM	Pulse Amplidude / Optical Power Measurements										☒	☒	⌘	⌘	☒	⌘	⌘	☒	⌘	⌘	⌘	☒	☒	Using J2912A/B
ATM	Fractional										☒	☒	⌘	⌘	⌘	☒	☒							
ATM	Cell BERT										☒	☒	⌘	⌘	☒	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	☒
ATM	Frame BERT										☒	☒	⌘	⌘	☒	⌘	⌘		⌘	⌘	⌘	⌘	⌘	☒
ATM	Auto-discovery and Statistics on 1024 VPI/VCIs										☒	☒	⌘	⌘	Up to 12 VCs	Up to 12 VCs	⌘	⌘	Up to 12 VCs	⌘	⌘	⌘	⌘	⌘
ATM	Line Vitals										⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
ATM	Real-Time Filtering										☒	☒	⌘	⌘	☒	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
ATM	Decodes										⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
ATM	IMA ICP Cell Decode										☒	☒	⌘	⌘										
ATM	Signaling & Call Placement										⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	☒
ATM	Traffic Generation										⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
ATM	PING Generation										⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	☒
ATM	QoS										☒	☒	⌘	⌘	☒	⌘	⌘	⌘	☒	⌘	⌘	☒	⌘	⌘
ATM	Policing										☒	☒	⌘	⌘	☒	⌘	⌘	⌘	☒	⌘	⌘	☒	⌘	☒
ATM	ATM-DXI (Frame)	⌘	⌘	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
ATM	X.25	⌘	⌘	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
Application	Pulse Amplidude / Optical Power Measurements	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	⌘	⌘		⌘	⌘							
Application	DLCI Statistics	⌘	⌘	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
Application	Top Talkers & Line Vitals	⌘	⌘	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
Application	Real Time Filtering	⌘	⌘	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
Application	Decodes	⌘	⌘	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
Application	LAN Protocol Distribution	⌘	⌘	⌘	⌘	⌘	☒	☒			⌘	⌘	⌘	⌘		⌘	⌘							
Application	Simulation	⌘	☒	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
Application	Traffic Generation	⌘	⌘	☒	⌘	⌘	☒	☒			⌘	⌘	⌘	⌘		⌘	⌘							
Application	PING Generation	⌘	⌘	⌘	⌘	⌘	☒	☒			⌘	⌘	⌘	⌘		⌘	⌘							
Application	SLA	≈	⌘	☒	☒	⌘	☒	☒			☒	☒	⌘	⌘		☒	⌘							
Application	CIR	≈	⌘	☒	⌘	⌘	☒	☒			☒	☒	⌘	⌘		⌘	⌘							
Application	LMI Expert	⌘	⌘	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
Application	HDLC/SDLC	⌘	⌘	⌘	⌘	⌘	⌘	⌘			⌘	⌘	⌘	⌘		⌘	⌘							
Application	PPP	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘		⌘	⌘							
Application	Async PPP	⌘	☒	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘		⌘	⌘							
Application	Packet over SONET/SDH Monitor-only (Cisco HDLC based)																		⌘	⌘	⌘		☒	
Application	Packet over SONET/SDH Monitor-only (IETF PPP based)																		⌘	⌘	⌘		☒	
Application	WAN BERT	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	☒	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	☒
Application	SLIP	≈																						
ISDN	Monitor/Decodes + B Channel Tracker with Voice in B Channels								⌘	⌘	⌘	⌘												
ISDN	Simulation & Call Placement								⌘	⌘	⌘	⌘												
ISDN	B Channel Tracker with WAN Protocols running in B Channels								⌘	⌘	⌘	⌘												
ISDN	B Channel BERT (D Channel Signaling)								⌘	⌘	⌘	⌘												
ISDN	Multi-link PPP								⌘	⌘	⌘	⌘												
ISDN	Basic Rate						⌘	⌘																

⌘	Yes
≈	Yes with any of J2294D, J2296D, or J2298D inserted in the mainframe
☒	No
	Not Applicable

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ATM and WAN Interface Specifications

Unless otherwise stated, ATM and WAN interfaces provide two input ports and two output ports allowing any one of the following connection configurations to be used:

- Terminal Mode - uses one input and one output
- Bridged Monitor Mode - uses both inputs and outputs for bi-directional monitoring at test access points; a high input impedance should normally be selected
- Monitor Jack Mode – uses both inputs only for bi-directional monitoring at protected monitor points
- Through Monitor Mode - uses both inputs and outputs providing bi-directional repeater functionality plus bi-directional monitoring functionality. Each receiver input is terminated. The insert mode can place test traffic like SLA, PING, LMI emulation, Traffic Generation and Simulation.

The operation of the physical interface is often critical in determining the cause of network problems. Therefore, the Advisor tracks errors at the physical layer, and it stamps the information with a 1 ms time stamp. Signal events are recorded on the display for both the line (network) side as well as the equipment (user/subscriber) side. The time of the last occurrence of a particular event is recorded as well. Events are saved in the buffer and can be logged to disk.

Line status is displayed in real time. All of the events listed in the "Physical layer alarms and statistics" section for each interface below are saved in the buffer and counted in the line status display. These events may be logged to disk. Critical parameters marked with an asterisk (*) are also displayed in large green or red boxes in the line status display for easy "at-a-glance" viewing.

V-Series Interfaces (Integrated in the J2300E)

General

V.10/V.11, V.24/V.28/RS-232C, V.35 and V.36/RS-449/422/423 are built into the J2300E mainframe; X.21 (with J2277A external cable – V.36/RS-449 to DB15) and RS-530 (with external cable J2278A – V.36/RS-449 to DB25) are also available.

Note: The interface J5457A provides V.35, RS-449 and X.21 interface operations up to 8.192 Mb/s.

Detail

Bit rates:
Sync or Sync NRZI, 50 b/s to 2.048 Mb/s on V.35, V.36/RS-449/422/423/530 and X.21
Sync or Sync NRZI, 50 b/s to 256 kb/s on V.24/V.28/RS-232C
Async, 50 b/s to 256 kb/s

Lead status:
RTS, CTS, DTR, DSR, and CD (V.24/V.28/RS-232C and V.35)
CS, RS, RR, TR, and DM (V.10/V.11 and V.36/RS-449/422/423)

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ATM and WAN Interface Specifications (continued)

High-Speed V-Series J5457A

General
V.35, RS-449 and X.25 interface support up to 8.192 Mb/s.

Detail
Bit rates:
Sync or Sync NRZI, 2.4 kb/s to 8.192 Mb/s on V.35, RS-449 and X.21
Applications:

Frame Relay
X.25
PPP
HDLC
SDLC
BERT
Transmission of bit error ratio (BER) patterns in the physical layer frame payload.
Transmission of 4000 byte BER user pattern in WAN

Note: The J5457A interface supports all the applications of Frame Relay (Vital Signs, Decode, LMI Expert, etc.) with the exception of Simulation and SLIP measurements. Traffic Generation and PING Generation are available.

DDS 4-wire J2908A

General
This interface comprises a plug-in module (J2908A) suitable for plugging into the J2300C/D/E Agilent Advisor mainframe or J2900A High Speed undercradle. This WAN module can be used with T1 Digital Data Systems (DDS) circuits to monitor and decode the data traffic of individual DDS subrate users. The module is only available in the United States of America

Input
Connectors:
RJ48s
Demultiplexed access:
Timeslots 1-24 on T1 lines using D4 or ESF framing
Timeslots 1-23 on DDS lines using T1 DM framing
Rates:
DS0A, single user:
2.4, 4.8, 9.6, 19.2, 38.4, and 56 kb/s (error corrected 19.2 kb/s not supported)
DS0B:
2.4, 4.8 and 9.6 kb/s in 20, 10 and 5 user positions respectively 19.2, 28.8 and 38.4 kb/s multiplexed intermediate rates in any adjacent combination of five 9.6 kb/s channels.
Standards:
ANSI T1.107 – 1988, Digital Hierarchy Synchronous Digital Data Format
ANSI T1.107b – 1991 Supplement to ANSI T1.107
AT&T TR 54075 Subrate Data Multiplexing for Digital Data Systems
CB-INC-101 Compatibility Bulletin, Integrated Network Corporation, 38.4 kb/s DDS Equipment, June 1988

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ATM and WAN Interface Specifications (continued)

ISDN Basic Rate Interface (BRI) S/T/U J2905B

General

This interface J2905B is suitable for plugging into a J2300C/D/E Agilent Advisor mainframe or J2900A High Speed undercradle. The J2905B can handle the S, T and U interfaces.

Common to Inputs and Outputs

Connectors:
- RJ-45
- RJ-11 handset jack

Voice coding supported:
- a-law and μ-law

Standards:
- BRI S/T: ITU-T I.430, ETSI ETS 300 012, ANSI T1.605
- BRI U: 2B1Q ANSI T1.601 – 1992, ETSI ETR 80, ITU-T G.960/961

Data Rates:
- D channel: 16 kb/s
- B1 channel: 56 or 64 kb/s
- B2 channel: 56 or 64 kb/s
- B1+B2 channels: 112 or 128 kb/s

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ATM and WAN Interface Specifications (continued)

ISDN Primary Rate Interfacev (PRI) T1 (1.544 Mb/s) J4648A and J4649A

General

This interface comprises a choice of two plug-in modules (J4648A and J4649A) suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and the J2900A High Speed undercradle. The J4648A has RJ-48C connectors and the J4649A has RJ-45 connectors; both have mini-Bantams. The modules handle ISDN, PPP, Async PPP, Multi-link PPP, and BERT.

Common to Inputs and Outputs:

Connectors:
- J4648A: balanced 100 Ohm RJ-48C and WECO mini-Bantams
- J4649A: balanced 100 Ohm RJ-45 and WECO mini-Bantams

Line Code:
- B8ZS, AMI

Framing:
- Extended Super Frame (ESF)
- D4 (Super Frame) Ft and Fs, or Fs only
- Fractional, any multiple of 56 kb/s or 64 kb/s channels
- DS0A and DS0B subrates from a single 56 kb/s timeslot
- Unframed 1.544 Mb/s

Inputs:

Two ports

Interface types (and input sensitivities):
- DSX-1 (+6 dB to –10 dB) and Network Interface (+6 dB to -36 dB)

Monitor modes:
- Terminated (100 Ohm)
- Bridged (High Impedance)
- Monitor Jack

Physical Layer Alarms and Statistics:
- Loss of Signal (LOS)
- Loss of Frame (LOF)
- Alarm Indication Signal (AIS)
- Remote Alarm Indication (RAI)/Yellow
- Bi-polar violations
- Extended Super-Frame (ESF) CRC errors
- Line code violation
- Frame slips
- Frame bit errors
- One's density violations
- Excess zeros

Capture buffer size: 28 Mbyte

Capture buffer timestamp resolution: 100 ns

Capture rate: Full line rate

Outputs:

Two ports, 100 Ohm balanced

RJ-11 handset jack (for WAN)

Interface types (and output levels):
- DSX-1 (build-out selectable from 0 to 655 ft in 5 steps) and Network Interface (selectable LBO levels, 0, -7.5 dB and -15.0 dB)

Electrical:
- ITU-T G.703

Clocking:
- Recovered (loop), Internal, and External (using other receiver input)

Internal clock rate accuracy:
- +/- 32 ppm

Transmission of bit error ratio (BER) patterns in the physical layer frame payload:
- PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} – 1
- Transmission of 64-byte BER User pattern in WAN

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ATM and WAN Interface Specifications (continued)

ISDN Primary Rate Interface (PRI) E1 (2.048 Mb/s) J4646A and J4647A

General
This interface comprises a choice of two plug-in modules (J4646A and J4647A) suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and the J2900A High Speed undercradle. The J4646A has 75 Ohm BNC connectors; the J4647A has RJ-45 and DB-9 connectors, which with converter cables, can connect to 120 Ohm Small Siemens connectors. The modules handle ISDN, PPP, Async PPP, Multi-link PPP and BERT.

Common to Inputs and Outputs:
Connectors:
J4646A: unbalanced 75 Ohm BNC female
J4647A: balanced 120 Ohm DB-9 and RJ-45
Line Code:
HDB3, AMI
Electrical:
ITU-T G.703
Framing:
ITU-T G.704 alternate framing with or without CRC-4
Fractional channel, any multiple of 64 kb/s channel
Unframed at 2.048 Mb/s

Inputs:
Two ports
Levels:
ITU-T G.703
Monitor modes:
Terminated, 75 Ohm unbalanced (J4646A)
Monitor Jack -20 dB and -30 dB
Terminated, 120 Ohm balanced (J4646A)
Bridged (High Impedance)
Physical Layer Alarms and Statistics:
Loss of Signal (LOS)
Loss of Frame (LOF)
Alarm Indication Signal (AIS)
Remote Alarm Indication (RAI)
Line code violations
CRC-4 errors (if CRC-4 is selected)
Frame alignment error
Capture buffer size: 28 Mbyte
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate

Outputs:
Two ports, 75 Ohm unbalanced (J4646A) or 120 Ohm balanced (J4647A)
Levels:
ITU-T G.703
Clocking:
Recovered (loop), Internal and External (using other receiver input)
Internal clock rate accuracy:
+/- 50 ppm
Generation of bit error ratio (BER) patterns in the physical layer frame payload:
PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} – 1
Transmission of 64-bit BER user pattern

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ATM and WAN Interface Specifications (continued)

T1 (1.544 Mb/s) / E1 (2.048 Mb/s) J2298D

General
This interface module suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and the J2900A High Speed undercradle. This module has 4 bantam connectors and two 8-pin connectors that can easily switch between RJ-48C and RJ-45 pin wiring. The J2298D module handles frame- and cell- based technologies such as ATM, Frame Relay, HDLC, SDLC, X.25, ATM DXI and PPP in addition to BERT.

This module can be configured as a T1 (1.544 Mb/s) or as an E1 (2.048 Mb/s) interface. For E1 information, see J2294D specifications.

Common to Inputs and Outputs:
Connectors:
Balanced 100 Ohm RJ-48C/RJ-45 and WECO mini-Bantams
Line Code:
ATM: B8ZS
WAN: B8ZS, AMI
Framing:
Extended Super Frame (ESF) with CRC
D4 (Super Frame)
Fractional WAN and ATM, any multiple of 56 kb/s or 64 kb/s channels
Unframed 1.544 Mb/s
Cell Mapping:
Direct (ITU-T G.804)
Cell Scrambling:
Conforms to ITU-TI.432.1 ($x^{43} + 1$) and may be turned on or off
Inputs:
Two ports
Interface types (and input sensitivities):
DSX-1 (+6 dB to –10 dB)
Network Interface (+6 dB to -36 dB)
Received pulse amplitude measurement (mVpeak)
Monitor modes:
Terminated (100 Ohm)
Bridged (High Impedance)
Monitor Jack (20dB for T1)
Physical Layer Alarms and Statistics:
Loss of Signal (LOS)
Loss of Frame (LOF)
Alarm Indication Signal (AIS)
Remote Alarm Indication (RAI)/Yellow
Bi-polar violations
Extended Super-Frame (ESF) CRC errors
Line code violation
Frame slips
Frame bit errors
Pulse density violations / Excess zeros
Loss of Cell Delineation (LCD)
IMA Control Protocol (ICP) decoding supported
ATM Layer Statistics:
Auto-discovery of up to 1024 VCs and collection of statistics on each
Average utilization in percent
Instantaneous utilization in percent
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header (“HEC”) errors

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Frame Relay Statistics:
Average utilization in percent
Instantaneous utilization in percent
Maximum utilization in percent
Minimum utilization in percent
Total frames
Total octets
Average throughput (bps)
Instantaneous throughput (bps)
Maximum throughput (bps)
Minimum throughput (bps)
Aborted frames
Short frames
FCS errors
ATM QoS measurements (to ITU-T O.191)
ATM Traffic contract conformance (policing) measurements
Frame Relay SLA measurements (to FRF.13)
Frame Relay CIR measurements
Capture buffer size: 64 Mbyte on each receiver
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate
Analyze bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1

Outputs:

Two ports, 100 Ohm balanced
RJ-11 handset jack (for WAN)
Interface types (and output levels):
DSX-1 (build-out selectable from 0 to 655 ft in 5 steps)
Network Interface (selectable LBO levels, 0, -7.5 dB and -15.0 dB)
Electrical:
ITU-T G.703, G.704
Clocking:
Recovered (loop), Internal or External (using other receiver input)
Internal clock rate accuracy:
+/- 20 ppm
Alarm generation:
Remote Alarm Indication (RAI), formerly known as FERF
Alarm Indication Signal (AIS)
Simulate line or equipment
Generate Test Cell traffic (to ITU-T O.191) shaped to traffic contract
Generate from cell table
Generate Frame Relay SLA traffic (to FRF.13)
Generate bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} – 1
Transmission of 4000 byte BER user pattern in WAN

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ATM and WAN Interface Specifications (continued)

E1 (2.048 Mb/s) / T1 (1.544 Mb/s) J2294D

General
This interface is a plug-in module suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and the J2900A High Speed undercradle. The J2294D has DB-9 and RJ-45 connectors, which, with converter cables, can connect to 120 Ohm Small Siemens connectors. This module handles frame- and cell-based technologies such as ATM, Frame Relay, HDLC, SDLC, X.25, ATM DXI, and PPP in addition to BERT.

This module can be configured as a T1 (1.544 Mb/s) or as an E1 (2.048 Mb/s) interface. For T1 information, see J2298D specifications.

Common to Inputs and Outputs:
Connectors:
  Balanced 120 Ohm DB-9 and RJ-45
Line Code:
  ATM: HDB3
  WAN: HDB3, AMI
Electrical:
  ITU-T G.703, G.704
Framing:
  ATM and WAN
  ITU-T G.704 alternate framing with or without CRC-4
  Fractional channel, any multiple of 64 kb/s channel
  Unframed at 2.048 Mb/s
Cell Mapping:
  Direct (ITU-T G.804)
Cell Scrambling:
  Conforms to ITU-T I.432.1 ($x^{43} + 1$)
Inputs:
Two ports
Levels:
  ITU-T G.703
Received pulse amplitude measurement (mVpeak)
Monitor modes:
  Terminated, 120 Ohm balanced
  Bridged (High Impedance)
Monitor Jack -20 dB and -30 dB
Physical Layer Alarms and Statistics:
  Loss of Signal (LOS)
  Loss of Frame (LOF)
  Alarm Indication Signal (AIS)
  Remote Alarm Indication (RAI)
  Line code violations
  CRC-4 errors (if CRC-4 is selected)
  Frame alignment error
  Loss of Cell Delineation (LCD)
IMA Control Protocol (ICP) decoding supported
ATM Layer Statistics:
  Auto-discovery of up to 1024 VCs and collection of statistics on each
  Average utilization in percent
  Instantaneous utilization in percent
  Total cells received
  Idle/unassigned cells received
  Busy (assigned) cells received
  Header ("HEC") errors

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Frame Relay Statistics:
- Average utilization in percent
- Instantaneous utilization in percent
- Maximum utilization in percent
- Minimum utilization in percent
- Total frames
- Total octets
- Average throughput (bps)
- Instantaneous throughput (bps)
- Maximum throughput (bps)
- Minimum throughput (bps)
- Aborted frames
- Short frames
- FCS errors

ATM QoS measurements (ITU-T O.191)
ATM Traffic contract conformance (policing) measurements
Frame Relay SLA measurements (to FRF.13)
Frame Relay CIR measurements
Capture buffer size: 64 Mbyte each receiver
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate
Analyze bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
- 1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1

Outputs:
Two ports, 120 Ohm balanced
Levels:
- ITU-T G.703

Clocking:
- Recovered (loop), Internal or External (using other receiver input)

Internal clock rate accuracy:
- +/- 20 ppm

Alarm generation:
- Remote Alarm Indication (RAI), formerly known as FERF
- Alarm Indication Signal (AIS)

Simulate line or equipment
Generate ATM Test Cell traffic (ITU-T O.191) shaped to traffic contract
Generate from cell table
Generate Frame Relay SLA traffic (to FRF.13)
Generate bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
- 1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} – 1
- Transmission of 4000 byte BER user pattern in WAN

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ATM and WAN Interface Specifications (continued)

E1 (2.048 Mb/s) J2296D

General
This interface is a plug-in module suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and the J2900A High Speed undercradle. The J2296D has 75 Ohm BNC connectors and handles frame-based technologies such as Frame Relay, HDLC, SDLC, X.25, ATM DXI, and PPP in addition to BERT.

Common to Inputs and Outputs:
Connectors:
Unbalanced 75 Ohm BNC female
Line Code:
HDB3, AMI
Electrical:
ITU-T G.703, G.704
Framing:
ATM and WAN:
ITU-T G.704 alternate framing with or without CRC-4
Fractional channel, any multiple of 64 kb/s channel
Unframed at 2.048 Mb/s
Inputs:
Two ports
Levels:
ITU-T G.703
Received pulse amplitude measurement (mVpeak)
Monitor modes:
Terminated, 75 Ohm unbalanced
Bridged (High Impedance
Monitor Jack -20 dB and -30 dB
Physical Layer Alarms and Statistics:
Loss of Signal (LOS)
Loss of Frame (LOF)
Alarm Indication Signal (AIS)
Remote Alarm Indication (RAI)
Line code violations
CRC-4 errors (if CRC-4 is selected)
Frame alignment error
Loss of Cell Delineation (LCD)
IMA Control Protocol (ICP) decoding supported
ATM Layer Statistics:
Auto-discovery of up to 1024 VCs and collection of statistics on each
Average utilization in percent
Instantaneous utilization in percent
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header ("HEC") errors
Frame Relay Statistics:
Average utilization in percent
Instantaneous utilization in percent
Maximum utilization in percent
Minimum utilization in percent
Total frames
Total octets
Average throughput (bps)
Instantaneous throughput (bps)
Maximum throughput (bps)
Minimum throughput (bps)
Aborted frames
Short frames
FCS errors

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ATM QoS measurements (to ITU-T O.191)
ATM Traffic contract conformance (policing) measurements
Frame Relay SLA measurements (to FRF.13)
Frame Relay CIR measurements
Capture buffer size: 64 Mbyte on each receiver
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate
Analyze bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1

Outputs:

Two ports, 75 Ohm unbalanced
Levels:
ITU-T G.703
Clocking:
Recovered (loop), and Internal or External (using other receiver input)
Internal clock rate accuracy:
+/- 20 ppm
Alarm generation:
Remote Alarm Indication (RAI), formerly known as FERF
Alarm Indication Signal (AIS)
Simulate line or equipment
Generate ATM Test Cell traffic (to ITU-T O.191) shaped to traffic contract
Generate from cell table
Generate Frame Relay SLA traffic (to FRF.13)
Generate bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} – 1
Transmission of 4000 byte BER user pattern in WAN

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J2 (6.312 Mb/s) J2911A

General
This interface is a plug-in module (J2911A) suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and the J2900A High Speed undercradle. It handles ATM for the Japanese J2 standard.

Common to Input and Output:
Connectors:
Unbalanced 75 Ohm BNC female
Electrical:
ITU-T G.703
Line Code:
B8ZS
Framing:
ITU-T G.704 framing
Full frame: Timeslots 1 - 96 (6.312 Mb/s)
Fractional frame:
Timeslots 1 - 72 (4.608 Mb/s)
Timeslots 1 - 48, 49 - 96 (3.073 Mb/s)
Timeslots 1 - 24, 25 - 48, 49 - 72, 73 - 96 (1.536 Mb/s)
Cell Mapping:
Direct (ITU-T G.804)
Cell Scrambling conforms to ITU-T I.432.1 ($x^{43} + 1$) and may be turned on or off
Input:
Two ports
Levels:
$0.5V_{peak}$ to $2.0V_{peak}$ (ITU-T G.703)
Monimodes:
Terminated, 75 Ohms unbalanced
Bridged (High Impedance, >1 kOhm)
Physical Layer Alarms and Statistics:
Loss of Signal (LOS)
Loss of Frame (LOF)
Loss of Cell Delineation (LCD)
Alarm Indication Signal (AIS)
Remote Alarm Indication (RAI)
Payload AIS
Line code violations
CRC-5 errors
Capture buffer size: 28 Mbyte (approximately 400,000 cells)
Capture buffer timestamp resolution: 100ns
Capture rate: full line rate
Output:
Two ports, 75 Ohm unbalanced
Levels:
$0.2V_{peak}$, to +/- $0.3V_{peak}$ (ITU-T G.703)
Clocking:
Recovered (loop), Internal and External (using other receiver input)
Internal clock rate accuracy:
+/- 30 ppm
Traffic Generation from cell table
Alarm Generation:
RAI, AIS

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ATM and WAN Interface Specifications (continued)

ATM25 (25.600 Mb/s) J3766A

General
This interface comprises a plug-in module (J3766A) suitable for plugging into the J2300E Agilent Advisor mainframe and J2900A High Speed undercradle.

Common to Inputs and Outputs:
Main Specifications: ATM Forum af-phy-0040.000, ITU-T I.432.5
Ports: Two bi-directional, one towards the equipment and the other towards the network: 100 Ohm (for UTP-3 cable) and 120 Ohm (for UTP-5 cable)
Test configuration modes:
Terminal (towards network or equipment) and Monitor (both directions for protocol analysis with repeater functionality in each direction)
Connectors: RJ-45 (UTP)
Line Code: NRZI
Symbol Coding: 4B5B
Line Symbol Rate: 32 Mbaud
Cell Mapping: Symbolic direct (i.e. no framing)
Cell Scrambling: Conforms to af-phy-0040.000 ($x^{10} + x^7 + 1$)
Inputs:
Physical Layer Alarms and Statistics:
Invalid symbol
Short cell
Loss of signal (LOS)
Loss of Timing Synchronization
Timing synchronization frequency
ATM Layer Statistics:
Auto-discovery of up to 1024 VCs and collection of statistics on each
Average utilization in percent
Instantaneous utilization in percent
Maximum utilization in percent
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header ("HEC") errors
ATM QoS measurements (to ITU-T O.191):
ATM traffic contract conformance (policing) measuremets
Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate
Analyze bit error ratio (BER) patterns in the ATM cell payload:
1111, 1010, 1100, PRBS $2^{15} - 1$, PRBS $2^{20} - 1$, PRBS $2^{23} - 1$
Outputs:
QoS and X8 timing source:
Recovered from line (loop), recovered from X8 8 kHz time synchronization source, and internal
Internal clock rate accuracy: +/- 50 ppm
Optional generation of X8 8 kHz time synchronization symbol pair
Simulate network or user equipment
Generate ATM Test Cell traffic (to ITU-T O.191) shaped to traffic contract
Generate bit error ratio (BER) patterns in the ATM cell payload:
1111, 1010, 1100, PRBS $2^{15} - 1$, PRBS $2^{20} - 1$, PRBS $2^{23} - 1$

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ATM and WAN Interface Specifications (continued)

E3 (34.368 Mb/s) J3759B

General
This interface comprises a plug-in module (J3759B) suitable for plugging into the J2300C/D/E Advisor mainframe and the J2900A High Speed undercradle. The J3759B supports both ATM and frame-based technologies such as Frame Relay (CIR & SLA), HDLC, PPP in addition to BERT. This module can also be configured for use as a DS3 (44.736 Mb/s) interface; see below for details.

Common to Inputs and Outputs:
Connectors: 75 Ohm BNC female
Electrical: ITU-T G.703
Line Code: HDB3
Framing:
- Frame Relay: ITU-T G.751
- ATM Direct: ITU-T G.832
- ATM PLCP: ITU-T G.751

Cell Mapping:
- Direct (normal mode, ITU-T G.804)
- PLCP (obsolete mode, ETSI 300 214)

Cell Scrambling:
- Conforms to ITU-T I.432.1 ($x^{43} + 1$) and may be turned on or off

Inputs:
Two ports
Levels:
- Auto gain control for high, low and monitor jack; all unbalanced 1.2Vpeak to 26mVpeak, 34 dB dynamic range

Received pulse amplitude measurement (mVpeak)
Monitor modes:
- Terminated/Repeater (75 Ohm unbalanced)
- Bridged (high impedance)

Physical Layer Alarms and Statistics:
- Loss of Signal (LOS)
- Loss of Frame (LOF)
- Line code violations
- Alarm Indication Signal (AIS)
- Remote Defect Indication (RDI), formerly known as FERF
- Remote Error Indication (REI), formerly known as FEBE
- Bit Interleave Parity (BIP-8)
- Payload type mismatch
- Loss of Cell Delineation (LCD)

ATM Statistics:
- Auto-discovery of up to 1024 VCs and collection of statistics on each
- Average utilization in percent
- Instantaneous utilization in percent
- Maximum utilization in percent
- Total cells received
- Idle/unassigned cells received
- Busy (assigned) cells received
- Header ("HEC") errors

Frame Relay Statistics:
- Average utilization in percent
- Instantaneous utilization in percent
- Maximum utilization in percent
- Minimum utilization in percent
- Total frames
- Total octets

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ATM and WAN Interface Specifications (continued)

Average throughput (bps)
Instantaneous throughput (bps)
Maximum throughput (bps)
Minimum throughput (bps)
Aborted frames
Short frames
FCS errors
ATM QoS measurements (to ITU-T O.191):
ATM traffic contract conformance (policing)measurements:
Frame Relay SLA traffic measurements (to FRF.13)
Frame Relay CIR measurements
Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate
Analyze bit error ratio (BER) patterns in the physical layer
frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1

Outputs:

Two ports, 75 Ohm unbalanced
Levels:
ITU-T G.703
High (1.0 Vpeak)
137 m / 450 ft (0.62 Vpeak)
275 m / 900 ft (0.26 Vpeak)
Clocking source (Tx bit clock and ATM QoS):
Recovered (loop)
Internal (± 20 ppm)
Alarm generation:
Remote Defect Indication (RDI), formerly known as FERF
Alarm Indication Signal (AIS)
Simulate line or equipment
Generate ATM Test Cell traffic (to ITU-T O.191) shaped to traffic contract
Generate from cell table
Generate Frame Relay SLA traffic (to FRF.13)
Generate bit error ratio (BER) patterns in the physical layer
frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} – 1
Transmission of 4000 byte BER user pattern in WAN

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ATM and WAN Interface Specifications (continued)

DS3 (44.736 Mb/s) J3759B

General
This interface comprises a plug-in module (J3759B) suitable for plugging into the J2300C/D/E Advisor mainframe and the J2900A High Speed undercradle. The J3759B supports both ATM and frame-based technologies Frame Relay (CIR & SLA), HDLC, PPP in addition to BERT. This module can also be configured for use as an E3 (34.368 Mb/s) interface; see above for details.

Common to Inputs and Outputs:
Connectors: 75 Ohm BNC female
Electrical: ITU-T G.703
Line Code: B3ZS
Framing:
  Frame Relay: C-bit and M13 (auto-select on input side)
  ATM: C-bit framing
Cell Mapping:
  Direct (normal mode, ITU-T G.804)
  PLCP (obsolescent mode, ITU-T G.804)
Cell Scrambling:
  conforms to ITU-T I.432.1 ($x^{43} + 1$) and may be turned on or off
Inputs:
Two ports,
Levels:
  Auto gain control for high, DSX-3, low, and monitor jack
  (min. = DSX -23 dB); all unbalanced 1.2 V peak to 26 mV,
  34 dB dynamic range
Received pulse amplitude measurement (mVpeak) (WAN only)
Monitor modes:
  Terminated/Repeater (75 Ohm)
  Bridged (high impedance)
Physical Layer Alarms and Statistics:
  Loss of Signal (LOS)
  Loss of Frame (LOF)
  Alarm Indication Signal (AIS)
  Remote/yellow X-bit
  Line code violations
  Far End Block Error (FEBE)
  Idle
  P1/P2 parity errors
  C-bit parity errors
  Far End Alarm and Control (FEAC):
    DS3 Line
    LOS/HBER
    Out of Frame (OOF)
    AIS received
    Idle signal received
    Service failure
    No service failure
    Common equipment failure
    Line loopback activate
    Line loopback de-activate
  PLCP sync loss
  PLCP yellow (Path FERF)
  PLCP BIP
  PLCP FEBE
  Loss of Cell Delineation (LCD)

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ATM and WAN Interface Specifications (continued)

ATM Statistics:
- Auto-discovery of up to 1024 VCs and collection of statistics on each
- Average utilization in percent
- Instantaneous utilization in percent
- Total cells received
- Idle/unassigned cells received
- Busy (assigned) cells received
- Header ("HEC") errors

Frame Relay Statistics:
- Average utilization in percent
- Instantaneous utilization in percent
- Maximum utilization in percent
- Minimum utilization in percent
- Total frames
- Total octets
- Average throughput (bps)
- Instantaneous throughput (bps)
- Maximum throughput (bps)
- Minimum throughput (bps)
- Aborted frames
- Short frames
- FCS errors

ATM QoS measurements (to ITU-T O.191):
- CLR, CMR, CER, CDV, CTD, SECBR

ATM traffic contract conformance (policing) measurements
Frame Relay SLA measurements (to FRF.13)
Frame Relay CIR measurements
Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate
Analyze bit error ratio (BER) patterns in the physical layer
frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1

Outputs:

Two ports, 75 Ohm unbalanced
Transmit levels/line build-out (±100 mV):
- High (0.85 V peak)
- DSX (0.45 V peak)†
- Low (0.36 V peak)†
- 900ft. (0.12 V peak)†

† selectable in frame mode (FR, PPP, HDLC) only

Clocking source (Tx bit clock and ATM QoS):
- Recovered (loop)
- Internal (± 20 ppm)

Alarm generation:
- Remote/Yellow (X-bits),
- Alarm Indication Signal (AIS)
- Idle

Simulate line or equipment
Generate ATM Test Cell traffic (to ITU-T O.191) shaped to traffic contract
Generate from cell table
Generate Frame Relay SLA traffic (to FRF.13)
Generate bit error ratio (BER) patterns in the physical layer
frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} – 1
Transmission of 4000 byte BER user pattern in WAN

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ATM and WAN Interface Specifications (continued)

HSSI (56 kb/s – 52 Mb/s)

General
This interface comprises a plug-in module (J3762B) suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and J2900A High Speed undercradle. The J3762B supports frame-based technologies such as Frame Relay (CIR and SLA), HDLC, SDLC, and PPP in addition to BERT.

Common to Inputs and Outputs:
Connectors:
Two 50 pin SCSI (one to DCE, one to DTE)
Type:
Latch Blocks without rails
Clocking:
Recovered or
Internal (selectable from 56 kb/s - 52 Mb/s)
Control Signal:
DCE: CA, TM
DTE: TA
Loop Control:
DTE: None, Local DTE, Local Line, Remote Line
DCE: LC
Electrical:
EIA-612
EIA-613
Monitored:
Signal:
DTE: SD
DCE: RD
Clock:
From DCE: ST, RT
From DTE: TT
Status:
DCE Ready: TA
DTE Ready: CA
Loopback:
A: LA
B: LB
Test Mode: TM

BERT:
Analyze bit error ratio (BER) patterns in the physical layer frame payload or in the ATM cell payload.
Generate bit error ratio (BER) patterns in the physical layer frame payload or in the ATM cell payload
Transmission of 4000 byte BER user pattern in WAN

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ATM and WAN Interface Specifications (continued)

STM-1/OC-3 (155.520 Mb/s) J2912B

General
This optical interface comprises a plug-in module (J2912B) suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and J2900A High Speed undercradle. The interface handles ATM and Packet over SONET/SDH (PoS).

Common to Inputs and Outputs:
Connectors: SC-PC
Framing:
SDH: STM-1
SONET: STS-3c
SONET/SDH Frame Scrambling ($x^7 + x^6 + 1$)
STM-1: ITU-T G.707
SONET: ANSI T1.105
ATM Cell Scrambling: conforms to ITU-T I.432.1 ($x^{43} + 1$) and may be turned on or off;
PoS analysis configurations supported:
IETF PPP in HDLC: RFC 1662 and both current RFC 2615 ($x^{43} + 1$ scrambled SONET/SDH payload) and obsolete RFC 1619 (unscrambled SONET/SDH payload) versions with version auto-detect based on POH C2 byte value (default) and manual over-ride for scrambling enable/disable
Cisco HDLC over SONET/SDH
FCS-16 (default) and FCS-32

Inputs:
Two ports (single-mode/multi-mode compatible)
Sensitivity:
Typ. -32 dBm
Min. -28 dBm
Loss of Signal Detect Level:
-34 dBm
Real-time optical power measurement
(can also be used to measure at 622Mb/s):
+3 dBm to -42 dBm dynamic range
+/-0.5 dB absolute accuracy
Physical layer alarms and statistics (SDH / SONET):
Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
B1, B2, B3 BIP errors
Summary BIP error (*)
MS-REI/REI-L (Line FEBE)
REI/REI-P (Path FEBE)
MS-RDI/RDI-L (Line FERF) (*)
MS-AIS/AIS-L (*)
RDI/RDI-P (Yellow)
AIS/AIS-P
Summary Far End (*)
Loss of Cell Delineation (LCD) (*)
ATM layer statistics:
Auto-discovery of up to 1024 VCs and collection of statistics on each
Average utilization in percent
Instantaneous utilization in percent
Maximum utilization in percent
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header ("HEC") errors

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ATM and WAN Interface Specifications (continued)

PoS statistics:
- Average utilization in percent
- Instantaneous utilization in percent
- Maximum utilization in percent
- Minimum utilization in percent
- Average throughput (kbps)
- Instantaneous throughput (kbps)
- Maximum throughput (kbps)
- Minimum throughput (kbps)
- Total frames
- Total octets
- Abort frames
- Short frames
- FCS errors

ATM QoS measurements (to ITU-T O.191):
ATM: traffic contract conformance (policing) measurements
Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate for ATM and PoS
Analyze bit error ratio (BER) patterns in the physical layer frame payload or in the ATM cell payload:
- 1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1

Outputs:
Two ports, 1310nm Class 1 laser (multi-mode fiber compatible with 10 dB attenuator, available separately as J2928A)
Output levels:
- Min. -12 dBm
- Max. -7 dBm

Clocking: Internal (± 20 ppm)
Alarm Generation:
- MS-RDI/RDI-L (Line FERF)
- MS-AIS/AIS-L
- RDI/RDI-P (Yellow)
- AIS/AIS-P

Generate ATM Test Cell traffic (to ITU-T O.191) shaped to traffic contract
Generate bit error ratio (BER) patterns in the physical layer frame payload or in the ATM cell payload:
- 1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1

Generation of PoS traffic not supported

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ATM and WAN Interface Specifications (continued)

STM-1e/EC-3 (155.520 Mb/s) J2914A

General
This electrical interface comprises a plug-in module (J2914A) suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and J2900A High Speed undercradle. The interface handles ATM and Packet over SONET/SDH (PoS).

Common to Inputs and Outputs:
Connectors: 75 Ohm BNC, unbalanced
Electrical: ITU-T G.703
Line Code: CMI
Framing:
- SDH: STM-1
- SONET: STS-3c

SONET/SDH Frame Scrambling ($x^7 + x^6 + 1$):
- SDH: STM-1, ITU-T G.707
- SONET: STS-3c, GR-253

ATM Cell Scrambling: conforms to ITU-T I.432.1 ($x^{43} + 1$) and may be turned on or off
PoS analysis configurations supported:
- IETF PPP in HDLC: RFC 1662 and both current RFC 2615 ($x^{43} + 1$ scrambled SONET/SDH payload) and obsolete RFC 1619 (unscrambled SONET/SDH payload) versions with version auto-detect based on POH C2 byte value (default) and manual over-ride for scrambling enable/disable
- Cisco HDLC over SONET/SDH
- FCS-16 (default) and FCS-32

Inputs:
Two ports
- Terminal mode
- Monitor Mode: automatic gain control (0 dB or 12 dB gain) to ITU-T G.772 (protected monitor point specification)

Received pulse amplitude measurement (mVpeak)
Physical layer alarms and statistics (SDH/SONET):
- Loss of Signal (LOS) (*)
- Loss of Frame (LOF) (*)
- Loss of Pointer (LOP)
- Line Code Violations
- B1, B2, B3 BIP errors
- Summary BIP error (*)
- MS-REI/REI-L
- REI/REI-P (Line FEBE)
- MS-RDI/RDI-L (Line FERF) (*)
- MS-AIS/AIS-L (*)
- RDI/RDI-P (Yellow)
- AIS/AIS-P
- Summary Far End (*)
- Loss of Cell Delineation (LCD) (*)

ATM layer statistics:
- Auto-discovery of up to 1024 VCs and collection of statistics on each
- Average utilization in percent
- Instantaneous utilization in percent
- Maximum utilization in percent
- Total cells received
- Idle/unassigned cells received
- Busy (assigned) cells received
- Header ("HEC") errors

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ATM and WAN Interface Specifications (continued)

PoS statistics:
- Average utilization in percent
- Instantaneous utilization in percent
- Maximum utilization in percent
- Minimum utilization in percent
- Average throughput (kbps)
- Instantaneous throughput (kbps)
- Maximum throughput (kbps)
- Minimum throughput (kbps)
- Total frames
- Total octets
- Abort Frames
- Short frames
- FCS errors

ATM QoS measurements (to ITU-T O.191)
ATM traffic contract conformance (policing) measurements
Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate for ATM and PoS
Analyze bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
- 1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1

Outputs:
Two ports
Output levels: 1.0 V ± 0.1V
Clocking:
- Internal (± 20 ppm)
- Recovered from input signal

Alarm Generation:
- MS-RDI/RDI-L (Line FERF)
- MS-AIS/AIS-L
- RDI/RDI-P (Yellow)
- AIS/AIS-P

Generate ATM Test Cell traffic (to ITU-T O.191) shaped to traffic contract
Generate from cell table
Generate bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
- 1111, 1010, 1100, PRBS 2^{15} - 1, PRBS 2^{20} - 1, PRBS 2^{23} - 1
- Transmission of 4000 byte BER user pattern in WAN

Generation of PoS traffic not supported

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ATM and WAN Interface Specifications (continued)

UTP155 (155.520 Mb/s) J2913B

General
This interface comprises a plug-in module (J2913B) suitable for plugging into the J2300C/D/E Agilent Advisor mainframe and J2900A High Speed undercradle.

Common to Inputs and Outputs:
Main Specification:
ATM Forum af-phy-0015.000
Connectors: RJ-45 (UTP)
Line Code: NRZ
Framing:
SONET: STS-3c
SDH: STM-1
Frame Scrambling: SONET: ANSI T1.105
Cell Scrambling conforms to ITU-T I.432.1 ($x^{43} + 1$)
Inputs:
Two ports, one towards the user, one towards the network,
100 Ohm and 120 Ohm
Monitor modes:
Terminated
Physical layer alarms and statistics (SONET/SDH):
Loss of Signal (LOS) (*)
Loss of Frame (LOF) (*)
Loss of Pointer (LOP)
B1, B2, B3 BIP errors
Summary BIP error (*)
REI-L/MS-REI
REI-P/REI
RDI-L (Line FERF)/MS-RDI (*)
AIS-L/MS-AIS (*)
RDI-P (Yellow)/RDI
AIS-P/AIS
Summary Far End (*)
Loss of Cell Delineation (LCD) (*)
ATM layer statistics:
Auto-discovery of up to 1024 VCs and collection of statistics on each
Average utilization in percent
Instantaneous utilization in percent
Maximum utilization in percent
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header ("HEC") errors
ATM QoS measurements (to ITU-T O.191)
ATM traffic contract conformance (policing) measurements
Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate
Analyze bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS $2^{15} - 1$, PRBS $2^{20} - 1$, PRBS $2^{23} - 1$

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ATM and WAN Interface Specifications (continued)

Outputs:

Two ports, one towards the user, one towards the network,
100 Ohm and 120 Ohm
Clocking: Internal (± 20 ppm)
Alarm Generation:
RDI-L (Line FERF)/MS-RDI
AIS-L/MS-AIS
RDI-P (Yellow)/RDI
AIS-P/AIS
Simulate network or user equipment
Generate ATM Test Cell traffic (to ITU-T O.191) shaped to traffic contract
Generate from cell table
Generate bit error ratio (BER) patterns in the
physical layer frame payload or in the ATM cell payload:
1111, 1010, 1100, PRBS 215 - 1, PRBS 220 - 1, PRBS 223 - 1
Transmission of 4000 byte BER user pattern in WAN

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ATM and WAN Interface Specifications (continued)

STM-4c/OC-12 (622.080 Mb/s) J3763A

General
This interface comprises an undercradle (J3763A) for the Agilent Advisor and a single-mode optics plug-in module (J3764A) which can be used in multi-mode situations with the use of a pair of 10 dB attenuators such as the J2928A.

Common to Inputs and Outputs:
Connectors: SC
Framing:
SDH: STM-4c
SONET: STS-12c
Frame Scrambling:
STM-1: ITU-T Rec.G.707
SONET: ANSI T1.105
Cell Scrambling conforms to I.432.1 ($x^{43} + 1$) and may be turned on or off
Inputs:
With single-mode optics plug-in module J3764A:
Two ports (single-mode/multi-mode compatible)
Sensitivity:
Typ. –30 dBm
Min. –28 dBm
Loss of Signal (LOS) Detect Level: -39 dBm
Physical layer alarms and statistics (SDH / SONET):
Loss of Signal (LOS)
Loss of Frame (LOF)
Loss of Pointer (LOP)
Out of Frame (OOF)
B1, B2, B3 BIP error counts
BIP error indication
MS-REI/REI-L (Line FEBE) and counts
REI/REI-P (Path FEBE) and counts
MS-RDI/RDI-L (Line FERF)
MS-AIS/AIS-L
RDI/RDI-P (Yellow)
AIS/AIS-P
Signal label mismatch
Loss of Cell Delineation (LCD)
ATM Statistics:
Auto-discovery of up to 4,095 virtual channels (VC)
Instantaneous utilization in percent per VC
Peak percentage of total bandwidth per VC
Total cells received per VC
Header ("HEC") errors
Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100ns
Capture rate: full line rate

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ATM and WAN Interface Specifications (continued)

Pre-capture filtering:
By VPI-VCI (UNI or NNI), including/excluding idle/unassigned cells, by PTI and/or CLP; up to three different VPI-VCI filters can be specified; cells with bad HECs can also be filtered
Display (post-capture) filtering by:
VCC: VPI-VCI (UNI or NNI), errored headers ("HEC" errors)
IP source and/or destination address in PDUs conforming to RFC 1483, RFC 1577 or LANE
Decode: same as for display decodes (below)
Display decodes include:
AAL-3/4, AAL-5, OAM, ILMI, RM
Q.2110 SSCOP (for UNI Sig. 3.1), Q.SAAL1 SSCOP (for UNI Sig. 3.0), UNI Signalling (3.0, 3.1), SPANS, LANE (1.0 and 2.0), MPOA, PNNI, Frame Relay network interworking (FRF.5),
MPEG2,
802.1d (Spanning Tree), 802.2, 802.3, Ethernet, 802.5,
ARP (inc. Inverse ARP), BGP (Keep Alive),
BOOTP, DNS, GSMP, ICMP, IFMP, IP, IPX, LLC/SNAP, NHRP, OSPF, RIP, SAP, SNAP, SNMP, TCP, TFTP, Telnet, UDP
Other LAN decodes (including Agilent Advisor "Commentators"):
TCP/IP, Novell, IBM, AppleTalk, Xerox, Banyan, Oracle, Sybase, OSI, DECNet
QoS measurements:
Test cell analysis for cell loss, misinsertion, CDV tolerance threshold (note: test-cell generation does not conform to ITU-T O.191)
Outputs:
With single-mode optics plug-in module J3764A:
Two ports, 1310nm Class 1 single-mode laser
(multi-mode fiber compatible with 10 dB attenuator, sold separately)
Output levels:
Min. -15 dBm
Typ. -13 dBm
Max. -8 dBm
Clocking:
Recovered (loop) and Internal
Generation:
a single cell
from a script of multiple cells
from a previously captured cell trace
from imported files
send PING (ICMP Echo) - AAL-5 encapsulated RFC 1483 and RFC 1577
QoS test cell generation (note: test-cell generation does not conform to ITU-T O.191

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Remote Operation

The Agilent Advisor can connect to other Advisors or to PCs using standard Microsoft Windows® remote operation software, such as pcANYWHERE 8.0 and 9.2.

General Specifications

Physical Specifications (J2300E)

Size: 300 x 100 x 310 mm (12 x 4 x 12 in)
Weight: 6 kg (14 lb); 7.2 kg (16.5 lb) with optional J3444A LAN undercradle

Power Requirements

External: 100 to 120 and 200 to 240 V AC
50 to 60 Hz, 130 VA

Temperature

Operating: 5° to 40° C
Non-operating: -25° to 60° C

Humidity

Operating: 20% to 80%
Non-operating: 10% to 90%

Condensation

Not allowed

Altitude

Operating to 4.5 km (15,000 ft)
Non-operating: to 12.2 km (40,000 ft)

Regulatory Compliances

EMC: European Union EMC Directive
IEC 801-2, ESD Susceptibility
IEC 801-3, Radiated Immunity
IEC 801-4, Electrical Fast Transient Immunity

CISPR11, Radiated and Conducted Emission

CE marked
C-Tick marked

Safety: CSA 22.2 No. 1010-1
UL 3111
IEC 1010-1
CE marked
CSA marked (NRTL)

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Related Literature

Agilent Advisor ATM	Product Overview	5968-1437E
Advisor WAN	Product Overview	5967-5566E
Downtime is not an Option for Enterprise	Brochure	5988-2430EN
ATM Quality of Service	White Paper	5968-8556E
Basic ATM Troubleshooting with the Advisor	Application Note 1327	5968-5924E
Testing and Troubleshooting Medium and High Speed Frame Relay Networks	Application Note 1323	5968-5310E
Dual Simultaneous Measurements	Application Note 1346	5980-0547E

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Notes

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Notes

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Agilent Ordering Information

J2300E Agilent Advisor - WAN

Undercradles

J2524A	LAN-FDDI undercradle
J2900A	High Speed Acquisition undercradle
J2901A	LAN – Gigabit Ethernet undercradle
J3444A	LAN Fast Ethernet undercradle
J3763A	OC-12/STM-4 undercradle
J4630A	VQT undercradle – Analog FXO/E&M

Modules

J2294D	E1/T1 DB-9/RJ-45 interface module
J2296D	E1 BNC 75 Ohm interface module
J2298D	E1/T1 RJ-45/RJ-48C/ mini-bantam interface
J2905B	ISDN BRI S/T and U interface module
J2908A	DDS 4-wire module
J2911A	J2 (6.13 Mbs) ATM interface module
J2912B	OC-3/STM-1 plug-in module
J3913B	UTP155 interface module
J2914A	ATM-1e/EC-3 plug-in module
J3759B	WAN-DS3/E3 cells and frames module
J3762B	WAN-HSSI module
J3766A	ATM25 module
J5457A	High Speed V-series interface

Software

J3307A	Agilent Advisor Reporter WAN/LAN/ATM
J5425A	Switch Advisor software – RMON
J5458A	Advisor 3G UMTS W-CDMA software

Education

J1998A	Network Troubleshooting book
J1999A	Network Troubleshooting CD
H7211A-211	Wide Area Network Analysis
H7211A-212	Frame Relay Network Analysis
H7211A-213	ATM Network Analysis
H7211A-403	TCP/IP Troubleshooting

Warranty and Support Services

Hardware	1 year
	Agilent Instrument Warranty and Service Plan
	Agilent Phone Support Products
	Agilent Software Support Products
Software	90-day media replacement warranty

Use this link to go directly to our network troubleshooting solutions:

http://www.agilent.com/comms/onenetworks

By internet, phone or fax, get assistance with all your Test and Measurement needs.

Online assistance:
http://www.agilent.com/find/assist

United States:
(Tel) 1 800 452 4844

Canada:
(Tel) 1 877 894 4414
(Fax) (905) 282 6495

China:
(Tel) 800-810-0189
(Fax) 1-0800-650-0121

Europe:
(Tel) (31 20) 547 2323
(Fax) (31 20) 547 2390

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(Fax) (886-2) 2545-6723

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