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Agilent Technologies

Advisor Frame Relay and Async/BiSync - 11.4

Technical Specifications

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Solve complex internetworking problems the first time

The Agilent Advisor is a Tool for Today's Field Service Network Managers, Engineers, and Technicians for the deployment, troubleshooting, and optimization of today's advanced, Frame-and Cell-based networks with Mission-Critical Applications.

The Advisor is the most complete LAN, WAN and ATM tool for Installation, Maintenance and Troubleshooting. The Advisor lets you connect anywhere on the network and capture all the necessary data to give you complete visibility into the Network. This document covers Frame Relay aspects of the Advisor release 11.4, unless otherwise specified. See the LAN Product Overview (5980-0990E) and the ATM/WAN Technical Specifications (5980-0786E) for more information.

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Frame Relay Testing Made Easy

To install or troubleshoot a Frame Relay link, you need to test for many things: physical errors, equipment interoperability, Frame Relay congestion, and even LAN traffic problems. The Advisor offers integrated Frame Relay protocol analysis capabilities, along with Bit Error Rate Testing (BERT), stimulus/response measurements, and statistical analysis capability - everything you require to get a good look at the physical layer, Frame Relay Signaling, and all the protocol layers above.

No matter what the traffic level, the Advisor will capture every frame on your full-duplex network connections. It monitors non-intrusively and captures Frame Relay data at full line rate. In addition, it can simulate either direction of a line under test and process previously captured data from its capture buffers or from a file for retransmission. The analyzer doesn't just capture traffic when the network is working - it gives you information when the network is broken - when you need it the most.

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

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

Acquisition Systems

There are two acquisition systems for ATM and WAN: the J2300D Advisor mainframe and the J2900A High Speed undercradle.

J2300D Advisor Mainframe

The J2300D mainframe comprises the acquisition system for all ATM and WAN plug-in modules plus the V series interfaces, connectors for which are located on the body of the mainframe.

In addition, the mainframe includes a full PC running the Microsoft® Windows98® operating system on a 300 MHz processor, 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.

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 J2300D mainframe except that it has no built in PC but relies upon the PC contained in the J2300D ATM/WAN or J3446D 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 Advisor has the ability to test two different interfaces and technologies simultaneously, e.g. E1 Frame Relay and E3 ATM, DS3 Frame Relay and 10/100 Mbps Ethernet, ATM25 and OC-3c ATM, etc. This functionality lets you 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 Advisor mainframe (J2300D or J3446D) 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 J2300D Advisor mainframe fitted with a J2900A High Speed undercradle could each be fitted with the same type of ATM or WAN interface and be run simultaneously – e.g. two J3766A ATM25 interface modules.

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

Dual Measurment Analysis Support

			J2300D Mainframe										J3446D Mainframe
			WAN only				WAN/ATM			ATM only			
		Rev. 11.4 June 2000	V Series	DDS 4-wire J2908A	HSSI J3762A/B	ISDN J2904B J2905B	T1 J2298B/D J2299B	E1 J2293B J2294C/D J2296B/D J2297B	E3/DS3 J3759B	ATM25 J3766A	STM-1/OC-3c J2912B	UTP155 J2913B	LAN Ethernet Fast Ethernet
J2900A High Speed Undercradle	WAN only	DDS 4-wire J2908A	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		HSSI J3762A/B	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		ISDN J2904B J2905B	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
	WAN/ATM	T1 J2298B J2299B	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		E1 J2293B J2294C J2296B J2297B	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		E3/DS3 J3759B	❖	❖	❖	❖	❖	❖	No	❖	❖	❖	❖
	ATM only	ATM25 J3766A	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		STM-1/OC-3c J2912B	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		UTP155 J2913B	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
LAN Undercradles		Fast Ethernet J3444A	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		Ethernet J2306A	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		Token Ring J2307A	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		Ethernet/TR J2309A/B	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖
		FDDI J2524A	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖	❖

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

Table 1: Dual measurement analysis support.

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Key WAN Features and Functionality

(Note: See ATM-WAN technical specification publication 5980-0786E for a complete description of WAN specifications plus the ATM specifications). The Agilent Technologies Advisor provides the following powerful wide area network (WAN) features and functions:

- WAN testing speeds from 50 bps to 52 Mbps
- 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
- Interfaces, including ISDN Basic Rate Interfaces (BRI) S/T/U and Primary Rate Interfaces (PRI), E3/DS3 Cells and Frames, E1/T1, HSSI, DDS 4-wire, 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, 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 rate 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 1483.
- Service Level Agreement measurements according to FRF.13
- LMI Expert analysis
- CIR Measurements in all Frame Relay DLCIs
- Tests simultaneously on two different or similar WAN interfaces
- Tests simultaneously with other technologies (e.g. Frame Relay, Ethernet)
- Signal Level measurement on T1, E1, E3 and DS3

WAN and Other Technologies 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. Other interfaces, including ISDN basic rate interfaces (BRI) S/T/U and primary rate interfaces (PRI), ATM STM-1/OC-3c, E3/DS3 Cell and Frame, ATM 155 UTP, E1/T1, HSSI, DDS 4-wire, are available as slide-in modules or as undercradle for 10/100 Ethernet, Gigabit, Token Ring and FDDI, STM-4c/ OC-12c ATM.

Monitoring of LAN data over WAN and ATM is a standard feature. Real-time monitoring of network conditions is an Advisor powerful testing capability to dig deeply into the data if needed.

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

The Advisor traffic generation is another powerful tool; it allows the transmission of virtually any type of message or frame onto the network.

To get statistical information about the data on your network, the Advisor will analyze every frame and count user definable events. A number of counters have been pre-defined.

The Advisor is equipped with standard Bit Error Rate Testing (BERT) and is capable of generating BERT patterns onto V Series, T1, E1, E3, or DS3 WAN links.

No matter if your 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.

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Unmatched WAN Solutions

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

Network Line Vitals
Frame Relay DLCI Statistics
Frame Relay SLA Measurement
Frame Relay CIR Policing
Frame Relay LMI Expert
LAN over Frame Relay 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

WAN Analysis Capabilities

The Advisor provides real-time and post-processing Layer 2 and Layer 3 analysis capabilities for:
Frame Relay
PPP (Sync, Async)
ISDN
X.25
HDLC
ATM DXI
SMDS (optional)
SNA
V5.1/V5.2
Async and Bisync

Frame Relay Testing

No matter how complex your testing needs are, the Advisor with interfaces such as the T1, E1, E3/DS3, or the HSSI lets you to test and troubleshoot complex WAN environments to solve WAN access and inter-networking problems quickly.

The 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 you to test:

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

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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 an User. This contract allows both parties to exchange information under controlled traffic conditions. CIR is the rate expressed in bits per second (bit/s) at which 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.

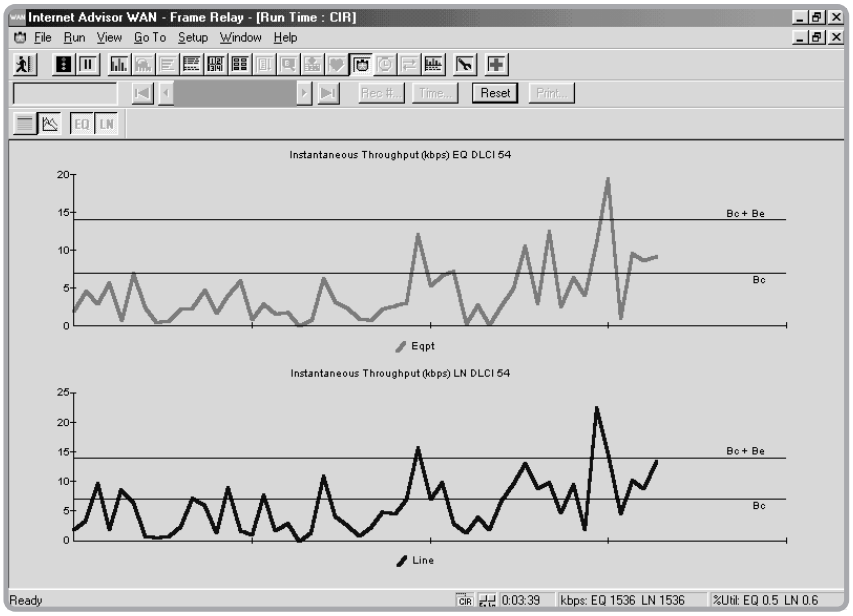


Figure 1: CIR measurement.

The Agilent Advisor performs CIR monitoring of 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 utilization in the Internet Reporter

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Service Level Agreement (SLA) Measurement

Another aspect of the Frame Relay service that often needs to be tested is the provisioning as defined by the CIR (Committed Information Rate).
Note: This measurement is sometimes called Service Level Agreement (SLA) testing or Service Level Definitions see the Frame Relay Forum FRF.13 implementation agreement.

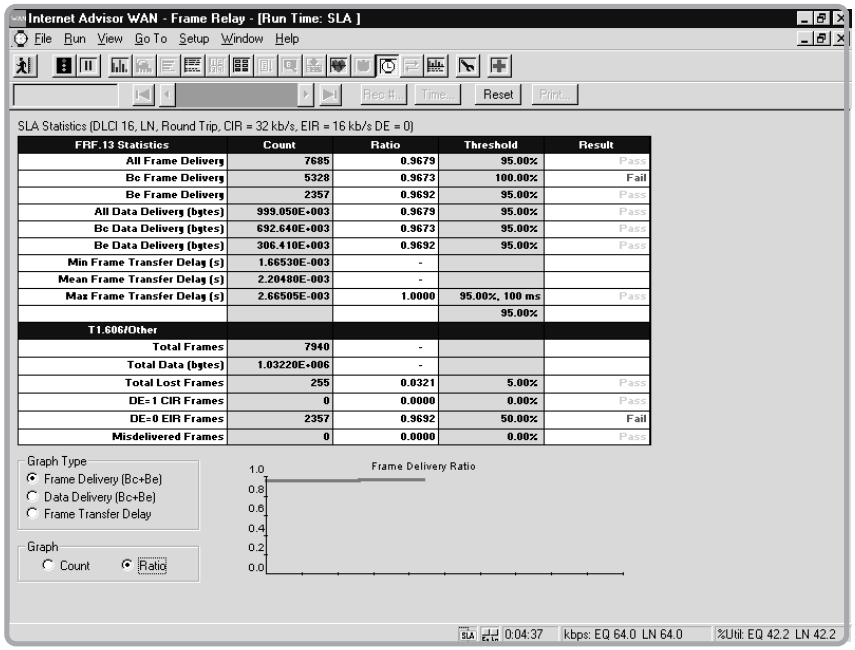


Figure 2: SLA measurement.

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 Advisor
- Generation of IP-ICMP requests from the Advisor to a network device

This test runs with LMI emulation off and 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. The application automatically identify 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

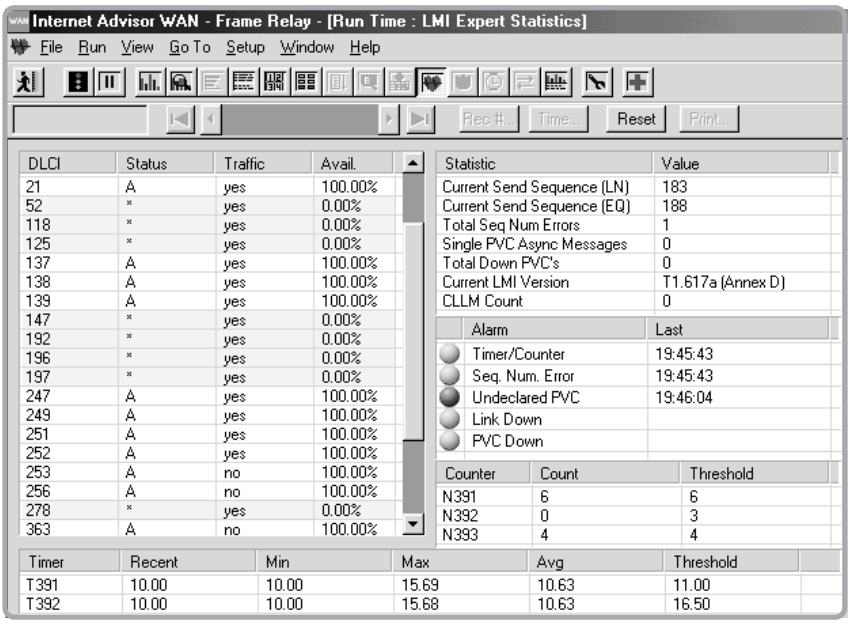


Figure 3: LMI Expert.

DLCI Statistics

The Advisor captures all the Frame Relay frames in the link and performs an automatic study of all the possible DLCIs (1024). This application lets you to track 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 kbps
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 kbps
Total octets (bytes)
Total frames/packets
Short frames/packets
DE
FECN
BECN

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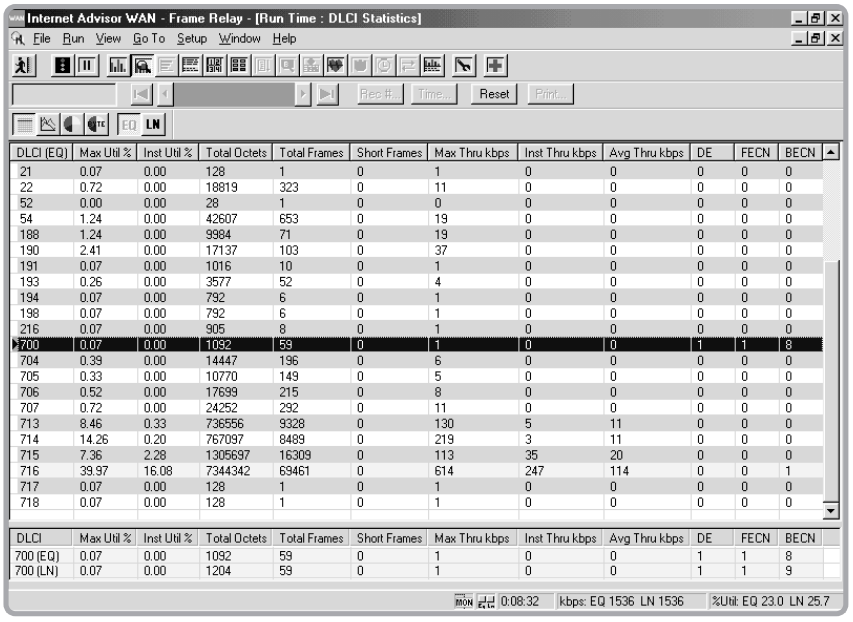


Figure 4: DLCI statistics table.

DLCI Statistics allows graphing the throughput of a particular PVC in the network so you can visually determine traffic patterns. With this application, you can isolate the traffic of a specific PVC from the rest of the link traffic.

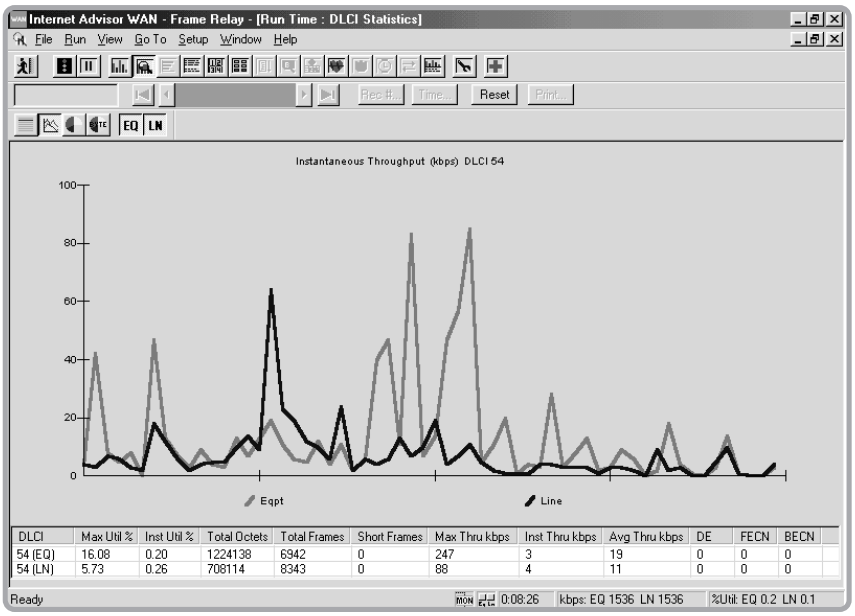


Figure 5: DLCI statistics.

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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. 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 you 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 kbps
Total octets (bytes)
Total frames/packets
Short frames/packets
Abort frames/packets
FCS errors

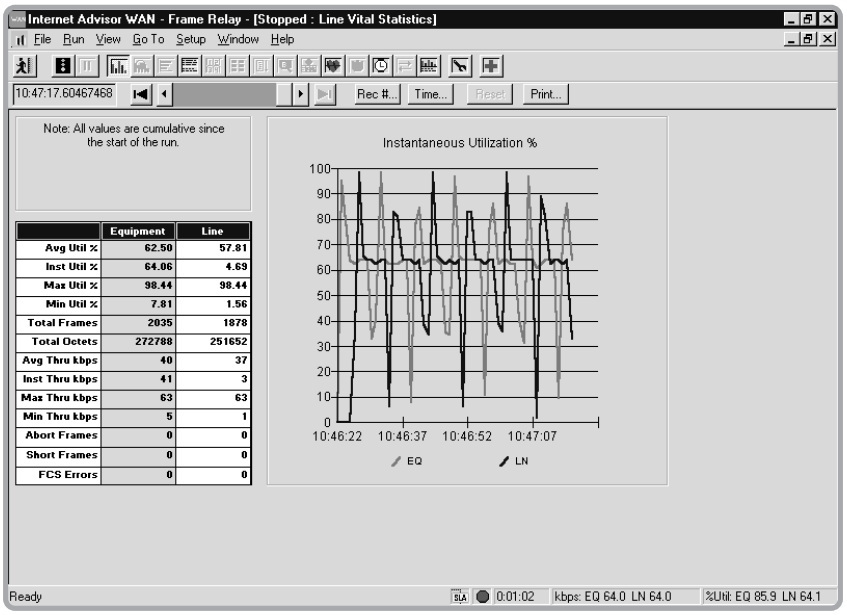


Figure 6: Line vital statistics.

Top Talkers

Top Talkers determines which IP and IPX users consume the most Frame Relay bandwidth.

The following values are displayed:

Sorts the IP and IPX source and destination statistics
Traffic identified as DTE or DCE (CPE or Network)
Throughput in kbps
Frame rate and percentage (%) utilization
Samples from 2 seconds to 24 hours
Specified periods by hours, minutes and seconds
Updates measurement results every 2 seconds

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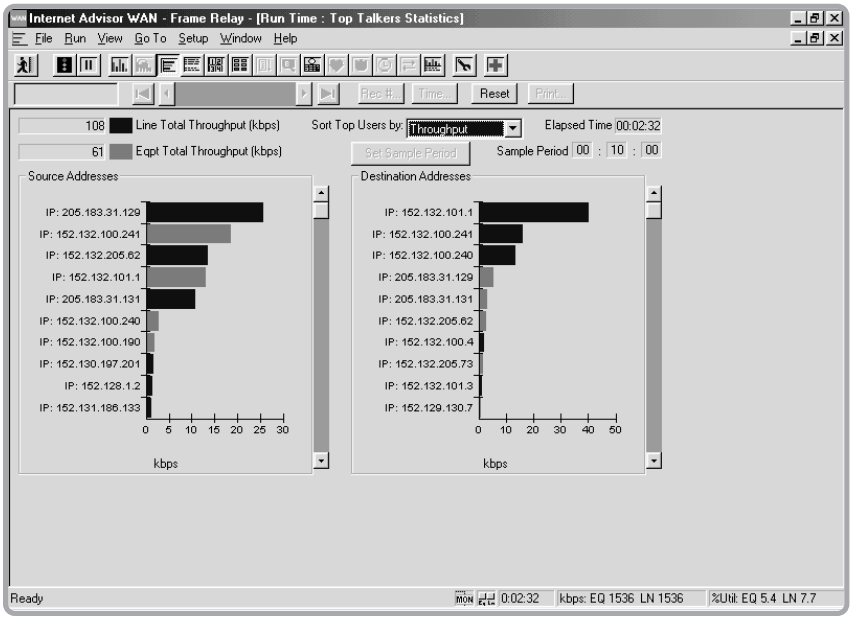


Figure 7: Top Talkers.

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.

The display 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

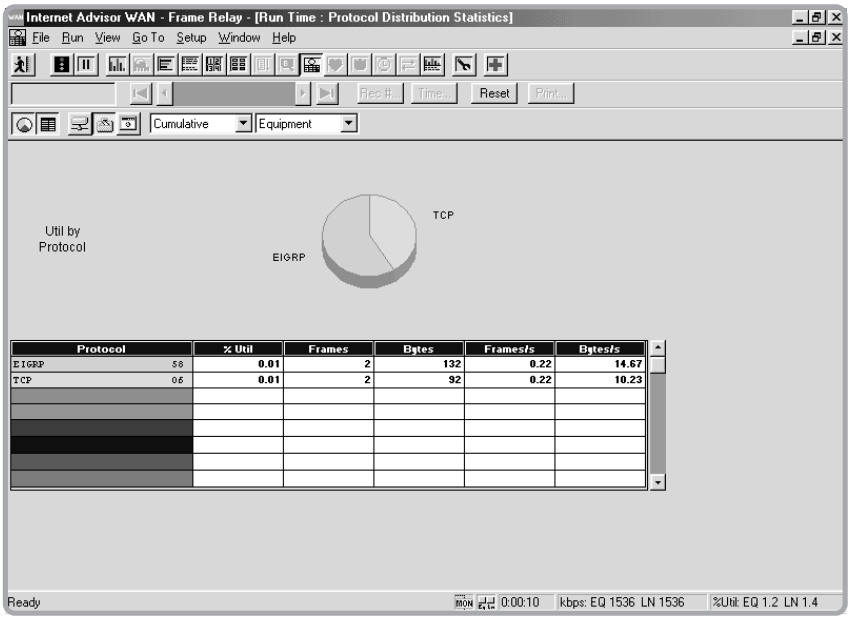


Figure 8: Protocol distribution.

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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 that detects warning and alarms of erroneous events in the user traffic.

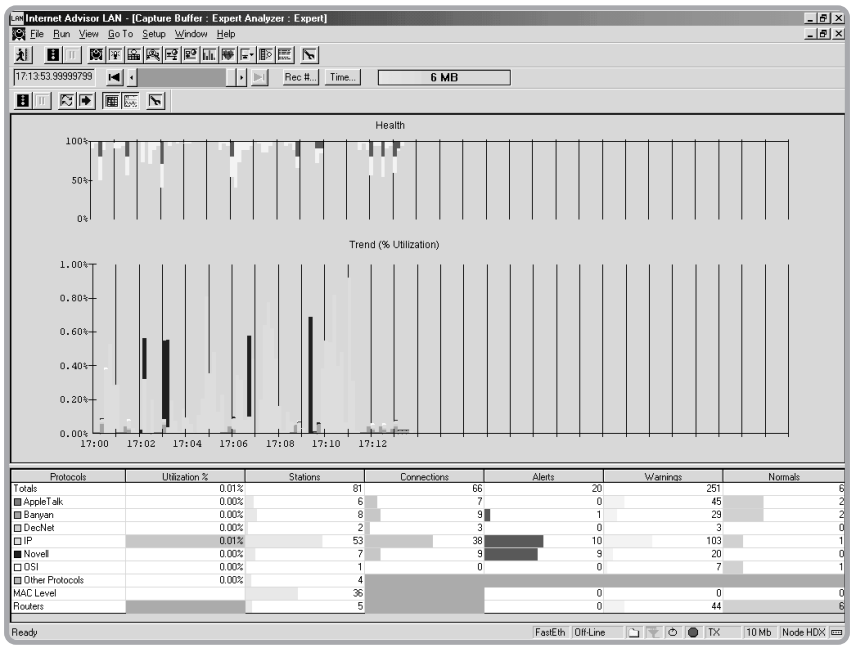


Figure 9: Expert analysis.

Decodes

The 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.

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 the 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.

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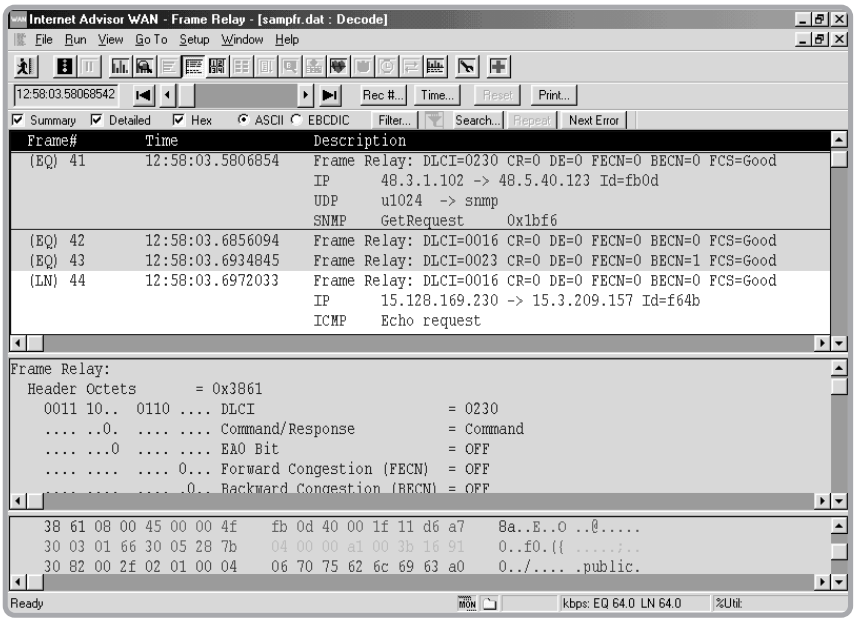


Figure 10: Decodes.

Decode View

The Advisor provides the ability to decode correlated Frame Relay network traffic with its enhanced decode view. The decode view can be configured by 'right clicking' in the summary view. The decode view has a very user-friendly 'one-line', 'one-line top', and 'multi-line' read out in the summary view. It also 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 by clicking hex.

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

- **Delta** — shows the time interval between adjacent frames or displayed filtered frames.

- **Relative** — shows the time difference between critical events and other frames in the traffic flow; for example, if a ping is considered time-zero, frames which arrived before or after will be time-stamped with their relative corresponding arrival time;

- **Absolute** — shows events time stamped with date and time of day.

The decode view now also offers color mapping of the protocol layers in the decode view; this allows each layer in the data flow to be easily identified, thus simplifying protocol analysis.

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LAN over WAN, and LAN (over WAN) over ATM
Encapsulated LAN data is automatically extracted and decoded by the Advisor including complex encapsulated protocols. For unique encapsulation schemes, you can 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 Advisor provides an off-line LAN Expert Analysis tool. The off-line LAN Expert Analysis examines Ethernet, Fast Ethernet, Gigabit Ethernet, ATM or WAN (HDLC or Frame Relay) encapsulated LAN frames on an Advisor or personal PC without 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
- Microsoft LAN Manager
- H.323 series, T.38
- SIP, MGCP, SGCP, MEGACO

Real-time Capturing, Filtering and Searching

The 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 taking place 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 their ATM or Frame Relay network, thus allowing them to see specific traffic types that may be causing trouble on the network. The user can even filter by IP source and/or destination address IP traffic that is encapsulated in Frame Relay, which is, in turn, 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, which is performed in hardware, the 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 display (post-capture) filtering and search functionality allows the user to drill down further for troubleshooting purposes when post processing data from capture buffer or file.

Capture Filters and Counters
Hardware counters and filters let you select frames to bring into the capture buffer. The Advisor will capture every frame, no matter what the traffic level, and that is exactly what you need.

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Up to 16 hardware data filters can be enabled simultaneously or individually turned on or off. A flexible and user-friendly menu helps you 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)

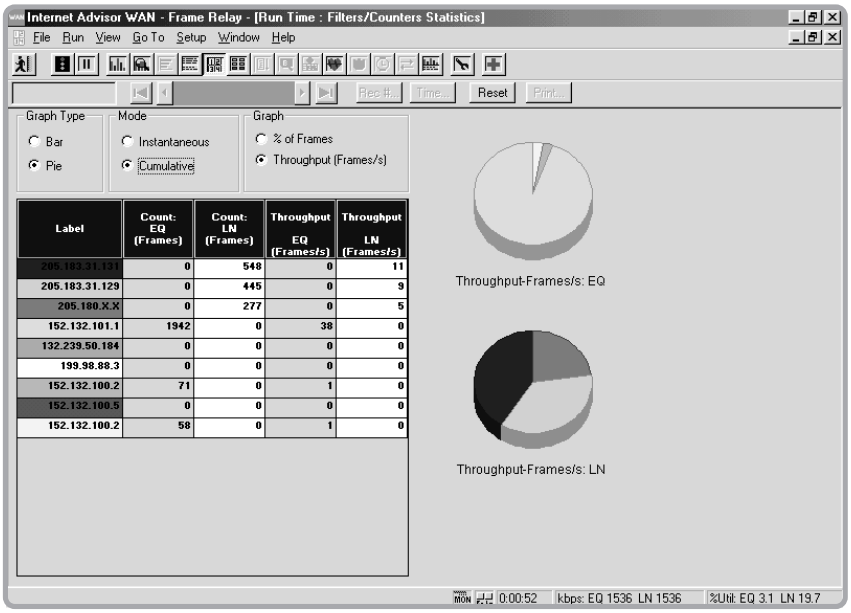


Figure 11: Filters and counters.

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Display Filters and Searching

Display filtering and searching lets you 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, you can filter on Annex D without having to know any of the protocol specifics.

Post-processing lets you quickly zoom in on selected criteria, from the traffic passing between specific devices to individual conversations. With post-processing, you 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.

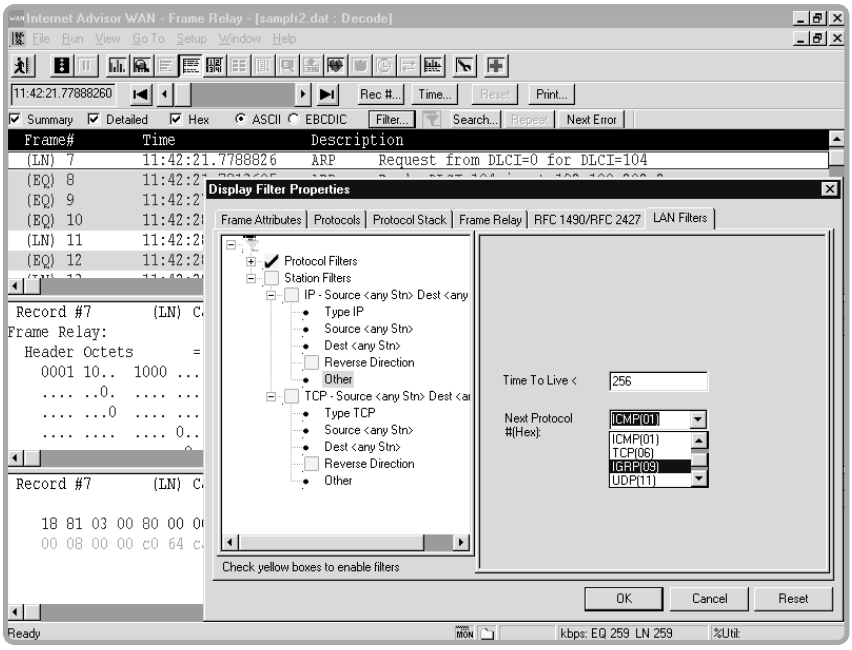


Figure 12: Display filters.

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VoFR and FoFR Decodes and Filtering

The Advisor support 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 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.

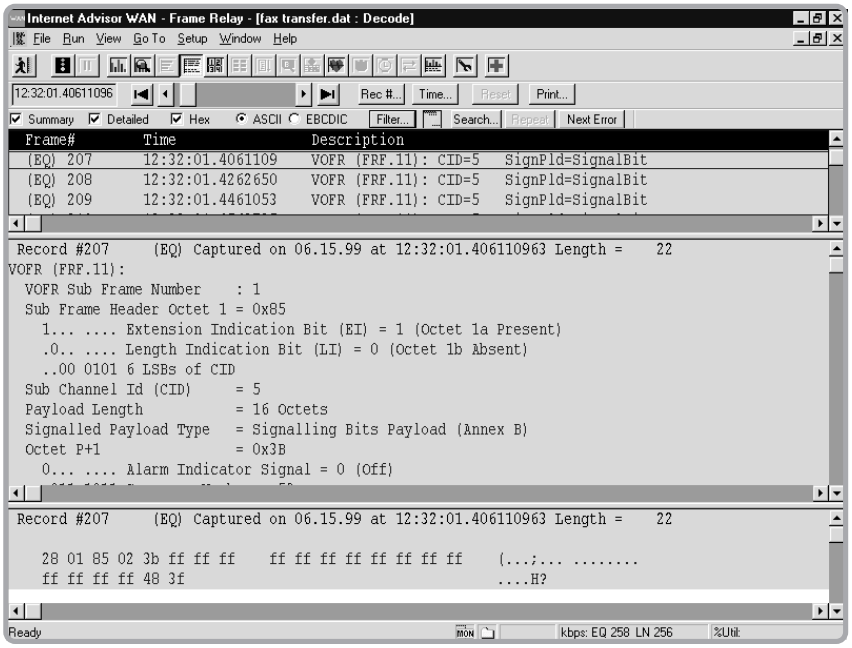


Figure 13: Voice over Frame Relay decode.

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Simulation

Because the Advisor is a multitasking instrument, you can perform any of the active stimulus/response tests while the analyzer simultaneously monitors their effect on the network.
The Advisor WAN provides a series of pre-written and pre-configured test routines; you 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 your 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 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 also transmitting ICMP PING Requests to the network and also sending a capture buffer to the network.

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 a 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.

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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 a 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

Frame Relay Ping

A PING test verifies whether a route exists to any given IP address.
The 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 and 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)

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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

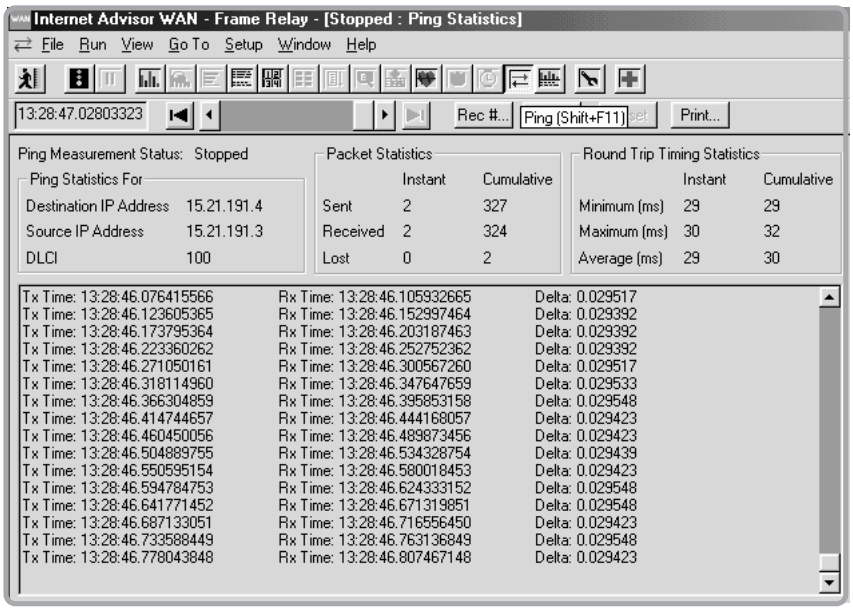


Figure 14: PING measurement.

Buffer Retransmission

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

Traffic Generation

The 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 50 bps to 52 Mbps
- 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

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- 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 bps to 52 Mbps)
- 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 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.

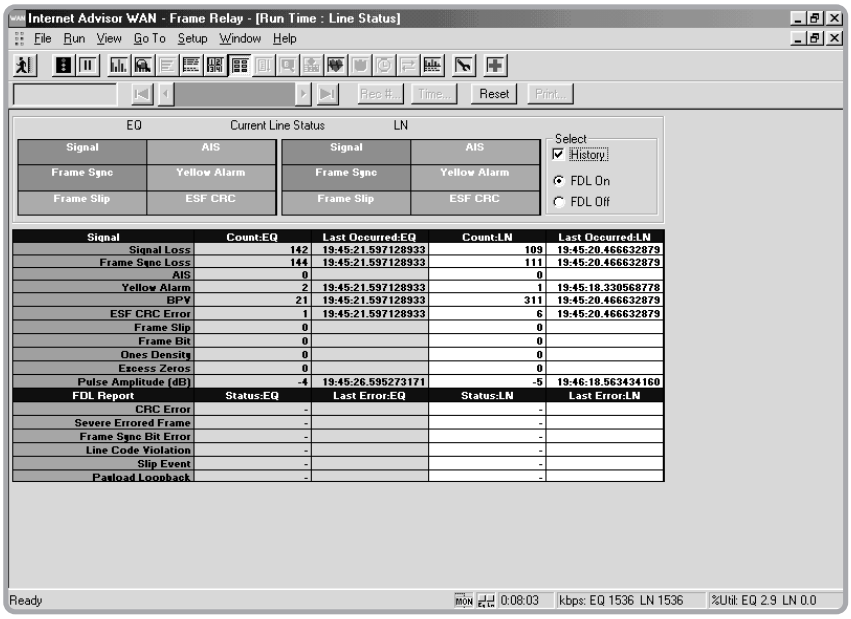


Figure 15: Line status.

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

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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

Power Meter

In addition to full WAN analysis, The Advisor E1/T1 (D models), and E3/DS-3 interfaces have a built-in pulse amplitude power meter that allows you to check power levels with a resolution of +/- 1 dBm. The dynamic range is between +6 dBm and –40 dBm.

Bit Error Rate Testing (BERT)

Many times problems on the network can be attributed to the transmission medium. The Advisor has a powerful, built-in bit error rate test capability. For a complete description of this functionality, please refer to the ATM-WAN Technical Specification document 5980-0786E.

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Configuration

Depending on the interface and application the configuration lets you 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 are 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 the RFC-1490, RFC-2427, Ethertype or FRF.3.1, CLLM.

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Async/BiSync Protocol Measurement

The Agilent Advisor 11.4 incorporates a Windows based Character Oriented Protocol (COP) Analysis. The Agilent Advisor Async/BiSync (COP) 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.24
RS-449 / V.36
V.35
RS-530 (When used with J2278A)

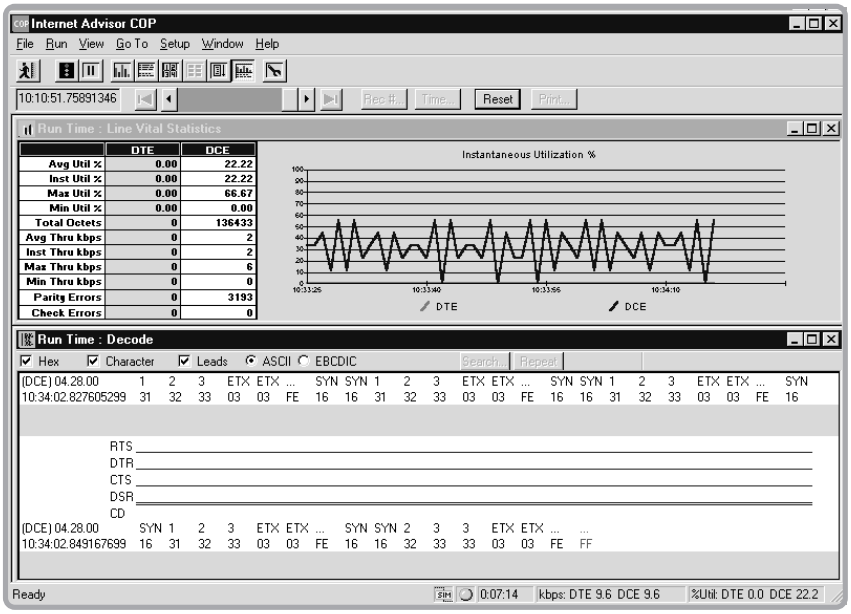


Figure 16: Async/BiSync Protocol application.

The application runs in Windows operating environment to show data in ASCII or EBCDIC format, 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 you can see the status of the physical line, utilization percentages, octets, throughput, and error/data events.

The application allows you 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	

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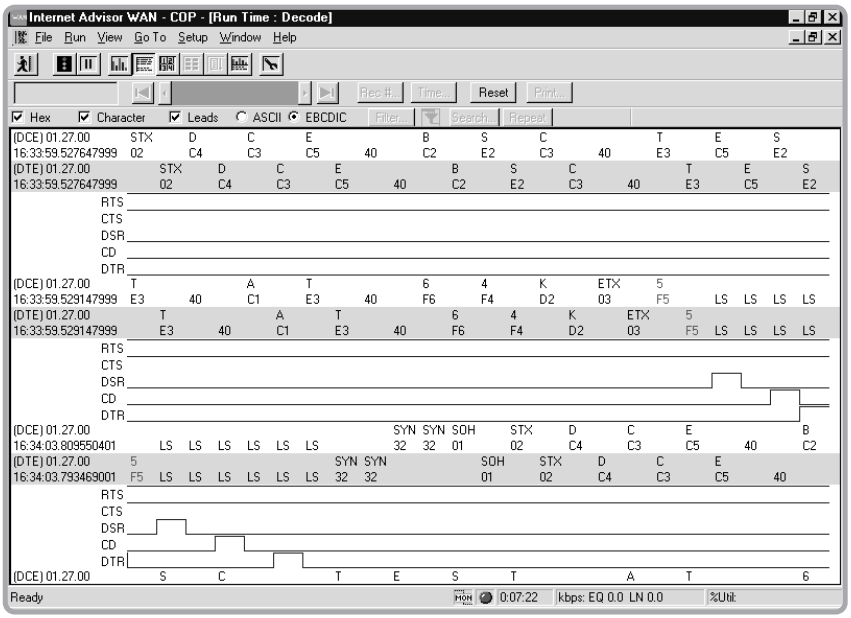


Figure 17: Async/BiSync (COP) decode.

Filters and Counters

The Async/BiSync (COP) application allows you to set up filters and counters for specific capture patterns. The filters and counters can be used to detect specific traffic conditions in the network.

Simulation

You can simulate common network processes and devices. A simulation script language interface helps you to quickly create custom simulation tests for your unique measurement needs.

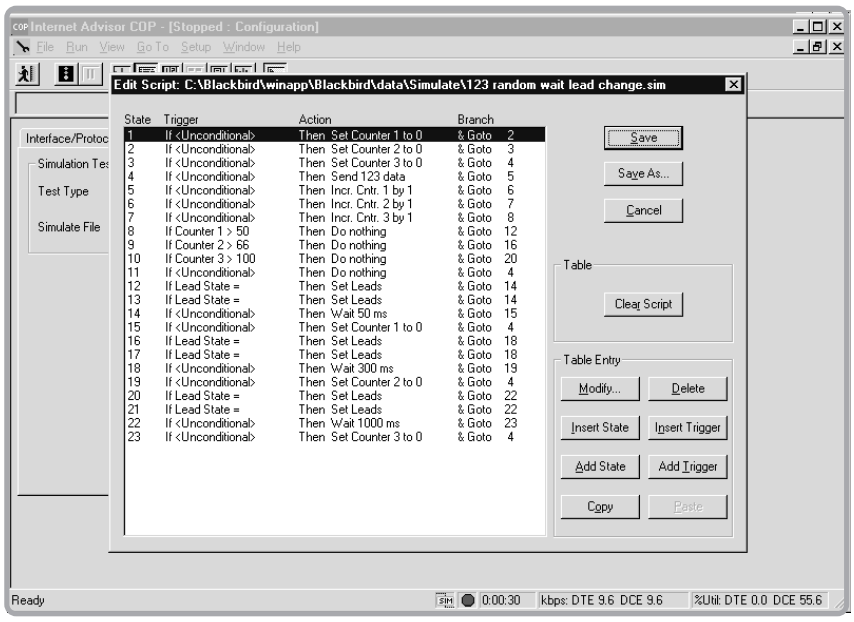


Figure 18: Async/BiSync (COP) simulation.

Post-Process Analysis

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

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Module Support

Interface Application Support for 11.4

	Release 11.4 June 2000	Interface										
		V Series	DDS 4-wire J2908A	HSSI J3762A	HSSI J3762B	ISDN J2904B J2905B	T1 J2298B J2299B	E1 J2293B J2294C J2296B J2297B	E1/T1 J2294D J2298D	E1 J2296D	E3/DS3 J3759A	E3/DS3 J3759B
Application	BERT	⌘	⌘	☒	☒	⌘	⌘	⌘	☒	☒	⌘	⌘
	ATM Cell	☒	☒	☒	☒	☒	⌘	⌘	☒	☒	⌘	⌘
	ATM (DXI)	⌘	☒	⌘	⌘	☒	⌘	⌘	⌘	⌘	⌘	⌘
	ISDN	⌘	☒	☒	☒	⌘	⌘	⌘	☒	☒	☒	☒
	X.25 HDLC SDLC PPP	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
Frame Relay	Decodes	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
	Real Time Filtering	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
	SLA and CIR	□	☒	☒	⌘	☒	☒	☒	⌘	⌘	☒	⌘
	LMI Expert	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
	DLCI Stats	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
	Simulation	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
	Traffic Generation	⌘	☒	⌘	⌘	☒	⌘	⌘	⌘	⌘	⌘	⌘
	Top Talkers and Line Vitals	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘

⌘	Yes
□	Yes with any of J2294D, J2296D, or J2298D installed
☒	No

Note: J2294D, J2296D and J2298D will support BERT and ATM

Table 2: Interface application support.

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WAN Interface Specifications

Unless otherwise stated, 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
- Jack Monitor Mode – uses both inputs only for bi-directional monitoring at protected monitor points
- Through Monitor Mode (Drop and Insert Mode) - uses both inputs and outputs providing bi-directional repeater and 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.

T1/DS1 (1.544 Mb/s) J2298B and J2299B

General
This interface comprises a choice of two plug-in modules (J2298B and J2299B) suitable for plugging into the J2300C/D Advisor mainframe and the J2900A High Speed undercradle. The J2298B has RJ-48C connectors and the J2299B has RJ-45 connectors. These modules handle cell and frame-based technologies, i.e. ATM, Frame Relay, ISDN, HDLC, X.25, PPP, and BERT. These interfaces do not support Frame Relay CIR and SLA measurements.

Common to Inputs and Outputs:
Connectors:

J2298B: balanced 100 Ohm RJ-48C and WECO mini-Bantams
J2299B: balanced 100 Ohm RJ-45 and WECO mini-Bantams

Line Code:
ATM: B8ZS
WAN: B8ZS, AMI

Framing:
ATM:
Extended Super Frame (ESF)
WAN:
Extended Super Frame (ESF)
D4 (Super Frame) Ft and Fs, or Fs only
Fractional, any multiple of 56 kbps or 64 kbps channels
Unframed 1.544 Mbps

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

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

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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)
Loss of PLCP Synchronization (LOPS)
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
ATM Layer Statistics:
Average utilization in percent
Instantaneous utilization in percent
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header ("HEC") errors
Capture buffer size: 28 Mbyte (approximately 400,000 cells)
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
Traffic Generation from cell table
Transmission of bit error rate (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 64-bit BER user pattern in WAN

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

General
This interface module suitable for plugging into the J2300C/D Advisor mainframe and the J2900A High Speed undercradle. This module has 4 bantam connectors and two 8-pin connectors that can easily switched between RJ-48C and RJ-45 pin wiring. The J2298D module handles frame-based technologies such as Frame Relay (CIR &SLA), HDLC, SDLC, X.25, ATM DXI and PPP). ATM and BERT are expected for future releases.

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:
B8ZS, AMI
Framing:
Extended Super Frame (ESF) with CRC
D4 (Super Frame)
Fractional, any multiple of 56 kbps or 64 kbps channels
Unframed 1.544 Mbps

Inputs:
Two ports
Interface types (and input sensitivities):
DSX-1 (+6 dB to –10 dB)
Network Interface (+6 dB to -36 dB)
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
Capture buffer size: 64 Mbyte on each receiver
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)
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

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E1 (2.048 Mb/s) J2294C and J2296B

General
This interface comprises a choice of two plug-in modules (J2294C and J2296B) suitable for plugging into the J2300C/D Advisor mainframe and the J2900A High Speed undercradle. The J2294C has RJ-45 and DB-9 connectors which, with converter cables, can connect to 120 Ohm Small Siemens connectors; the J2296B has 75 Ohm BNC connectors. These modules handle cell and frame-based technologies, i.e. ATM, Frame Relay, ISDN, HDLC, X.25, PPP, and BERT. These interfaces do not support Frame Relay CIR and SLA measurements.

Common to Inputs and Outputs:
Connectors:
J2294C: balanced 120 Ohm DB-9 and RJ-45
J2296B: unbalanced 75 Ohm BNC female
Line Code:
ATM: HDB3
WAN: HDB3, AMI
Electrical:
ITU-T G.703
Framing:
ATM:
ITU-T G.704 alternate framing with or without CRC-4
WAN:
ITU-T G.704 alternate framing with or without CRC-4
Fractional channel, any multiple of 64 kbps channel
Unframed at 2.048 Mbps
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

Inputs:
Two ports
Levels:
ITU-T G.703
Monitor modes:
Terminated, 120 Ohm balanced (J2294C)
Bridged (High Impedance)
Terminated, 75 Ohm unbalanced (J2296B)
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)
ATM Layer Statistics:
Average utilization in percent
Instantaneous utilization in percent
Total cells received
Idle/unassigned cells received
Busy (assigned) cells received
Header (“HEC”) errors
Capture buffer size: 28 Mbyte (approximately 400,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate

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Outputs:
Two ports, 75 Ohm unbalanced (J2296B) or 120 Ohm balanced (J2294C)
Levels:
ITU-T G.703
Clocking:
Recovered (loop), Internal and External (using other receiver input)
Internal clock rate accuracy:
+/- 50 ppm
Traffic Generation from cell table
Generation of bit error rate (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 64-bit BER user pattern in WAN

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 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-based technologies such as Frame Relay, HDLC, SDLC, X.25, ATM DXI, and PPP. ATM and BERT are expected for future releases.
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:
J2294D: balanced 120 Ohm DB-9 and RJ-45
Line Code:
HDB3, AMI
Electrical:
ITU-T G.703, G.704
Framing:
ITU-T G.704 alternate framing with or without CRC-4
Fractional channel, any multiple of 56 or 64 kbps channel
Unframed at 2.048 Mbps

Inputs:
Two ports
Levels:
ITU-T G.703
Monitor modes:
Terminated, 120 Ohm balanced
Bridged (High Impedance)

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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
Capture buffer size: 64 Mbyte each receiver
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate
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

E1 (2.048 Mb/s) J2296D

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

Common to Inputs and Outputs:
Connectors:
J2296D: unbalanced 75 Ohm BNC female
Line Code:
HDB3, AMI
Electrical:
ITU-T G.703, G.704
Framing:
ITU-T G.704 alternate framing with or without CRC-4
Fractional channel, any multiple of 64 kbps channel
Unframed at 2.048 Mbps

Inputs:
Two ports
Levels:
ITU-T G.703
Monitor modes:
Terminated, 75 Ohm unbalanced (J2296B)
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
Capture buffer size: 64 Mbyte on each receiver
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate

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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

E3 (34.368 Mb/s)
General
This interface comprises a plug-in module (J3759B) suitable for plugging into the J2300C/D 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. 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) (WAN only)
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:
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

Analyze bit error rate (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

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

Traffic contract conformance (policing):
- CBR.0 (PCR 0+1, PCR CLP = 0);
- CBR.1/DBR/UBR.1 (PCR CLP = 0+1);
- VBR.1/SBR1 (PCR CLP = 0+1, SCR CLP = 0+1 without tagging);
- VBR.2/SBR2 (PCR CLP = 0+1, SCR CLP = 0 without tagging);
- VBR.3/SBR3 (PCR CLP = 0+1, SCR CLP = 0+1 with tagging)

Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate

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 Test Cell traffic (ITU-T O.191) shaped to traffic contract (as in traffic contract conformance, above)
Generate from cell table
Generate bit error rate (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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DS3 (44.736 Mb/s)

General
This interface comprises a plug-in module (J3759B) suitable for plugging into the J2300C/D 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. 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 Statistics:
- 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

Analyze bit error rate (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

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

Traffic contract conformance (policing):
- CBR.0 (PCR 0+1, PCR CLP = 0);
- CBR.1/DBR/UBR.1 (PCR CLP = 0+1);
- VBR.1/SBR1 (PCR CLP = 0+1, SCR CLP = 0+1 without tagging);
- VBR.2/SBR2 (PCR CLP = 0+1, SCR CLP = 0 without tagging);
- VBR.3/SBR3 (PCR CLP = 0+1, SCR CLP = 0+1 with tagging)

Capture buffer size: 64 Mbyte (approximately 1,000,000 cells)
Capture buffer timestamp resolution: 100 ns
Capture rate: Full line rate

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 Test Cell traffic (ITU-T O.191) shaped to traffic contract (as in traffic contract conformance, above)
Generate from cell table
Generate bit error rate (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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HSSI (50 kb/s - 52 Mb/s)

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

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 50 kbps - 52 Mbps)
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

V-Series Interfaces

General
V.10/V.11, V.24/V.28/RS-232C, V.35 and V.36/RS-449/422/423 are built into the J2300D 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.

Detail
Bit rates:
Sync or Sync NRZI, 50 bps to 2.048 Mbps on V.35,
V.36/RS-449/422/423/530 and X.21
Sync or Sync NRZI, 50 bps to 256 kbps on V.24/V.28/RS-232C
Async, 50 bps to 256 kbps
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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DDS 4-wire

General
This interface comprises a plug-in module (J2908A) suitable for plugging into the J2300C/D 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.

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 kbps (error corrected 19.2 kbps not supported)
DS0B:
2.4, 4.8 and 9.6 kbps in 20, 10 and 5 user positions respectively 19.2, 28.8 and 38.4 kbps multiplexed intermediate rates in any adjacent combination of five 9.6 kbps 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 kbps DDS Equipment, June 1988

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Remote Operation

You can connect the Advisor to other Advisors or to PCs using standard Microsoft Windows remote operation software, such as pcANYWHERE 2.0.

General Specifications

Physical Specifications (J2300D)

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)

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 Emmissions
CE marked
C-Tick marked

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

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Related Literature

Advisor ATM/WAN	Technical Specification	5980-0786E
Advisor LAN Product	Overview	5980-0990E
Advisor ATM	Product Overview	5968-1437E
Advisor WAN	Product Overview	5967-5566E
Family Products	Brochure	5980-1093E
Internet Advisor ATM Troubleshooting	Application Note 1327	5968-5924E
Testing and Troubleshooting Medium and High Speed Frame relay Networks	Application Note 1323	5968-5310E
ATM Quality of Service	White Paper	5968-8556E
Dual Simultaneous Analysis	Application Note 1346	5980-0547E

Warranty

Hardware: Full 3 year Warranty
Software: 90 day replacement only

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Notes

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This Product is Y2K Compliant

Agilent Ordering Information

J2300D	Advisor mainframe
J2900A	High Speed ATM/WAN undercradle
J2294C	E1 plug-in module (balanced 120 Ohm DB-9 and RJ-45 connectors)
J2294D	E1/T1 plug-in module (balanced 120 Ohm DB-9 and RJ-45 connectors)
J2296B	E1 plug-in module (unbalanced 75 Ohm BNC connectors)
J2296D	E1 plug-in module (unbalanced 75 Ohm BNC connectors)
J2298B	T1 plug-in module (100 Ohm RJ-48C and WECO mini-Bantam connectors)
J2298D	T1/E1 plug-in module (100 Ohm RJ-48C and WECO mini-Bantam connectors)
J2299B	T1 plug-in module (100 Ohm RJ-45 and WECO mini-Bantam connectors)
J3766A	ATM25 plug-in module (RJ-45 connectors)
J3759B	E3/DS3 plug-in module (unbalanced 75 Ohm BNC connectors)
J2912B	STM-1/OC-3c plug-in module (SC-PC optical connectors)
J2913B	UTP155 plug-in module (RJ-45 connectors)
J3763A	622Vu STM-4c/OC-12c ATM undercradle (requires also J3764A or J3765A)
J3764A	Mono-mode Optical Interface for J3763A (supports multi-mode with Tx attenuators)
J3765A	Multi-mode Optical Interface for J3763A (does not support mono-mode)
J2904B	ISDN Basic Rate plug-in module for S & T interfaces
J2905B	ISDN Basic Rate plug-in module for S, T & U interfaces
J2908A	DDS 4-wire plug-in module
J3762B	HSSI plug-in module (50 pin SCSI connectors)
J2277A	V.36/RS-449 to DB15 cable (for X.21)
J2278A	V.36/RS-449 to DB25 cable (for RS-530)
J2928A	Optical attenuator (10dB)

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