Agilent Technologies

Agilent Advisor - ATM

Product Overview

Solve ATM Problems the First Time You Connect

No matter where you are in the process of bringing up your ATM network, the Agilent Advisor gives you visibility to help you know what's happening. The Advisor is the complete ATM troubleshooting tool. No other portable analyzer offers statistical performance measurements, stimulus and response testing, protocol decoding tools, and more. From installation, maintenance and troubleshooting to performance optimization and remote monitoring, the Advisor lets you connect anywhere on the network, capture all the necessary data, and comprehend that information as it reveals problems and suggests solutions.

ATM Testing Made Easy

To install or troubleshoot an ATM link, you need to test for many things: physical errors, equipment interoperability, ATM cell congestion, and even LAN traffic problems. The Advisor offers integrated ATM, WAN, and LAN protocol analysis capabilities, along with BERT (bit error ratio testing), stimulus/response measurements, and statistical analysis capability — everything you require to get a good look at the physical layer, ATM layer, and the upper layer protocols.

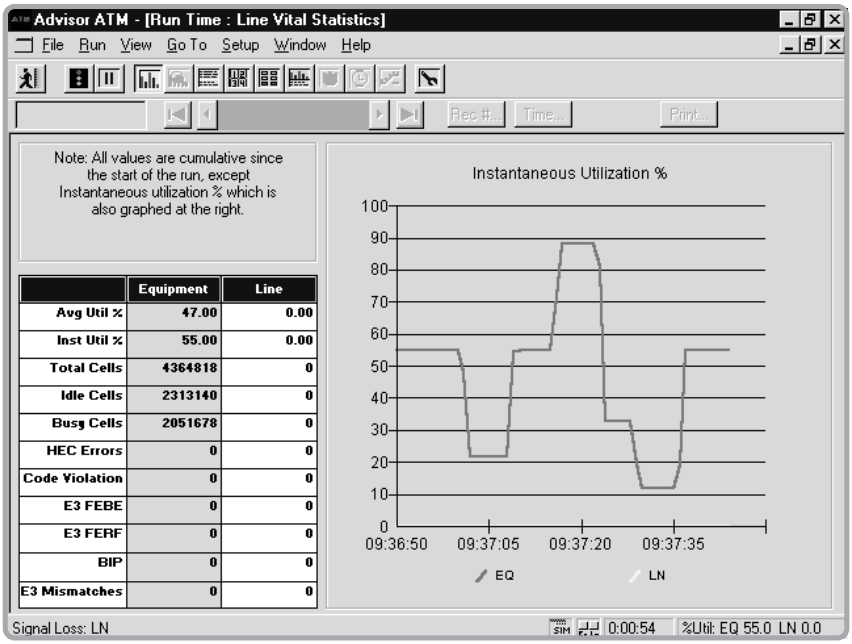
The monitoring and analysis capabilities for ATM are supported by an interface specific slide-in module or undercradle. This highly portable and economical package features a built-in, rugged personal computer with full keyboard, large display, pointing device, and Microsoft® Windows® 98 user interface.

No matter what the traffic level, the Advisor will capture every cell on your full-duplex network connection. It non-intrusively monitors and decodes ATM data at full line speed. In addition, it can simulate either direction of a line and process previously captured data from the buffer or from a file. 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.

Network Vitals

Isolating an ATM problem or testing a network often requires searching through hundreds or thousands of captured frames and cells to decide what is important. Even a highly skilled troubleshooter can be quickly overwhelmed. The Vitals feature saves valuable time by automating this process, providing a quick view of overall network health (Figure 1). You can then drill down to determine the problem. For instance, when utilization suddenly spikes to 100%, examine the Counts view. If the physical layer statistics (highlighted) reveals values other than zeros, check the Line Status view.

Values in the Vitals display are given in tabular form and are cumulative from the start of a test, except the 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 line (network) side and the equipment (user) side and include such statistics as average utilization in percent, instantaneous utilization in percent, total cells, idle cells, busy cells, header ("HEC") errors, code violations, and frame alignment errors.



	Equipment	Line
Avg Util %	47.00	0.00
Inst Util %	55.00	0.00
Total Cells	4364818	0
Idle Cells	2313140	0
Busy Cells	2051678	0
HEC Errors	0	0
Code Violation	0	0
E3 FEBE	0	0
E3 FERF	0	0
BIP	0	0
E3 Mismatches	0	0

Figure 1. The Vitals feature provides an instantaneous view of overall network health.

Simultaneous Measurements

The user-interface of the Advisor is intuitive, simple, and extremely easy to learn. Standard Windows capabilites allow you to mix and match various simultaneous measurements as you please (Figure 2).

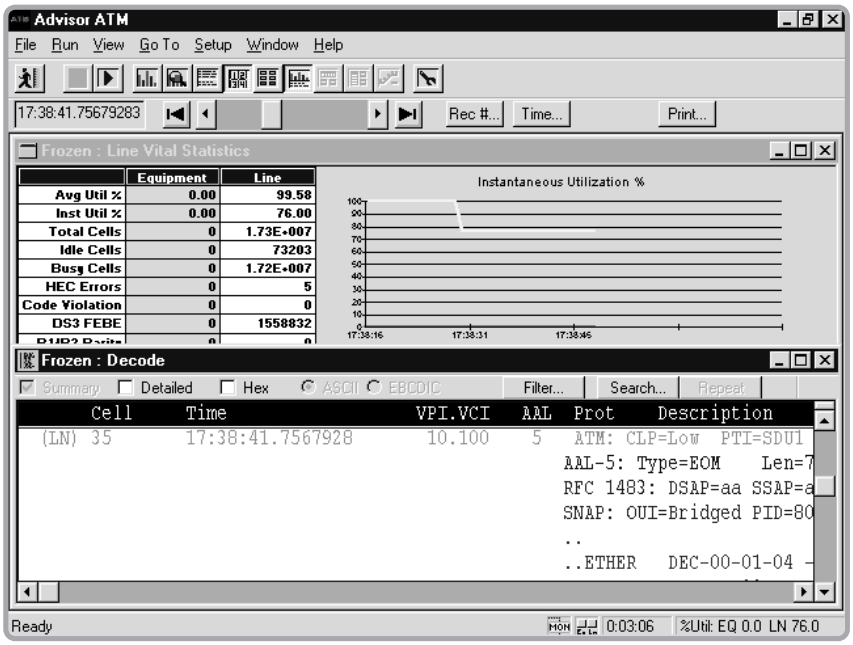


Figure 2. Multiple views can be combined and customized by the user.

True Multi-tasking

Unix-based data acquisition hardware makes the Advisor a true multi-tasking instrument whose various measurements can be executed simultaneously, in real time. You won't have to choose between statistical performance measurements and frame capture, or between traffic generation and network monitoring. With the Advisor, you can simulate a network load and observe its effect on the performance of a switch or on an individual conversation. You can even actively verify station connectivity (PING) while still monitoring the performance of the overall network (Figure 3).

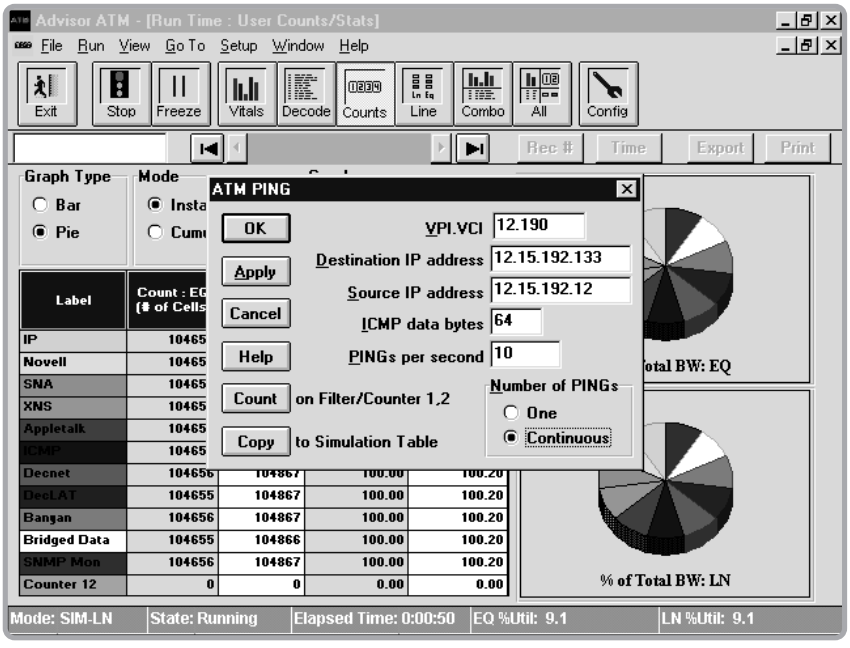


Figure 3. You can PING while still monitoring the performance of the overall network.

Optical Power and Pulse Amplitude Meter

The STM-1/OC-3 module for the Advisor has a built-in optical power meter that allows you to check power levels, in addition to full ATM analysis. Optical power sensitivity is +/- 0.5 dB (Figure 4), and can also be used for power measurements at 622 Mb/s (STM-4c/OC-12). For most electrical ATM interfaces, pulse amplitude measurements (mV_{peak}) are similarly available.

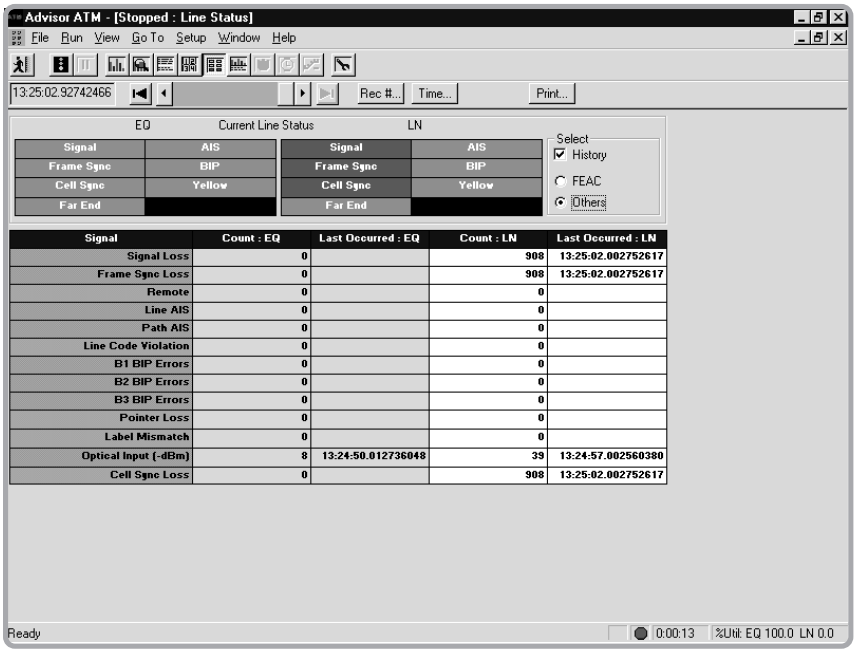


Figure 4. The STM-1/OC-3 module has a built-in optical power meter.

Get a Statistical Picture of Your Network

Visibility on the health of the physical interface is often critical in determining the cause of network problems. Therefore, the Advisor tracks errors at the physical layer. Signal events are recorded on the display for both the line (network) side as well as the equipment (user) side. Events are time stamped and saved in the buffer and can be logged to disk.

To alert you immediately to problems at the physical link, critical parameters appear at the bottom of all screens – whether you are looking at line status or other displays – and these parameters are shown in red if a physical problem has occured. They include such events as loss of signal, loss of frame, loss of cell delineation and applicable parameters for the STM-1/OC-3, STM-1e/EC-3, UTP155, E3/T3, J2, and E1/T1 line interfaces currently supported by the Advisor.

Monitor and Decode ATM and Upper Layer Protocols in Real Time

The Advisor monitors the network, captures data, and decodes it in real time. Data capture can be started manually, or automatically by setting a trigger. The analyzer can selectively capture data using its 12 hardware capture filters, so that the memory buffer contains just the information you want to see.

The Advisor fully decodes frames and cells and displays all fields in summary, detail, or hexadecimal format (Figure 5). In addition, being Microsoft Windows-based enables you to view different protocol decodes, vitals, statistics, and other displays simultaneously. Data can be printed, or stored to a file and retrieved for later analysis.

Advisor users now have powerful, user-configurable time-stamp options as follows:

- Delta — shows the time interval between adjacent cells; gives another view into delay and delay variation.
- 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 corresponding relative arrival time.
- Absolute — actual time, with 100ns resolution.

Advanced Decode View

Today's Advisor has a very user-friendly, 'one-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 header 'Hex' section of the decodes. The reverse is also true.

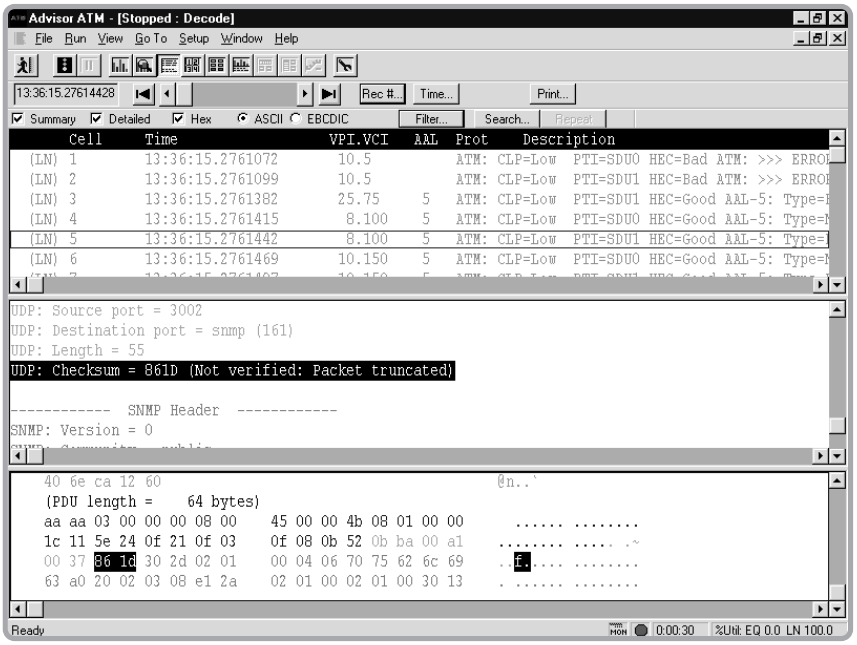


Figure 5. Real-time decodes are customizable to suit your needs.

Powerful Post-processing Capability

Post-processing display filters let you quickly zoom in on selected criteria, from the traffic passing between specific devices to individual conversations.

With post-processing you can:

- Search through the data by record or by time stamp
- Search for events, strings or addresses
- Verify event-to-event timing
- View protocol errors
- Print the current display or the entire buffer
- Export data to other programs or reports
- Analyze statistics from the buffer data

You'll spend less time searching through frames, and more time focusing on problems.

Expert Charts and Graphs

With the addition of the optional Advisor Reporter software you can generate unmatched reports and graphs to benchmark your network performance. The Advisor Reporter helps you optimize network elements to ensure peak performance for mission-critical applications (Figure 6).

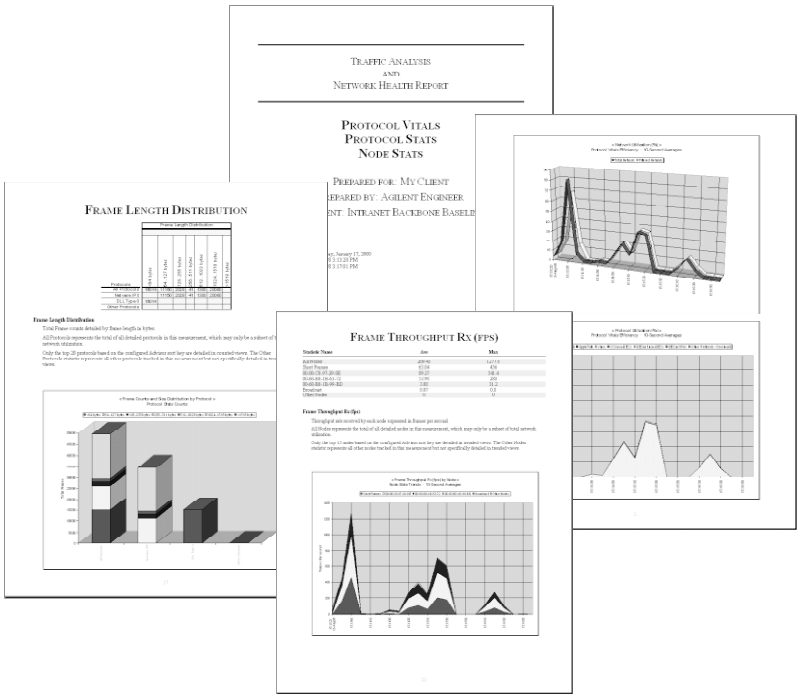


Figure 6. Agilent Advisor Reporter Expert charts and graphs.

Decodes for All Layers of the ATM Protocol Stack

The Advisor provides decodes for every layer of the ATM protocol.

- ATM physical layer: IMA Control Protocol
- ATM cell layer: cell header details
- ATM adaptation layer: AAL-1, AAL-2, AAL-3/4, and AAL-5 (with complete reassembly)
- Services layer:
  - Encapsulated protocols such as frame relay, X.25, and LAN (using RFC 2684/1483, RFC 2225/1577 or LANE 1.0/2.0)
  - MPEG-2 decode
  - Signaling: UNI 3.0, 3.1, 4.0 PNNI, B-1SUP, B-ICI, SPANS (Fore systems)
- All major protocol suites are supported, including TCP/IP, 3Com, AppleTalk, Banyan, Cisco, DECnet, H.323, IBM/SNA, LLC, Microsoft LAN manager, Novell, OSI, SUN, XNS, ISO, SIP, MEGACO, MGCP, SGCP, RTP, GPRS, W-CDMA, and more.

The analyzer can capture all cells or filter certain cells, to maximize your capture buffer space. Events are time-stamped with 100 ns resolution. Protocol decodes can run simultaneously over all active VP.VCs, allowing the analyzer to decode all channels in real-time or in post-process mode.

BERT (Bit Error Ratio Testing)

Many times problems on the network can be attributed to the transmission medium. Although the physical medium may be good for normal data transmission, it may not be able to handle cell-based ATM data. That is why the Advisor has a powerful, built-in bit error ratio tester that performs not only frame-based (physical layer) BERT, but also cell-based BERT, in which the bit patterns are carried in the payload of the ATM cell (Figure 7).

Whether installing a new fiber or cable line, or troubleshooting an existing network, the Advisor provides for all your test needs, under one handle.

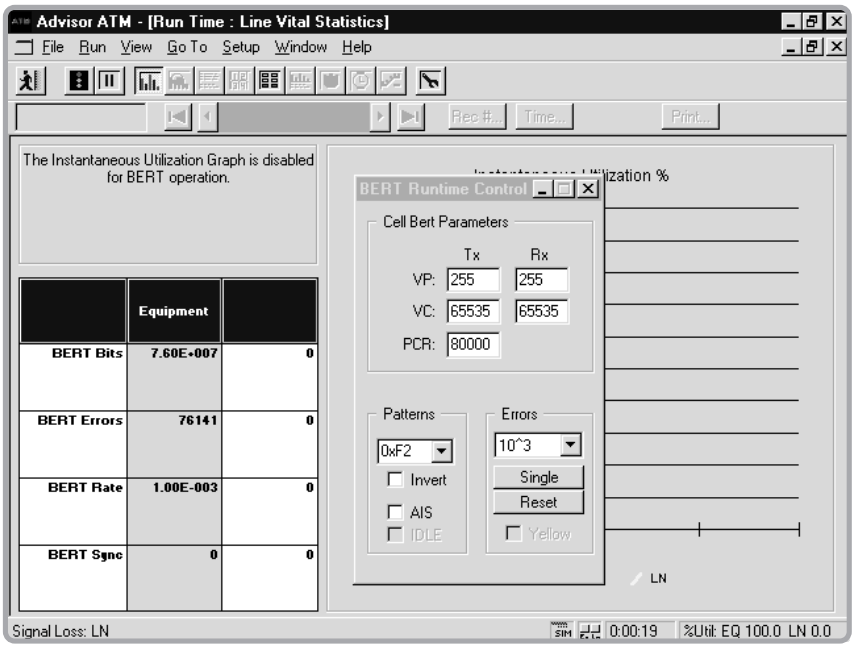


Figure 7. Verify link and ATM-layer integrity by using the BERT capability.

VP.VC Autodiscovery and Statistics

The Advisor can auto-discover up to 1024 virtual channels and for each collect and display VPI.VCI, maximum and instantaneous utilization (%) and throughput (kb/s), cell and octet counts, header ("HEC") errors and CLP status (Figure 8).

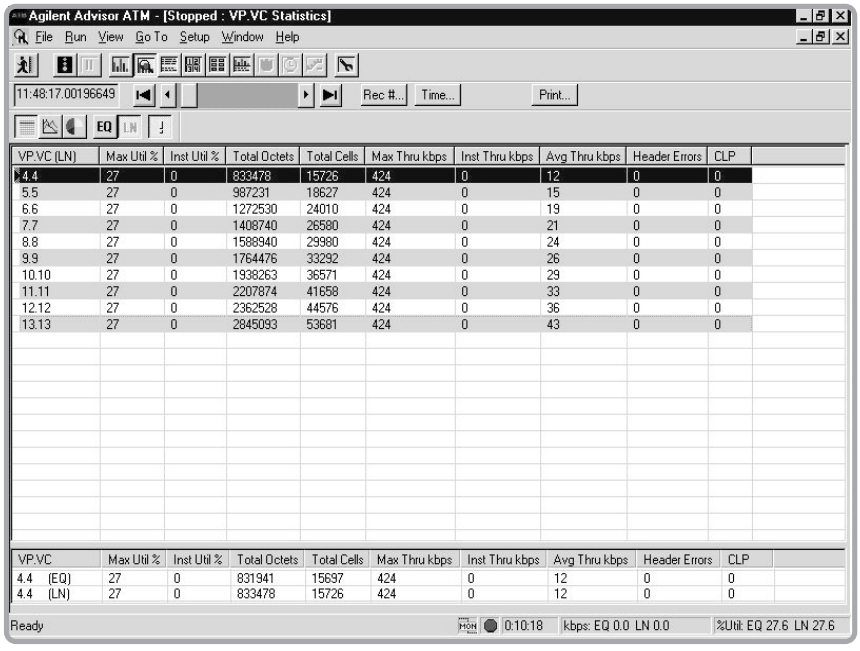


Figure 8. VPI.VCI Autodiscovery and statistics for each.

Whether you have PVCs or SVCs or both, you can select a VP.VC and view statistics on full duplex sampled data on that channel. You can also see in real-time a graph of that channel's utilization (Figure 9). VPI/VCIs with header ("HEC") errors, tagged cells (CLP ->1), or both, are color-coded for easy identification.

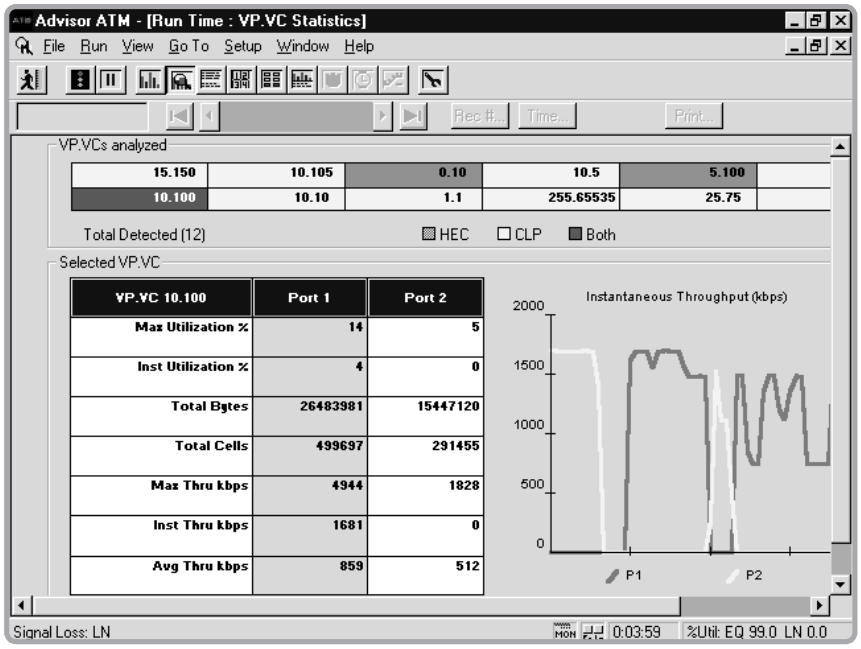


Figure 9. Real-time VP.VC statistics.

VP.VC Decode View

With VP.VC decode view, you can see a log of VPI.VCIs showing which AAL and LAN encapsulation protocol is running on each VPI.VCI (Figure 10).

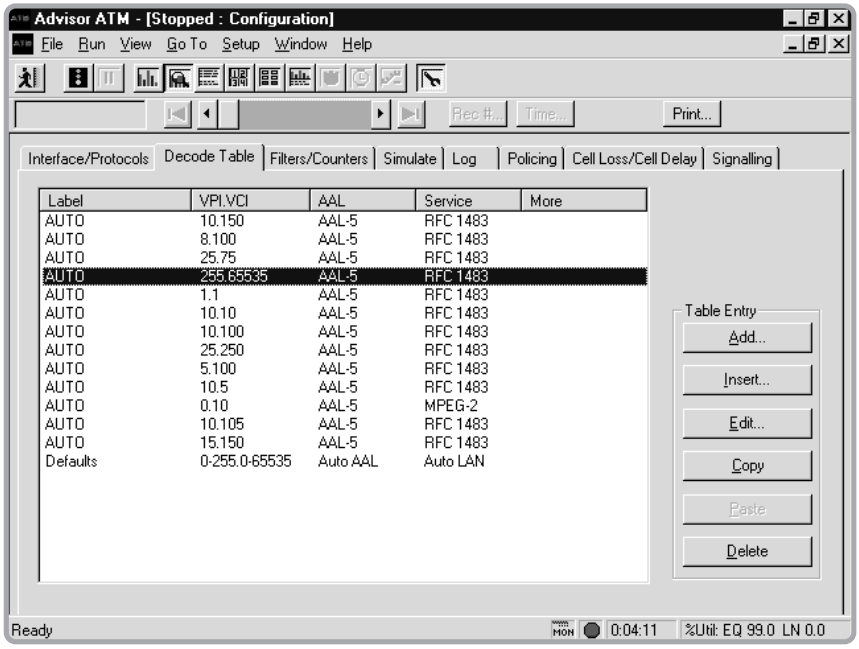


Figure 10. Automatic assiciation of VP.VCs with AAL and types of traffic.

Quick Tests

Using the cell generation editor or one of the many predefined quick tests, you can create normal or abnormal protocol behavior on demand to help isolate protocol implementation problems. For example, a quick test lets you send an ATM ping to check for continuity. You simply enter the IP address and the analyzer creates an ATM AAL-5 ICMP frame that uses IP addresses to test network operation and connectivity.

Other quick tests provide traffic filters for OAM, ILMI, and various LAN stacks, IP filtering templates, all of which can generate traffic up to full bandwidth. Other tests focus on statistics for particular monitoring tests, such as signaling statistics. Test scripts can be customized or created from scratch to a library of test sequences tailored to your individual application.

Traffic Generation

Network faults related to traffic levels are often difficult to isolate. Few analyzers can capture every packet, frame, or cell at wire speed, and such problems are often intermittent and difficult to recreate. With the Advisor, you will never miss a cell, no matter what the data rate. You can also generate traffic and make measurements simultaneously, so that you can recreate problems and analyze them for solutions.

Powerful traffic generation capabilities in the Advisor lets you transmit virtually any type of message or cell onto the network – one time, a specified number of times, or continuously (Figure 10). To generate traffic for network simulation, you can leverage the many testing scenarios already defined in the analyzer. Previously captured cells in the capture buffer can be used to duplicate events or to create complex messages.

If you are using previously captured traffic, you can modify the VPI.VCI and/or the payload (to change the IP addresses, for example) and the HEC and/or AAL-5 CRC-32 is automatically recalculated.

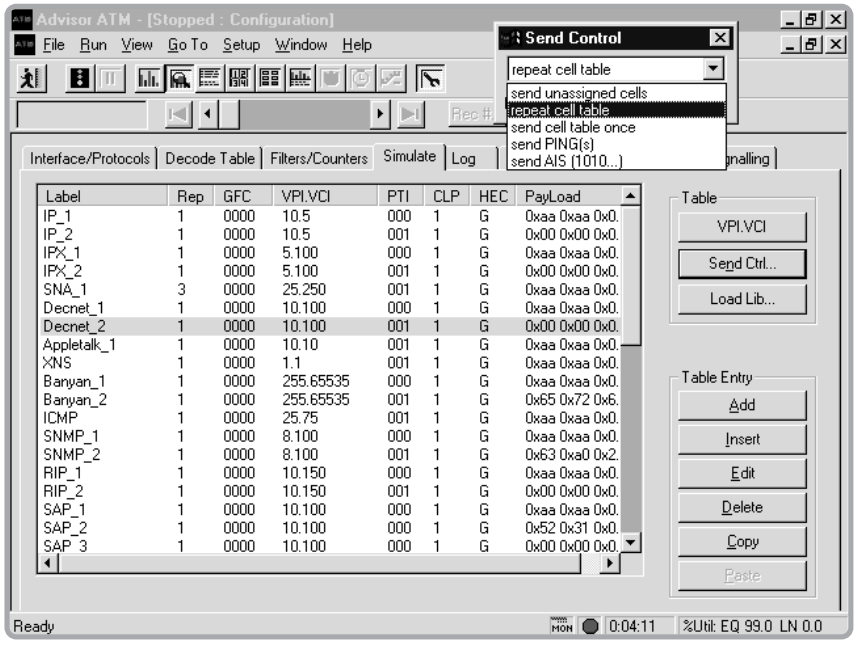


Figure 11. Traffic generation using user-defined or previously captured data.

Quality of Service

Service providers are very interested in maintaining a high level of 'Quality of Service'. Large enterprise network operators are likewise interested in maintaining a given level of service for the departments and applications they are supporting. Unlike the traditional Internet, which suffers slow response and high packet loss under load, ATM networks are designed to control traffic before it is even allowed admission into the network, and to maintain high performance characteristics at all times, while offering the benefit of different service level guarantees. In today's increasingly competitive telecom environment, and with the rise of diverse traffic types like multi-media and voice-over-IP, ATM networks need to be able to ensure a consistent quality of the service being provided.

Today's Advisor has greatly enhanced Quality of Service (QoS) capabilities (Figure 12). QoS tests comprise a set of measurements designed to assess things like delay, delay variation, cell loss, and cell misinsertion. The core suite of QoS tests on the Advisor includes:

- Cell delay - including Cell Delay Variation (CDV) and Mean Cell Transfer Delay
- Cell Loss Ratio (CLR)
- Cell Misinsertion Rate (CMR)
- Cell Error Ratio (CER)
- Severely Errored Cell Block Ratio (SECBL)
- Background traffic while running QoS

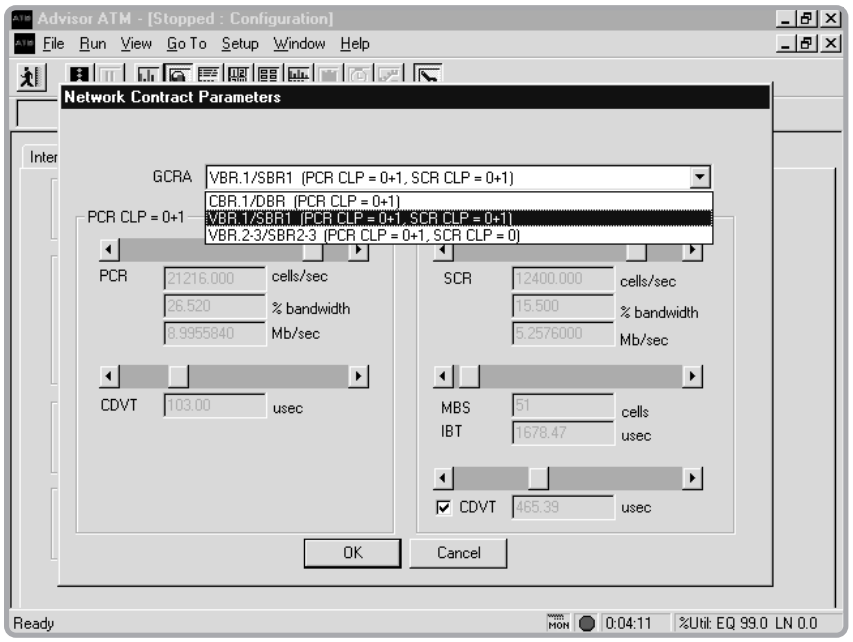


Figure 12. Cell loss testing.

Shaping

Shaping allows the user to control the characteristics of the traffic entering the ATM network. During QoS tests, being able to shape the test traffic coming into the network according to a traffic contract yields more meaningful test results by simulating real-world ATM traffic. QoS tests utilize the industry standard 'O.191' test cells to ensure interoperability with other vendor's test equipment (Figure 15).

The Advisor already has the capability to generate traffic at a constant rate which is specified in the send control dialog box. The shaping feature allows the user to specify several additional parameters, including PCR (peak cell rate), SCR (sustainable cell rate), MBS (maximum burst size), and CDVT (cell delay variation tolerance), to define a traffic "shape", i.e., one which will check the quality of service of the network in terms of CDV, cell loss, etc.

Policing and Traffic Contract Measurements

Is the Customer Complying? Am I getting what I'm paying for? These are common questions from service providers and customers of ATM networks. One of the most important premises of the deployment of ATM networks is the ability to maintain a given level of performance within the core network. The user will specify the Peak Cell Rate (PCR), Cell Delay Variation Tolerance (CDVT), Sustainable Cell Rate (SCR), and Maximum Burst Size (MBS) (Figure13). The Advisor's policing tests are real time measurements that are done in service to check a cell stream's conformance to the traffic contract (Figure 14). Often, the user will complain that the service provider is not delivering the agreed QoS when, in fact, it is the user's traffic that is at fault - the Advisor will show this.

The user may specify one of the following Generic Cell Rate Algorithms (GCRA), to determine how many cells in the cell stream are conforming or non-conforming:

CBR.1/DBR (PCR CLP=0+1)
VBR.1/SBR.1 (PCR CLP=0+1, and SCR + MBS CLP=0+1)
VBR.2/SBR.2 (PCR CLP=0+1, and SCR + MBS CLP = 0)
VBR.3/SBR.3 (PCR CLP=0+1, and SCR + MBS CLP = 0 with tagging)

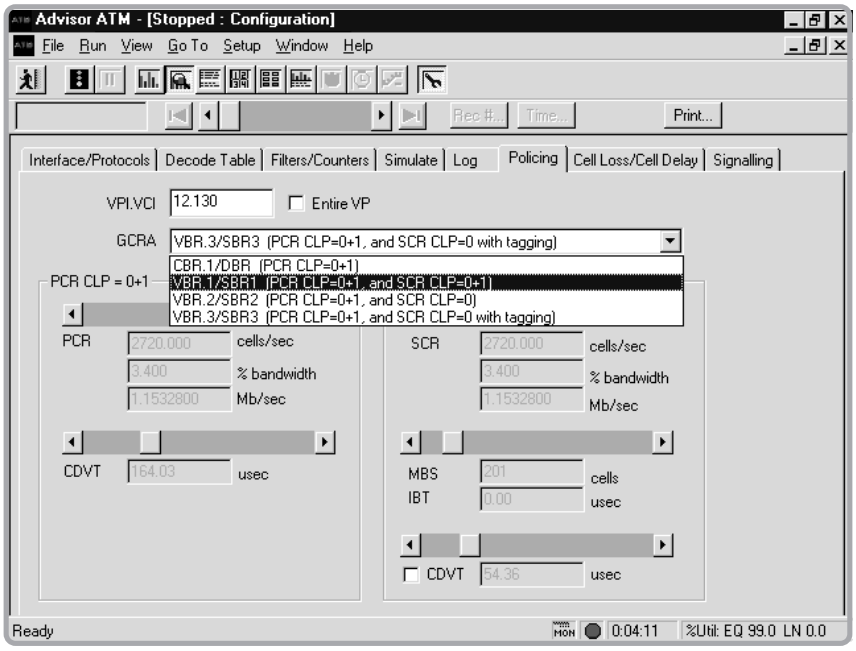


Figure 13. Policing matches customer traffic contract parameters.

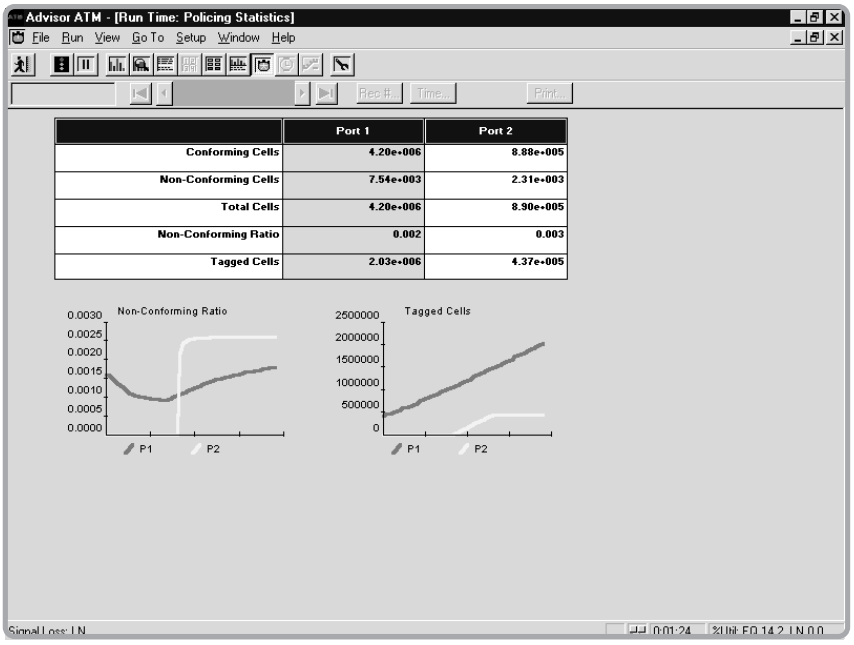


Figure 14. Contract conformance and switch performance.

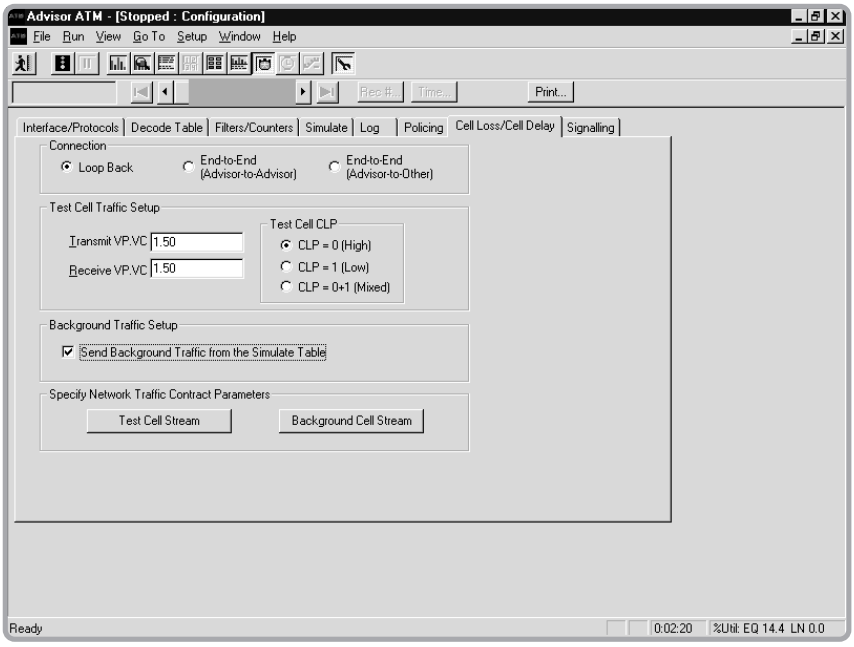


Figure 15. O.191 test cell customization.

Signaling and Call Placement

"Can I bring up a Switched Virtual Circuit (SVC)?" "Can I bring up a LANE session?" This is very similar in concept to a PING, which has the function of "Can I reach an IP host?"

During initial service turn-up, service providers will benefit by being able to confirm the ability to establish UNI 3.0, 3.1 or 4.0 connections, all while emulating either the user device or the network equipment (the edge switch).

The Advisor includes Signaling and LANE emulation to provide connectivity testing. The signaling and call placement feature supports UNI 3.0, 3.1, and 4.0. Users may specify the UNI that they wish to use in bringing up the SVC. In addition, the user will be able to specify and edit the Information Elements placed on Call Connect messages that specify what type of SVC to bring up and with what level of service (Figure 16).

Note: While ITU-T Q.2931 signaling is not explicitly supported, the ATM Forum's UNI 4.0 was derived from Q.2931 and Q.2971 and, with the exception of a few rarely used Information Elements, UNI 4.0 will work in most situations where ITU-T signaling is in use.

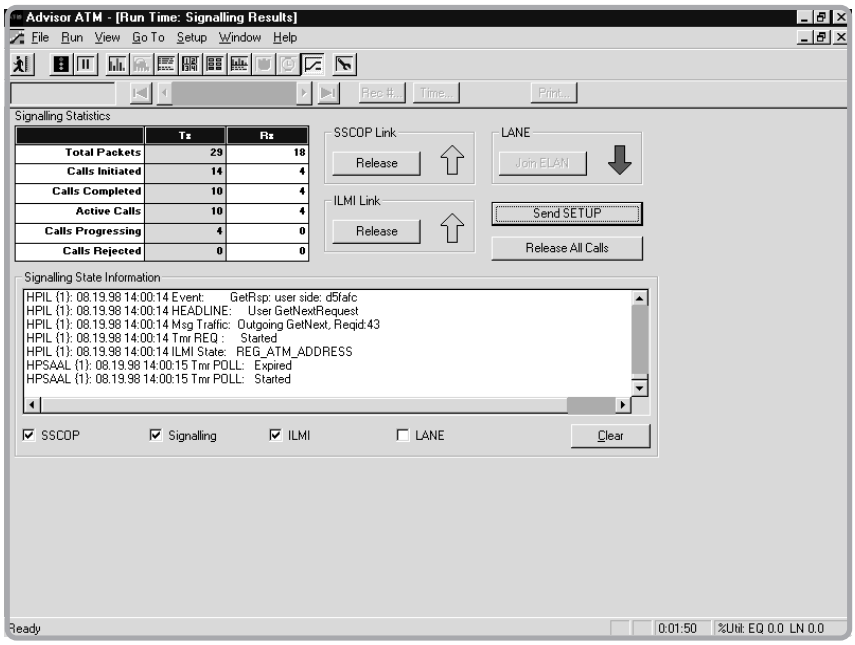


Figure 16. Results of signaling emulation.

Real-time IP Filtering

Do you need to perform applications-level, LAN-centric troubleshooting on your ATM network? The Advisor offers real time, packet-level IP/LAN filtering and capture. This allows the user to isolate and analyze LAN conversations taking place on an ATM circuit. This feature maximizes valuable buffer space for optimal data collection of targeted LAN traffic (Figure 17).

The users can even filter on IP addresses of packets encapsulated in Frame Relay (to RFC 2427/1490) which is, in turn encapsulated in AAL-5 (FRF.5).

The skilled user of the Advisor can also create capture filters and counters by copying cell sequences into the filters/counters buffer then editing this to add "don't cares" where a match is not desired.

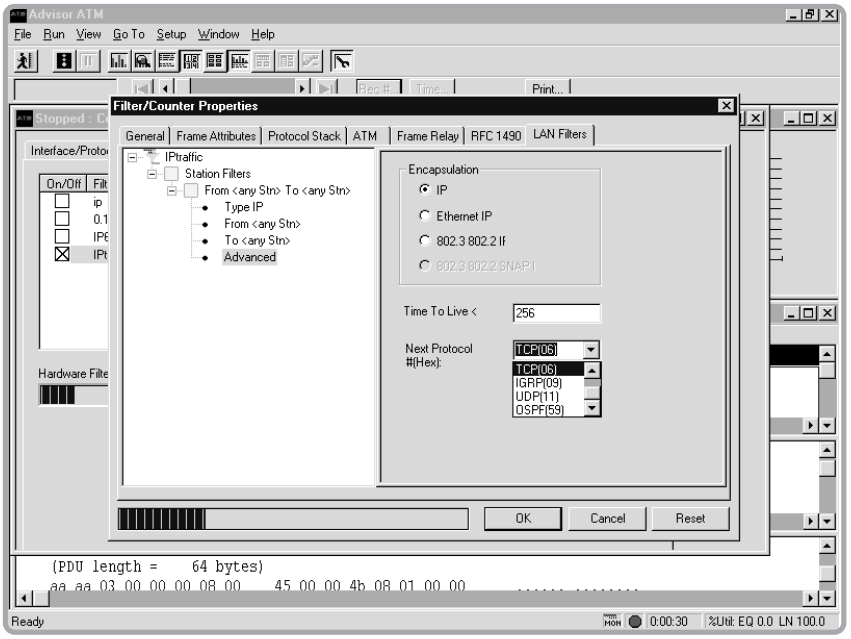


Figure 17. Real-time filters allow customized LAN analysis.

Expert Analysis of LAN Traffic Within ATM Cells

More and more, service providers and enterprise net managers want to know the specific types of LAN traffic and the users involved in events running over their ATM network. The new expert feature on the Advisor allows expert commentary, connection statistics, expert analysis, and troubleshooting of LAN sessions running over an ATM network path. This analysis is done in a post-process mode, and can be done on any standard Windows-based PC with the Advisor software. ATM Advisor customers now get all the benefits of the LAN in Windows product without the LAN hardware (Figure 17).

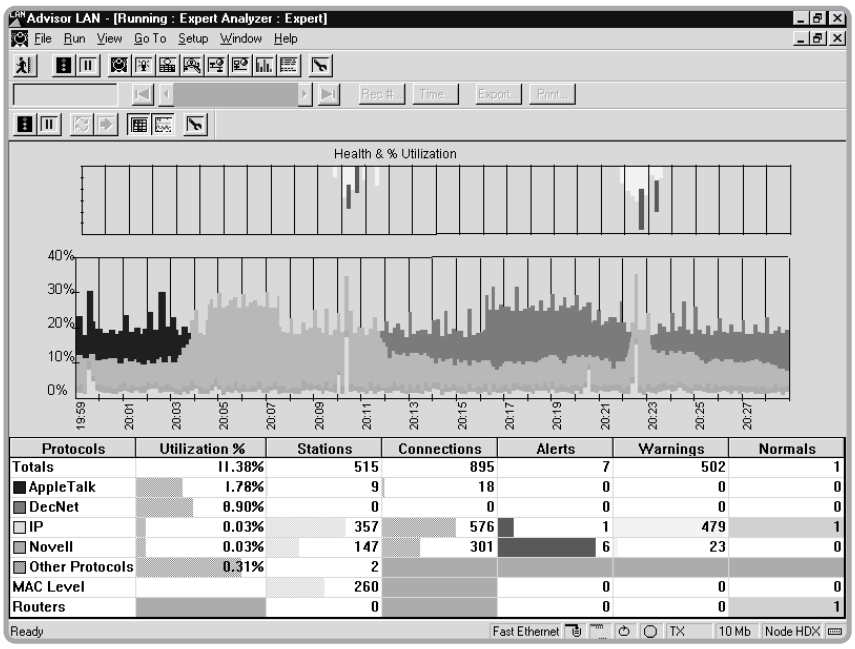


Figure 18. LAN utilization with unmatched ease of use to drill down to specific network anomalies.

Commentators

LAN commentators allow LAN traffic running over ATM to be examined for unusual events, giving rise to "warnings" and "alerts". The commentators work by "state following" PDU sequences to detect unusual behavior e.g. TCP windowing problems, etc. (Figure 19).

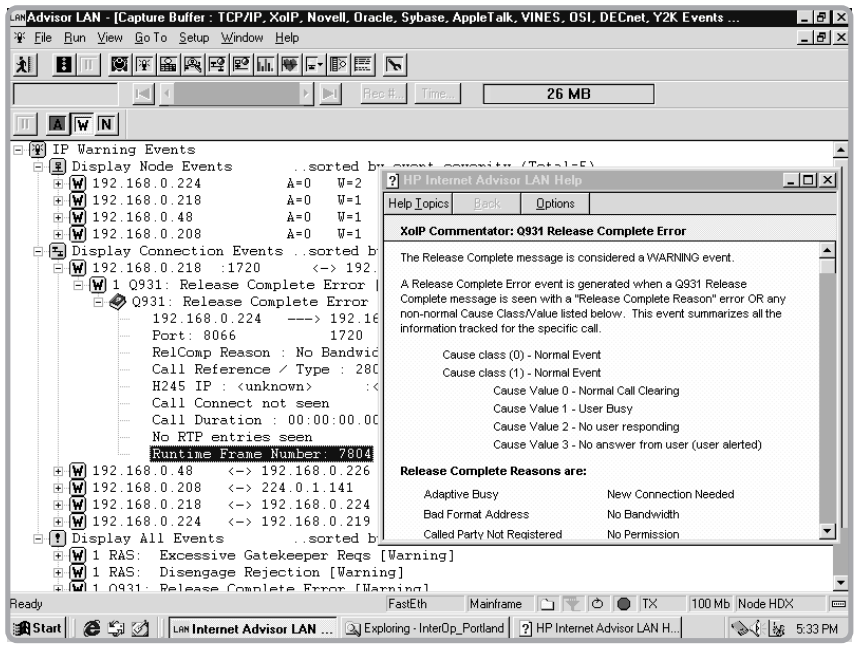


Figure 19. LAN commentator warns or alerts you to unusual protocol sequences.

Remotely gather MIB Statistics from Around Your Network

The Switch Advisor gives you the capability to trend switch port utilization and other vital statistics without leaving your chair. Simultaneously monitor a suspect ATM link and any other Management Information Base (MIB) supported device to correlate problems between the two. Discover switches and other MIB supported devices via user directed search or directly enter device management IP address and graphically view current port utilization levels. Switch Advisor sends SNMP messages over your Ethernet connection and gathers MIB data including utilization, packet information and errors.

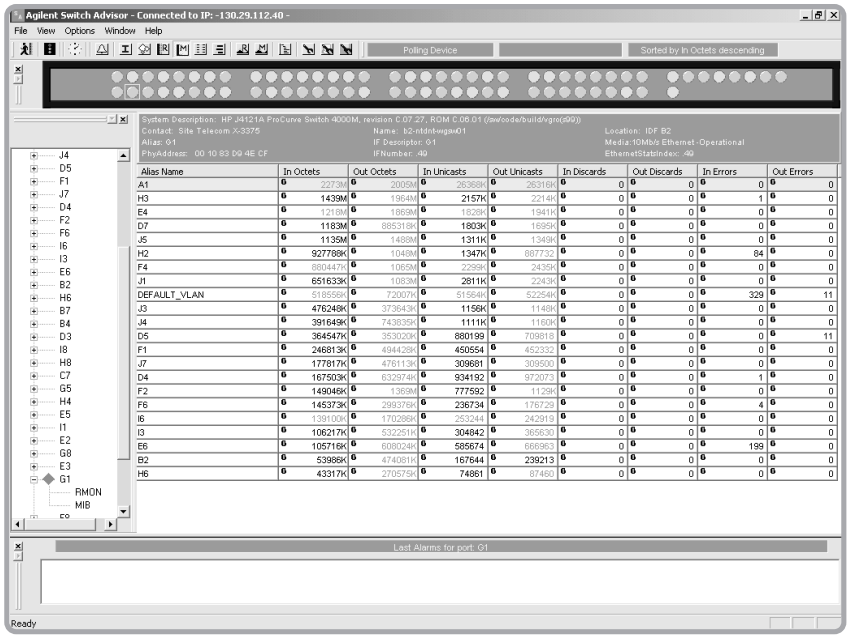


Figure 20. The Switch Advisor collects MIB data.

This raw data is correlated and displayed on an easy to understand display. Five separate views organize the MIB device data, allowing the user to concentrate on the data of interest, presenting pertinent statistical and graphical information needed to assess the health of the data being processed by the switch. Select which port to monitor via the "explorer" navigation menu or "clicking" on the port of interest.

- Management – displays System information including switch part number, location, designated name and site contact information. Displays each port # by customizable "Alias" name with Interface description, associated Media type and whether RMON capability is supported, per interface.

- MIB Statistics – displays per port statistics including in/out octets, unicasts, discards and errors.

- Port Usage – graphically displays switch-port utilization, per port, over time. Also, allows same measurements to be taken during a user-initiated test.

- Single Port Statistics – displays per-port information including graphical representation of "In" and "Out" port utilization, octets, unicasts, broadcasts, discards, and errors. Also, allows same measurements to be taken during a user-initiated test.

- MIB Browser – allows user directed MIB data collection.

Related Literature

Agilent Advisor	Brochure	5980-1093E
Agilent Advisor ATM/WAN	Technical Specifications	5980-0786E

Warranty

Hardware: standard 3-year (or optional 5-year).
Software: 90 day replacement only

Get On-Line Help

A context-sensitive on-line help system is built into the Advisor. The help system provides complete explanations of all measurements, as well as suggestions for troubleshooting and tutorials on networking topics. An acronym guide, tutorial, index, and glossary help you better understand the language of ATM.

A Path to the Future

Powerful as they are, the capabilities of the Advisor continue to expand with every software release, ensuring that your investment in these testing tools will be returned for many years to come. Agilent's Software Upgrade Subscription Service will keep you up-to-date on the very latest enhancements to the Advisor.

Notes

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise
Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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Agilent Ordering Information

J2300E	Agilent Advisor - WAN

Undercradles

J2900A	High Speed Acquisition undercradle
J3763A	OC-12/STM-4 undercradle

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
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
J3764A	622 Mbs single mode interface module
J3766A	ATM25 module

Software

J3307A	Agilent Advisor Reporter WAN/LAN/ATM
J5458A	Advisor 3G UMTS W-CDMA software
J6848A	Report Center

Accessories

J2300E-005	Add combination 56K modem/10/100 NIC card
J2305A	Agilent Advisor Soft Carrying Case
J2514A	Agilent Advisor Wheeled, Hard Transit Case
J2927A	CD-ROM player

Cables

J2281A	T1 Mini-bantam cable set
J2283A	CEPT-E1, E3 and DS-3 BNC cable set
J2285A	T1 RJ-48 cable set
J2286B	DB-9 to dual Siemens 3-pin cable set
J2928A	10dB SC attenuators
J2929A	90/10 optical power splitter, SC connectors

Education

J1998A	Network Troubleshooting book
J1999A	Network Troubleshooting CD
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.

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