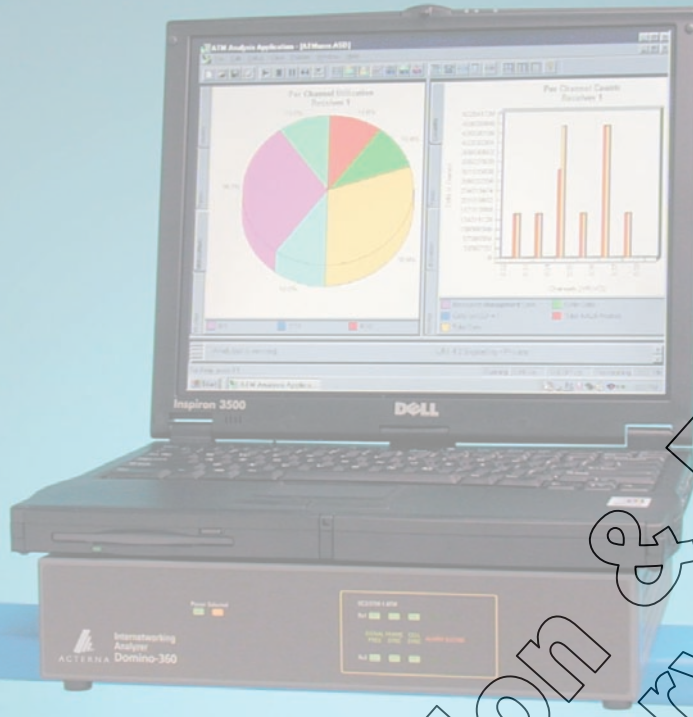


ATM Internetworking Analyzer



For monitoring, troubleshooting, and simulation in internetworking environments

- Full-duplex Auto Channel Discovery with complete Call Statistics
- SVC Emulation, Per Channel Statistics and extensive QoS measurements
- Powerful filter and triggering capabilities
- Lightweight, modular and highly portable
- Supports OC-3/STM-1 single-mode, multi-mode, and UTP, E3, DS3, E1, DS1, ATM 25 Mbps
- Plug and Play modular design also supports Fast Ethernet, WAN and Frame Relay

A Field Service Solution for Internetworks

Field service organizations require an analyzer that can handle the multiple protocols and multiple topologies of today's complex internetworks. They also need one that's easy to carry and easy to use. The Domino®-360 ATM analyzer provides a complete solution in one box. The analyzer can monitor activity, decode all major protocols, and generate network traffic on ATM networks, making it an excellent tool for ATM network troubleshooting. The Domino-360 ATM analyzer is more than an ATM instrument. Because it can link to any other Domino analyzer, it also performs as an internetworking analyzer, allowing you to track a problem across multiple segments of varying types.

The Domino-360 ATM analyzer supports automatic ATM ILMI address registration which enables 'plug and play' operation in an ATM network environment. It can emulate either an ATM user or an ATM network using ATM Forum UNI 3.0, UNI 3.1 or UNI 4.0 signaling. With its ability to monitor PNNI signaling, it can also be used to troubleshoot a PNNI network environment. The Domino-360 ATM

supports dynamic real time capture, filter and triggering based on cell header, cell payload, ATM addresses and MAC/IP/IPX addresses.

Powerful transmit capabilities allow cells or frames to be imported from a capture file or constructed by an ATM cell editor or frame builder, and then transmitted onto the network. Frames are automatically segmented into cells for transmission. With ATM's unique frame builder feature not only can cells be transmitted, but they can also be easily constructed for popular internetworking protocol stacks such as TCP/IP over AAL5.

Lightweight, Modular, Portable Design

Weighing less than seven pounds, the Domino-360 ATM analyzer connects to your notebook PC for easy operation. Up to eight Domino analyzers can be linked together to perform multi-segment analysis. By generating and receiving traffic simultaneously, the instrument is an ideal tool for benchmarking routers, bridges, gateways, and other equipment prior to installation or after an upgrade.

The Domino-360 ATM analyzer's modular design allows for multiple network

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interfaces to be used in a single, compact DominoPLUS chassis. The DominoPLUS chassis supports a variety of LAN, WAN and ATM interface modules. Changing modules takes only seconds and requires no special tools. This design results in lower ownership costs and greater portability when troubleshooting in today's multi-topology network environments.

High Performance Architecture

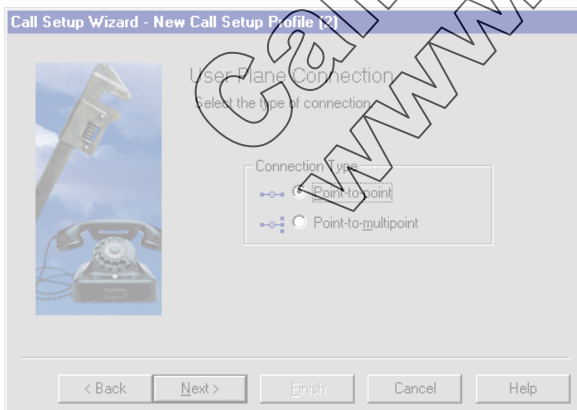
The Domino-360 ATM is capable of extremely high performance because it employs multiple, independent RISC processors, each dedicated to performing separate functions. For example, separate RISC processors capture and decode traffic. High-speed links connect these processors, thus avoiding bottlenecks between them and allowing real time network traffic analysis.

ATM Forum Compliant

The Domino-360 ATM explicitly supports emulation and monitoring in environments compliant to ATM Forum UNI 3.0 and 3.1, UNI 4.0 and PNNI 1.0 and 1.1. In addition to UNI 3.0, 3.1 and 4.0 decodes, full PNNI, Q.2931, Q.2971, LANE, SSCOP, OAM and over 1,000 additional upper-layer decodes are fully supported. Where appropriate, point-to-point or point-to-multipoint ATM calls can be placed and received. ILMI event monitoring and full automatic address registration is supported for both ATM network and end-point addresses.

Wizards Make it Easy

Domino-360 ATM has a Windows®-based graphical user interface and includes extensive use of intelligent Wizards to simplify setup tasks and other complex ATM-related features. For setting up traffic to send onto the network, the *Transmit Wizard* intuitively walks users through the setup to transmit CBR, VBR and bursty data. The *Call Setup Wizard* walks the user through the entire specification of ATM Call Request messages. To help simplify the call setup process, reasonable default values are provided so that a valid call can be placed with the user defining only the called and calling party addresses. A programmable repetition of sequences of user-defined cells or frames can be created.



The *ATM Address Wizard* makes the building of ATM address libraries quick and easy and allows symbolic naming of ATM addresses. In addition to the ATM address library, call profile

and call request libraries are also provided. Sets of analyzer profiles, including all of the libraries, can be saved to a user configuration. An unlimited number of these configurations can be created, and the user can even create a desktop shortcut to them. Saved analyzer configuration information includes window positions, display properties, filters and address aliases (symbolic names). This is useful where different individuals must use the same test equipment in multiple network configurations.

Filter and Triggering Capabilities

Filter and Triggering capabilities support filtering and triggering of specific ATM call data without prior VCC knowledge. The application monitors the ATM signaling channel and finds user-specified called and calling party ATM addresses in the call request message. Once identified, the filters or trigger (or both) are automatically configured to filter/trigger on the resulting PVCs. This is especially useful for troubleshooting and fault isolation in dynamic SVC environments. Dynamic SVC filtering and triggering eliminates the need to search through large amounts of captured data in the hopes of finding the cells or PVCs of interest. The Domino-360 ATM analyzer has a capture buffer size of 16 Mbytes, which based on the trigger setting, wraps or stops when full.

To help limit captured data to the addresses where the problem resides, Domino-360 ATM also supports real time filtering and triggering based on ATM and MAC/IP/IPX addresses. It determines which VCCs carry the specified addresses, captures data and reassembles AAL5 frames. The Domino-360 ATM supports several types of filtering that enable each pattern matcher to filter or trigger over a range of addresses or data. The trigger location is displayed in the frame/cell decode.

While employing the powerful hardware-based filter and triggering capabilities for full line rate performance, the application supports an unlimited library of filter profiles. With this library the user can define as many filter/trigger criteria as desired over time, and simply turn them on or off as needed.

Extensive Statistics

Extensive SVC and PVC statistics can be saved to the clipboard and exported to other applications. Multi-pane windows facilitate the viewing of statistics and VCC data, including graphs, tabular data and libraries. The Domino-360 ATM analyzer provides extensive statistics for SVC calls, physical layer performance and defect indicators such as alarms and errors counts, as well as ATM layer performance and defects such as cell counts, cell rates and HEC error counts. These statistics are vital for troubleshooting in an ATM environment.

Detailed Virtual Channel and QoS Statistics

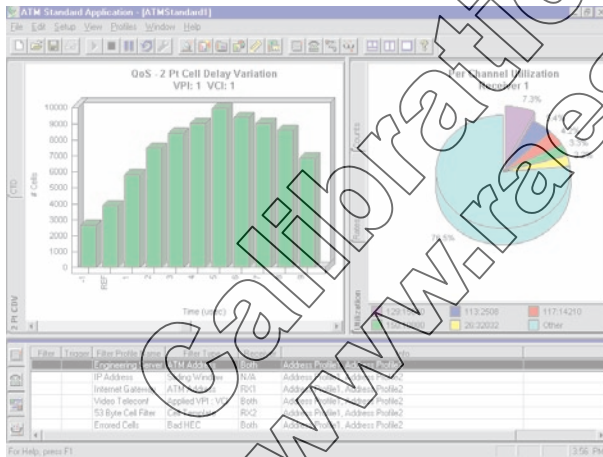
The analyzer collects and displays extensive statistics on a per-VC basis. Included is the ability to auto-discover VPI/VCI's that are in use. In addition, extensive call setup information is maintained and displayed. This information includes agreed upon QoS, traffic contract and type of traffic. Individual views are provided for per-VC counts (cells, OAM, RM, CLP=1 cells

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and AAL5 PDUs), rates (traffic rates, VPI/VCI rates on selected VCs) and utilization (selected VCs and top users). The application also provides a call signaling history of SVC calls that simplifies monitoring and debugging in an ATM SVC environment.

QoS setups are facilitated by the QoS Setup Wizard, which specifies which measurements to perform and which VCC to measure. The analyzer provides both in-service and out-of-service QoS measurements. The in-service measurement consists of one-point cell delay variation (CDV) and cell misinsertion rate measurements. The out-of-service QoS measurements include a two-point CDV measurement, cell transfer delay measurement and distribution as well as providing more than the recommended ITU-T.356 and ATM Forum measurements. These measurements are in accordance with applicable ITU-T and ATM Forum recommendations and guidelines. Distribution and historical graphs of all the QoS measurements are invaluable for troubleshooting traffic content and SLA testing and verification.

In-service QoS measurements can be taken while monitoring live traffic because they do not affect network traffic. The drawback of in-service QoS measurements is that they are limited to a single measurement point. Out-of-service QoS measurements, on the other hand, are more accurate because measurements are taken at two different points on the network. Additionally, more QoS parameters can be measured when out-of-service QoS measurements are performed. Unlike in-service measurements, out-of-service QoS measurements can interrupt traffic and should not be performed while monitoring.



generating reports in a snap. All information can be printed directly from the application or easily exported for use in spreadsheets, word processors, and other desktop office applications.

Transportable Network Analysis Kit on Alert with Domino

Domino Attaché is a rugged aluminum case used for safe and secure transportation of Domino analyzers. Domino units are mounted in a small, expandable rack system in the base shell while an optional laptop computer can be secured on top of the rack system with a heavy-duty Velcro® strap. The removable case top allows full access for mounting, pre-wiring and plugging in Domino analyzers, providing an analysis kit ready for immediate use.



In addition to Domino Attaché, WWG offers a soft carrying case with shoulder strap. This bag has room for a Domino analyzer, laptop and cables. Our single or multiple-card interface module containers also make shipping and storage a breeze.

Notebook Compatibility and Connection

With its small footprint and stackable design, Domino accommodates many popular Windows-compatible notebook PCs. This compatibility allows users to choose and upgrade PCs according to needs and desires, so users are not held captive to a proprietary platform or yesterday's PC standard.




Warranty Information

Domino-360 ATM Internetworking Analyzers come with a two-year manufacturer's warranty, which covers any defects detected by the customer or Wavetek Wandel Goltermann. Domino-360 ATM software is covered under a 90 day manufacturer's warranty.

Specifications

To receive a calibration and/or repair quote-RMA from R.A.E. Services Inc.
Click here>> www.raeservices.com/services/quote.htm

General Specifications

Safety..... UL 3111, CAN/CSA C.22.2 No. 1010.1,
..... IEC-1010-1, EN61010-1
For laser applications 21CFR 1040.10/11, IEC-825, EN60825
  
Ambient Temperature Range
Use..... +5 to +40 °C
Storage and transport -20 to +60 °C
Dimensions
Weight approx. 3.0 kg (6.5 lbs.)
Size (L×W×H) 290×283×70 mm (11.4×11.1×2.8 inches)

OC-3/STM-1 Interface Specifications

Interface Connectors

Single mode ST connectors: Two receive, two transmit
Multi-mode SC connectors: Two receive, two transmit
155 UTP Two receive, two transmit

Optical Specifications

Single mode..... Bellcore TA-NWT-000253 and
..... ITU-T SGXV G.957,
..... intermediate reach 1310 nm Class 1 Laser product
Multi-mode 2 km reach, 1310 nm
Framing..... OC-3 or STM-1
Section scrambling..... On or Off

Optical Power Specification

Single mode
Optical output power min. 15 dBm, nom. 10 dBm, max. 8 dBm
Sensitivity min. 36 dBm
Multi-mode
Optical output power min. 19 dBm, max. 14 dBm
Sensitivity min. 30 dBm

Interface-Specific Layer 1-2 Processes

Transmission Convergence to ATM Forum UNI 3.0/3.1/4.0
Cell Delineation HEC
HEC Coset..... 55H or none

Modes of Operation

Test modes Monitor, Emulate User, or Emulate Network,
..... UNI 3.0, 3.1, 4.0, PVC, Public, Private

Status LEDs for Each Receiver

..... Signal, Frame Sync, AIS, Cell Sync, Slicing

Statistics

OC-3/STM-1..... Line Frequency, Path/Line/Section BIPs,
..... Path/Line FEBEs, defect-second counts for
..... Section Loss of Frame, Loss of Signal, Invalid clock,
..... OOF, Line LOP, Line AIS, Line RDI, Path AIS,
..... Path RDI, Loss of Cell Sync
ATM..... (for each receiver) assigned cell count, HEC errors,
..... assigned cell rate, utilization and payload bit rate,
..... filtered cell count, filtered cell rate and payload bit rate

Alarm/Error Insertion

Single error insertion
OC-3/STM-1 Line, Path, and Section BIP errors
ATM Cell HEC (correctable) and HEC (uncorrectable)
Continuous alarm insertion
OC-3/STM-1..... Path and Line RDI, Path and
..... Line AIS, and C2 Unequipped

E1 Interface Specifications

Interface Connectors

BNC..... NIST, ISO, IEC, ANSI, NCSL, MIL-STD by www.raeservices.com
Optional LEMO two receive, two transmit

Specifications

PMD to ITU G.703 for 2.048 Mbps network
Transmit timing recovered clock or internal clock
Receive termination 75Ω or high impedance
Framing ITU G.704 FAS or CRC4
Line coding..... HDB3
Cell mapping..... PLCP or Direct
Transmission Convergence..... ATM Forum AF-PHY-0064

Interface-Specific Layer 1-2 Processes

Cell Delineation HEC or PLCP
HEC Coset 55H or None
Cell Payload Scrambling On or Off
Addressing UNI or NNI

Modes of Operation

Test modes: Monitor or Emulate User, UNI 3.0,
..... 3.1, 4.0, PVC, Public, Private

Status LEDs for Each Receiver

..... LOS, FAS, MPAS, CRC4, AIS/Alarms, Cell Sync

Statistics

E1 Line Frequency, Frame Errors, FEBEs, CRC4, LCV,
..... defect second counts for LOS, LOF, AIS, RDI,
..... Loss of Cell Sync
PLCP LOF, Yellow, Frame/POI, FEBE, BIP8
ATM..... (for each receiver) Assigned cell count, HEC errors,
..... assigned cell rate, utilization and payload bit rate,
..... filtered cell count, filtered cell rate and payload bit rate

Alarm/Error Insertion

Continuous Physical Alarms AIS, RDI
Continuous PLCP Alarms Yellow
Continuous PLCP Errors BIP8, Frame, FEBE, POI
Continuous ATM Errors HEC Correctable

E3 Interface Specifications

Interface Connectors

BNC 2 receive, 2 transmit

Specifications

PMD ANSI T1.107-1988/ITU G.703
Framing..... ITU G.832
Tx Timing recovered clock or internal clock
Receive Termination 75Ω or high impedance
Line Encoding HDB3

Interface-Specific Layer 1-2 Processes

Transmission Convergence..... ATM Forum AF-PHY-0034
Cell Delineation HEC or PLCP
Cell Payload Scrambling On or Off
Addressing UNI or NNI
Cell Mapping..... Direct

Modes of Operation

Test Modes Monitor, Emulate User or Emulate Network
..... UNI 3.0, 3.1, 4.0, PVC, Public, Private

Status LEDs for Each Receiver

..... Signal Present, AIS, Frame Sync,
..... Cell Sync, RDI

Statistics

E3..... Line Frequency, defect second counts for Loss of Signal,
..... Loss of Frame, AIS, RDI, and OOC, Framing Errors,
..... FEBE, LCV, BIP-8, CRC7, display of Timing Marker,
..... TAP-Id and Payload Type
ATM..... (same as other interfaces)

| | |
|-----------------------------------|--------------------|
| Alarm/Error Insertion | |
| <i>Single Error Insertion</i> | |
| E3 | LCV |
| <i>Continuous Alarm Insertion</i> | |
| E3 | AIS, RDI |
| <i>Continuous Error Insertion</i> | |
| E3 | BIP-8, Frame, FEBE |
| ATM Cell | HEC (correctable) |

DS3 Interface Specifications

Interface Connectors

| | |
|--------------|-----------------------|
| BNC. | 2 receive, 2 transmit |
|--------------|-----------------------|

Specifications

| | |
|-------------------------------|-----------------------------------|
| PMD | ANSI T1.107/ITU G.703 |
| Framing | ITU G.804, M23 or C-Parity |
| Tx Timing | recovered clock or internal clock |
| Receive Termination | 75Ω or high impedance |
| Line Encoding. | B3ZS |

Interface-Specific Layer 1-2 Processes

| | |
|------------------------------------|--|
| Transmission Convergence | ATM Forum AF-PHY-0054, UNI 3.0/3.1/4.0 |
| Cell Delineation | HEC or PLCP |
| Cell Payload Scrambling | On or Off |
| Addressing. | UNI or NNI |
| Cell Mapping | Direct or PLCP G.804 |

Modes of Operation

| | |
|----------------------|--|
| Test Modes | Monitor, Emulate User or Emulate Network |
| | UNI 3.0, 3.1, 4.0, PVC, Public, Private |

Status LEDs for Each Receiver

| | |
|--|--|
| | Signal Present, AIS, Frame Sync, Cell Sync |
|--|--|

Statistics

| | |
|---------------|--|
| DS3. | Line Frequency, defect second counts for Loss of Signal, Loss of Frame, AIS, RDI, OOC, Idle and Red, Framing Errors, FEBE, PERR, PPERR, LCV, Frame Alignment |
| PLCP. | defect second counts for LOF and Yellow, Frame, FEBE, BIP-8 |
| ATM | (same as other interfaces) |

Alarm/Error Insertion

| | |
|-----------------------------------|--------------------------|
| <i>Single Error Insertion</i> | |
| DS3 | LCV |
| <i>Continuous Alarm Insertion</i> | |
| DS3 | AIS, RDI, Idle |
| PLCP | Yellow |
| <i>Continuous Error Insertion</i> | |
| DS3. | Frame, FEBE, PERR, PPERR |
| PLCP | BIP-8, Frame, FEBE, POI |
| ATM Cell | HEC (correctable) |

DS1 Interface Specifications

Interface Connectors

| | |
|-----------------------|-----------------------|
| RJ-48C | 2 receive, 2 transmit |
| Bantam Plug | 2 receive, 2 transmit |

Specifications

| | |
|-------------------------|--|
| PMD | ANSI T1.107/ITU G.703 |
| Monitor Type | Bridged or DSX |
| Line Build Out. | selections from 0 to 665 ft, 0 to -22.5 dB |
| Rx Levels. | Hi or DSX |

| | |
|------------------------|------------|
| Line Encoding. | B8ZS |
| Framing | G.704, ESF |

Interface-Specific Layer 1-2 Processes

| | |
|------------------------------------|---------------------------|
| Transmission Convergence | ATM Forum AF-PHY-0016.000 |
| Cell Delineation | HEC |
| Cell Payload Scrambling | On or Off |
| Addressing. | UNI or NNI |
| Cell Mapping. | Direct, G.804 |

Modes of Operation

| | |
|----------------------|--|
| Test Modes | Monitor, Emulate User or Emulate Network |
| | UNI 3.0, 3.1, 4.0, PVC, Public, Private |

Status LEDs for each Receiver

| | |
|--|---|
| | Frame Sync, Cell Sync, Red, Yellow (RDI), AIS |
|--|---|

Statistics

| | |
|---------------|--|
| DS1. | Line Frequency, defect second counts for Loss of Signal, Loss of Frame, AIS, RDI, Loss of cell sync and Red, Framing Errors, CRC6, LCV |
| ATM | (same as other interfaces) |

Alarm/Error Insertion

| | |
|-----------------------------------|-------------------|
| <i>Continuous Alarm Insertion</i> | |
| DS1 | AIS, RDI |
| <i>Continuous Error Insertion</i> | |
| ATM Cell | HEC (correctable) |

ATM 25 Mbps Interface Specifications

Interface Connectors

| | |
|-----------------|--|
| RJ-45 | ISO/IEC 603-7 to support UTP-MIC at 100Ω, 120Ω |
| DB-9. | EIA/TIA-568-A via adapter cable to support STP-MIC at 150Ω |

Specifications

| | |
|---------------------------|---|
| PMD | ISO/IEC 11801, EIA/TIA-568-A |
| Monitor Type | Bridged |
| Tx Timing | Crystal or Low Jitter Timing Reference |
| Line Termination. | 100Ω, 120Ω (UTP Cat 3,4,5) or 150Ω (STP) |
| Line Encoding | NRZI, 4B5B |

Interface-Specific Layer 1-2 Processes

| | |
|------------------------------------|------------------------------------|
| Transmission Convergence | ATM Forum AF-PHY-0040.000 |
| Cell Delineation | Start_of_Cell Command (X_X or X_4) |
| Cell Payload Scrambling. | On |
| Addressing. | UNI |
| Cell Mapping | Direct |

Modes of Operation

| | |
|----------------------|--|
| Test Modes | Monitor, Emulate User or Emulate Network |
| | UNI 3.0, 3.1, 4.0, PVC, Public, Private |

Status LEDs for Each Receiver

| | |
|--|--|
| | Signal, Cells Received, 8Khz Reference, HEC Errors, Short Cells, Symbol Errors |
|--|--|

Statistics

| | |
|--|---|
| | Symbol Error Counts, HEC Error Counts, Tx/Rx Assigned Cell Counts, Rx1/Rx2 8Khz Reference |
|--|---|

Alarm/Error Insertion

| | |
|--|----------------------|
| | Single Bit HEC Error |
|--|----------------------|

Domino-360 ATM Internetworking Analyzer

Domino-360 ATM

Internetworking Analyzer

includes BAM, appropriate LIM, LED overlay, integrated power supply, user documentation, and notebook/parallel port cable

OC-3/STM-1 ATM Multi-Mode Pack

BN 9316/90.03

OC-3/STM-1 ATM Single Mode Pack

BN 9316/90.04

OC-3/STM-1 UTP Pack

BN 9316/90.05

E3 ATM Pack

BN 9316/90.02

DS3 ATM Pack

BN 9316/90.18

E1 ATM Pack

BN 9316/90.01

DS1 ATM Pack

BN 9316/90.17

25 Mbps ATM Pack

BN 9316/90.64

DominoNAS

(includes ATM software)

BN 9316/93.30

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