Discover What's Possible™

Anritsu

MD1231A

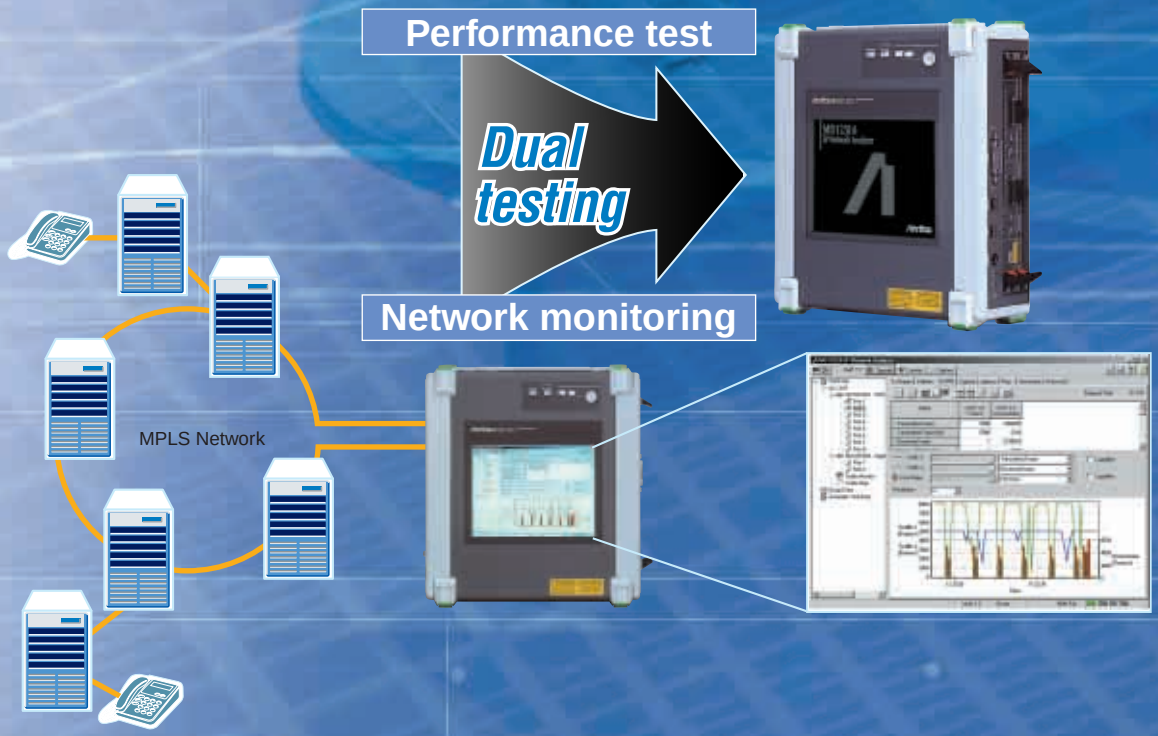
IP Network Analyzer

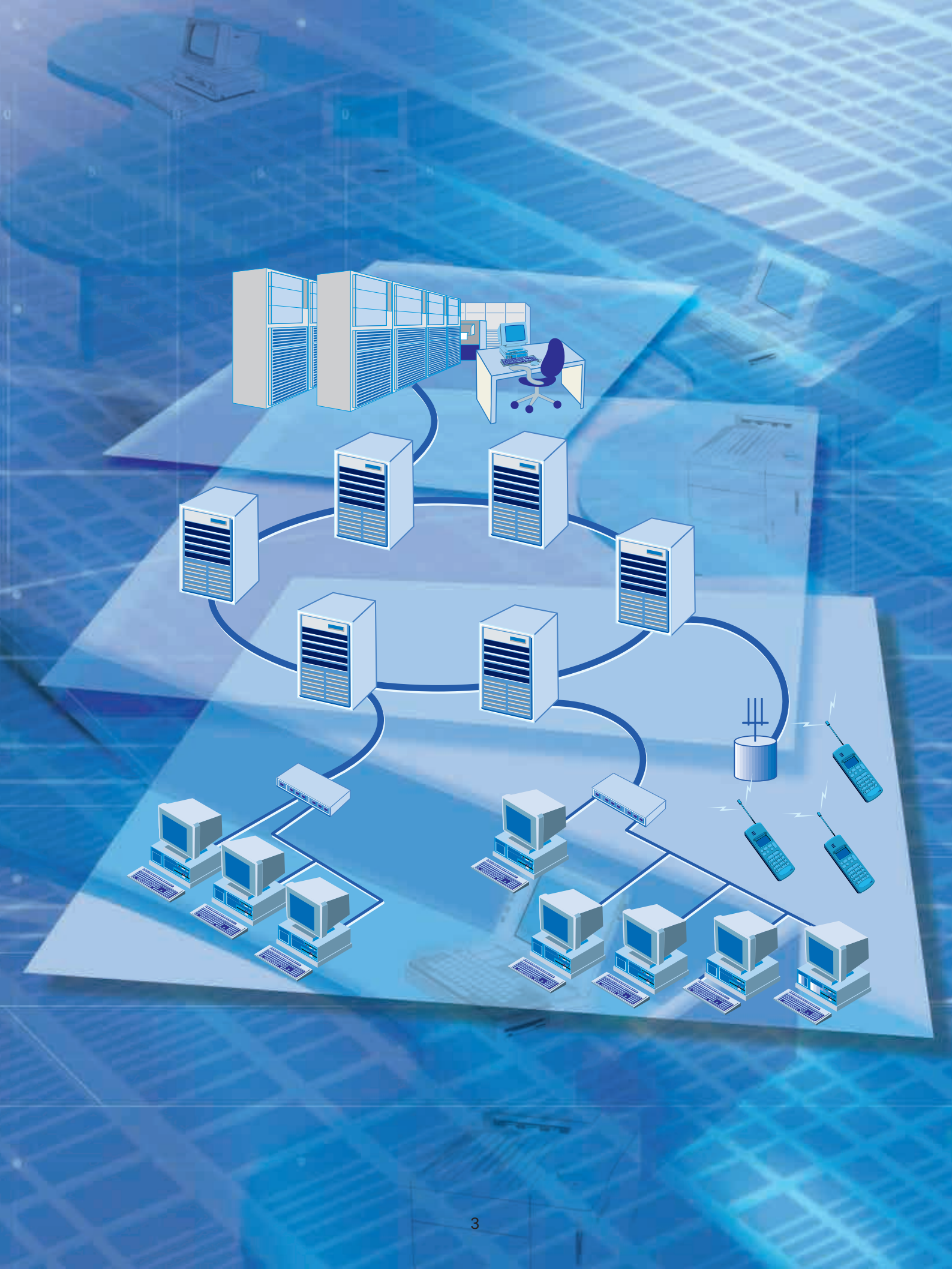
Complete performance testing and monitoring with one lightweight portable unit

Excellent Eco Product
Lightweight
Power saving
Small size

Integrated Performance Testing and Monitoring

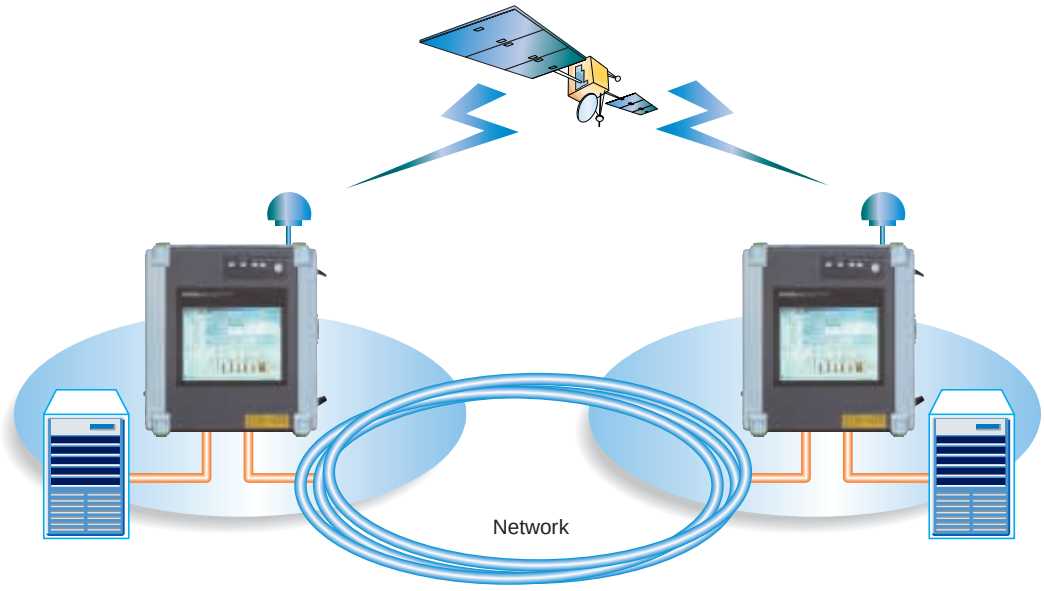
IP networks are spreading rapidly throughout society in conjunction with the expansion of networks carrying voice, video, and mission-critical data. And now maintenance of network quality has become an important theme. Development of network equipment and systems requires measuring network performance and evaluating QoS.
In addition, network operations and maintenance requires monitoring in-service traffic, latency, and frame arrival time variation (frame jitter) as well as prompt troubleshooting.
The MD1231A integrates both performance testing and network monitoring into one lightweight portable instrument.





Applications

Metro Area Networks



Troubleshooting Metro Ethernet

Metropolitan area networks are being built using economically efficient 100 Mbit/s and Gigabit Ethernet. Ethernet is easy to operate, but it does not provide a high level of maintenance and monitoring functions like SONET/SDH lines.
The MD1231A provides through-mode Ethernet monitoring and protocol analysis so that simply inserting a MD1231A into an Ethernet circuit enables easy and correct Ethernet troubleshooting.

VPN QoS Traffic Monitoring

Since traffic can be measured according to 8 priority levels based on the VLAN tag user priority field specified by IEEE802.1D (formerly 802.1p) and the 3 least significant bits of the DiffServ DSCP field specified by RFC2474, it is possible to measure QoS traffic for packets not generated by the MD1231A. If user-defined filters are used, VoIP traffic (specified by a UDP port number) to which specific MPLS labels are appended can be measured in real time.

Remote Latency (MD1231A Option 05)

The MD1231A has a GPS clock input option which can be used to perform time synchronization with remote MD1231A or MD1230A units to measure frame latency over a long distance. Moreover, the capture function can be triggered when a measured frame latency exceeds the user setting. The MD1231A is an effective tool for testing guaranteed latency of VPN services.

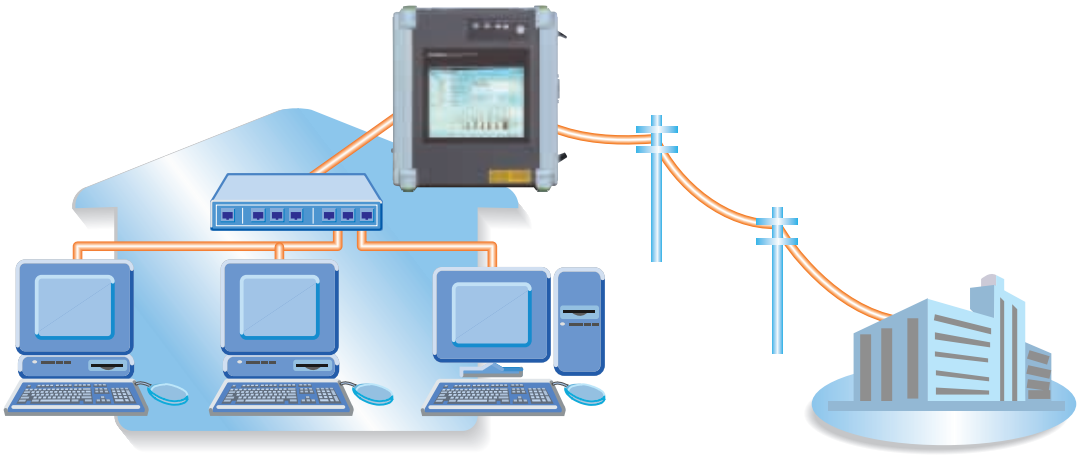
Evaluating Switch and Router Performance

In building metro area networks, an important requirement is to determine whether the performance of networking devices can support the load placed on the network. RFC1242 and RFC2544 define methods for measuring the performance of networking devices. MD1231A conducts the five types of tests (Throughput, Latency, Frame Loss Rate, Back-to-Back Frames, and System Recovery) defined in these standards and indicates the results in tables or graphs. MD1231A automation and one-button execution makes these tests much more efficient.

Evaluating Video Transmission Services

Enterprises are increasingly using network for video conferences. Video data requires higher transmission quality than most other network data.
Above all, any packet jitter introduced by the network considerably affects video reproduction quality. The MD1231A enables real-time in-service jitter measurements when or other time-sensitive data packets arrive. In addition, MD1231A's IGMP emulator function is compatible with IP multicast, which is used in video distribution.

Access Network



Measuring ADSL Throughput

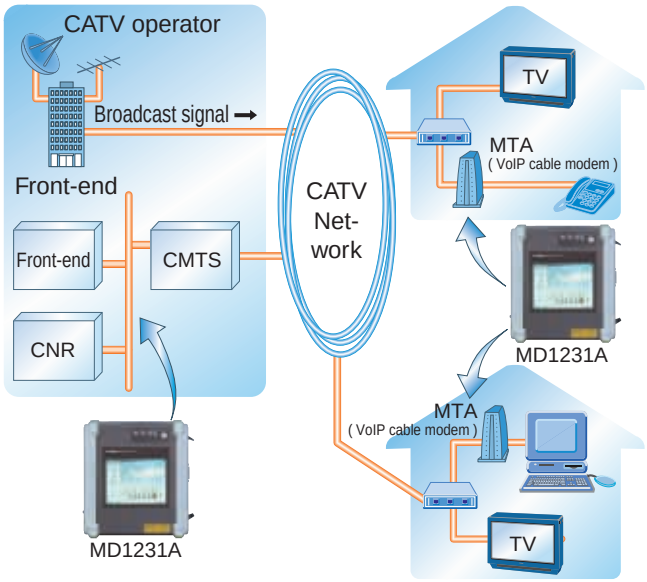
As ADSL becomes more and more widely used, the demand for throughput testing increases. On an asymmetric line such as ADSL, it is not possible to measure transmission rate by using loop back. For this reason, the transmission rate is often calculated from the time required for downloading a large file from FTP server. This method, however, doesn't provide reproducible measurements because of the variation in factors such as PC performance and TCP flow control. Since the MD1231A allows traffic to be generated at any transmission rate, upstream and downstream throughput can be measured with higher accuracy.

Measuring PON System Performance

Some PON systems allow one OLT to connect to 32 ONUs. One MD1231A can provide up to 16 Ethernet ports. With multiple MD1231As connected via networking, up to 128 ports may be supported, providing the user with a solution for the problem of measuring performance of multi-port systems such as PONs.

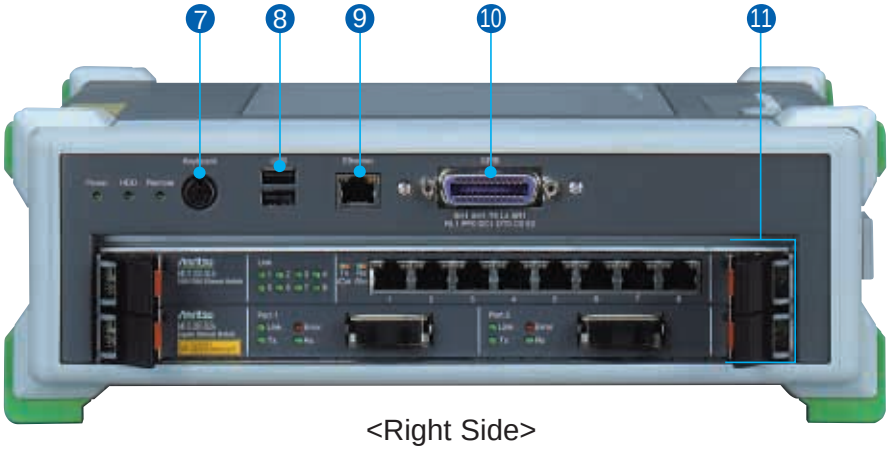
Verifying Conformity to VoIP in CATV

VoIP telephone service via CATV networks requires QoS control, which is indispensable for ensuring the quality of audio signals. With the MD1231A, users can evaluate whether the transmission bandwidth for audio signals is acceptable even if a high load is applied to the CATV network. SIP, the call control protocol, can be displayed using the MD1231A frame capture function to troubleshoot originating call control.



MD1231A

<Top View>



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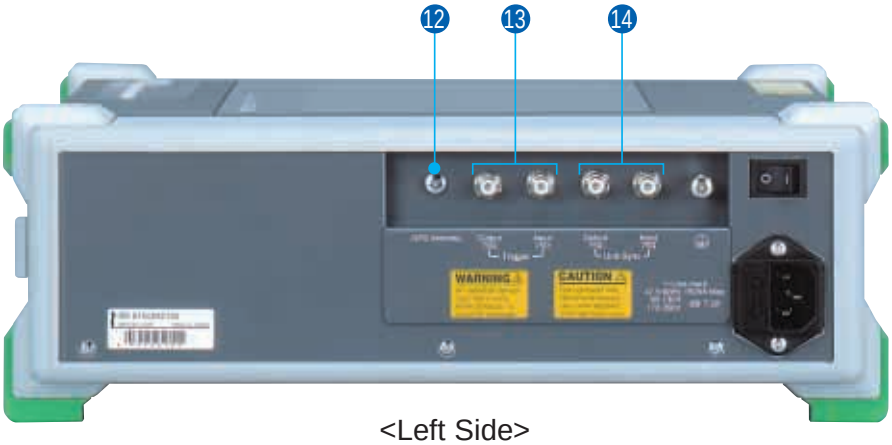
❶ **Display:** 8.4-inch TFT-LCD, SVGA (800 x 600)
❷ **Panel Lock:** Disables the keypad and pointing device.
❸ **Local/Remote:** Switches between local and remote control
❹ **Pointing Device Left clik**
❺ **Pointing Device Right clik**
❻ **Pointing Device:** For manipulation of corsor on the screen
❼ **Keyboard:** For connecting PS/2 keyboard
❽ **USB:** For connecting two USB devices
❾ **Ethernet:** Ethernet connector for control software (It is required only for remote control using GPIB commands.)
❿ **GPIB:** GPIB interface when MD1231A Option 02 is installed.
⓫ **Module slots:** For installing up to two interface modules
⓬ **GPS Antenna:** For connecting a GPS antenna when MD1231A Option 05 is installed.
⓭ **Trigger Input/Trigger Output:** External trigger I/O
⓮ **Unit Sync Input/Unit Sync Output:** Clock signal I/O for time synchronizing several MD1231As connected in a daisy chain



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For developing, manufacturing and maintaining network equipment and systems

- **Compact and lightweight with Built-In display**
- **Real-time measurement of in-service traffic**
- **Physical interfaces for 10 Mbit/s to 1 Gbit/s**
- **Powerful and flexible filter and trigger conditions**
- **Supports protocol decoding including MPLS, IPv6, and BGP-4**
- **Full wire rate transmission of user edited data streams**

Compact and lightweight with Built-In display

MD1231A incorporates a pointing device and doesn't need an external display, keyboard, or mouse. It has two USB ports for connecting a printer or external storage media.
The MD1231A's easy operability, compact size, and lightweight provide the solution for convenient on-site network troubleshooting.

Real-Time Measurement of In-Service Traffic

MD1231A measurements can be output on a printer in reports formatted as tables or graphs. CSV-format result files may be transferred to Microsoft® Excel.
The MD1231A provides pass-through mode functionality in all its interface modules. In pass-through mode, received data is monitored and output directly to the transmit port without change. Inserting the MD1231A into the actual line enables easy in-service monitoring.

Physical Interfaces for 10 Mbit/s to 1 Gbit/s

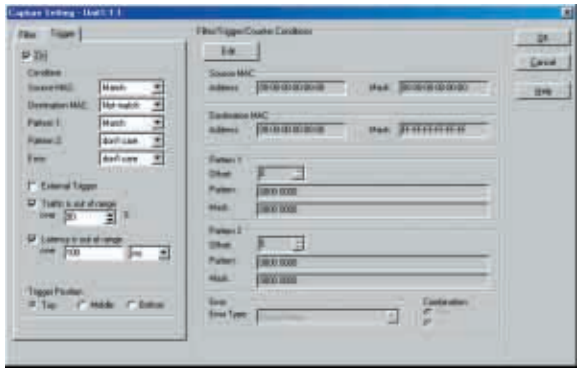
The MD1231A supports up to two interface modules of the types shown in the table below. The Gigabit Ethernet Module uses Gigabit Interface Converters (GBICs) that can be changed to support 1000BASE-SX/LX/LH/ZX ports.

10M/100M Ethernet Module	8 ports
Gigabit Ethernet Module	2 ports

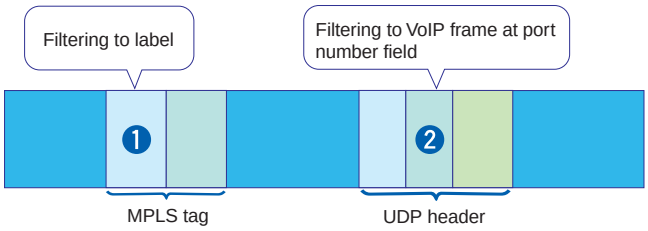
Powerful and Flexible Filter/Trigger Conditions

The MD1231A has powerful and flexible filter and trigger functions that can be set independently for each port as shown in the following table.

Trigger condition	Filter condition	Condition	Remarks
√	√	Destination MAC address	MAC address mask permits partial match.
√	√	Source MAC address	
√	√	User-defined 32 bit pattern	Two sets of user-defined 32 bit pattern conditions per port. Sets offset and pattern match at any frame position. Pattern mask permits partial match.
√	√	User-defined 32 bit pattern	
√	√	Error condition	Good frame, FCS error, undersize, fragment, oversize, oversize/FCS error, dribble error, alignment error, IP header checksum error, TCP checksum error, UDP checksum error
√	√	Ext. trigger input	Rising edge of pulse
√	—	Traffic over	When traffic setting overflows
√	—	Latency over	When latency setting overflows



As an example, when filtering only VoIP frames on an MPLS network, the MPLS label is specified as a 32 bit pattern (1), and VoIP frames are specified at the UDP header port number field as a 32 bit pattern (2). As a result, only VoIP frames on the specified MPLS network are captured, and the number of packets can be counted.

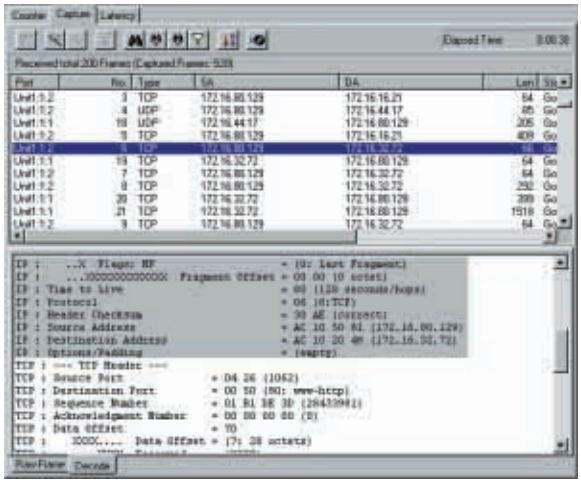


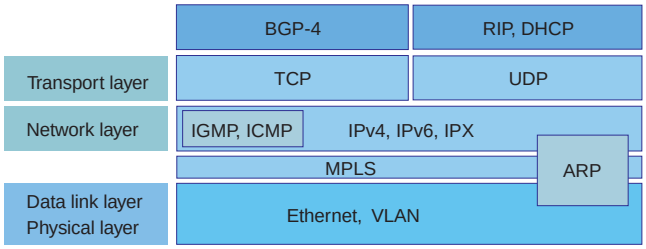
Supports Protocol Decode including MPLS, IPv6, and BGP-4

The MD1231A real-time capture buffers do not drop frames even at the full wire rate of 1 Gbit/s. The in-service capture function is an especially powerful and useful tool for troubleshooting the causes of network faults. Captured frames can be searched on the basis of specified conditions and interesting frames can be selected and displayed. Each port has an independent capture buffer and is unaffected by other ports.

Using the real time capture buffers, Ethernet, MPLS, VLAN, ARP, IPv4, ICMP, IPv6, IPX, TCP, UDP, IGMP, RIP, BGP-4 and DHCP protocols can be decoded and displayed for captured frames.

Frames from up to 8 ports captured at the same time may be displayed simultaneously on the screen. The captured frames are arranged in the order of time received, enabling the protocol exchange to be verified.

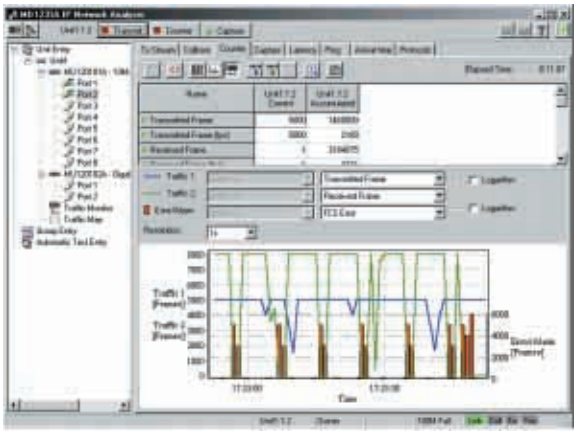




• Traffic Monitoring

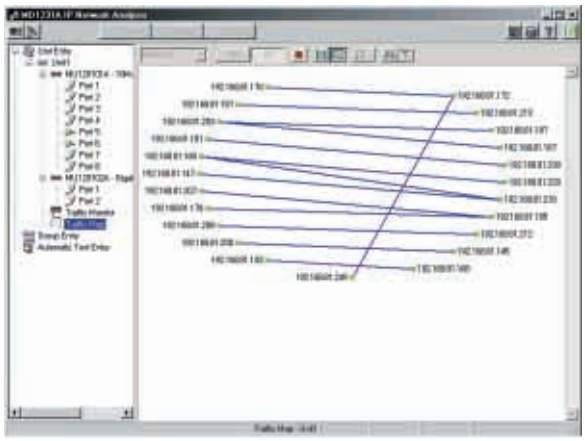
The MD1231A can make simultaneous real-time counts of send and receive bytes/frames, QoS frames in 8 priority ranks, every error type, and many other parameters. In addition, when the previously-described filter function is used, specific frame traffic can be measured for each port.

For example the powerful frame filtering operations can be used to capture and verify performance of VPN services where the UDP port number specifies MPLS VoIP frames.



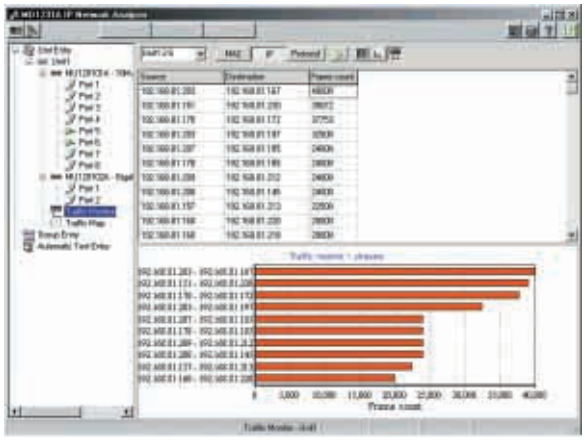
• Traffic Map

Traffic mapping displays Ethernet data flow pairs or IP data flow pairs to illustrate the data flow communicating partners.



• Traffic Monitor

Traffic monitoring graphically displays the traffic for Ethernet data flows, IP data flows, or traffic for each protocol in real time. Ethernet or IP data flow frame counts can be displayed for up to 64 communicating partners.

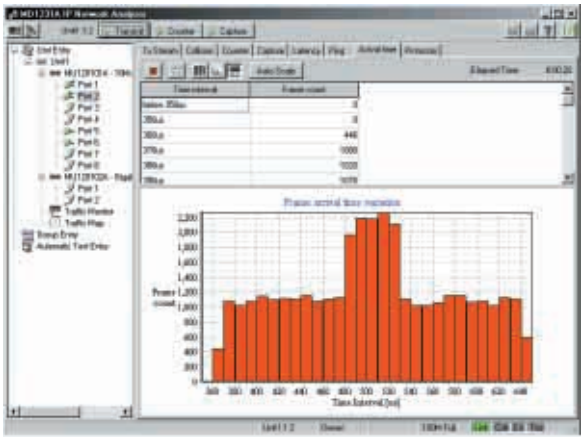


• Latency

The MD1231A is able to measure the latency of simplex data transfer. When up to eight MD1231A or MD1230A units are daisy chained, latency can be measured by interconnecting a clock signal for time synchronization. In addition, when a GPS antenna is connected, latency can be measured between remote locations.

• Frame Arrival Time Variation

In applications like Voice over IP (VoIP) and Video on Demand (VoD), frames must arrive within the correct time slot. In other words, it is important to evaluate variation in the frame arrival time at the receive side. The MD1231A can perform these types of important timing measurements.



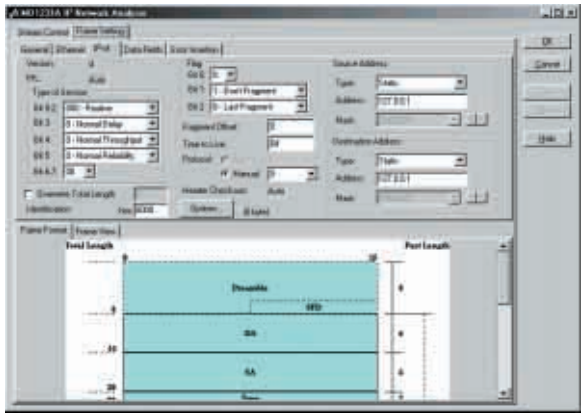
Full Wire Rate Transmission of User Edited Data Streams

The MD1231A can send a up to 256 data streams per port at the full wire rate. Data editing is a simple three-step procedure described below.

• Step 1: Setting Frame Data

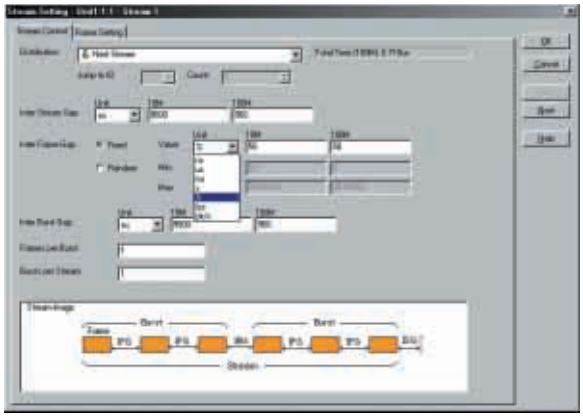
The frame editor is used to edit the frame data for any of the Ethernet, ARP, IPv4, IPv6, IPX, MPLS, VLAN, TCP, UDP, IGMP, RIP and DHCP protocols. When a specific protocol frame header is selected, each frame data field can be edited in accordance with the frame format specifications that are also displayed.

The IP and/or MAC addresses can either be partially or completely set to automatically increment, decrement, or set randomly. When using IPv6, the 32 bits of the address fields can be set for automatic random, increment, or decrement operations.



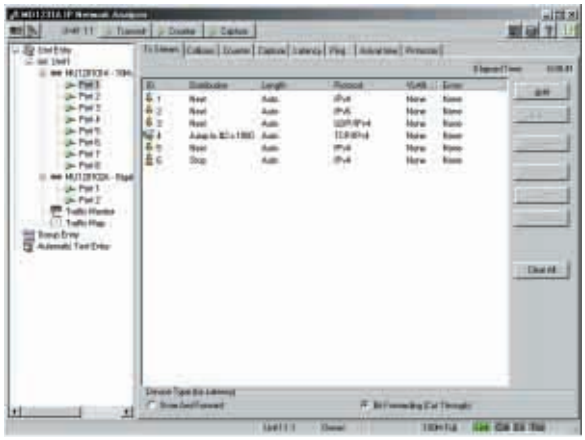
- **Step 2: Setting Stream Control**

The interframe gaps for the traffic defined in Step 1 are set and the data stream is defined. The load may be set based on values such as frame interval, the percentage of wire rate, or bit/s value. Typically, an actual network load is not static or constant, but rather dynamic or bursty. To simulate this type of load, the MD1231A has a multi-burst function. In addition, a random frame interval can be simulated by setting the interframe gap to random within a specified interval range.



- **Step 3: Combining Data Streams**

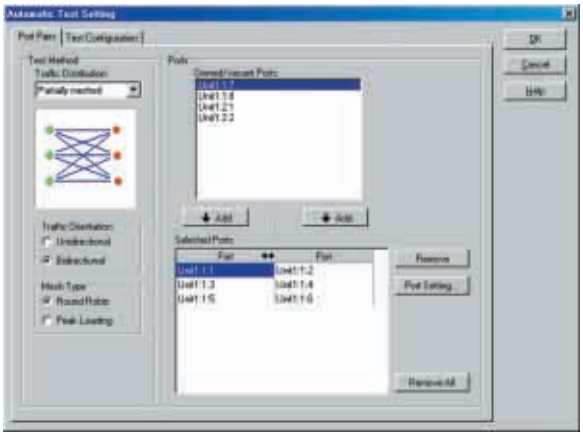
Up to 256 data streams defined in Step 1 and 2 can be combined per port. Any number of data streams can also be repeated a specified number of times.

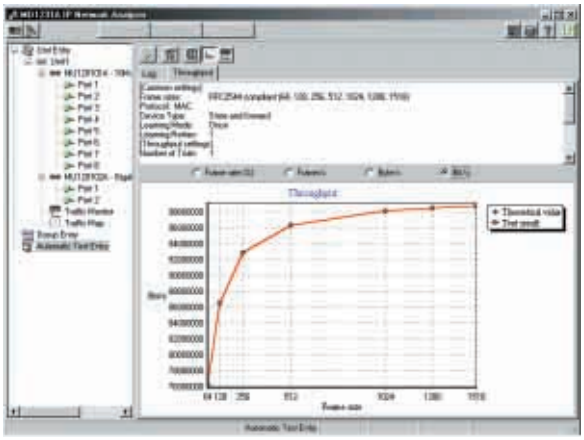


Testing in Conformance to RFC2544

MD1231A implements automatic testing that conforms to RFC2544 test specifications. In five types of tests (Throughput, Latency, Frame Loss Rate, Back-to-Back Frames, and System Recovery) the test conditions are set in advance. After that, all measurements can be made automatically by simply pressing the START button.

The test results may be displayed in tables or graphs. In the throughput test, which is most important of these tests, partial mesh and full mesh tests are supported depending on configuration and network connections.





Protocol Emulation

• ARP

The MD1231A can send each port's MAC address in response to appropriate ARP requests. It is also possible to select either a mode that allow a port to respond to all ARP requests regardless of IP address, or a mode that does not respond to any ARP request. Furthermore, the ARP request and response packets can both be counted.

• PING (ICMP for IPv4)

The MD1231A supports PING for port IP addresses. In addition, the number of ping request frames and the number of ping response frames can both be counted.

• IGMP

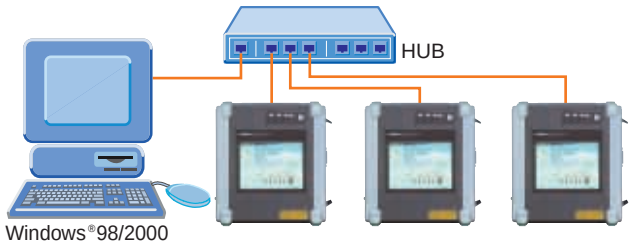
The MD1231A sends the user-set host group address via a host membership report in response to host membership queries from routers. MD1231A will reports up to 255 consecutive host group addresses. Even if there is no host membership query, the user-set host group address can be sent periodically via the host membership report.

• BGP-4

The MD1231A can emulate up to 8 BGP speakers, advertising up to 100 routes per BGP speaker. Link flaps and route flaps can be generated at any user-specified frequency (However, it cannot use routes advertised by the DUT in the route flap test.)

Remote PC Control

With the Windows®98/2000-compatible MX123001A Data Quality Analyzer Control Software (sold separately) installed, up to eight remote PCs can control up to 8 linked MD1231A or MD1230A units over an Ethenet network.



Multi-User Functions

The MD1231A supports multi-user functions. Multiple users can reserve their own individual ports, preventing any interference from other users. On network equipment production lines, for example the MD1231A supports reserving ports for each manufacturing process step, permitting system sharing.
In addition, when the MX123001A Data Quality Analyzer Control Software (sold separately) is installed on several computers within a product engineering environment, multiple designers and researchers can use the same MD1231A, increasing engineering efficiency.

Automated Measurement Using Remote Commands (Option)

Almost all MD1231A functions can be executed by remote commands. An automated test system can be configured by operating the MD1231A from the user's application software. In addition, the interface for sending and receiving GPIB commands can be selected from either the optional GPIB interface (MD1231A Option 02) or the Ethernet interface (MD1231A Option 03).

Specifications

● MD1231A (Main Frame)

Trigger output	Level: TTL (active high), impedance: 75 Ω (SMB)
Trigger input	Usable as capture buffer trigger Level: TTL (Active high), connector: 75 Ω (SMB)
Sync I/O	MD1231A time sync signal, impedance: 75 Ω (SMB)
Interfaces	GPIB (Option 02), Ethernet (10BASE-T/100BASE-TX)*1, USB port x 2 , PS/2 keyboard connector, GPS antenna (Option 05), Pointing Device
Built-in memory	Measurement conditions: 10 sets, Measurement results: 10 sets
OS	Windows® 98 Second Edition
Auto test	RFC2544 Tests (throughput, latency, frame loss rate, back-to-back frame, system recovery, reset)
Traffic monitor	Ethernet frame count for up to 64 flows, IP packet count for up to 64 flows, frame count for each protocol
Traffic map	Ethernet data flow for up to 256 flows, IP data flow for up to 256 flows
LEDs	Remote, local, HDD, power
Dimensions and mass	320 (W) x 100 (H) x 300 (D) mm, ≤5 kg (excluding options and modules)
Power supply	85 to 132 Vac/170 to 250 Vac (auto switching), 47.5 to 63 Hz, ≤150 VA
Operating temperature	0˚ to +40˚C (except when HDD are active.)
Storage temperature	– 20˚ to +60˚C
EMC	EN61326: 1997/A1: 1998 (Class A), EN61000-3-2: 1995/A2: 1998 (Class A), EN61326: 1997/A1: 1998 (Annex A)
LVD	EN61010-1: 1993/A2: 1995 (Installation Category II, Pollution degree 2)

*1: The Remote Control using GPIB via Ethernet Interface requires MD1231A-03 option.

● Ethernet Modules

Model	MU120101A	MU120102A
Ports	10BASE-T/100BASE-TX Number of ports: 8 Connector: RJ-45 Link speed: 10 Mbit/s, 100 Mbit/s Duplex mode: Full, half Auto negotiation: On/off Flow control: On/off	1000BASE-SX/LX/LH/ZX *1 Number of ports: 2 Connector: SC Link speed: 1000 Mbit/s Duplex mode: Full Auto negotiation: On/off Flow control: On/off
LEDs	Link, Tx/collision, Rx/error	Link, Tx, Rx, error
Frame settings	MAC address: Fixed, increment, decrement, random (changeable portions specified in 4 bit units) VLAN tag *2: Fixed, increment, decrement, random MPLS label *2: Up to 10 MPLS labels with fixed settings can be appended. Protocol editing: IPv4, IPv6, TCP, UDP, IGMP, ICMP for IPv4, RIP, DHCP, IPX, ARP, pause control Data field: Can set any 4 portions of data field All 0s, all 1s, alternate 1/0 (each bit, each 2 bits, each 4 bits, each byte, each 2 bytes), increment, decrement, random, single PRBS 9,user programmed, sequence number, time stamp, test frame	
Frame length	18 bytes to 10000 bytes (settable as auto, fixed, increment, or random)	48 bytes to 64 kbytes (settable as auto, fixed, increment, or random)
Stream settings	Stream transport mode: Continuous, continuous burst, stop after this stream, next stream, jump to stream. Jump to stream for count (loop count: 1 to 16777215, frame count per burst: 1 to 16777215, burst count per stream: 1 to 1 x 10^{12})	
	Interframe gap 10BASE-T: 8000 ns to 1700 s, resolution of 800 ns, settable as fixed, random 100BASE-TX: 800 ns to 170 s, resolution of 80 ns, settable as fixed, random Interburst gap 10BASE-T: 8000 ns to 1700 s, resolution of 800 ns, settable as fixed 100BASE-TX: 800 ns to 170 s, resolution of 80 ns, settable as fixed Interstream gap 10BASE-T: 8000 ns to 1700 s, resolution of 800 ns, settable as fixed 100BASE-TX: 800 ns to 170 s, resolution fixed of 80 ns, settable as fixed	Interframe gap: 64 ns to 120 s, resolution of 16 ns, settable as fixed, random Interburst gap: 64 ns to 120 s, resolution of 16 ns, settable as fixed Interstream gap: 64 ns to 120 s, resolution of 16 ns, settable as fixed
Number of streams	256 streams/port	

Model	MU120101A	MU120102A
Error insertion	Collision, FCS error, alignment error, dribble bit error, undersize error, oversize error, Fragments error, oversize & FCS error, IP header checksum error, TCP/UDP checksum error	FCS error, undersize error, oversize error, Fragments error, oversize & FCS error, IP header checksum error, TCP/UDP checksum error
Counter	Transmitted frame*3, received frame*3, transmitted bytes, received bytes, transmitted data rate, received data rate, fragments, undersize, oversize, oversize & FCS error, FCS error, line error, flow control, alignment error, dribble bit error, collision, capture trigger, capture filter, transmitted ARP reply, transmitted ARP request, transmitted ping reply, transmitted ping request, received ARP reply, received ARP request, received ping reply, received ping request, QoS 0 to 7*3, user defined 1*3, user defined 2*3, transmitted IP*4, received IP*4, IP header checksum error, TCP checksum error, UDP checksum error	Transmitted frame*3, received frame*3, transmitted bytes, received bytes, transmitted data rate, received data rate, fragments, undersize, oversize, oversize & FCS error, FCS error, line error, flow control, byte alignment error, capture trigger, capture filter, transmitted ARP reply, transmitted ARP request, transmitted ping reply, transmitted ping request, received ARP reply, received ARP request, received ping reply, received ping request, QoS 0 to 7*3, user defined 1*3, user defined 2*3, transmitted IP*4, received IP*4, IP header checksum error, TCP checksum error, UDP checksum error
Latency	Maximum, minimum, average measure	
Frame arrival time variation measurement	Time resolution: 1 µs, 10 µs, 100 µs, 1 ms, 10 ms, 100 ms, 1 s	
QoS counter setting	Using QoS described below, 8-level priority frame count: IEEE802.1D VLAN tag user priority field, 3 LSB of RFC2474 DSCP field	
Capture buffer	8 Mbytes/port	32 Mbytes/port
Capture filter	At following conditions for each port, capture filter condition settings: Destination MAC address, source MAC address, 32-bit pattern (settable bit length and offset) x 2, error conditions	
Capture trigger	At following conditions for each port, capture trigger condition settings: Destination MAC address, source MAC address, 32-bit pattern (settable bit length and offset) x 2, error conditions, traffic over, latency over, external trigger input	
Protocol decode	Ethernet, MPLS, VLAN, ARP, IPX, IPv4, ICMP for IPv4, IPv6, TCP, UDP, IGMP, RIP, BGP-4, DHCP	
Protocol emulation	ARP, PING, IGMP, BGP-4	

*1: 1000BASE-SX/LX/LH/ZX can be chosen by exchanging GBIC devices that are optional accessories.
*2: VLAN tag and MPLS labels cannot both be used simultaneously.
*3: Frame quantity and frame rate (fps) are counted.
*4: Packet quantity and packet rate (pps) are counted.


MU120101A


MU120102A

Ordering Information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name	
	Main frame	
MD1231A	IP Network Analyzer	
	Standard accessories	
	Power cord	:1 pc
F0101	Fuse, 2 A	:1 pc
W2096AE	MD1231A operation manual	:1 copy
W2097AE	MD1231A remote control operation manual	:1 copy
W1928AE	MX123001A software operation manual	:1 copy
B0489	Front cover*1	:1 pc
	Options	
MD1231A-02	GPIB control*2	
MD1231A-03	Ethernet control*2	
MD1231A-05	GPS module	
	Plug-in modules	
MU120101A	10M/100M Ethernet Module	
MU120102A	Gigabit Ethernet Module*3	
	Software	
MX123001A	Data Quality Analyzer Control Software	
MX123001A-05	Data Quality Analyzer Control Software 5 licenses	
MX123001A-08	Data Quality Analyzer Control Software 8 licenses	
	Maintenance service *4	
MD1231A-90	Extended three year warranty service	
MU120101A-90	Extended three year warranty service	
MU120102A-90	Extended three year warranty service	
	Optional accessories	
B0501B	Blank panel	
G0105A	GBIC SX 850 nm*5	
G0106A	GBIC LX 1310 nm*5	
G0107A	GBIC LH 1310 nm*5	
G0108A	GBIC ZX 1550 nm*5	
J0660B	Optical fiber cable (SC/PC-SC/PC-2 m-SM), 2 m	
J1119B	Optical fiber cable (duplex, MM), 2 m	
J0008	GPIB cable, 2 m	
J1109B	LAN cable (Cross), 5 m	
J1110B	LAN cable (Straight), 5 m	
J1165A	Coaxial cord (27CP-P-1.5-BNC-P-1.5C-CR10)*6	
J1166A	Coaxial cord (27CP-P-1.5)*7	
B0510	Carrying case*8	
Z0321A	Keyboard (PS/2)	
Z0541A	Mouse	

*1: It is for protecting interface modules, and not a display.
*2: The MD1231A-02/03 options are required only for remote control using GPIB commands. Note that these options may be ordered together, although they cannot be used at the same time because one of them must be selected when actually applied.
*3: MU120102A requires two GBIC modules (sold separately).
*4: Please ask your local Anritsu Field Office or Sales Representative for price and availability.
*5: GBIC modules are sold per one piece. MU120102A has two GBIC interfaces.
*6: It is for connecting a MD1230A and a MD1231A
*7: It is for connecting MD1231As.
*8: This carrying case is only for hand-carrying.

Carrying case

Anritsu

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