Agilent N2620A FrameScope Pro

Technical Data, Software Release 7.1

Gigabit Ethernet Performance and Triple-Play Quality of Service Testing

- Automatic Network Discovery simplifies usage and documents network resources and stations
- Remote control via any Web browser allows troubleshooting, monitoring, and reporting from any office, eliminating costly dispatches
- Full-screen, color LCD displays clear and complete results
- Touch-screen interface and online manuals enhance ease of use

Features and Benefits

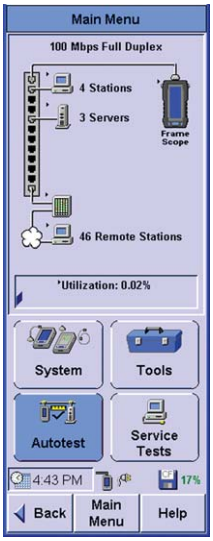
- Support for 802.3ab and 802.3z-compliant 10/100/1000BASE-T copper and 1000BASE-SX/-LX Gigabit fiber SFP interfaces
- VoIP, IPTV and DSL testing for efficient deployment and troubleshooting of triple-play services
- Optical power measurements enable isolation of link issues before network performance is impacted
- RFC 2544 performance benchmarking verifies throughput at full line rates up to 1 Gbit/s on both copper and fiber Ethernet interfaces
- Autotest function allows quick isolation of protocol, configuration and problems in network performance

Triple-Play Testing with the FrameScope Pro

The FrameScope Pro is a handheld Ethernet deployment network, services and troubleshooting tool. With the FrameScope Pro, technicians deploying metro-based services have a fast, efficient and very cost-effective test solution to locate network issues and bottlenecks at any line rate up to 1 Gbit/s. Data, voice and video service quality tests are available through a few taps on the FrameScope Pro's color touch screen. Agilent's unique Autotest measures the performance of network resources and services using the same operations that an end-user would execute. Additionally, user-centric service quality metrics, like MOS for VoIP telephony, help service technicians resolve troubleshooting tickets faster.

Pre-defined performance tests and online manuals make the FrameScope Pro very easy to use. Expert users can assist technicians in difficult cases through remote control and Web-based access to test results. Centrally defined, custom test suites can be distributed via ftp downloads to the entire service staff.

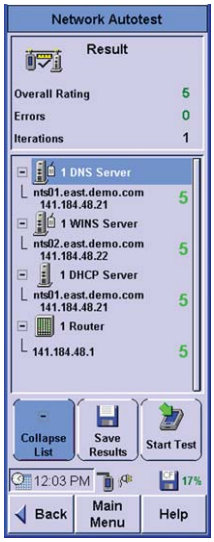
Automatic Network Discovery



Once connected, the FrameScope Pro automatically surveys the network and displays all devices in a switched network—providing instant visibility of IP and IPX devices on different subnets, along with their MAC addresses, network addresses, and names. Using the populated Network database, you can document the asset of network stations and services, and immediately identify rogue stations and unauthorized services.

Agilent Technologies

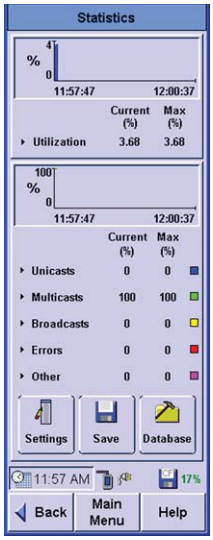
Autotest



The FrameScope Pro's *unique* Autotest function lets you run *customized test suites*, out of which detailed metrics reports can be generated. This helps you to objectively measure and benchmark the performance of network application servers. For added security, passwords saved to the CompactFlash card as part of a test suite are encrypted.

Diagnostic Tools

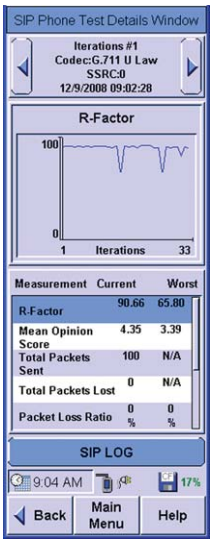
Includes a Diagnostic Monitoring Interface for Optical Transceivers



Diagnostic tools range from the basic Ping and TraceRoute to real-time statistical monitoring of network traffic and packet error rate testing (PERT) up to 24 hours. With just a few taps, the FrameScope Pro allows you to identify 10/100/1000 Mbits/s Ethernet utilization, broadcasts, pause frames, collisions, and errors or incorrectly assigned subnet masks, misconfigured servers, and duplicate IP addresses.

For optical power measurements on SFPs, the FrameScope Pro measures receiving input power and transmitted output power. This helps to single out link problems and verify component compliance before network performance is impacted. On top of that, FrameScope Pro also displays manufacturer's name, OUI and transceiver ID for all SFPs that support DMI standards.

VoIP Quality of Service Testing[1]



The FrameScope Pro is capable of measuring the quality of SIP-based (RFC 3261) and H.248-based (RFC 3525) VoIP services from end to end.

In SIP-controlled networks, the FrameScope Pro can be used to place calls to another FrameScope Pro or SIP phone after registration with a SIP server. Similarly, in Megaco/H.248-controlled networks, the FrameScope Pro can simulate a merged media gateway and IP phone, and place VoIP calls via the Media Gateway Controller (MGC).

Once a connection is successfully established, either pre-recorded audio files, or live audio is exchanged. Based on RTP/RTCP packet statistics, Mean Opinion Score (MOS) and R-factor (according to ITU-T G.107) are measured to provide user-centric performance metrics. What's more: the FrameScope Pro also enables professional documentation of your test results.

In networks where no SIP server is present, two FrameScope Pro testers can establish a connection using the peer-to-peer protocol. This function is particularly useful to validate VoIP readiness of a data network.

With the optional auxiliary port, VoIP measurements can be performed effectively despite the presence of increased background traffic.

[1] with VoIP Quality of Service Testing license

IPTV Service Quality Testing[1]

The FrameScope Pro supports two test modes: Monitor and Terminate modes. In Monitor mode, a set-top box is used to initiate IPTV channel set-up and change channels, while the FrameScope Pro is used to analyze IPTV traffic parameters.

In Terminate mode, the FrameScope Pro supports both RTSP and IGMP to control IPTV channel setup. In testing multicast video streaming, the FrameScope Pro uses IGMP to join/leave multicast addresses to which the content is streamed.

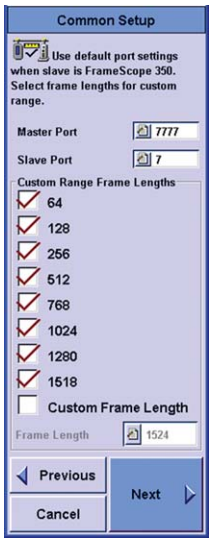
In testing RTSP-based video-on-demand (VOD) streams, the FrameScope Pro establishes a RTSP session with the media server, performing as a RTSP client. Once the session set-up is completed, the RTSP client triggers the server to start or stop media delivery.

Transport quality metrics derived from the sequence and timestamp information in the RTP header include packet count, packet loss ratio, and packet jitter. Results for one or two RTP channels (if video and audio channels are separate) are polled and displayed periodically. MPEG-2 transport streams carrying MPEG-2 or MPEG-4 multicast video are measured for ETSI TR 101 290 parameters and MDI (Media Delivery Index, RFC 4445).

In addition to transport quality metrics, the FrameScope Pro also measures key service transaction parameters such as IGMP join/leave latency and channel zapping time. The video list configuration and download feature make it easy to manage IPTV channels in test suites. Three scoring levels are configurable for most test results, giving a quick indication of service quality.

IPTV tests are run with either the global network setting or an IPTV-specific network setting. The latter is useful if the IPTV service is delivered via a different network from the data service.

RFC 2544 Performance Benchmark Testing[2]

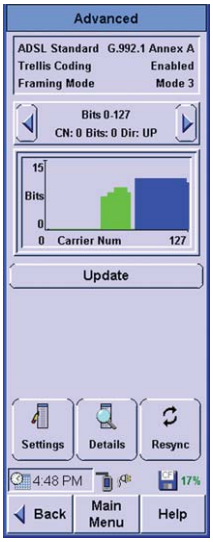


Based on the point-to-point testing methodology defined by RFC 2544, the FrameScope Pro enables throughput, latency, back-to-back frames and frame loss rate measurements for SLA verification and performance testing.

Enhancements from previous firmware release include testing with a custom range of frame lengths, frame loss count display in the Frame Loss Test Report, display of Layer 2 bit rate in Mbits/s, and configurable error tolerance for testing over lossy network paths.

Test results can be stored on the CompactFlash card or printed via the instrument's remote interface.

ADSL/ADSL2+ Physical Layer Testing[3]



With the FrameScope Pro and optional DSL golden modem you can perform not only physical layer measurements on DSL, but also network and service quality tests over the modem's Ethernet bridge function. This lets you verify DSL installations and troubleshoot home gateway installations conveniently with just a single test set.

[1] with IPTV Quality of Service Testing license
[2] with RFC 2544 Network Performance Testing license
[3] with Digital Subscriber Line Testing license

Seamless Network Connectivity

The FrameScope Pro supports a wide range of connection protocols and physical media to allow connectivity and dial-in at subscribers' homes, at DSLAMs, aggregation switches, or in data centers. Supported connectivity protocols include IPoE and PPPoE (manually connected or disconnected with a single click button), with and without stacked VLAN enabled (a technology often used to steer traffic loads in triple play networks).

The FrameScope Pro is equipped with an RJ-45 test port for 10/100/1000 Mbits/s over copper and a Small Form-factor Pluggable (SFP) interface for Gigabit Ethernet over fiber. Also available as options are a USB-powered media converter for 100BASE-FX and a range of SFP Gigabit Ethernet optical transceivers.

The system also can be configured to ensure that only the default gateway on the test port is active to avoid ambiguity when both the test and auxiliary ports are being used.

Static routes can be added to reach remote networks via the auxiliary port. Settings for the test port, auxiliary port and static routes can be saved and restored. For easy remote access from anywhere on the network, system network settings can be downloaded via FTP and uploaded via HTTP.

General Specifications

User Interface

60 mm x 160 mm (2.38" x 6.25")
touch-sensitive color LCD display

Dimensions

Size: 228 mm x 114 mm x 66 mm
(9" x 4.5" x 2.6")

Weight: 1.2 kg
(approx. 2.5 lbs.)

Test Interfaces

- Electrical 10/100/1000BASE-T RJ45 interface, full and half duplex
- 1000BASE-SX and –LX SFP fiber interfaces
- Optional Auxiliary 10/100BASE-T RJ45 interface for remote control over a separate network

or

- Optional Wiremap port for wiremap testing to locate miswires, shorts, and open ends (requires Wiremap adapter)

Data Storage

- 1GB CompactFlash card included
- Network Station Database, Network Settings, Test Results Database, Test Suites

Ports

- Universal Serial Bus (USB 1.1) for firmware upgrade or powering accessories
- Talkset interface: 3.5 mm stereo jack
- CompactFlash memory card interface

Operating Temperature

0 °C to +40 °C

Storage Temperature

–10 °C to +55 °C

Relative Humidity

10% to 90%

Power Supply

- Removable/Rechargeable Lithium-Ion batteries provide up to 8 hours of operation
- AC Power Adapter: 100–240 V AC, 0.5 A, 47–63 Hz (output 12 V DC, 1.5 A), plugs directly into the battery pack which can be recharged separate from the instrument
- Optional Auto Lighter DC Power Adapter, 12 V (output 12 V, 5 A)

Administrative Functions

- Remote control from any PC on the network; requires installation of a small applet
- Access to measurement results through Web browser
- Generation of printable reports through Web browser
- Download of pre-defined test suites from a customer-managed ftp server
- Download of a pre-defined video station list from a customer-managed ftp server

Available User Interface Languages

English, French, Spanish, Italian, German, Portuguese, Simplified Chinese, Korean and Japanese

Available User's Manuals

English, French, German, and Japanese

Professional Network and Service Testing, Product Kit N2620A–001

Supported Protocols	IP, IPX, NetBIOS
Dial-Up and Addressing	PPPoE, DHCP
Tagging	
VLAN Support	IEEE 802.1Q (VLAN), IEEE 802.1AD (VLAN), QinQ, configurable VLAN tags and priority fields
QoS/TOS Support	QoS IP, TOS, DSCP
Network Discovery	Automatic network discovery, active or passive
Autotest	
Supported RFCs	RFC 2617 (HTTP Basic Authentication Scheme), RFC 959 (FTP)
Supported Services	Email, Web File, DNS, DHCP, WNS, Novell, Print, FTP, Primary DC, Secondary DC Servers, Switches and Routers
Tools	• Ping (up to 9,208 Bytes, configurable "don't fragment" bit) • TraceRoute • Locate Switch Port • Error (problem) log • Wiremap test (requires Option N2620A-040 Wiremap port and N2614A-001 Wiremap adapter) • Demo (training) mode • Comprehensive built-in help function • Optical power measurement tool
Traffic Statistics	• Protocol statistics • Top talker analysis • Local utilization and error statistics • Local error source
SNMP Query Functions	• Locate Switch Port • SNMP public MIBs • SNMP community setup
Report Generation	
Formats	• Comma Separated Value (csv, raw data) • JAVA (formatted report with tables and graphs, requires JAVA version 1.4.2 or later installed) • html (formatted report with tables)
Tests	Autotest, RFC 2544 performance benchmarking, VoIP, IPTV, DSL, TCP/UDP throughput test, IP and MAC loopback test
Statistics	Network Station List, Network Statistics

Professional Network Performance Testing, Product Kit N2620A–001

Loopback Measurements	Delay to IP (Layer 3) or MAC (Layer 2) address, requires additional FrameScope Pro
Traffic Generation	
Max. Data Rate	1000 Mbits/s, full duplex (frame length 40 to 16,000 Bytes)
Setup Parameters	• Duration in number of frames, or continuous generation • Frame length in Bytes (40 to 16,000 Bytes) • Simulation of 10/100/200 stations • Utilization in percent of port speed (adjustable during test) • Utilization in frames per second • Data pattern (choice of 0X00 00, 0XFF FF, 0XAA 55, 0X00 FF, 0X11 11) for standard Ethernet frame sizes only
Error Generation	Inject 1 or up to 1000 errors during the test
Supported Frame Types	802.3/802.2, Ethernet II/IP, 802.2/IP, SNAP/IP, Ethernet/IPX, 802.2/IPX, 802.3/IPX, SNAP/IPX
Enhanced Features	• Enhanced statistics for traffic load up to 1,042,000 fps • Sending of a list of variable frame lengths • Sending of flow control frames during test • Sending of ARP before starting test • Display of Layer 2 bit rate in Mbps
Packet Error Rate Test (PERT)	Bi-directional, downstream or upstream frame loss test, performed between two FrameScope Pro units, or using a loopback device
Max. Data Rate	1000 Mbits/s, full duplex (frame length 64 to 16,000 Bytes)
Setup Parameters	• Duration in hours, or continuous generation • Frame length in Bytes (64 to 16,000 Bytes) • Frame rate utilization in percent of port speed • Data pattern (choice of 6 pre-configured patterns, and custom pattern)
Max. Duration	24 hours
TCP/UDP Throughput Test	Supports configurable TCP and UDP ports on the master and slave units, allowing testing through firewalls
Max. Throughput	
Copper Interface	• 9/70/200 Mbits/s (UDP, at 10/100/1000 Mbits/s port speed) • 6/25/30 Mbits/s (TCP, at 10/100/1000 Mbits/s port speed)
Fiber Interface	200 Mbits/s (UDP), 17 Mbits/s (TCP), full duplex, at 1 Gbit/s port speed

VoIP Quality of Service Testing, Options N2620A-030, -03E, -03G, 032

Supported Protocols	• Session Initiation Protocol (SIP), RFC 3261, requires Option N2620A-030 or -03E • Peer-to-peer SIP, RFC 3261, requires Option N2620A-030 or -03E • STUN, RFC 3489, requires Option N2620A-03E • H.248/Megaco, RFC 3525, requires Option N2620A-032
R-Factor	R-Factor/Reference R-Factor, according to ITU-T G.107
Mean Opinion Score	MOS/Reference MOS, according to ITU-T G.107
VoIP Statistics	Parameters calculated based on the incoming RTP packets: • total packets sent • total packets lost • packet loss ratio • inter-arrival jitter • packet round-trip delay based on the exchanged RTCP packets Additional parameters available for SIP calls only: • total packets discarded • packet discard ratio
Supported Codecs	• G.711 A-law, G.711 µ-law • G.723.1 • G.729A, G.729B • G.721 (equivalent to G.726 with 32 Kbits/s) • G.726 with 16, 24, and 40 Kbits/s
Audio Content	• Pre-recorded Harvard Sentences • Live audio through headset
Operating Modes	
SIP (RFC 3261)	FrameScope Pro acts as a SIP phone, initiating calls to, and receiving calls from other SIP phones, a SIP gateway or another FrameScope Pro, with or without a SIP server/ proxy; requires Option N2620A-030 or -03E
H.248.1 v2 (RFC 3525)	FrameScope Pro acts as an IP phone media gateway, initiating calls to, and receiving calls from other IP phones, or another FrameScope Pro via MGC on demand; requires Option N2620A-032
VoIP Traffic Generation	Emulates up to 100 VoIP streams with valid RTP headers, requires Option N2620A-03G
Supported Codecs	• G.711 A-law, G.711 µ-law (no meaningful audio data) • G.729A (no meaningful audio data)
Background Traffic Generation	Emulates background traffic on the test port (burst frames with invalid RTP headers, bandwidth equivalent to up to 1000 RTP streams using supported codecs); requires Option N2620A-041 AUX port to perform the VoIP quality test

IPTV Quality of Service Testing, Options N2620A-070, -071

Parallel Monitoring Capacity	• 1 stream, active testing • Up to 10 streams, passive monitoring, requires Option N2620A-071
Signaling	RTSP (RFC 2326) for video-on-demand (VOD) streams IGMP v2 (RFC 2236) and v3 (RFC 3376) for multicast streaming Video streams with VLAN tagging, requires Option N2620A-071
Transport	RTP/RTCP (RFC 3550), UDP, MPEG-2 Transport Stream, Unicast and Multicast
IPTV RTP Transport Statistics	RTP transport, as defined in RFC 3550: • total packets received • total packets lost • inter-arrival jitter • interval packet loss ratio
One-Way Loss Pattern Sample Metrics; requires Option N2620A-071	As defined in RFC 3357: • packet loss distance • packet loss period
IPTV Statistics; requires Option N2620A-071	MPEG-2 TS (Transport Stream) statistics, as defined in ETSI TR 101 290: • TS sync loss • Sync byte error • PAT error • PAT error 2 • Continuity count error • PMT error • PMT error 2 • Transport error • PCR repetition error • PCR discontinuity indicator error Service transaction quality: • IGMP join latency • IGMP leave latency • IGMP channel zapping time Media Delivery Index (MDI, RFC 4445) • MDI:MLR (media loss rate); requires transport over RTP • MDI:DF (delay factor) Average throughput
Max. Stream Bit Rate	15 Mbits/s
Min. IGMP Join/Leave Latency	0.5 ms
Test Reporting	• Log the results of all tests for review by technicians back at the NOC • Signaling events (IGMP/RTSP) • Video quality measurements
Configurable Parameters	• Multicast address/port • RTSP URL • RTSP server port • RTP port • Thresholds for the 3-level scoring of key parameters (requires Option N2620A-071) • IPTV-specific network configuration

Digital Subscriber Line (DSL) Testing, Options N2620A-055, -056

	Option N2620A-055	Option N2620A-056
Supported Standards	ITU-T G.994.1 (Handshake), G.992.1 Annex A (ADSL), G.992.3 Annex A (ADSL2), G.992.5 Annex A (ADSL2+), ETSI TS 101 388, T-Com 1 TR 112 (U-R2)	ITU-T G.994.1 (Handshake), G.992.1 Annex B (ADSL), G.992.3 Annex B (ADSL2), G.992.5 Annex B (ADSL2+), ETSI TS 101 388, T-Com 1 TR 112 (U-R2)
Max. Throughput		
Downstream	24 Mbits/s	24 Mbits/s
Upstream	2 Mbits/s	2 Mbits/s
Line Test Parameters (displayed separately for upstream and downstream paths)	Noise Margin, Line Attenuation, Transmitting Power, Gross Data Rate, Max. Data Rate, Latency Path, Bit Allocation	
Error Counters (displayed separately for Customer Premises Equipment and Central Office side)	CRC, FEC, HEC, LOS, NCD, LCD	

Note: If equipped with one of the DSL test options, the FrameScope Pro displays detailed line parameter measurement results acquired by the Vierling DSL tester.

RFC 2544 Network Performance Testing, Option N2620A-031, Product Kit N2620A-001

Supported Protocols	IP, IPX, NetBIOS
Dial-Up and Addressing	PPPoE, DHCP
Supported RFCs	RFC 2544, RFC 1242
Performance Benchmarking	
Test Parameters	Throughput, latency, frame loss rate, back-to-back frames (frame burst test)
Frame Lengths	64, 128, 256, 512, 768, 1024, 1280, 1518 Bytes (plus 4 – 12 Bytes if VLAN tagging is activated)
Jumbo Frames	Up to 16 KBytes
Remote Device	Additional FrameScope Pro or FrameScope 350 (firmware rev. 3.2.8 or later, no VLAN), physical loopback, IP or MAC packet responder
Max. Throughput	
Copper Interface	1000 Mbits/s, full duplex (frame length 64 to 2048 Bytes)
Fiber Interface	1000 Mbits/s, full duplex (frame length 512 to 2048 Bytes) (983.1 Mbits/s at 64 Bytes, 992.9 Mbits/s at 128 Bytes, 999.09 Mbits/s at 256 Bytes)
Min. Latency	4 µs (at 64 Bytes frame length)

Ordering Information

FrameScope Pro Product Kits

All FrameScope Pro product kits contain:
(1) FrameScope Pro, (1) AC power adapter, (1) Soft carrying case, (1) Battery pack, (1) Hanging strap, (1) USB cable, (1) FrameScope Pro User's Guide, (1) FrameScope Pro Utilities CD, (1) CompactFlash card, (1) Stylus with spiral cord, (1) Screen cover and (1) Dust cap.

N2620A-001 FrameScope Pro Ethernet, also includes RFC 2544 test license N2620A-031 and Wiremap Port license N2620A-040

N2620A-003 FrameScope Pro Basic, also includes VoIP QoS test license N2620A-030 (standard SIP signaling protocol), headset N2620A-060 and Wiremap Port license N2620A-040

Optional DSL Test Kits

(Golden modem with accessories and software license)

N2620A-055 ADSL/ADSL2+ Test Kit, ITU-T G.992.1/3/5 Annex A

N2620A-056 ADSL/ADSL2+ Test Kit, ITU-T G.992.1/3/5 Annex B

Software Upgrade Licenses

(multiple software licenses can be combined)

N2620A-030 VoIP Quality of Service Test, standard SIP RFC 3261 signaling protocol

N2620A-03E VoIP Quality of ServiceTest, SIP signaling protocol with STUN support

N2620A-03G VoIP Traffic Generation

N2620A-032 VoIP Quality of Service Test, H.248/Megaco

N2620A-031 RFC 2544 Network Performance Test

N2620A-070 IPTV RTP Transport Statistics

N2620A-071 IPTV RTP Transport Statistics, IPTV Transport Stream Statistics, MDI and Transaction Analysis

Recommended Accessories

N2620A-050 Multimode SFP transceiver, 1000BASE-SX

N2620A-051 Single-mode SFP transceiver, 1000BASE-LX

N2620A-053 100BASE-FX media converter, USB powered

N2620A-054 10/100 Mbits/s Ethernet switch, 5 ports, palm-sized, USB powered

N2620A-041 Auxiliary 10/100 Ethernet Port for remote control

N2620A-060 Headset, binaural, with microphone and volume control

N2614A-001 Wiremap adapter (requires Option N2620A-040 Wiremap Port)

N2605A-094 CompactFlash memory card

N2605A-132 Soft carrying case

N2641A-134 Hard carrying case

N2595A-096 Rechargeable battery pack

N2595A-094 Auto lighter DC power adapter, 12 V

N2620A-080 Universal AC adapter

N2620A-090 Accessory kit (replacement stylus, spiral cord, display cover, dust cap and strap set)

Soft carrying case

Hard carrying case

Auto lighter DC power adapter, 12 V

Universal AC adapter

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