ETS-1000

ETHERNET ANALYZER

MEMBER

SPEC SHEET

A cost-effective, dual-port, 10M to 1G handheld Ethernet tester enabling service providers to turn-up and install Carrier Ethernet services

KEY FEATURES

- Two 10/100/1000BaseT and GigE independent test ports
- Throughput, back-to-back, latency and frame-loss measurements as per RFC 2544 (asymmetric results)
- Multistream, up-to-layer-4 traffic generation and analysis, allowing quality of service (QoS) verification through VLAN, TOS/DSCP prioritization testing
- MPLS route prioritization validation with up to three MPLS labels (MPLS option)
- Cable diagnostics
- Through mode testing for troubleshooting applications
- TCP/IP network configuration test suite including TCP client, DNS lookup and ARP monitor

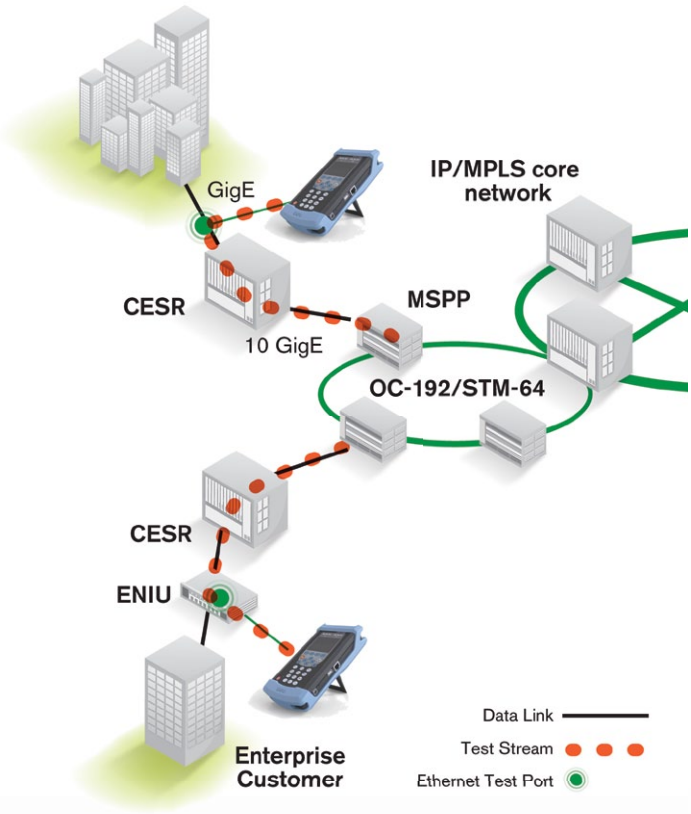
ASSESSING CARRIER ETHERNET SERVICES

EXFO's ETS-1000 is a cost-effective handheld Ethernet analyzer enabling service providers to turn-up and install next-generation carrier Ethernet services. Its compact size and complete feature set make it the perfect tool for field technicians looking to reliably validate service-level agreements (SLA) of Ethernet-based services running over metro Ethernet networks.

The ETS-1000 has two completely independent test ports that support the following interfaces: 10/100/1000Base-T, 1000Base-SX, 1000Base-LX and 1000Base-ZX. Using this analyzer, technicians can transmit up to layer-4 traffic with fully configurable virtual local area networks (VLAN), multiprotocol label switching (MPLS) and quality of service (QoS) parameters. The ETS-1000 supports all of today's necessary Ethernet/IP field testing capabilities, including RFC 2544, bit-error-rate testing (BERT), packet jitter as well as multistream generation and analysis.

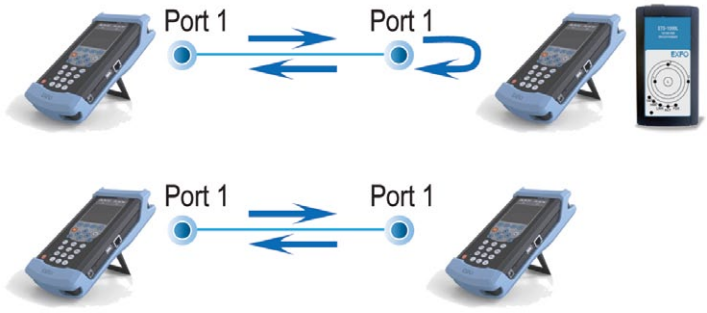
Key Features

- Throughput, back-to-back, latency and frame-loss measurements as per RFC 2544 (asymmetrical results optional)
- Up-to-10 traffic stream generation and analysis, perfect for turning up next-generation Ethernet services
- EtherBERT™ for bit-error-rate testing of 10, 100, and 1000 Mbit/s Ethernet circuits
- MPLS support for carrier Ethernet
- Packet jitter measurement to qualify Ethernet transport networks for transmission of delay-sensitive traffic such as voice-over-IP (VoIP) and video
- Remote-control capability
- Dual-port capability for simultaneous traffic generation and reception at 100 % wire speed for 10/100/1000Base-T, 1000Base-SX, 1000Base-LX or 1000Base-ZX full-duplex networks at all packet sizes
- Ethernet-in-the-First-Mile 802.3ah testing
- Clear pass/fail test results
- Through mode capability for troubleshooting applications
- TCP/IP network configuration test suite including TCP client, DNS lookup, ARP monitor, ping and traceroute
- Cable diagnostics

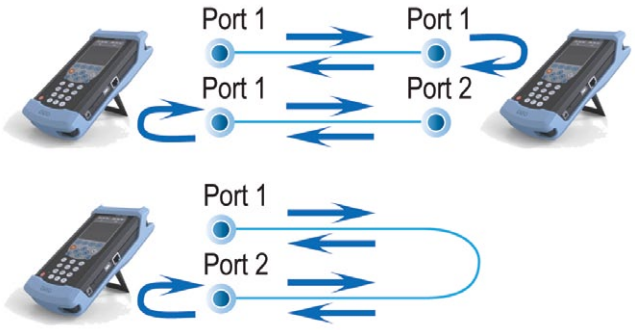


FLEXIBLE TESTING CONFIGURATIONS

With its default two-port configuration, the ETS-1000 offers a variety of testing configurations, providing complete flexibility to the user. The automatic remote loopback also considerably simplifies and accelerates the test setup.



Single-port testing (one-way or round-trip results).



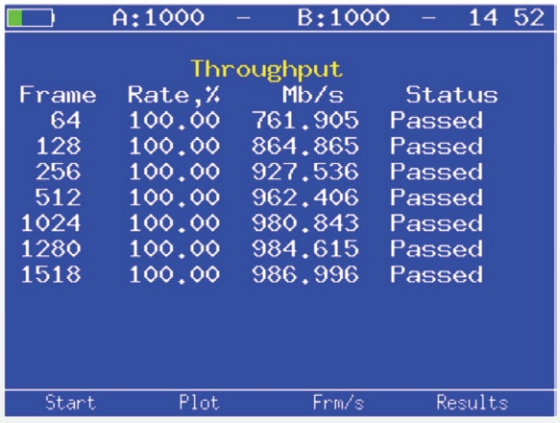
Dual-port testing (one-way or round trip results).

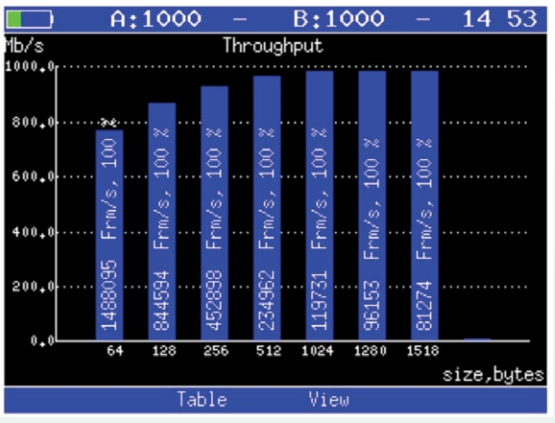
Testing Applications

Ethernet has become the technology of choice for delivering next-generation telecommunications services for business, mobile backhaul and wholesale services. Proper assessment of these services is essential to ensuring quality and performance. The ETS-1000 supports all key testing applications, enabling field technicians to effectively install and turn up these services.

RFC 2544

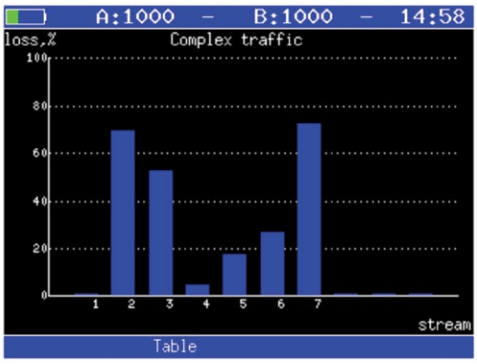
RFC 2544 is the common standard methodology used to turn-up, install and troubleshoot Ethernet circuits. Four important tests to include in the RFC 2544 are throughput, back to back, frame loss and latency. The methodology defines the frame size, duration and number of test iterations. Once performed, these tests provide performance metrics of the Ethernet network under test. The ETS-1000 executes all RFC 2544 tests and provides quick and easy configuration. The ETS-1000 supports two configurations for the RFC 2544. The first configuration has a loopback at the remote end, providing round-trip results, and the second offers asymmetrical testing providing separate results for each test direction.





QoS Assessment—Multistream Testing

Ethernet circuits including Ethernet-based mobile backhaul need to support new and more advanced services. Networks now carry a variety of different applications, such as voice, e-mail, video-on-demand and online gaming. Due to the nature of these different services, they will be affected differently by network characteristics such as latency, frame-delay variation (packet jitter) and frame loss. To ensure QoS, service providers must properly configure their networks to define how the traffic will be prioritized. The ETS-1000 can assess these new services by way of its complex traffic capability, which allows simultaneous testing of up to 10 streams representing different applications. Key performance indicators (KPIs) such as throughput, latency and frame loss are measured for each individual stream.



Cable Testing

With the help of the Wiremap test, field technicians can check for continuity problems as well as MDI and MDIX compatibility. Also, knowing the length, distance to fault, propagation delay and skew further ensures that the physical cabling is within the IEEE 802.3 standard specifications.

MPLS Testing

The MPLS testing option allows for generation of traffic with up to three MPLS labels. RFC 2544, multistream and BER tests can be performed with MPLS traffic, enabling field technicians to test within the MPLS network and verify proper label routing and prioritization.

EtherBERT

Ethernet is increasingly carried across a variety of layer-1 media over longer distances. This creates a growing need for Ethernet transport certification on a bit-per-bit basis. This can be achieved using BERT, which uses a pseudo-random binary sequence (PRBS) encapsulated into an Ethernet frame. By providing this capability, the ETS-1000 allows for easy transition from frame-based error measurement to a bit-error-rate measurement.

TCP/IP Network Configuration Test Suite

The ETS-1000 offers a network configuration test suite that allows technicians to easily verify network connectivity and validate proper configuration. Using these tests, users can detect network configuration problems, verify server availability, verify operability and estimate the load of the link. The network configuration test suite includes the following tests:

›DNS lookup

›ARP monitor: makes it possible to view ARP replies transmitted in the network and retrieve the IP and MAC addresses they contain

›TCP-client: makes it possible to verify whether a tested server responds to HTTP requests

›Ping/traceroute

Reports, Test Configurations and Remote Control

The ETS-1000 analyzer supports saving complete test results to file. It is also possible to load and view previously saved results and configurations directly on the unit. The user has the abilitly to take screen captures of the ETS-1000 user interface. It is also possible to use the ETS-1000 with full remote control via the tester's LAN port.

SPECIFICATIONS

Ethernet Interfaces

OPTICAL INTERFACES

Available wavelengths (nm)	**1000Base-SX**	**1000Base-LX**	**1000Base-ZX**
Wavelength (nm)	850	1310	1550
Transmission level (dBm)	–9 to –3	–9.5 to –3	0 to +5
Reception level sensitivity (dBm)	–20	–22	–22
Maximum reach	550 m	10 km	80 km
Transmission bit rate (Gbit/s)	1.25	1.25	1.25
Reception bit rate (Gbit/s)	1.25	1.25	1.25
Transmission operational wavelength range (nm)	830 to 860	1270 to 1360	1540 to 1570
Maximum reception before damage (dBm)	+6	+6	+6
Jitter compliance	IEEE 802.3	IEEE 802.3	
Ethernet classification	IEEE 802.3	IEEE 802.3	
Laser type	VCSEL	FP	DFB
Eye safety	Class 1	Class 1	Class 1
Connector	LC	LC	LC
Transceiver type	SFP	SFP	SFP

ELECTRICAL INTERFACES

Electrical interfaces	Two ports, 10/100BaseT half/full duplex, 1000BaseT full duplex Straight/crossover cable auto-detection		
Transmission bit rate	10 Mbit/s	125 Mbit/s	1 Gbit/s
Transmission accuracy (ppm)	±100	±100	±100
Reception bit rate	10 Mbit/s	125 Mbit/s	1 Gbit/s
Duplex mode	Half and full duplex	Half and full duplex	Full duplex
Jitter compliance	IEEE 802.3	IEEE 802.3	IEEE 802.3
Connector	RJ-45	RJ-45	RJ-45
Maximum reach (m)	100	100	100

Ethernet Functional Specifications

TESTING

RFC 2544	Throughput, back-to-back, frame-loss and latency measurements according to RFC 2544 (option for asymmetrical results). Frame size: RFC-defined sizes, user-configurable.
BERT	Layer 1 to layer 4, with or without VLAN and MPLS.
Patterns (BERT)	CRTP, PRBS 2E11-1, PRBS 2E15-1, PRBS 2E20-1, PRBS 2E23-1, PRBS 2E29-1, PRBS 2E31-1 and user patterns.
Error measurement	Jabber/giant, runt, CRC.
Error measurement (BERT)	Bit error, bit mismatch 0, bit mismatch 1.
Multistream generation and analysis	Capability to transmit and analyze up to 10 streams. Configuration parameters: packet size, transmission rate, MAC source/destination address, VLAN ID, VLAN priority. IP source/destination address, ToS field, DSCP field, TTL, UDP source/destination port and payload. MPLS tags can also be inserted. Analysis is performed on all 10 streams simultaneously, including throughput, frame count and latency.
MPLS [a]	Ability to generate and analyze streams with up to three layers of MPLS labels.
Ethernet statistics	Multicast, broadcast, unicast, pause frame, frame rate, frame loss, out-of-sequence frames, in-sequence frames.
Packet jitter	Packet jitter measurements according to RFC 4689, packet jitter distribution.
802.3ah (OAM)	Ability to test Ethernet OAM as per IEEE 802.3ah, including connection establishment, OAM protocol statistics and loopback control.
Pass through	Ability to set the two test ports in Pass Through mode for troubleshooting applications.

TESTING (CONT'D)

Pass through	Ability to set the two test ports in Pass Through mode for troubleshooting applications.
TCP/IP network configuration test suite	DNS lookup, ARP monitor, TCP client, ping and traceroute.
Cable diagnostics	Category 5 cable (or better), UTP/STP cable, ≤120 meters.
Loopback	Ability to return traffic to the local unit by swapping packet overhead up to layer 4 of the OSI stack. Ability to loopback packets at layer 1 (without swapping). Ability to swap MAC, VLAN, Priority and ToS/DSCP in loopback.
DHCP client	Ability to connect to a DHCP server to obtain its IP address and subnet mask for connection on the network.
Remote loopback	Ability to connect, enable and disable loopback of a remote unit.

ADDITIONAL FEATURES

Save and load configuration	Ability to store and load test configurations.
Report generation	Ability to generate test reports in text format.
Screen capturing	Ability to gather a snapshot of the screen for future use.
Graph	Allows the user to graphically display the test statistics of the test results.
Configurable test timer	Allows the user to set a specific start and stop time for tests.
Remote control	Remote control via a USB or LAN port.

GENERAL SPECIFICATIONS

Size (H x W x D)		222 mm x 112 mm x 54 mm
Weight		0.640 kg
Temperature	operating storing	0 °C to 45 °C –40 °C to 60 °C
Relative Humidity		0 % to 93 %, noncondensing
Power consumption		12 W
Languages		English, Spanish, Chinese

Note

a. Available as a software option.

ORDERING INFORMATION

ETS-1000-XX

Software options
ETMPLS = MPLS testing
ETAT = RFC 2544 asymmetric testing

Example: ETS-1000-ETMPLS

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