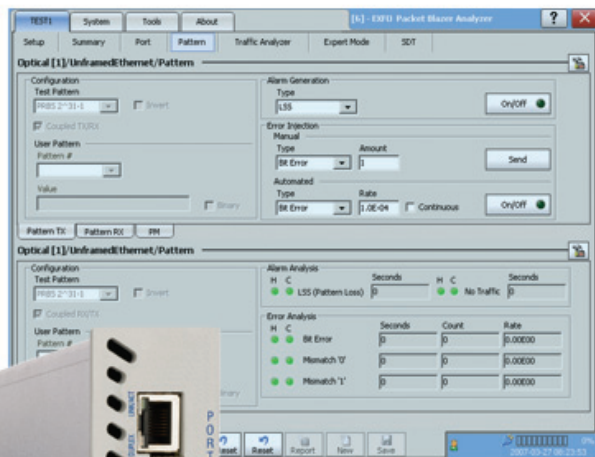


IQS-8510B

Packet Blazer

R&D AND MANUFACTURING—TRANSPORT AND DATACOM



Fully integrated functionality for benchmarking Ethernet devices and systems

- Throughput, back-to-back, latency and frame-loss measurement as per RFC 2544 (bidirectional)
- Packet-jitter measurement for assessing the capability of Ethernet transport network to transmit delay-sensitive traffic such as voice-over-IP (VoIP) and video
- EtherBERT™ test functionality for assessing the integrity of Ethernet services running on WDM networks
- Multistream generation and analysis, allowing quality of service (QoS) verification through VLAN and ToS/DSCP prioritization testing
- True wire-speed, stateful TCP throughput test for precise validation of IP services
- IPTV testing and analysis
- Complete Carrier Ethernet services portfolio: PBB-TE (MAC-in-MAC), MPLS, MPLS-TP, 802.3ah and IPv4/IPv6
- 1x and 2x Fibre Channel testing
- Part of EXFO's unified layer 0/1/2/3/4 testing solution

Platform compatibility

- IQS-600 Integrated Qualification System



Designed for Manufacturing, R&D and Network Testing Applications

Manufacturing and R&D: Testing Gigabit Ethernet Devices

Housed in EXFO's IQS platform, the IQS-8510B Packet Blazer Ethernet Test Module brings a wide range of Gigabit Ethernet test capabilities to manufacturing and R&D environments. This module tests Ethernet traffic in its native format: 10/100/1000Base-T, 100Base-FX, 100Base-LX, 1000Base-SX, 1000Base-LX or 1000Base-ZX for testing applications including Ethernet component testing, SONET/SDH hybrid multiplexers, switched Ethernet, VLANs, DWDM and FTTx systems.

- Offers high port density (up to 20 ports per 5U mainframe) for parallel device testing and traffic generation
- Combines with a wide range of IQS test modules, providing fully integrated physical and datacom-layer testing of Ethernet and Fibre Channel devices

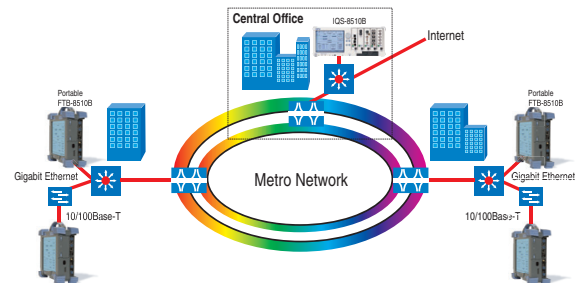


■ IQS-610P Integrated Qualification System

Network Service Providers: Remote Ethernet Testing and Monitoring

When configured for remote testing applications, the IQS-8510B enables carriers to ensure the reliability and performance of their Ethernet networks. This rack-mountable, central office (CO)-based module combines with its portable counterpart, the FTB-8510B Packet Blazer, to simplify and accelerate deployment of Ethernet services. This unique approach allows a single technician to perform end-to-end testing of Ethernet circuits.

- Minimizes time and cost of service turn-up and troubleshooting
- Facilitates resource and test equipment management
- Delivers network testing flexibility
- UDP and IP header integrity validation
- Provides consistency for service qualification



Key Features

- Interfaces
 - Ethernet 10/100/1000Base-T, 100Base-FX, 100Base-LX, 1000Base-SX, 10Base-LX and 1000Base-ZX
 - Fibre Channel 1x and 2x test suite with buffer-to-buffer credit estimation and login feature
- Traffic generation
 - IPv6 testing
 - Throughput, back-to-back (burst), latency and frame loss measurement as per RFC 2544 (bidirectional results available through dual test set)
 - Multistream traffic generation and advanced filtering capability for in-depth troubleshooting
 - Q-in-Q capability for up to three layers of stacked VLANs
 - IEEE 802.1 p/Q framing capability to test RFC 2544 in a layer 2 VLAN environment
 - Dual port capabilities for simultaneous traffic generation and analysis at 100 % wire speed at any packet size
 - EtherBERT™ for bit-error-rate testing of Ethernet devices and systems
 - True wire-speed and stateful TCP throughput testing
- Additional analysis
 - UDP, TCP and IP header integrity validation
 - Service disruption time (SDT) measurements
 - IPTV testing and analysis
 - Packet jitter measurement (IP packet-delay variation as per RFC 3393) to qualify Ethernet equipments for transmission of delay-sensitive traffic such as VoIP and video
- Management protocols
 - PBB-TE and MPLS support for Carrier Ethernet
 - Ethernet in the First Mile 802.3ah OAM testing
- User interface
 - Easy-to-use smart user interface (SUI) for configuration screens, customization of test suites, reporting on real-time and historical performance
 - Expert mode capability to set test thresholds for clear pass/fail test results
 - Remote control capability through the Visual Guardian Lite and VNC software

Ethernet Performance Validation

The Internet Engineering Task Force (IETF) has put together a test methodology to address the issues of layers 2 and 3 performance verification. RFC 2544, a "Benchmarking Methodology for Network Interconnect Devices," specifies the requirements and procedures for testing throughput (performance availability), back-to-back frames (link burstability), frame loss (service integrity) and latency (transmission delay).

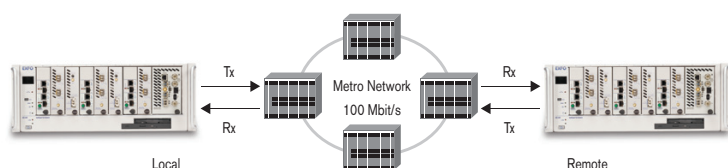
These measurements provide a baseline for service providers to define customer service-level agreements (SLAs). They enable service providers to validate QoS, allowing them to create value-added services that can be measured and demonstrated to customers. For example, these tests provide performance statistics and commissioning verification for virtual LANs (VLANs), virtual private networks (VPNs) and transparent LAN services (TLS), all of which use Ethernet as an access technology.

The SLA criteria defined in RFC 2544 can be precisely measured using specialized test instruments. The performance verification is usually done when the installation is completed. The measurements are done out-of-service to make sure that all parameters are controlled.

RFC 2544 Test Suite

The IQS-8510B Packet Blazer can perform the RFC 2544 test suite for 10/100/1000 Base-T and optical 100 Mbit/s GigE interfaces at all frame sizes and at full line rate, allowing the provider to certify that the circuit is efficient and error-free at 100 % utilization.

The Packet Blazer supports automated RFC 2544 testing, which helps ensure repeatable results. Automation also provides ease of use for field technicians by enabling accurate, efficient measurements and results through a clear and simple pass/fail indication. In addition, the Packet Blazer delivers reports that can be given to customers for future reference related to their specific SLAs.



Example of throughput test application.

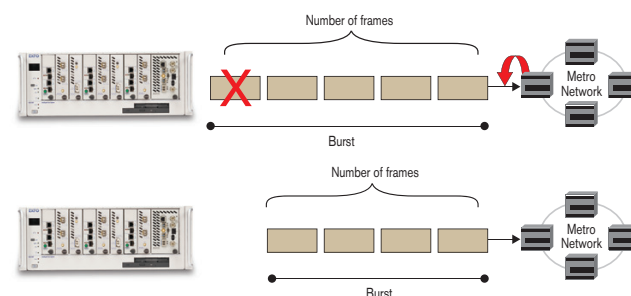
Throughput

Throughput is the maximum rate at which none of the offered frames are dropped by the device under test (DUT) or network under test (NUT). For example, the throughput test can be used to measure the rate-limiting capability of a switch. The throughput is essentially equivalent to the bandwidth.

The throughput test allows vendors to report a single value, which has proven to be useful in the marketplace. Since even the loss of one frame in a data stream can cause significant delays while waiting for the higher level protocols to time out, it is useful to know the actual maximum data rate that the device can support. Measurements should be taken over an assortment of frame sizes. Separate measurements should be made for routed and bridged data in those devices that can support both. If there is a checksum in the received frame, full checksum processing should be done.

Burst (Back-to-Back)

In this test, fixed-length frames are presented at a rate such that there is the minimum legal separation for a given medium between frames over a configurable period of time, starting from an idle state. The back-to-back value is the number of frames in the longest burst that the DUT/NUT will handle without the loss of any frames.



Example of burst (back-to-back) test application.

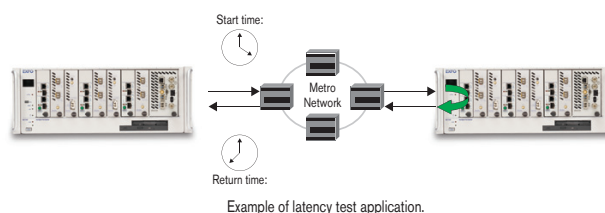
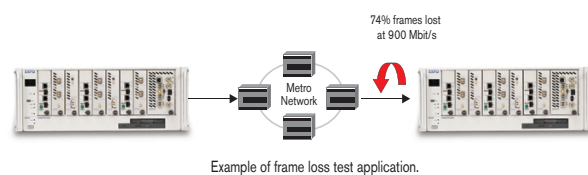
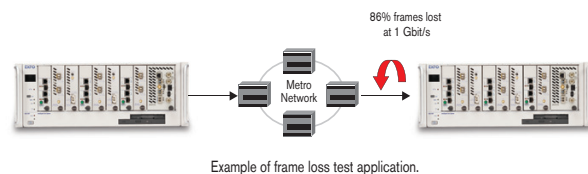
Ethernet Performance Validation (Cont'd)

Frame Loss

Frame loss is the percentage of frames that should have been forwarded by a network device under steady state (constant) loads that were not forwarded due to lack of resources. This measurement can be used in reporting the performance of a network device in an overloaded state. This can be a useful indication of how a device would perform under pathological network conditions such as broadcast storms.

Latency

Round-trip latency is the time it takes a bit (cut-through devices) or a frame (store and forward devices) to come back to its starting point. Variability of latency can be a problem. With technologies like voice and video-over-IP, a variable or long latency can cause significant degradation in quality.



TCP Throughput

The Internet protocol (IP) and transmission control protocol (TCP) together form the essence of TCP/IP networking. While IP deals with the delivery of packets, TCP provides the integrity and assurance that the data packets transmitted by one host are reliably received at the destination. Applications such as hypertext transfer protocol (HTTP), e-mail or file transfer protocol (FTP) depend on TCP as their delivery assurance mechanism within networks.

Customers deploying such applications expect not only physical and link-level SLAs from their service providers, but assurance that their TCP traffic requirements will be supported across the network. The TCP throughput feature on the Packet Blazer™ offers Ethernet service providers the capability of measuring and validating that the services offered to their customers support the TCP traffic performance they expect.

MPLS, MPLS-TP and PBB-TE: Carrier Ethernet Transport Solution Testing

Service providers worldwide are evolving their transport infrastructures to support bandwidth- and quality-intensive services such as voice and video. Network equipment providers must therefore offer IP convergence equipment to the edge/metro networks in a cost-effective and quality-assured manner. Ethernet has long been accepted as an inexpensive, scalable data networking solution in LAN environments. The stringent QoS expectations require solutions that tap into the cost-effectiveness of Ethernet without sacrificing the benefits of connection-oriented (albeit it costly) TDM solutions such as SONET/SDH.

Ethernet tunneling technologies such as Provider Backbone Bridge-Traffic Engineering or PBB-TE (also referred to as PBT) and transport MPLS address these requirements. These technologies enable connection-oriented Ethernet, providing carriers with a means of offering scalable, reliable and resilient Ethernet services. The PBB-TE and MPLS options on the IQS-8510B Packet Blazer offers a comprehensive tool to efficiently qualify Ethernet services from end-to-end, validating metro and core tunneling technologies.

Ethernet Advanced Troubleshooting

The IQS-8510B provides a number of advanced features essential for in-depth troubleshooting. The advanced filtering option allows the user to configure up to ten filters—each with up to four operands—which will be applied to the received Ethernet traffic. Detailed statistics are available for each configured filter, providing the user with critical information required to pinpoint specific problems. Additionally, the IQS-8510B supports a traffic scan feature that allows quick identification and monitoring of VLAN and MPLS flows on the network. This can help clearly identify top bandwidth users.

The IQS-8510B also supports full-line-rate data capture and decode. This key troubleshooting tool enables field technicians to easily identify complex network issues. The comprehensive capture feature includes the capability to configure capture filters and triggers to quickly zero-in on network events.

IPTV Testing and Analysis

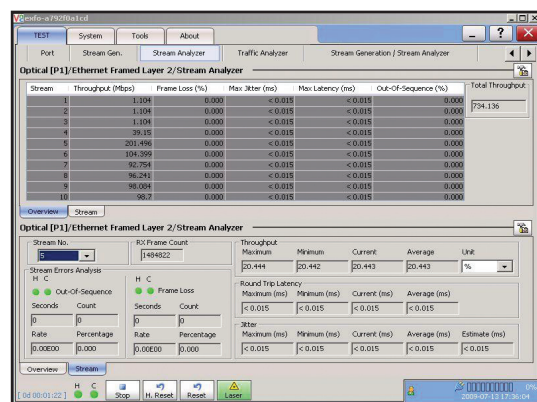
The IPTV software option, available on the IQS-8510B, leverages the current frame-analysis engine, delivering high performing measurement capabilities and providing users with over 35 different IPTV metrics and statistics. The key features and capabilities provided with this software option include RFC 4445 media delivery index (MDI), TR 101 290 priority 1 metrics, in addition to program clock reference jitter, IGMP support, stream rate and bandwidth utilization on 100 simultaneous MPEG-2, MPEG-4 or VC-1 streams. Usability features include user-configurable alarm thresholds for MDI and other selected metrics, enabling customizable test sequences as well as an auto-stream detection capability that automatically discovers valid IPTV streams within the Ethernet layer. Additionally, stream IP addresses can be linked to a user-definable stream name through an alias table typically containing the name of the broadcast channel.

The combination of an IQS platform and the IQS-8510B Packet Blazer with the IPTV software option offers service providers the most effective tool to quickly and efficiently test and monitor IPTV streams over their network. For more information on the IQS-8510B Packet Blazer IPTV option, please refer to the IPTV Test Option specification sheet.

EtherBERT™

Since the transparent transport of Ethernet services over physical media is becoming common, Ethernet is increasingly carried across a variety of layer 1 media over longer distances. This creates a growing need for the certification of Ethernet transport on a bit-per-bit basis, which can be done using bit-error-rate testing (BERT).

BERT uses a pseudo-random binary sequence (PRBS) encapsulated into an Ethernet frame, making it possible to go from a frame-based error measurement to a bit-error-rate measurement. This provides the bit-per-bit error count accuracy required for the acceptance testing of physical-medium transport systems. BERT-over-Ethernet should usually be used when Ethernet is carried transparently over layer 1 media, in cases such as Ethernet over DWDM, CWDM or dark fiber.



Statistics for each stream

Ethernet QoS Measurements

Data services are making a significant shift toward supporting a variety of applications on the same network. Multiservice offerings such as triple-play services have fuelled the need for QoS testing to ensure the condition and reliability of each service. The IQS-8510B Packet Blazer allows simultaneous simulation and qualification of different applications through its multistream application. The user has the capability to configure up to ten streams with different Ethernet and IP QoS parameters such as VLAN ID (802.1Q), VLAN Priority (802.1p), VLAN stacking (802.1ad Q-in-Q), ToS and DSCP. Specific stream profiles to transmit VoIP, video and data can be selected for each stream. Throughput, latency, frame loss and packet jitter (RFC 3393) measurements are also available simultaneously for each stream, allowing fast and in-depth qualification of performance criteria.

Fibre Channel Network Integrity Testing

EXFO's IQS-8510B Packet Blazer module also supports comprehensive Fibre Channel testing.

Interfaces

This module supports the following Fibre Channel interfaces:

INTERFACE	RATE
1x	1.0625 Gbit/s
2x	2.125 Gbit/s

Applications

Since most storage area networks cover large distances and Fibre Channel has stringent performance attributes that must be respected, testing at each phase of network deployment is imperative to ensure appropriate service levels. EXFO's IQS-8510B Fibre Channel option provides full wire-speed traffic generation at FC-0, FC-1 and FC-2 logical layers, allowing BER testing for link integrity measurements. Latency, buffer-to-buffer credit measurements for optimization, and login capabilities are also supported.

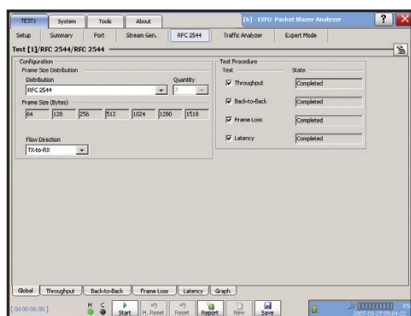
Buffer-to-Buffer Credit Estimation

Buffer-to-buffer credits are part of the flow control engine for Fibre Channel connections. This is a crucial configuration parameter for optimal network performance. Usually, network administrators calculate the value by taking the traveled distance and the data rate into consideration. However, since latency issues are not considered, poor accuracy is to be expected. The IQS-8510B module is capable of estimating buffer-to-buffer credit values with respect to latency by calculating the distance according to the round-trip latency time.

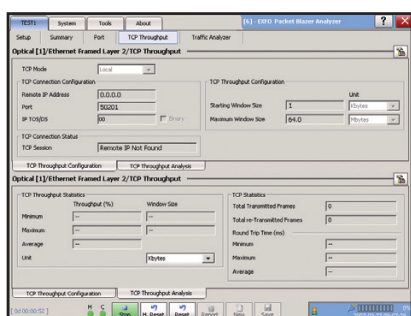
Latency

Transmission of frames in a network is not instantaneous and is subject to multiple delays caused by the propagation delay in the fiber and by processing time inside each piece of network equipment. Latency is the total accumulation of delays between two endpoints. Some applications such as VoIP, video and storage area networks are very sensitive to excess latency. It is therefore critical for service providers to properly characterize network latency when offering Fibre Channel services. From the latency measurement that they perform, the IQS-8510B Packet Blazer estimates buffer-to-buffer credit value requirements.

Efficient Testing Leads to Reliable Performance



RFC configuration screen



Throughput results screen

Remote Management

The Visual Guardian Lite™ remote management software, supported on all the Transport Blazer and Packet Blazer modules, provides the user with a remote connection to the instrument's graphical user interface (GUI). This identical view of the GUI is supported on any Windows-based workstation and allows for simplified remote testing and data analysis, as well as remote monitoring. Up to five simultaneous Visual Guardian Lite sessions can be supported per test module via a standard Ethernet connection to the platform. For remote testing applications, the Visual Guardian Lite software must be ordered separately.

Automated Test Scripting

All Packet Blazer modules support SCPI-compliant commands. The IQS-8510B Packet Blazer comes with a built-in macro-recorder, which allows users to easily record their test actions and automatically create test scripts; this also enables them to build standard test routines that can easily be accessed and run by technicians with little or no manual intervention. The Packet Blazer test modules include an extensive SCPI command set for automating test cases and routines using a GPIB or LAN interface. Complete documentation and technical support is provided to facilitate the integration of the instrument into your application.

Test Logger and Reporting

EXFO's IQS-8510B Packet Blazer module supports a detailed test logger and test reporting tools, enabling users to view any errors/alarms that occurred during the test interval, which can then be used for post-processing of results or SLA conformance validation.

IQS-600 Integrated Qualification System

The IQS-8510B Packet Blazer modules are housed in the IQS-600 Integrated Qualification System, a scalable modular rack-mount platform that is comprised of a controller, expansion units and a comprehensive range of plug-in test modules—ideal for manufacturing, lab and R&D environments. The IQS-600 platform offers up to ten slots, which can support any combination of modules from EXFO's full range of industry-proven protocol and optical test modules. Systems can be expanded to support up to 100 test modules. The IQS-600 family is comprised of the IQS-610P (a ten-slot control unit that can support up to nine IQS-610E ten-slot expansion units), and the IQS-605P (a five-slot control unit with an integrated touch screen). Combined with the built-in IQS Manager software, the IQS-600 platform provides an easy-to-use environment to manage your modules, configure your system, launch applications and analyze results. The IQS-600 can be controlled using local applications or through GPIB, RS-232 or Ethernet interfaces.



EXFO's IQS-8510B Packet Blazer Test Modules are housed in the IQS-600 Integrated Qualification System—EXFO's powerful lab/manufacturing test platform

Functional Specifications

OPTICAL INTERFACES

Optical interfaces	Two ports at 100M and GigE				
Available wavelengths (nm)	850, 1310 and 1550				
	100Base-FX	100Base-LX	1000Base-SX	1000Base-LX	1000Base-ZX
Wavelength (nm)	1310	1310	850	1310	1550
Tx level (dBm)	-20 to -15	-15 to -8	-9 to -3	-9.5 to -3	0 to 5
Rx level sensitivity (dBm)	-31	-28	-20	-22	-22
Maximum reach	2 km	15 km	550 m	10 km	80 km
Transmission bit rate (Gbit/s)	0.125	0.125	1.25	1.25	1.25
Reception bit rate (Gbit/s)	0.125	0.125	1.25	1.25	1.25
Tx operational wavelength range (nm)	1280 to 1380	1261 to 1360	830 to 860	1270 to 1360	1540 to 1570
Measurement accuracy (uncertainty)					
Frequency (ppm)	±4.6	±4.6	±4.6	±4.6	±4.6
Optical power (dB)	±2	±2	±2	±2	±2
Maximum Rx before damage (dBm)	3	3	6	6	6
Jitter compliance	ANSI X3.166	IEEE 802.3	IEEE 802.3	IEEE 802.3	—
Ethernet classification	ANSI X3.166	IEEE 802.3	IEEE 802.3	IEEE 802.3	—
Laser type	LED	FP	VCSEL	FP	DFB
Eye safety	Class 1	Class 1	Class 1	Class 1	Class 1
Connector	LC	LC	LC	LC	LC
Transceiver type	SFP	SFP	SFP	SFP	SFP

ELECTRICAL INTERFACES

Electrical interfaces	Two ports 10/100BaseT half/full duplex, 1000BaseT full duplex. Straight/crossover cable selection.		
	10Base-T	100Base-T	1000Base-T
Tx bit rate	10 Mbit/s	125 Mbit/s	1 Gbit/s
Tx accuracy (uncertainty) (ppm)	±100	±100	±100
Rx bit rate	10 Mbit/s	125 Mbit/s	1 Gbit/s
Rx measurement accuracy (uncertainty) (ppm)	±4.6	±4.6	±4.6
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

TESTING

EtherSAM (Y.156sam)	Capability to perform the Network Configuration Test and Service Test as per ITU-T Y.156sam. Tests can be performed to loopback or dual test set mode for bidirectional results.
RFC 2544	Throughput, back-to-back, frame loss and latency measurements according to RFC 2544. Frame size: RFC-defined sizes, user-configurable.
BERT	Layer 1 to layer 4 with or without VLAN Q-in-Q.
Patterns (BERT)	PRBS 2E9-1, PRBS 2E11-1, PRBS 2E15-1, PRBS 2E20-1, PRBS 2E23-1, PRBS 2E31-1, CRPAT, CSPAT, CJTPAT, Short CRTPAT, Long CRTPAT and up to 10 user patterns. Capability to invert patterns.
Error insertion (BERT)	FCS, bit, symbol.
Error measurement	Jabber/giant, runt, undersize, oversize, FCS, symbol, idle, carrier sense, alignment, collision, late collision, excessive collision, UDP, TCP and IP header checksum.
Error measurement (BERT)	Bit error, symbol error, idle error, bit mismatch 0, bit mismatch 1, FCS error, performance monitoring (G.821 and G.826).
Alarm insertion (BERT)	LOS, pattern loss.
Alarm detection	LOS, link down, pattern loss, no traffic.
Service disruption time measurement (BERT)	Defect or No Traffic mode. Disruption time statistics include shortest, longest, last, average, total and count.
Multistream generation	Capability to transmit up to ten streams. Configuration parameters are: packet size, transmission mode (N-Frames, Burst, N-Burst, Ramp, N-Ramp and Continuous), MAC source/destination address, VLAN ID, VLAN priority, IP source/destination address, ToS field, DSCP field, TTL, UDP/TCP source/destination port and payload. Selectable predefined stream profiles for voice, video and data streams. VoIP codecs (G.711, G.723.1, G.729), video (MPEG-2 SDTV, MPEG-2 HDTV, MPEG-4 HDTV).
Multistream analysis	Capability to analyze packet jitter, latency, throughput, frame loss and out-of-sequence per-stream statistics.
VLAN stacking	Capability to generate I.E.E.E 802.1ad Q-in-Q tagged VLAN traffic and filter received packets by VLAN ID and VLAN tag at any layer.
PBB-TE ^a	Capability to generate and analyze streams with PBB-TE data traffic including configuration of B-MAC (source and destination), B-VLAN and I-tag (as per 802.1ah) and to filter received traffic by any of these fields.
MPLS ^a	Capability to generate and analyze streams with up to two layers of MPLS labels and to filter received traffic by MPLS label or COS.
IPv6 ^a	Capability to perform BERT, RFC 2544, traffic generation and analysis and Smart Loopback tests over IPv6. Ping, traceroute, neighbor discovery and stateless auto-configuration.
Data capture ^a	Capability to perform up to 1G full-line-rate data capture and decode. Capability to configure detailed capture filters and triggers as well as capture slicing parameters.
Traffic scan ^a	Capability to scan incoming live traffic and auto-discover all VLAN/VLAN Priority and MPLS ID/COS flows. Capability to provide statistics for each flow including frame count and bandwidth.

Note

a. Available as a software option.

Ethernet Functional Specifications (Cont'd)

TESTING

Traffic filtering	Capability to analyze the incoming traffic and provide statistics according to a set of up to 10 configurable filters. Filters can be configured for MAC source/destination address, VLAN ID, VLAN priority, IP source/destination address, ToS field, DSCP field, TCP source/destination port and UDP source/destination port. VLAN filtering can be applied to any of the stacked VLAN layers.
Ethernet statistics	Multicast, broadcast, unicast, N-unicast, pause frame, frame size distribution, bandwidth, utilization, frame rate, frame loss, out-of-sequence frames, in-sequence frames.
Packet jitter statistics	Delay variation statistics (ms) – min., max., last, average, jitter measurement estimate.
Flow control injection	Packet pause time.
Flow control statistics	Pause time, last pause time, max. pause time, min. pause time, paused frames, abort frames, frames Tx, frames Rx.
Advanced auto-negotiation	Capability to auto-negotiate the rate, duplex and flow control capabilities with another Ethernet port. Configurable auto-negotiation parameters. Display of link partner capabilities. Fault injection: offline, link failure, auto-negotiation error.
Advanced filtering ^a	Capability to enhance the filters with up to four (4) fields each, that can be combined with AND/OR/NOT operations. A mask is also provided for each field value to allow for wildcards. Complete statistics are gathered for each defined filter.
Through mode ^a	Capability to test in Through/Pass Through mode.

ADDITIONAL TEST AND MEASUREMENT FUNCTIONS

Power measurement	Supports optical power measurement, displayed in dBm.
Frequency measurement	Supports clock frequency measurements (i.e., received frequency and deviation of the input signal clock from nominal frequency).
Frequency offset measurement	
Range	±120 ppm
Resolution	1 ppm
Accuracy (uncertainty)	±4.6 ppm
Frequency offset generation	
Range	±120 ppm
Resolution	1 ppm
Accuracy (uncertainty)	±4.6 ppm
Dual test set	Performs end-to-end, bidirectional performance testing (as required by leading standards bodies)–remote Packet Blazer controlled via the LAN connection under test.
DHCP client	Capability to connect to a DHCP server to obtain its IP address and subnet mask for connecting on to the network.
Smart Loopback	Capability to return traffic to the local unit by swapping packet overhead up to layer 4 of the OSI stack.
TCP throughput measurements ^a	Capability to evaluate TCP throughput and to provide performance results and statistics: window size with corresponding throughput, number of transmitted and re-transmitted segments, round-trip time.
IPTV testing and analysis ^a	Capability to measure and auto-discover 100 IPTV streams and provide IPTV statistics on a per stream basis: MDI (RFC 4445), PCR jitter (TR 101 290 priority 1) transmission rate, instantaneous rate, % utilization, virtual buffer size, UDP/IP port number, packet size and packet count, threshold alarm reporting and alias table. Also supports IGMPv2.
802.3ah OAM testing ^a	Capability to test Ethernet OAM as per IEEE 802.3ah including connection establishment, OAM protocol statistics and loopback control.
IP tools	Capability to perform ping and traceroute functions.

ADDITIONAL FEATURES

Expert mode	Ability to set thresholds in RFC 2544 and BERT mode to provide a pass/fail status.
Scripting	The built-in Visual Basic .NET scripting engine and embedded macrorecorder provide a simple means of automating test cases and routines. Embedded scripting routines provide a powerful means of creating advanced test scripts.
Event logger	Supports logging of test results, and the ability to print, export (to a file) or export the information contained in the logging tool.
Power up and restore	In the event of a power failure to the unit, the active test configuration and results are saved and restored upon bootstrap.
Save and load configuration	Ability to store and load test configurations to/from non-volatile memory.
Configurable test views	Allows users to customize their test views; i.e., to dynamically insert or remove test tabs/windows, in addition to creating new test windows, so as to accurately match their testing needs.
Report generation	Ability to generate test reports in the following user-selectable formats: .pdf, .html, .txt and .csv.
Screen capturing	Capability to gather a snap-shot of the screen for future use.
Logger printing	Capability to send logger messages to a supported local printer.
Graph	Allows to graphically display the test statistics of the performance (RFC 2544) and frame analysis tests.
Configurable test timer	Allows the user to set a specific start and stop time for tests.
Remote control	Remote control through Visual Guardian Lite software or VNC.
Test favorites	Capability to select and load from predefined or user-modified test configurations.

Note

a. Available as a software option.

Fibre Channel Interfaces

FC-1X/2X

Wavelength (nm)	850	1310	1550
Tx level (dBm)	-9 to -3	-9.5 to -3	0 to 5
Rx level sensitivity (dBm)	-18 at FC-2X -20 at FC-1X	-21 at FC-2X -22 at FC-1X	-21 at FC-2X -22 at FC-1X
Maximum reach	550 m on 50/125 µm MMF at FC-1X 300 m on 50/125 µm MMF at FC-2X 300 m on 62.5/125 µm MMF at FC-1X 150 m on 62.5/125 µm MMF at FC-2X	10 km	80 km
Transmission bit rate (Gbit/s)	1.0625 to 2.125	1.0625 to 2.125	1.0625 to 2.125
Reception bit rate (Gbit/s)	1.0625 to 2.125	1.0625 to 2.125	1.0625 to 2.125
Tx operational wavelength range (nm)	830 to 860	1270 to 1360	1540 to 1570
Measurement accuracy (uncertainty)			
frequency (ppm)	±4.6	±4.6	±4.6
optical power (dB)	±2	±2	±2
Maximum Rx before damage (dBm)	6	6	6
Jitter compliance	ANSI FC-PI-2	ANSI FC-PI-2	ANSI FC-PI-2
Fibre Channel classification	ANSI FC-PI-2	ANSI FC-PI-2	ANSI FC-PI-2
Laser type	VCSEL	Fabry-Perot	DFB
Eye safety	Class 1	Class 1	Class 1
Connector	LC	LC	LC
Transceiver type	SFP	SFP	SFP

Fibre Channel Functional Specifications

TESTING (1X AND 2X)

BERT	Unframed, framed FC-1, framed FC-2.
Patterns (BERT)	PRBS 2E31-1, 2E23-1, 2E20-1, 2E15-1, 2E11-1, 2E9-1 CSPAT, CRPAT, CJTPAT, and 10 user-defined 32 bits patterns.
Error insertion	Bit error, symbol error, oversize error, CRC error, undersize error.
Error measurement	Bit error, symbol error, oversize error, CRC error, undersize error, performance management (G.821 and G.826).
Alarm insertion	LOS, pattern loss, link down.
Alarm detection	LOS, pattern loss, link down.
Buffer-to-buffer credit testing	Buffer-to-buffer credit estimation based on latency.
Latency	Round-trip latency measurement.

ADDITIONAL TEST AND MEASUREMENT FUNCTIONS (1X AND 2X)

Power measurement	Support optical power measurement, displayed in dBm.
Frequency measurement	Supports clock frequency measurements (i.e., received frequency and deviation of the input signal clock from nominal frequency).
Frequency offset measurement	
Range	±120 ppm
Resolution	1 ppm
Accuracy (uncertainty)	±4.6 ppm
Frequency offset generation	
Range	±120 ppm
Resolution	1 ppm
Accuracy (uncertainty)	±4.6 ppm

General Specifications

Size (H x W x D)	125 mm x 36 mm x 280 mm	(4 ¹⁵ / ₁₆ in x 1 ⁷ / ₁₆ in x 11 in)
Weight (without transceivers)	0.5 kg	(1.1 lb)
Temperature		
operating	0 °C to 40 °C	(32 °F to 104 °F)
storing	-40 °C to 60 °C	(-40 °F to 140 °F)

ORDERING INFORMATION

MODULE

IQS-85XX-XX

Model

IQS-8510B^a
 IQS-8510B-1^b
 IQS-8510B-2^c

Other options

00 = Without other options
 100 optical = 100 M optical capability on both ports
 TCP = TCP throughput measurement
 IPTV_MON = IPTV testing and analysis (10 streams)
 IPTV_MaxStream = IPTV testing and analysis (100 streams)
 802.3ah OAM = 802.3ah OAM testing
 PBB-TE = PBB-TE testing
 MPLS = MPLS testing
 Adv_filtering = Advanced filtering capabilities
 IPv6 = IPv6 testing capabilities
 ETH-THRU = Through mode testing^d
 Data_Capture = Data capture and decode capabilities
 TRAFFIC-SCAN = VLAN/MPLS traffic scan

Example: IQS-8510B-2-100 optical

For Gigabit Ethernet optical interfaces, IQS-859x transceivers must be ordered separately if needed. User's transceiver(s) can be employed. However, compatibility with our products is not guaranteed.

TRANSCEIVER

IQS-8590 = 1000Base-SX (850 nm) LC connectors; optical SFP transceiver module for FTB-8510B Packet Blazer
IQS-8591 = 1000Base-LX (1310 nm) LC connectors; optical SFP transceiver module for FTB-8510B Packet Blazer
IQS-8592 = 1000Base-ZX (1550 nm) LC connectors; optical SFP transceiver module for FTB-8510B Packet Blazer
IQS-85910 = 100Base-FX (1310 nm) MM, LC connectors; optical SFP transceiver module for FTB-8510B Packet Blazer^e
IQS-85911 = 100Base-LX (1310 nm) SM, LC connectors; optical SFP transceiver module for FTB-8510B Packet Blazer^e

Note

- Provides 2x 10/100 BaseT ports.
- Provides 2x 10/100 BaseT ports and 1x GigE port.
- Provides 2x 10/100 BaseT ports and 2x GigE ports.
- Requires IQS-8510B-2 configuration.
- Available with 100 optical option.

Complementary Products

IQS-8510G Packet Blazer 10 Gigabit Ethernet Test Module

The IQS-8510G module tests connectivity in its native format: 10GBASE-xR or 10GBASE-xW used for transport of Ethernet-based LAN-to-LAN services. It can also be used to test next-generation SONET/SDH, hybrid multiplexers, dark fiber or xWDM networks running 10 Gigabit Ethernet interfaces.

For more information on the IQS-8510G, please refer to its detailed spec sheet on the product page at <http://documents.exfo.com/specsheets/IQS-8510G-angHR.pdf>.



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EXFO is certified ISO 9001 and attests to the quality of these products. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. EXFO has made every effort to ensure that the information contained in this specification sheet is accurate. However, we accept no responsibility for any errors or omissions, and we reserve the right to modify design, characteristics and products at any time without obligation. Units of measurement in this document conform to SI standards and practices. In addition, all of EXFO's manufactured products are compliant with the European Union's WEEE directive. For more information, please visit www.EXFO.com/recycle. Contact EXFO for prices and availability or to obtain the phone number of your local EXFO distributor.

For the most recent version of this spec sheet, please go to the EXFO website at <http://www.EXFO.com/specs>

In case of discrepancy, the Web version takes precedence over any printed literature.