FTB-8510B

Packet Blazer

NETWORK TESTING–TRANSPORT AND DATACOM

COMPLETE IPv6 TESTING

Fully integrated test solution for performance assessment of Ethernet transport networks

- Throughput, back-to-back, latency and frame loss measurements as per RFC 2544 (bidirectional results)
- 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 undisputable SLA reinforcement for Ethernet services
- IPTV testing and analysis
- Complete carrier Ethernet services portfolio: PBB-TE (MAC-in-MAC), MPLS, 802.3ah and IPv4/6
- 1x and 2x Fibre Channel testing

Platform Compatibility

- FTB-500 Platform
- FTB-400 Universal Test System
- FTB-200 Compact Platform

2004 FROST & SULLIVAN
2005 FROST & SULLIVAN
2006 FROST & SULLIVAN
2007 FROST & SULLIVAN
Growth Strategy Leadership Award

Next-Generation Network Assessment

MEF METRO ETHERNET FORUM

EXFO EXPERTISE REACHING OUT

Assessing the Performance of Ethernet Services

EXFO's FTB-8510B Packet Blazer™ brings performance assurance to Ethernet-based services. Its wide range of test functionalities provides all the necessary measurement tools for verifying service-level agreements (SLAs) between service providers and their customers.

The FTB-8510B module tests connectivity in its native format: 10/100/1000Base-T, 100Base-FX, 100Base-LX, 1000Base-SX, 1000Base-LX and 1000Base-ZX for LAN-to-LAN services delivered via next-generation SONET/SDH, SONET/SDH hybrid multiplexers, switched Ethernet, VLANs, dark fiber, WDM, FTTx systems or other means.

Combined with its rack-mounted manufacturing/R&D-environment counterpart, the IQS-8510B Packet Blazer, the FTB-8510B simplifies and speeds up the deployment of Ethernet services.

The FTB-8510B Packet Blazer Ethernet Test Module can be housed in the FTB-200 Compact Platform. Also shown in the platform, is the FTB-8510G Packet Blazer 10 Gigabit Ethernet Test Module.

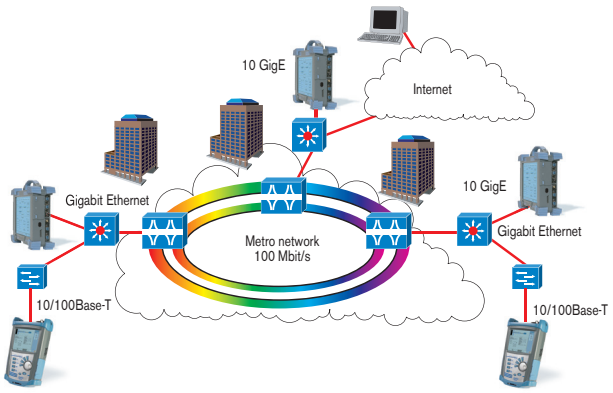
The FTB-8510B Packet Blazer Ethernet Test Module is also compatible with the FTB-400 Universal Test System and FTB-500 Platform. Shown in the FTB-400, are the FTB-8510G Packet Blazer 10 Gigabit Ethernet Test Module and the FTB-8130 Transport Blazer Next-Generation SONET/SDH Test Module.

Key Features

- Throughput, back-to-back, latency and frame loss measurements as per RFC 2544 (bidirectional results through dual test set)
- Multistream generation and analysis, perfect for installing, commissioning and maintaining Ethernet networks
- EtherBERT™ for bit-error-rate testing of 10, 100 and 1000 Mbit/s Ethernet circuits
- True wire-speed and stateful TCP throughput testing
- PBB-TE and MPLS support for carrier Ethernet
- IPTV testing and analysis
- Packet jitter measurement (IP packet-delay variation as per RFC 3393) to qualify Ethernet transport networks for transmission of delay-sensitive traffic such as voice-over-IP (VoIP) and video
- Dual port capability for simultaneous traffic generation and reception at 100 % wire speed for 10/100/1000Base-T, 100Base-FX, 100Base-LX, 1000Base-SX, 1000Base-LX or 1000Base-ZX full-duplex networks at all packet sizes
- Q-in-Q capability for up to three layers of stacked VLANs
- Ethernet in the first mile 802.3ah testing
- Fibre Channel 1x and 2x test suite
- Expert mode capability to set test thresholds for clear pass/fail test results
- Easy-to-use smart user interface (SUI) for configurable screens, customization of test suites, as well as real-time and historical performance reporting
- Remote control capability through Visual Guardian Lite and VNC software
- Advanced filtering capability for in-depth network troubleshooting
- Service disruption time measurement
- IPv6 testing

RFC 2544 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 SLAs.



Testing can be performed end-to-end or end-to-core, depending on the SLA. Remote testing is also possible.

RFC 2544 Test Suite

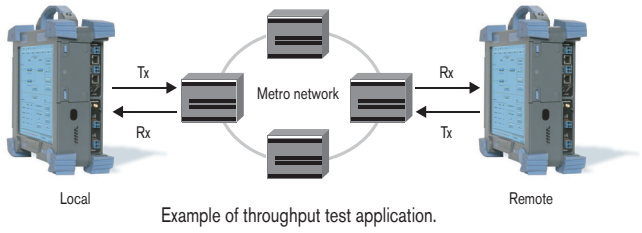
The FTB-8510B Packet Blazer can perform the RFC 2544 test suite for 10/100/1000Base-T and optical 100 Mbit/s and GigE interfaces at all frame sizes and at full line rate, allowing the provider to certify that the circuit is efficient and error-free at 100 % utilization. More importantly, when in dual test set mode, the Packet Blazer allows bi-directional testing, providing independent RFC 2544 test results for each direction (local to remote and remote to local). This is especially important when testing Ethernet services as traffic from each direction often takes different paths in the network. Performance results can therefore vary depending on the direction.

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 generates reports that can be given to customers for future reference related to their specific SLAs.

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.

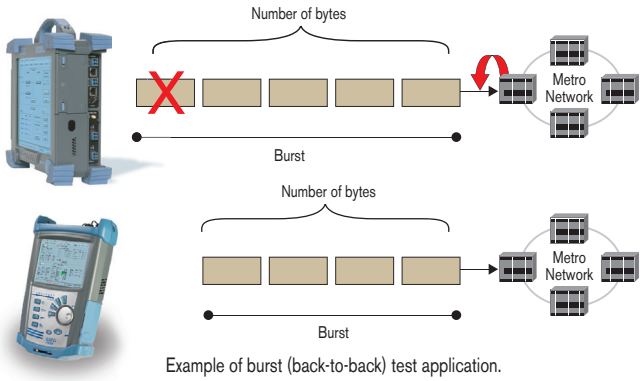
The throughput test allows vendors to report a single value, which has proven to be useful in the marketplace. Since even the loss of one frame in a data stream can cause significant delays while waiting for the higher level protocols to time out, it is useful to know the actual maximum data rate that the device can support. Measurements should be taken over an assortment of frame sizes and preferably in a bi-directional way.



Example of throughput test application.

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.

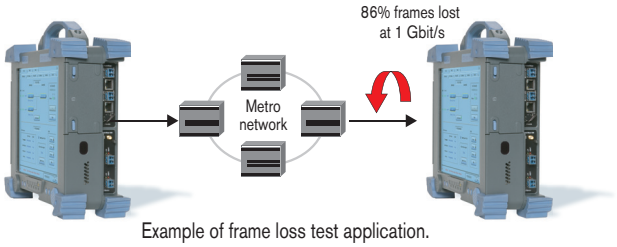


Example of burst (back-to-back) test application.

RFC 2544 Performance Validation (Cont'd)

Frame Loss

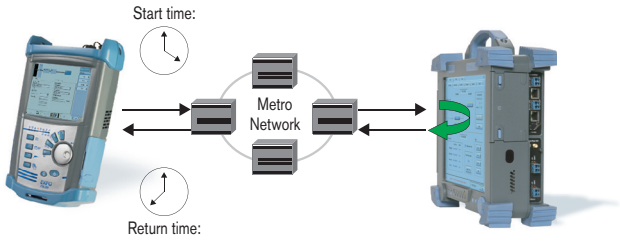
Frame loss is the percentage of frames that should have been forwarded by a DUT/NUT under steady state (constant) loads but were not forwarded due to lack of resources. This measurement can be used in reporting the performance of a network device in an overloaded state. This can be a useful indication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



Example of frame loss test application.

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.



Example of latency test application.

Efficient Testing Leads to Reliable Performance

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 throughout 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.

PBB-TE and MPLS: Carrier Ethernet Transport Solution Testing

As technologically-sophisticated business and residential consumers continue to drive demand for premium, high-bandwidth data services such as voice and video, service providers worldwide are evolving their transport infrastructures to support these bandwidth and quality intensive services. No longer is an all-IP core sufficient – providers must now expand their IP convergence to the edge/metro network, in a cost-effective, quality-assured manner. Ethernet has long been accepted as an inexpensive, scalable data networking solution in LAN environments. The stringent quality of service 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.

Two Ethernet tunneling technologies address these requirements: Provider Backbone Bridge-Traffic Engineering or PBB-TE (also referred to as PBT) and transport MPLS. These two 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 FTB-8510B Packet Blazer offer service providers a comprehensive field tool to efficiently qualify Ethernet services from end-to-end, validating metro and core tunneling technologies.

Ethernet Advanced Troubleshooting

The FTB-8510B provides a number of advanced features essential for in-depth troubleshooting in the event of network failures or impairments. 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. Other advanced troubleshooting tools include advanced auto-negotiation, flow control capabilities as well as Ethernet in the first mile 802.3ah support.

IPTV Testing and Analysis

The IPTV software option, available on the FTB-8510B, leverages the current frame-analysis engine, delivering high performing measurement capabilities and providing users with over 45 different IPTV metrics and statistics in a powerful portable IPTV test platform. 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.

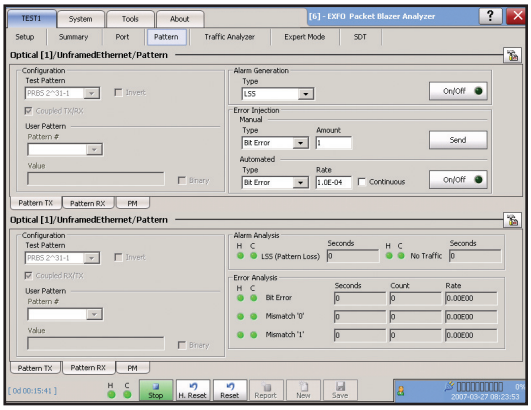
The combination of the portable FTB-400 or FTB-500 platforms and the FTB-8510B Packet Blazer with the IPTV software option offers service providers the most effective tool to quickly and efficiently test and monitor IPTV streams over their network. For more information on the FTB-8510B Packet Blazer IPTV option, please refer to the IPTV Test Option specification sheet.

EtherBERT™

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).

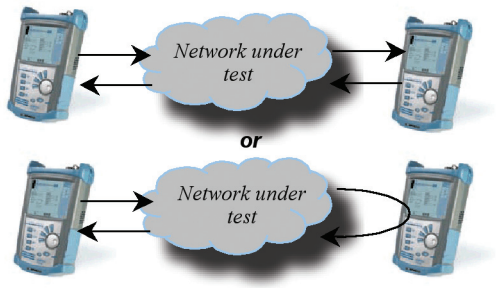
BERT uses a pseudo-random binary sequence (PRBS) encapsulated into an Ethernet frame, making it possible to go from a frame-based error measurement to a bit-error-rate measurement. This provides the bit-per-bit error count accuracy required for acceptance testing of physical-medium transport systems.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

- Ethernet-over-DWDM
- Ethernet-over-CWDM
- Ethernet-over-dark fiber



BERT analysis screen.

Ethernet statistics screen.



End-to-end testing options.

Ethernet and IP QoS Testing

Data services are making a significant shift toward supporting a variety of applications on the same network. This shift has fuelled the need for QoS testing to ensure the condition and reliability of services. By providing the ability to configure 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 on multiple streams, the Packet Blazer allows service providers to simulate and qualify different types of applications running over their Ethernet network.

This FTB-8510B Packet Blazer frame analysis feature enables multistream traffic generation and analysis allowing for the troubleshooting of Ethernet circuits as well as customer-traffic analysis and error identification. Thanks to its packet jitter measurement capability (RFC 3393), the FTB-8510B lets service providers efficiently benchmark transport networks when it comes to delay-sensitive traffic such as voice- and video-over-IP.

Flexible End-to-End Testing

With the FTB-8510B Packet Blazer, the user can perform end-to-end testing through control of the remote unit via the LAN connection under test. This unique approach gives service providers access to test results for each direction of test, which is essential to fully qualify Ethernet services. It is also possible to perform end-to-end testing by using the Smart Loopback mode where the remote unit will return traffic to the local unit by swapping packet overhead up to layer 4 of the OSI stack.

Fibre Channel Network Integrity Testing

EXFO's FTB-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 SANs 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 FTB-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 FTB-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.

Ethernet Interfaces

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 [a] 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

Note

a. Available as a software option.

Ethernet Functional Specifications

TESTING

RFC 2544	Throughput, back-to-back, frame loss and latency measurements according to RFC 2544 (bidirectional). Frame size: RFC-defined sizes, user-configurable (bidirectional).
BERT	Unframed. 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 and 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, 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 10 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 source/destination port and payload.
VLAN stacking (Q-in-Q)	Capability to generate streams with up to three layers of VLAN (including IEEE802.1ad Q-in-Q tagged VLAN) and to filter received traffic by VLAN ID or VLAN priority at any of the stacked VLAN layers.
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.

Note

a. Available as a software option.

Ethernet Functional Specifications (Cont'd)

TESTING

Traffic analysis	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.
Jitter statistics	Generation: packet jitter simulation – VoIP G.711, VoIP G.723.1, G.729, user-defined. Analysis: delay variation statistics (ms) – min., max., last, average, number of samples, 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-negociation 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.
Remote ENIU configuration	Capability to support the operation, administration and maintenance (OAM) layer between a Packet Blazer and ADC ENIUs. This includes detection of ENIUs in the network and sending loopback commands.
Through mode [a]	Capability to test in Through mode or 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, b]	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, percentage of utilization, virtual buffer size, UDP/IP Port #, 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.

ADDITIONAL FEATURES

Expert mode	Ability to set thresholds in RFC 2544 and BERT mode to provide a pass/fail status.
Scripting [b]	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 [b]	In the event of a power failure to the unit, the active test configuration and results are saved and restored upon bootup.
Save and load configuration	Ability to store and load test configurations to/from non-volatile memory.
Configurable test views [b]	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 [c]	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.

Notes

a. Available as a software option.

b. Available on the FTB-400, FTB-500, IQS-500 and IQS-600 platforms only.

c. Available on the FTB-200 platform only.

Fiber 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
Max 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
Max Rx before damage (dBm)	6	6	6
Jitter compliance	ANSI FC-PI-2	ANSI FC-PI-2	ANSI FC-PI-2
FC 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

Fiber 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.
Alarm insertion	LOS, pattern loss.
Alarm detection	LOS, pattern loss.
Buffer-to-buffer credit testing	Buffer-to-buffer credit estimation based on latency.
Latency	Round-trip latency measurement.

ADDITIONNAL 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)	96 mm x 25 mm x 280 mm	(3 3/4 in x 1 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

FTB-85XX-XX

Model

FTB-8510B [a]
FTB-8510B-1 [b]
FTB-8510B-2 [c]

Other options

00 = Without other options
100 optical = 100 Mbit/s 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
FC = 1x and 2X Fibre Channel option
Adv_filtering = Advanced filtering capabilities
IPv6 = IPv6 testing capabilities
ETH-THRU = Through mode testing

Example: FTB-8510B-2-100 optical

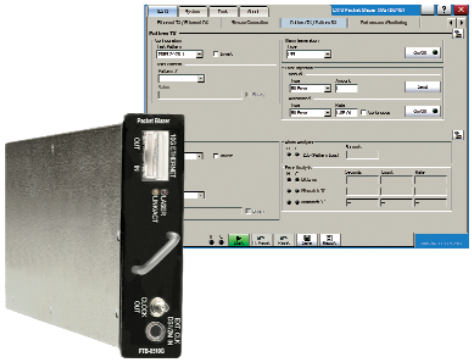
TRANSCEIVER

FTB-8590 = SFP mutirate optical transceiver module: Rates: GigE/FC/2FC 850 nm, LC, MMF, < 500 m reach
FTB-8591 = SFP mutirate optical transceiver module: Rates: GigE/FC/2FC 1310 nm, LC, 10 km reach
FTB-8592 = SFP mutirate optical transceiver module: Rates: GigE/FC/2FC 1550 nm, LC, 90 km reach
FTB-85910 [d] = 100Base-FX (1310 nm) MM, LC connectors; optical SFP transceiver module for FTB-8510B Packet Blazer
FTB-85911 [d] = 100Base-LX (1310 nm) SM, LC connectors; optical SFP transceiver module for FTB-8510B Packet Blazer

NOTE

a. Provides 2x 10/100 BaseT ports.
b. Provides 2x 10/100 BaseT ports and 1x GigE port.
c. Provides 2x 10/100 BaseT ports and 2x GigE ports.
d. Available with 100 optical option.

Complementary Products



FTB-8510G Packet Blazer 10 Gigabit Ethernet Test Module

Housed in the FTB-400 and FTB-200 platforms, the FTB-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 FTB-8510G, please refer to its detailed spec sheet at http://documents.EXFO.com/specsheets/FTB-8510G-ang.pdf.

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SPFTB8510B.6AN

Printed in Canada 09/04

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