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Test & Measurement

- sales
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- calibration
- repair
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Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

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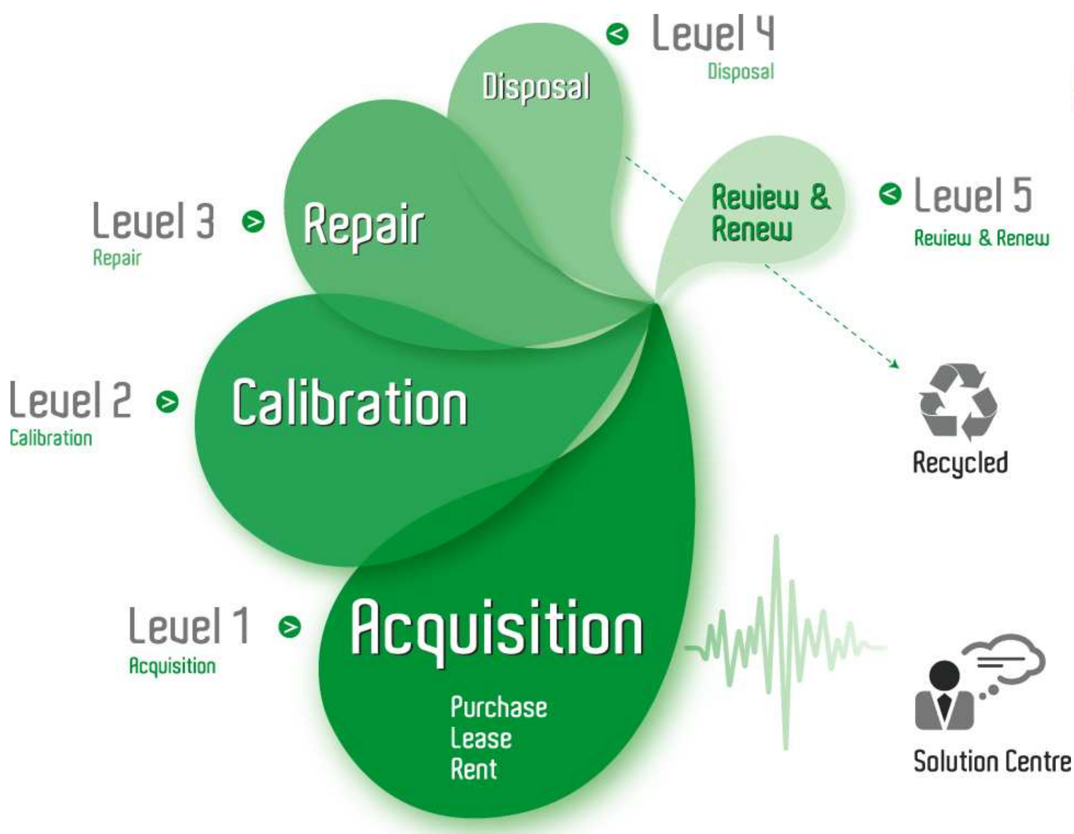

Product Lifecycle Management System

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Form 080/01

10 GIGABIT ETHERNET TEST MODULE

FTB-8510G Packet Blazer

NETWORK TESTING – TRANSPORT AND DATACOM

Platform Compatibility

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

Performance assurance for Ethernet-based frame services

- LAN and WAN PHY capability in a single module
- Fully integrated functionality for assessing the performance of Ethernet transport networks
- Packet jitter measurement to qualify Ethernet transport networks for transmission of delay-sensitive traffic such as voice-over-IP (VoIP)
- Throughput, burstability (back-to-back), latency and frame loss measurements as per RFC 2544
- EtherBERT™ test functionality for assessing the integrity of 10 Gigabit Ethernet running on WDM networks

The Choice for 10 Gigabit Ethernet Performance Assurance

EXFO's FTB-8510G Packet Blazer™ offers performance assurance for Ethernet-based frame services. Its suite of test applications provides all the measurements required for validating service-level agreements (SLAs) between service providers and their customers. Housed in the FTB-400 Universal Test System or FTB-200 Compact Platform, 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.

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

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

The FTB-8510G Packet Blazer 10 Gigabit Ethernet Test Module is housed in the FTB-400 Universal Test System, EXFO's rugged, all-in-one portable platform. Also shown in the platform, the FTB-8510B Packet Blazer Ethernet Test Module and the FTB-8120/8130 Transport Blazer Next-Gen SONET/SDH Test Module.

KEY FEATURES

- Measures throughput, back-to-back (burstability), latency and frame loss as per RFC 2544
- EtherBERT™* for bit-error-rate testing of 10 Gigabit Ethernet circuits
- Performs 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)
- Q-in-Q capability with the ability to go up to three layers of stacked VLANs
- LAN PHY and WAN PHY available in a single module
- Simultaneous traffic generation and reception at 100% wire speed for 10GBASE-SR, -ER, -LR, -SW, -EW or -LW full-duplex interfaces at all valid frame sizes
- Transmits and analyzes up to 10 streams, perfect for installing, commissioning and maintaining Ethernet networks
- UDP, TCP and IP header integrity validation
- Dual test set
- Expert mode capability for defining test pass/fail thresholds
- Easy-to-use smart user interface (SUI) for configurable screens, customization of test suites, as well as real-time and historical performance reporting
- Capability to remote control the Packet Blazer test module with the Visual Guardian Lite software or VNC
- Fully compliant to IEEE 802.3ae standard
- Pluggable XFP base optical module

* Patent-pending

Ethernet Performance Validation

The Internet Engineering Task Force (IETF) has put together a test methodology to address the issues of performance verification at the layer 2 and 3 level. 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).

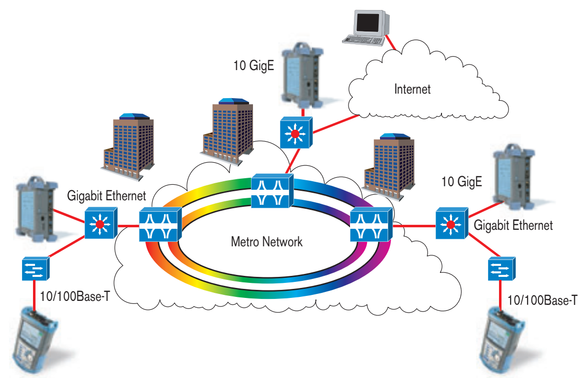
When these measurements are performed, they provide a baseline for service providers to define SLAs with their customers. They enable service providers to validate the quality of service (QoS) delivered and can provide them with a tool to create value-added services that can be measured and demonstrated 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 following sections describe each of the RFC 2544 tests. The test equipment used should be able to generate and analyze traffic for 10GBASE-xR or 10GBASE-xW full duplex networks at all frame sizes in order to test transparent connectivity for LAN-to-LAN services delivered via Next-Generation SONET/SDH, SONET/SDH hybrid multiplexers, switched Ethernet, VLANs, dark fiber, WDM or other means. The instruments should be capable of transmitting at full line rate, in order to allow the provider to certify that the circuit is efficient and error-free at 100% utilization.

Some test instruments allow automated testing, which helps to ensure repeatable results. Automation also provides ease of use for technicians in the field by enabling accurate, efficient measurements and providing reports they can give to customers for future reference related to their specific SLAs.

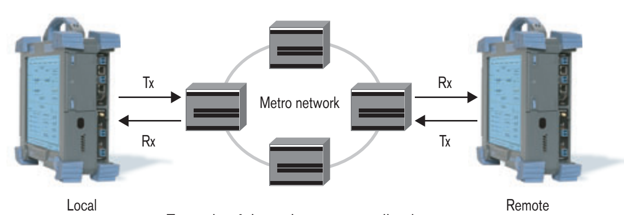


Testing can be performed end-to-end or end-to-core, depending on the SLA. Remote testing is also possible.

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.



Example of throughput test application.

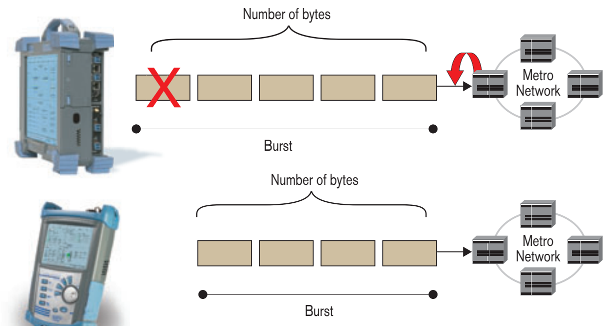
Throughput test procedure:

1. *Send a specific number of frames at a specific rate through the DUT/NUT and then count the frames that are transmitted by the DUT/NUT.*
2. *If the count of offered frames is equal to the count of received frames, the rate of the offered stream is raised and the test rerun.*
3. *If fewer frames are received than were transmitted, the rate of the offered stream is reduced and the test is rerun.*
4. *The throughput is the fastest rate at which the count of test frames transmitted by the DUT/NUT is equal to the number of test frames sent to it by the test equipment.*

Ethernet Performance Validation (Cont'd)

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.



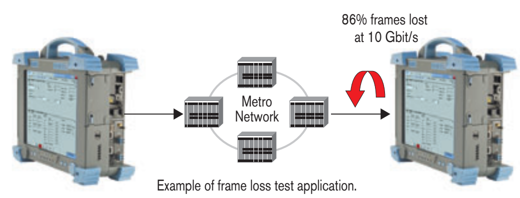
Example of burst (back-to-back) test application.

Burst test procedure:

1. *Send a burst of frames with minimum inter-frame gaps to the DUT/NUT and count the number of frames forwarded by the DUT/NUT.*
2. *If the count of transmitted frames is equal to the number of frames forwarded, the length of the burst is increased and the test is rerun.*
3. *If the number of forwarded frames is less than the number transmitted, the length of the burst is reduced and the test is rerun.*
4. *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.*
5. *The trial length must be at least 2 seconds and should be repeated at least 50 times with the average of the recorded values being reported.*

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.



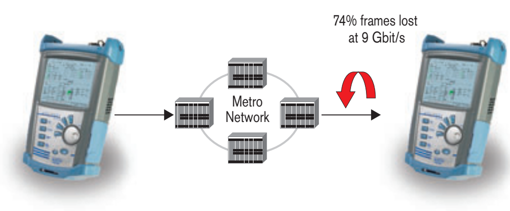
Example of frame loss test application.

Frame loss test procedure:

1. *Send a specific number of frames at a specific rate through the DUT/NUT to be tested and count the frames that are transmitted by the DUT/NUT.*
2. *The frame loss at a particular line rate is calculated using the following equation:*

$$\% \text{ Frame loss} = \frac{\text{Transmitted frames} - \text{Received frames}}{\text{Transmitted frames}} \times 100$$

3. *Measurement should be done for different frame sizes.*



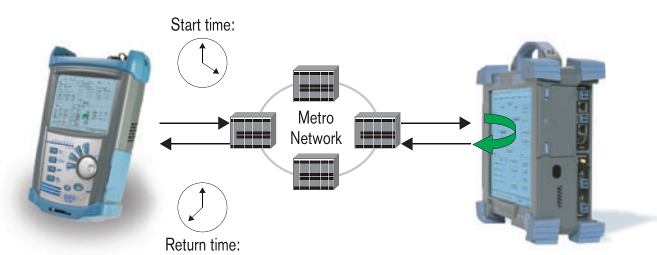
Example of frame loss test application.

LATENCY

For store and forward devices, latency is the time interval starting when the last bit of the input frame reaches the input port and ending when the first bit of the output frame is seen on the output port. Roundtrip latency is the time it takes a frame to come back to its starting point. Variability of latency can be a problem. With technologies like VoIP, a variable or long latency can cause degradation in voice quality.

Latency test procedure:

1. *Determine the throughput of the DUT/NUT for each frame size.*
2. *Send a stream of frames at a particular frame size through the DUT/NUT at the determined throughput rate to a specific destination.*
3. *Send a tagged frame after 60 seconds and store timestamp (A). Capture tag frame on reception side and store timestamp (B).*
4. *The latency is timestamp B minus timestamp A.*
5. *The test must be repeated at least 20 times with the reported value being the average of the recorded values.*



Example of latency test application.

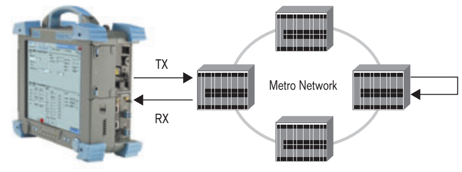
BERT OVER ETHERNET

Because transparent transport of Ethernet over physical media is becoming a common service, Ethernet is increasingly carried across a variety of layer 1 media over longer distances. There is therefore a growing need to certify Ethernet transport on a bit-per-bit basis. This can be done using bit-error-rate testing (BERT).

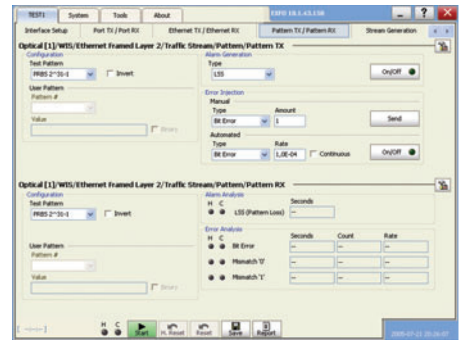
BERT uses a pseudo-random binary sequence (PRBS) encapsulated into an Ethernet frame, making it possible to go from a frame-based error measurement to a bit-error-rate measurement. This provides the bit-per-bit error count accuracy required for the acceptance testing of physical-medium transport systems.

BERT over Ethernet should 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

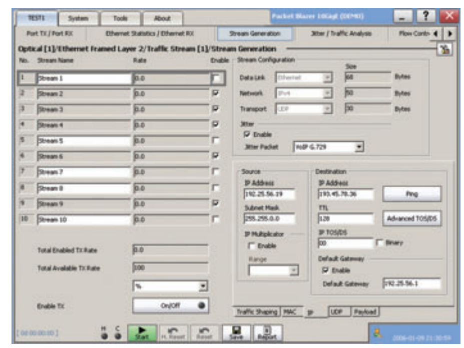


Example of EtherBERT Configuration.



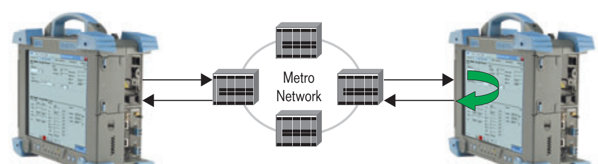
FRAME ANALYSIS

This FTB-8510G Packet Blazer 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-8510G lets service providers efficiently benchmark transport networks when it comes to delay-sensitive traffic such as voice-over-IP (VoIP).



SMART LOOPBACK

This feature allows transmitting back the received stream of data. To perform an end-to-end frame analysis, BERT or RFC 2544 across a layer 2, traffic needs to be looped back to the originator. A remote unit running the Smart Loopback mode will allow traffic to be returned to the local unit by swapping packet overhead up to layer 4.

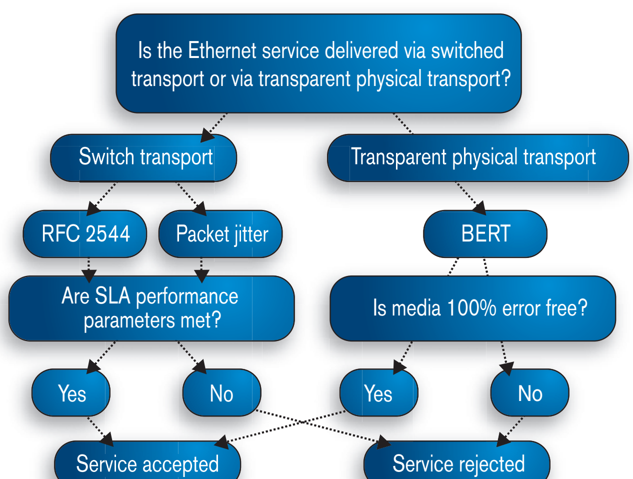


Example of Smart Loopback test application.

ETHERNET SERVICE ACCEPTANCE TESTING

The type of testing required for Ethernet service acceptance testing depends on how the service is carried on the network. The opposite figure shows how to test for switched transport or transparent physical transport using either RFC 2544 tests or BERT-over-Ethernet.

All of the tests that are part of the service-level agreement can be performed on either part of the network (end-to-core) or on all of it (end-to-end). For both switched transport and transparent physical transport, end-to-end testing can be performed by using two portable units and testing from one end to the other. Another way of doing this is to send a technician to one site and test using a second test device that is mounted in the network (e.g., in a central office). This type of testing is useful when two technicians cannot be sent at the same time or when the service provider is providing access to the Internet.



Functional Specifications

OPTICAL INTERFACES

	10BASE-SW	10BASE-SR	10BASE-LW	10BASE-LR	10BASE-EW	10BASE-ER
Wavelength	850 nm Multimode	850 nm Multimode	1310 nm Singlemode	1310 nm Singlemode	1550 nm Singlemode	1550 nm Singlemode
Tx level (802.3ae-compliant)	–7.3 to –1 dBm	–7.3 to –1 dBm	–8.2 to +0.5 dBm	–8.2 to +0.5 dBm	–4.7 to +4.0 dBm	–4.7 to +4.0 dBm
Rx level sensitivity	–9.9 to –1.0 dBm	–9.9 to –1.0 dBm	–14.4 to +0.5 dBm	–14.4 to +0.5 dBm	–15.8 to –1.0 dBm	–15.8 to –1.0 dBm
Transmission bit rate	9.95328 Gbit/s ± 4.6 ppm*	10.3125 Gbit/s ± 4.6 ppm*	9.95328 Gbit/s ± 4.6 ppm*	10.3125 Gbit/s ± 4.6 ppm*	9.95328 Gbit/s ± 4.6 ppm*	10.3125 Gbit/s ± 4.6 ppm*
Reception bit rate	9.95328 Gbit/s ± 150 ppm	10.3125 Gbit/s ± 150 ppm	9.95328 Gbit/s ± 150 ppm	10.3125 Gbit/s ± 150 ppm	9.95328 Gbit/s ± 150 ppm	10.3125 Gbit/s ± 150 ppm
Tx operational wavelength range (802.3ae-compliant)	840 nm to 860 nm	840 nm to 860 nm	1260 nm to 1355 nm	1260 nm to 1355 nm	1530 nm to 1565 nm	1530 nm to 1565 nm
Measurement accuracy						
Frequency	±4.6 ppm	±4.6 ppm	±4.6 ppm	±4.6 ppm	±4.6 ppm	±4.6 ppm
Optical power	< 2 dB	< 2 dB	< 2 dB	< 2 dB	< 2 dB	< 2 dB
Maximum Rx before damage	0 dBm	0 dBm	+1.5 dBm	+1.5 dBm	+4.0 dBm	+4.0 dBm
Jitter compliance	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae
Ethernet classification	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae	IEEE 802.3ae
Laser type	VCSEL	VCSEL	DFB	DFB	EML	EML
Eye safety	Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1	Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1	Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1	Class 1 laser; complies with 21 CFR 1040.10 and IEC 60825-1	Class 1M laser; complies with 21 CFR 1040.10 and IEC 60825-1	Class 1M laser; complies with 21 CFR 1040.10 and IEC 60825-1
Connector	Duplex LC	Duplex LC	Duplex LC	Duplex LC	Duplex LC	Duplex LC
Transceiver type (compliant with XFP MSA)	XFP	XFP	XFP	XFP	XFP	XFP

* When clocking is in internal mode

SYNCHRONIZATION INTERFACES

DS1/E1 external input clock interface

Parameter	DS1	E1
Rx level sensitivity (short haul only)	For 772 kHz: TERM: 6 dB (cable loss only)	For 1024 kHz: TERM: 6 dB (cable loss only)
Reception bit rate	1.544 Mbit/s ± 50 ppm	2.048 Mbit/s ± 50 ppm
Input jitter tolerance	AT&T PUB 62411, GR-499 section 7.3	G.823 section 7.2
Line coding	AMI and B8ZS	HDB3 and AMI
Input impedance (resistive termination)	100 ohms ± 5%, balanced	120 ohms ± 5%, balanced
Connector type	BANTAM	BANTAM

Clock out interface

Parameter	Value	
Tx pulse amplitude	600 mVpp ± 130 mV	
Transmission frequency	LAN	WAN
Clock divider = 16	644.53 MHz	622.08 MHz
Clock divider = 32	322.266 MHz	311.04 MHz
Clock divider = 64	161.133 MHz	155.52 MHz
Output configuration	AC coupled	
Load impedance	50 ohms	
Maximum cable length	3 meters	
Connector type	SMA	

Functional Specifications (Cont'd)

OPTICAL INTERFACES

Optical interfaces	10 GigE LAN and 10 GigE WAN
Available wavelengths	850, 1310 and 1550 nm

ELECTRICAL INTERFACES

Electrical interfaces	Ext. clock DS1/E1 and clock output	
Ext. clock DS1/E1	Line coding	DS1: AMI and B8ZS E1: AMI and HDB3
	Termination mode	DS1/E1: Term
	Framing	DS1: SF and ESF E1: PCM30, PCM30CRC, PCM31 and PCM31CRC
	Clocking	Internal, external (BITS) and recovered
Clock output	Clock out	Clock out divider: 16, 32 and 64

TESTING

RFC 2544	Throughput, back-to-back, frame loss and latency measurements according to RFC 2544. Frame size: RFC-defined sizes, user-configurable.
BERT	Unframed layer 1 up 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, and up to ten user patterns
Error insertion (BERT)	FCS, bit, 64B/66B Block
Error measurement	LAN/WAN: jabber/giant, runt, undersize, oversize, FCS, 64B/66B Block WAN: B1, B2, B3, REI-L, REI-P UDP, TCP and IP header checksum
Error measurement (BERT)	Bit error, bit mismatch 0, bit mismatch 1, performance monitoring (G.821 and G.826)
Alarm insertion	LOS, link down, local fault, remote fault, LSS (BERT) WAN: SEF, LOF, AIS-L, RDI-L, AIS-P, RDI-P, LCD-P, LOP-P, ERDI-PSD, ERDI-PCD, ERDI-PPD, UNEQ-P
Alarm detection	LOS, link down, local fault, remote fault, frequency offset, LSS (BERT) WAN: SEF, LOF, AIS-L, RDI-L, AIS-P, RDI-P, LCD-P, LOP-P, ERDI-PSD, ERDI-PCD, ERDI-PPD, PLM-P, UNEQ-P, Link (WIS)
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 (Burst, Ramp or Continuous), MAC source/destination address, VLAN ID, VLAN priority, IP source/destination address, ToS field, DSCP field and UDP source/destination port.
VLAN stacking	Capability to generate streams with up to three layers of VLAN (including IEEE802.1ad QinQ tagged VLAN) and to filter received traffic by VLAN ID or VLAN priority at any of the stacked VLAN layers.
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 (frame analyzer)	Packet pause time
Flow control statistics (frame analyzer and RFC 2544)	Pause time, last pause time, max. pause time, min. pause time, paused frames, abort frames, frames Tx, frames Rx

ADDITIONAL TEST AND MESUREMENT FUNCTIONS

Power measurement	Supports optical power measurement, displayed in dBm.	
Frequency generation and measurement	Supports clock frequency generation and measurements (i.e., received frequency and deviation of the input signal clock from nominal frequency).	
	Frequency offset generation:	Range: ±120 ppm Resolution: ±1 ppm Accuracy: ±4.6 ppm
	Frequency offset measurement:	Range: ±150 ppm Resolution: ±1 ppm Accuracy: ±4.6 ppm
Signal label control and monitoring	Ability to configure and monitor J0 Trace, J1 Trace and payload signal label C2 (WAN).	
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 to connect 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.	

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. [a]
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 [a]	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	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. [a]
Configurable test timer	Allows a user to set a specific start and stop time for tests.
Test favorites	Capability to select and load from predefined or user-modified test conditions.
Report generation	Ability to generate test reports in the following user-selectable formats: .pdf, .html, .txt and .csv.
Graph	Allows to graphically display the test statistics of the performance (RFC 2544) and frame analysis tests.
Screen capturing [b]	Capability to gather a snap-shot of the screen for future use.
Logger printing [b]	Capability to send logger messages to a supported local printer.
Remote control	Remote control through Visual Guardian Lite software or VNC.

NOTES

a. Available on the FTB-400 Universal Test System platform only.
b. Available on the FTB-200 Compact Platform only.

MODULE SPECIFICATIONS

	FTB-8510G-LAN	FTB-8510G-WAN	FTB-8510G-LAN/WAN
Port	One 10 Gigabit Ethernet port	One 10 Gigabit Ethernet port	One 10 Gigabit Ethernet port
Connector type	LC	LC	LC
Optical transceiver	850 nm optics (10GBASE-SR) 1310 nm optics (10GBASE-LR) 1550 nm optics (10GBASE-ER)	850 nm optics (10GBASE-SW) 1310 nm optics (10GBASE-LW) 1550 nm optics (10GBASE-EW)	850 nm optics (10GBASE-SR/-SW) 1310 nm optics (10GBASE-LR/-LW) 1550 nm optics (10GBASE-ER/-EW)
Port capacity	Full-line-rate traffic generation and analysis	Full-line-rate traffic generation and analysis	Full-line-rate traffic generation and analysis
Ethernet testing	RFC 1242, RFC 2544, RFC 3393, multistream traffic generation and analysis, EtherBERT	RFC 1242, RFC 2544, RFC 3393, multistream traffic generation and analysis, EtherBERT	RFC 1242, RFC 2544, RFC 3393, multistream traffic generation and analysis, EtherBERT

GENERAL SPECIFICATIONS

Size (H x W x D)		25 mm x 96 mm x 260 mm	(1 in x 3 in x 10 in)
Weight (without transceiver)		0.5 kg	(1.2 lb)
Temperature	operating	0 °C to 40 °C	(32 °F to 104 °F)
	storage	−40 °C to 60 °C	(−40 °F to 140 °F)

ORDERING INFORMATION

MODULE

FTB-8510G-XX

Model

FTB-8510G-LAN = Packet Blazer 10 GigE, 1 port 10 Gigabit Ethernet LAN PHY (10.3125 Gbit/s)

FTB-8510G-WAN = Packet Blazer 10 GigE, 1 port 10 Gigabit Ethernet WAN PHY (9.953 Gbit/s)

FTB-8510G-LAN/WAN = Packet Blazer 10 GigE, 1 port 10 Gigabit Ethernet LAN and WAN PHY (10.3125 and 9.953 Gbit/s)

Example: FTB-8510G-LAN

OPTION

FTB-8585 = Software option converting an FTB-8510G-LAN or FTB-8510G-WAN to a FTB-8510G-LAN/WAN model.

NET-SDK = .NET automation software development kit and programmer's guide

ACCESSORIES

FTB-85900 = 10GBase-SR/-SW (850 nm, LAN/WAN PHY) LC connectors; optical XFP transceiver module for 8510G Packet Blazer

FTB-85901 = 10GBase-LR/-LW (1310 nm, LAN/WAN PHY) LC connectors; optical XFP transceiver module for 8510G Packet Blazer

FTB-85902 = 10GBase-ER/-EW (1550 nm, LAN/WAN PHY) LC connectors; optical XFP transceiver module for 8510G Packet Blazer

Specifications are subject to change without notice.

Rugged Handheld Solutions

OPTICAL
- OTDRs
- OLTSs
- Power meters
- Light sources
- Talk sets

COPPER ACCESS
- ADSL/ADSL2+, SHDSL, VDSL test sets
- VoIP and IPTV test sets
- Ethernet test sets
- POTS test sets

Platform-Based Solutions

OPTICAL FIBER
- OTDRs
- OLTSs
- ORL meters
- Variable attenuators

DWDM TEST SYSTEMS
- OSAs
- PMD analyzers
- Chromatic dispersion analyzer

TRANSPORT AND DATACOM
- Next-generation SONET/SDH and OTN testers
- SONET/DSn (DS0 to OC-192) testers
- SDH/PDH (64 kbit/s to STM-64) testers
- T1/T3, E1 testers
- 10/100 Mbit/s and Gigabit Ethernet testers
- Fibre Channel testers
- 10 Gigabit Ethernet testers

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