SPEC SHEET

FTBx-88480 Series

DUAL-PORT 1G-400G, 800G-READY TESTERS

- Most flexible and future-proof 1G to 800G dual-port test solution for lab and field applications, supporting current and next-gen pluggables.

COMPATIBLE WITH

KEY FEATURES AND BENEFITS

- 1G to 800G Ethernet testing capabilities based on IEEE standards
- Test twice as fast: validate two circuits simultaneously with dual-port testing (1G up to 400G)
- Complete Ethernet test suite including EtherBERT, RFC 2544, EtherSAM Y.1564, smart loopback, traffic generation and monitoring, and RFC 6349 at supported rates.
- State-of-the-art open transceiver system (OTS) design for full flexibility with current and future transceivers
- Flexible solution that uniquely supports current SFP-DD, OSFP and QSFP-DD interfaces as well as next-gen technologies (e.g., digital coherent optics like 100ZR, 400ZR, Open ZR+)
- The FTBx-88480 Series 400G test solution offers advanced capabilities for validating cables and transceivers (including QSFP112)
- Compatible with the latest version of EXFO's portable FTB-1 Pro HPDC platform for the most compact, dual-port 400G solution—800G-ready
- Supports quick optical transceiver validation and sanity check using iOptics, including coherent optics
- Complete 1G to 64G Fibre Channel (FC) test solution suite helps ensure that new switches and transceivers are up and running reliably
- Support of OTN BERT capabilities (ODU0, OTU1 to OTU4, 4×OTU4 including overclock rates), multistage mapping and advanced GCC BERT tools

RELATED PRODUCTS

Portable platform
FTP-1 Pro HPDC

Portable platform
FTB-2 Pro

Portable platform
FTB-4 Pro

Rackmount platform
LTB-8

800G MAKING ITS WAY TO THE FIELD

Network infrastructure planners must deal with skyrocketing demands for more bandwidth, including in the data center interconnect (DCI) or even in core and metro networks. Service providers and hyperscale companies are constantly expanding their networks, looking for more efficient and cost-effective ways to deploy those high-speed circuits and migrate to higher rates. High-speed transceivers (pluggables) are being designed to be smaller and consume less power in order to meet the requirements of delivering high port density at a low cost. That is the reason why operation teams and field technicians look for future-proof test solutions designed to handle both current and upcoming high-speed transceiver technologies as they are developed and deployed.

The jump from 400G to 800G is a necessity, but due to its complexity, it is not without challenges. Moving to 800G everywhere requires special considerations, as much for data centers as for metro and core backbone networks. The FTBx-88480 enables today's field technicians to move smoothly and expertly between testing different rates, interfaces and technologies—all within a single, compact platform designed for the field.

PIONEERING THE VALIDATION OF QSFP112 OPTICS

QSFP112 represents the evolution of the QSFP transceiver form factor. Its streamlined, four-electrical lane architecture delivers a remarkable reduction in power consumption compared to QSFP-DD.

The FTBx-88480 Series test solution offers advanced capabilities for validating cables and transceivers (including QSFP112) in laboratory, manufacturing, and field applications. When paired with EXFO's FTB-1 Pro HPDC platform, **it's the industry's only portable QSFP112 test solution**.

- Multi-port, QSFP112 configuration (up to 3 ports in a single, compact handheld solution)
- QSFP112-types supported: FR4, DR4, SR4, LR4 and AOC.

TEST TWICE AS FAST WITH DUAL-PORT TESTING

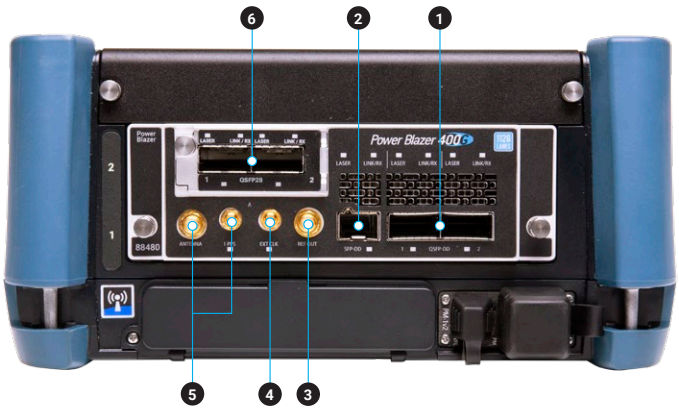
The ability to test two 400G ports simultaneously—including 1G, 10G, 25G, 40G, 100G and 200G—means technicians can do more in a day. With the sheer volume of ports in play, fast and accurate testing is critical. Furthermore, using dual-port testing, technicians can validate main and backup links simultaneously, and under consistent conditions—speeding up the process while reducing the potential for network failures.

COMPATIBLE WITH PORTABLE AND RACKMOUNT PLATFORMS

The FTBx-88480 series of modules offers a complete suite of 800G ecosystem testing capabilities, addressing early adopters' requirements from in-lab innovation to testing in the field. In addition, when portability is needed the FTBx-88480 or the FTBx-88481 modules can be inserted into the FTB-1 Pro HPDC. The module can also serve for rackmount applications, where not only one but four modules can be inserted into the high-performance LTB-8 rackmount chassis to deliver up to 3.2T of Ethernet traffic. The LTB-8 rackmount platform provides users with added versatility and power for lab validations.

DESIGNED FOR FLEXIBILITY

The OTS design provides enhanced flexibility and CAPEX protection to the end user; one test module can support various types of transceivers. A flexible solution that can adapt and adjust to the fast evolution of transceivers while providing multirate support.

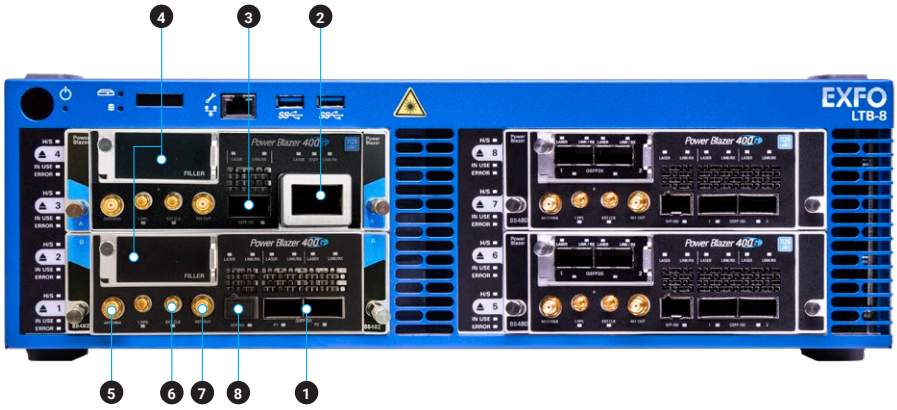


FTBx-88480

1. 2×QSFP-DD ports supporting 800G/400G/200G/100G Ethernet rates, 2×200G, 4×100G, 8×100G, 2×400G and 4×200G breakout cables as well as coherent optics (100ZR/ZR+, 200ZR+, 300ZR+, 400ZR/ZR+)
2. 1×SFP-DD port supporting SFP56 (64G FC and 100G Ethernet)
3. REF CLOCK OUT SMA interface
4. Synchronization SMB interface (input 1PPS, 10 MHz or 2 MHz)
5. Built-in GNSS/GPS: SMA, SMB (EXT CLK and 1PPS)
6. OTS module interface, supporting SFP, SFP+, SFP28, QSFP+ and QSFP28

FTBx-88481

1. 1×OSFP port supporting 800G and 400G Ethernet rates, 2×200G, 4×100G, 8×100G, 2×400G and 4×200G breakout cables as well as coherent optics (100ZR/ZR+, 200ZR+, 300ZR+, 400ZR/ZR+)
2. 1×QSFP-DD port supporting 800G/400G/200G/100G Ethernet rates, 2×200G, 4×100G, 8×100G, 2×400G and 4×200G breakout cables as well as coherent optics (same port is used for QSFP112)
3. REF CLOCK OUT SMA interface
4. Synchronization SMB interface (input 1PPS, 10 MHz or 2 MHz)
5. Built-in GNSS/GPS: SMA, SMB (EXT CLK and 1PPS)
6. OTS module interface, supporting SFP, SFP+, SFP28, QSFP+ and QSFP28



FTBx-88482

1. 2×QSFP-DD ports supporting 800G/400G/200G/100G Ethernet rates, 2×200G, 4×100G, 8×100G, 2×400G and 4×200G breakout cables as well as coherent optics [a] (100ZR/ZR+, 200ZR+, 300ZR+, 400ZR/ZR+)
2. OSFP port supporting 800G and 400G Ethernet rates, 2×200G, 4×100G, 8×100G, 2×400G and 4×200G breakout cables and coherent optics
3. QSFP-DD port supporting 400G/200G/100G Ethernet rates, 2×200G and 4×100G breakout cables as well as coherent optics [a]
4. 2×OTS module interface, supporting SFP28 and QSFP28
5. Built-in GNSS/GPS: SMA, SMB (EXT CLK and 1PPS)
6. Synchronization SMB interface (input 1PPS, 10 MHz or 2 MHz)
7. REF CLOCK OUT SMA interface
8. SFP-DD port supporting SFP56

a. 1 and 3 can be used for QSFP112 transceivers as well.

MULTIPORT CAPABILITIES

FTB-1 Pro high-power dual-carrier (HPDC)

The high-power, dual carrier configuration is the FTB-1 Pro platform's most flexible solution, allowing simultaneous dual-port 400G and 800G testing. This platform is completely field-focused, with features built specifically for today's technicians.

FTB-2 Pro portable platform

EXFO's most compact portable platform for lab and field applications features two slots that can house optical and transport and datacom modules. This platform can host either the FTBx-88480 or the FTBx-88481.

FTB-4 Pro portable platform

FTB-4 Pro platform is a powerful and scalable portable platform for lab and field applications. The FTB-4 Pro can support 2×FTBx-88480 test modules, allowing simultaneous testing. It can also support combining the FTBx-88480 with other EXFO solutions including OTDRs or OSAs. It can also host the FTBx-88482 module.

LTB-8 rackmount platform

The LTB-8 is a powerful, scalable eight-slot rackmount platform designed for advanced lab and manufacturing applications. The LTB-8 can support 4×FTBx-88480 test modules, allowing for the **simultaneous testing of 8 Ethernet ports**.

Combine the FTBx-88480 with other best-in-class test tools (e.g., OSA, optical switches and variable attenuators) for a full-suite of advanced testing capabilities.

RAPID EVOLUTION OF TRANSCEIVERS

A shared challenge in the telecom industry today is the wide variety of pluggable transceivers available and the rapid rate at which new types of transceivers are being launched. This growing challenge impacts both equipment manufacturers trying to keep up, and network operators/data centers trying to integrate new transceivers into their networks.

With that in mind, the latest addition of test modules—the FTBx-88480—comes with the innovative OTS design which allows users to customize the type of interfaces on the module according to their needs, without using adapters, while also ensuring the future-proof capacity to test new transceivers as they become available, by simply changing the transceiver system instead of having to purchase a new test unit.

		SUPPORTED INTERFACES	FEATURES	NUMBER OF TEST PORTS
OTS				
	**SFP28**	SFP, SFP+, tunable SFP+, SFP28 and bidirectional SFP	1G to 25G data rates Dual-port capability	2
	**QSFP28**	QSFP+, QSFP28	40G/100G data rates Dual-port capability AOC cables	2
Supported transceivers				
	**QSFP-DD**	QSFP-DD	100G, 200G, 400G and 800G data rates	2
	**OSFP**	OSFP	400G and 800G data rates	1
	**SFP-DD**	SFP-DD	100G and 64 FC	1

HIGH SPEED ETHERNET TESTING

800G Ethernet is the promising replacement for 100G Ethernet. 400G is making its way to the field as the industry ramps up to handle the massive demands of hyperscale data centers, 5G applications, service providers and business users. The FTBx-88480 series of modules offer advanced Ethernet testing capabilities, including forward error correction monitoring and validation.

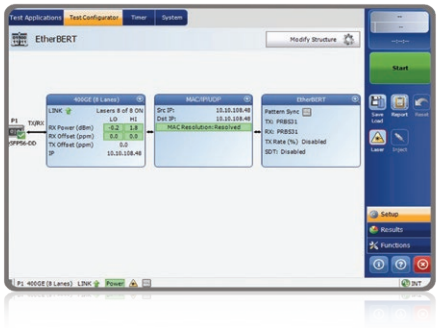
1G to 800G framed/unframed BERT testing capabilities

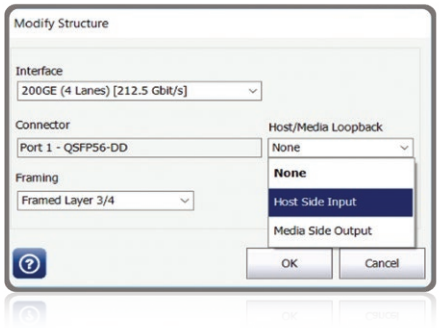
- 1G to 800G Ethernet MAC PCS/PMA/PMD layer testing
- 800G/400G/200G FEC RS (544, 514) decoding and error correction
- Test pattern monitoring
- MDIO/I2C for all interfaces read/write
- Alarms/errors generation and monitoring
- Per lanes PRBS unframed testing with pass/fail verdict
- CMIS support with loopback testing

Advanced testing capabilities

EtherBERT

- Skew measurement per lane
- FEC testing
- BER monitoring
- Advanced error analysis
- SDT measurement
- Ethernet traffic filtering
- Pre-emphasis for the capability to modify the signal for better eye opening
- Host and media side configuration





iOptics

iOptics is an intelligent pluggable optics test application and first-alert test that can be used in the field or lab to efficiently evaluate the proper operation of an optical interface, with minimal user configuration required. iOptics performs validation using several subtests, monitors power consumption and temperature and reports an individual verdict for each subtest and monitoring task. iOptics now supports the latest high-speed pluggables from 1G to 800G transceivers, AOC, DAC cables and coherent optics (400ZR and OpenZR+). iOptics now offers loopback settings for internal transceiver fault isolation.

SFP/SFP+/SFP28

QSFP+/QSFP28

QSFP112/QSFP-DD/OSFP

AOC cables

DAC cables

EXFO

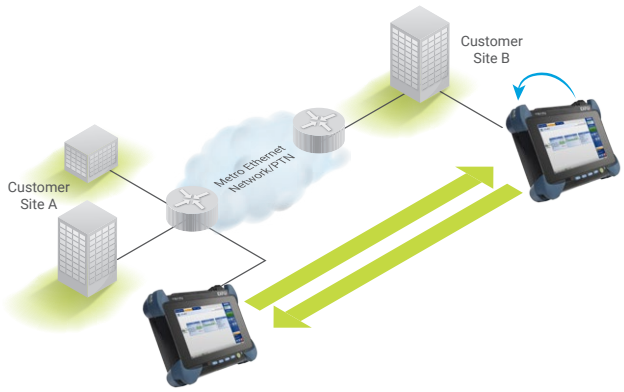
RFC 2544

As 400G moves from the lab to the field, ensuring service quality at turn-up is becoming key. Portable 1G to 400G test equipment will enable field technicians and contractors to immediately capture test results and demonstrate that the Ethernet service meets SLAs. These tests may also serve as a performance baseline for future reference.

From a laboratory and benchmarking perspective, RFC 2544 methodology is ideal for automated measurement and reporting. From a service turn-up and troubleshooting perspective, RFC 2544 provides an out-of-service benchmarking methodology for evaluation of network/device performance using four subtests with up to 10 configurable frame sizes, each validating a specific portion of an SLA. RFC 2544 provides engineers and network technicians with a common language and results format.

RFC 2544 includes the following subtests:

1. Throughput
2. Back-to-back (Burstability)
3. Frame loss
4. Latency



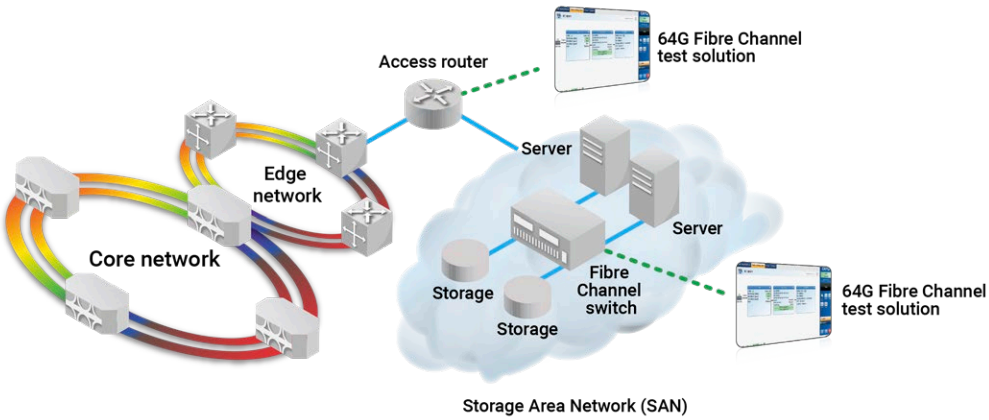
SMART LOOPBACK (1G TO 800G)

EXFO smart loopback is a unique functionality that enables loopback Ethernet traffic at all rates from a user-datagram protocol (UDP) or transmission-control-protocol (TCP) layer, or all the way down to a completely promiscuous mode (transport loopback). The modules can adjust to all loopback situations where the remote unit will return traffic to the local unit by swapping packet overhead up to layer 4 of the OSI stack.

1G TO 64G FIBRE CHANNEL (FC) TESTING

Data centers and other bandwidth-heavy environments that process and store large amounts of transactional data, are upgrading their FC storage area networks (SAN) from 1G to 64G FC. Given FC's strict performance requirements for latency, BER and other measurements, it's imperative to test new deployments thoroughly.

EXFO's 64G FC test solution helps ensure that new switches and transceivers are up and running reliably. Technicians can use this solution to address 64G FC testing needs at every stage—from service turn-up to troubleshooting. Available on the FTBx-88480 and FTBx-88482.

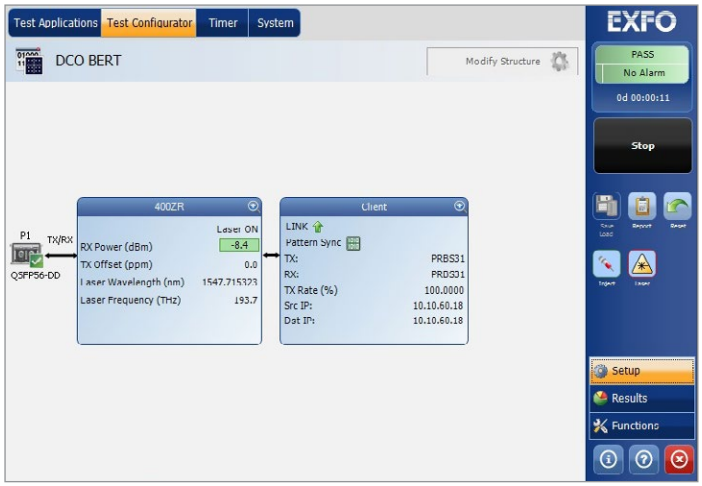


DIGITAL COHERENT PLUGGABLES

The OIF MSA standard has introduced a few WDM interfaces that leverage digital coherent optics (DCO). OIF 100ZR, 400ZR and OpenZR+ are the most popular ones, used for optimal connectivity in data center interconnect and metro applications. These transceivers support long-distance interconnections (see figure below with test configurations). The most popular rates for these transceivers are 100G, 200G, 300G and 400G.

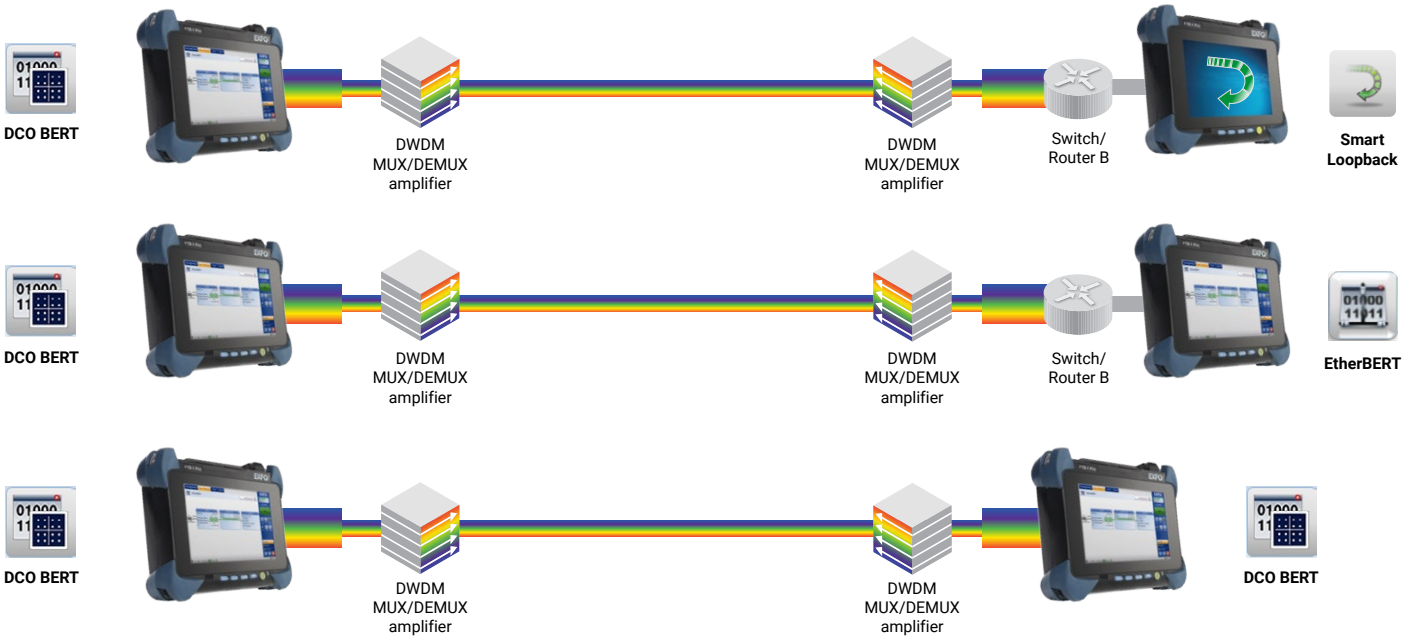
EXFO's FTBx-88480 Series advanced DCO capabilities include:

- Configurable Tx power
- Configurable wavelength
- Display from pluggable optical metrics like CD, OSNR, etc.
- 400G client L2 to L4 configuration capabilities
- Media Rx FEC alarm and error monitoring
- And more



DCO Bert generation and analysis

Wavelength tuning



EtherSAM: ITU-T Y.1564 ETHERNET SERVICE ACTIVATION

With more and more Ethernet services being activated today, the ITU-T Y.1564 standard addresses the growing demand for turning up and troubleshooting Carrier Ethernet services. The Power Blazer modules support Ethernet client services, including validation of critical SLA criteria, such as packet jitter and quality-of-service (QoS) measurements, as well as faster time-to-service. EXFO's EtherSAM test suite—based on the ITU-T Y.1564 Ethernet service activation methodology—provides comprehensive field testing for mobile backhaul and commercial services. EtherSAM can simulate all types of services that will run on the network and simultaneously qualify all key SLA parameters for each of these services.

Moreover, it validates the QoS mechanisms provisioned in the network to prioritize the different service types, resulting in better troubleshooting, more accurate validation and much faster deployment. EtherSAM is comprised of two phases:

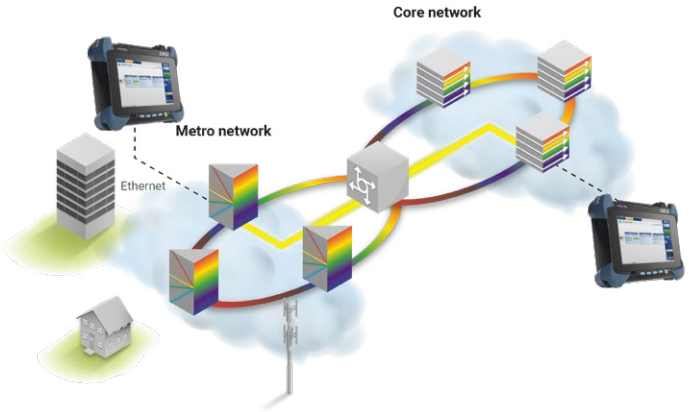
1. Service configuration test
2. Service performance test

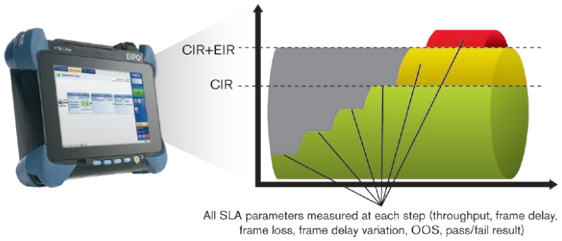
Service configuration test

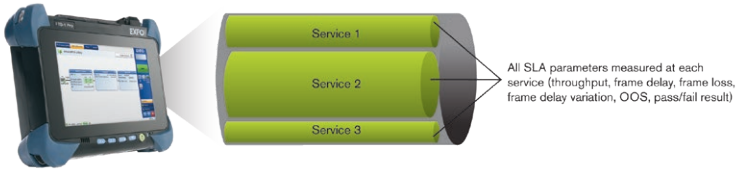
The service configuration test consists of sequentially testing each service. It validates that the service is properly provisioned and that all specific KPIs or SLA parameters are met.

Service performance test

Once the configuration of each individual service is validated, the service performance test simultaneously validates the quality of all the services over time. In addition, EtherSAM's approach proves even more powerful as it executes the complete ITU-T Y.1564 test bidirectionally. Key SLA parameters are measured independently in each test direction, thus providing 100% first-time-right service activation—the highest level of confidence in service testing.

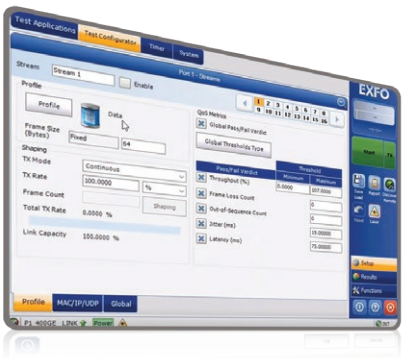






ETHERNET TRAFFIC GENERATION AND MONITORING

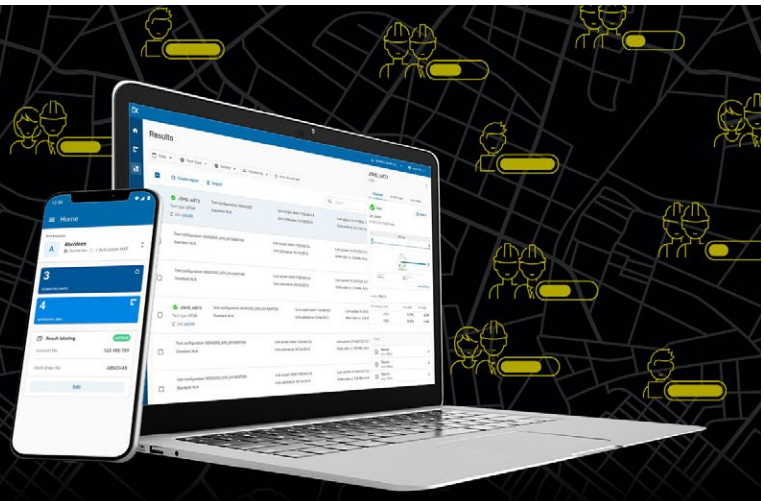
Data services carried over high-speed networks are making a significant shift towards a variety of applications. Multiservice offerings, such as triple-play services have fueled the need for QoS testing to ensure the condition and reliability of each service, and qualify SLA parameters. With traffic generation and monitoring, high-speed modules allow service providers to simultaneously simulate and qualify different applications. Up to 16 streams can be configured 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.



In addition, the modules support monitoring of multiple VLAN streams through the Traffic Scan functionality. In the same line, a MAC flooding capability is available for switch-addressable memory testing, where the range of MAC addresses can be cycled, forcing the switch to learn every single one. The modules offer the flexibility to define one configuration profile and apply it to as many streams as required. From there, it is just a matter of tweaking them to each stream. They also simultaneously measure throughput, latency, packet jitter (RFC 3393), frame loss and out-of-sequence errors in all streams, yielding fast and in-depth qualification of all SLA criteria. Results are displayed in tabular format and on analog visual gauges to ensure that test outcomes are quickly and easily interpreted.

EXchange

SHARE TEST RESULTS. BOOST COMPLIANCE. UNLOCK INSIGHTS.



Cloud-hosted solution for sharing test results and ensuring compliance.

Paired with EXFO's leading test instruments, EXFO Exchange drives an entire ecosystem, while integrating seamlessly with existing operation processes.

KEY BENEFITS

- **Automate test results management**
- **Boost compliance and efficiency**
- **Improve collaboration and visibility**
- **Access comprehensive reporting**
- **Unlock insights to see what matters**

SIMPLE SETUP IN THREE STEPS

1

Create your free EXFO Exchange account

Begin your journey by creating an EXFO Exchange account. Setting up your account is quick and easy.

Create an account

2

Install the mobile app

Download the EXFO Exchange app to allow test data from compatible EXFO devices to be uploaded securely to the cloud (free of charge).

GET IT ON Google Play | Download on the App Store

For MaxTester and FTB users, install the native app.

Access the Native app

3

Save time and boost efficiency

Once your account created—and the mobile app installed and paired with compatible EXFO devices—all test results will be sent to the cloud. On the web app, you will see field test results from all invited testers.

Get **started >**

EXFO

SOFTWARE TEST TOOLS

These platform-based software testing tools enhance the value of the FTB-1v2 and LTB-8 platforms, providing additional monitoring and inspection testing capabilities.

ConnectorMax

Providing lightning-fast results in the first step of fiber link testing, ConnectorMax2 is a powerful platform-based, automated inspection application. It delivers quick pass/fail assessment of connector endfaces and is designed to save time and money, in the field and in the lab.

Remote control

The Windows-based design enables remote operation through TeamViewer, Remote Desktop (RDP), Virtual Network Computing (VNC), Microsoft Teams and the free remote software, EXFO Remote Toolbox:

- Perform tests and evaluations remotely
- Enjoy easy remote access by connecting to a fixed/wireless Ethernet network or hotspot—no need to connect to the customer network
- Perform automation tasks using SCPI and Python in an automated test environment

SPECIFICATIONS

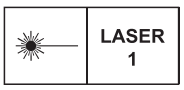
MECHANICAL AND ENVIRONMENTAL SPECIFICATIONS

Module		FTBx-88480	FTBx-88481	FTBx-88482
Size (H × W × D)		51 mm × 159 mm × 187 mm (2 in × 6 ¼ in × 7 ⅜ in)	51 mm × 159 mm × 187 mm (2 in × 6 ¼ in × 7 ⅜ in)	101 mm × 159 mm × 187 mm (4 in × 6 ¼ in × 7 ⅜ in)
Weight		0.85 kg (1.87 lb)	0.88 kg (1.94 lb)	1.75 kg (3.85 lb)
Temperature	Operating		0 °C to 40 °C (32 °F to 104 °F)	
	Storage		−40 °C to 70 °C (−40 °F to 158 °F)	

REF-OUT INTERFACE

Tx pulse amplitude	200 mVpp to 1300 mVpp, depending on frequency
Transmission frequency	155 MHz to 3.50 GHz
Output configuration	AC-coupled
Load impedance	50 Ω
Connector type	SMA
External cable	Maximum 1 meter cable length (RG178 cable with 3.1 dB/m attenuation at 3.5 GHz)

LASER SAFETY



IEC 60825-1:2014-05

SUMMARY OF KEY FEATURES	
Detailed compliance testing	IEEE 802.3ba, IEEE 802.3bs and IEEE802.3df standard
Multi-interface support	Pluggable MSA-compliant 2×QSFP28 transceivers AOC QSFP28/QSFP-DD cable support QSFP-DD MSA revision 6.3, 2×200G, 4×100G, 8×100G, 2×400G and 4×200G 400G DAC cables support Pluggable MSA-compliant 1×OSFP optical transceiver (with 88481 and 88482 versions) Pluggable MSA-compliant 2×QSFP+ transceivers Pluggable MSA-compliant 2×SFP28 optical transceivers Pluggable MSA-compliant 2×SFP/SFP+ optical transceivers Pluggable MSA-compliant 1×SFP-DD optical transceiver
Line rate	850/425/212.5/106.25 (single lambda)/103.125/53.125/41.25 Gbit/s, 100G SRBD, 40G, 25G, 1G, OIF DCO Coherent QSFP DD ZR, QSFP28 and ZR+
Robust physical-layer validation	400GAUI lane-error generation and monitoring PCS lane mapping and monitoring capability Per-lane skew generation and measurement PCS error generation and monitoring per lane Full MDIO/I2C read/write access
Transceiver and cable validation	SFP, SFP+, SFP28, QSFP+, QSFP28, QSFP56, QSFP-DD, QSFP112 and OSFP. Also AOC, DAC and breakout cables.
iOptics	Optical-device I/O interface quick check Optical Tx power-level test Optical Rx signal-presence and level test Stress test Excessive skew test Temperature and power consumption monitoring Host and media loopback
Power measurement	Optical channel power measurement with color indicators per lane
Frequency measurements	Allow users to measure the received frequency per wavelength (in Hz) in the used of parallel optics
Frequency offset	Offsetting of the transmitted signal's clock on a selected interface, and monitoring
Transceiver non-blocking analysis	Enables a step-by-step monitoring of the transceiver boot-up sequence
BERT	BERT framed and unframed testing using different parameters and different frame sizes, including EMIX. The Ethernet BERT application also allows LLDP neighbor validation which displays the most important information forwarded by the LLDP protocol.
Service disruption time (SDT)	Service disruption time measurements based on no-traffic mode, with statistics including longest disruption time, shortest, last, average, count, total and pass/fail thresholds
Latency measurements in BERT	High-resolution delay measurements integrated in the BER with statistics including current, average, maximum, minimum, count, total and pass/fail thresholds
Error injection mode	Manual, rate and continuous (maximum rate)
Layer 2	MAC address and Ether type edition available Q-in-Q capability with the ability to go up to three layers of stacked VLANs
Layer 3/4	Source and destination IP address configuration available IP TOS/DSP configuration available UDP source and destination port configuration available
RFC 2544	Throughput, back-to-back, frame loss and high-resolution latency measurements according to RFC 2544; frame size: RFC-defined or user-configurable
EtherSAM	Simplified ITU-T Y.1564 test that performs service configuration and service performance tests using remote loopback or dual test set mode for bidirectional results
Traffic generation and monitoring	Traffic generation and shaping of up to 16 streams of Ethernet and IP traffic, including the simultaneous monitoring of throughput, frame loss, packet jitter, latency and out-of-sequence frames, including MAC flooding for source and destination MAC addresses
RFC 6349	RFC 6349 with enhanced algorithm: performs TCP testing with single or multiple TCP connections from 10BASE-T up to 100G; discovers the MTU, RTT, actual and ideal TCP throughput; user can apply suggested window size boost factor to optimize test results or perform multiple client iPerf tests against the RFC 6349 (v2 and v3) iPerf Server mode of operation
Breakout cable support	Verification of 4×100GE, 2×200GE, 8×100GE, 2×400GE and 4×200GE breakout cables providing optical Tx/Rx power, L2/L3 traffic and BERT statistics per link.
Smart loopback	Return Ethernet traffic to the local unit by swapping packet overhead up to layer 4
Rx frame-size analysis	< 64, 65 - 127, 128 - 255, 256 - 511, 512 - 1023, 1024-1518 and > 1518
Rx rate	Line utlization (%), Ethernet BW (Mbit/s), frame rate (frame/s), and frame count
Ethernet alarms	Link down, local fault detected, local fault received, remote fault, LOA
Ethernet errors	FCS, jabber, runt, undersize and oversize
Higher layer error analysis	UDP checksum
PCS lane alarms and errors	LOS, LOC-lane, LOAML, excessive skew, Inv. Marker, Pre-FEC SYMB and Pre-FEC-bit
Skew insertion	Per-lane skew generation and measurement range 0 to 10550
PCS logical lane mapping	Manual and random
Pre-emphasis	Pre-/main-/post- cursor options to improve electrical waveform including gray encoding and precoding

SUMMARY OF KEY FEATURES (CONTINUED)	
FEC	Generation and analysis of FEC correctable and uncorrectable errors, local and remote degraded SER monitoring
FEC statistics	Number of symbol errors per correctable codeword, number of pre-FEC symbol errors and bit statistics, codeword count (error-free and uncorrectable) and percentage
IP tools	Performs ping and traceroute functions
IPv4 and IPv6 testing	Performs the following tests up to 400G over IPV4 and IPv6, RFC 2544, BERT, traffic generation and monitoring, EtherSAM, ping and traceroute
Advanced filtering	Configure up to 10 filters, each with four fields that can be combined with AND/OR/NOT operations; a mask is also provided for each field value with IPv4 or IPv6 capabilities
Remote access	Supported via EXFO Remote ToolBox, Remote Desktop, VNC and EXFO Multilink for multiuser support
Automation	Wide range of commands available per application to allow test automation
Reporting	Test results are included in a report that can be generated in different formats: pdf, html and json
OTN testing	• OTU4 (112 Gbit/s), 4×OTU4, OTU3 (43 Gbit/s), OTU3e1 (44.57 Gbit/s), OTU3e2 (44.58 Gbit/s), OTU2 (10.71 Gbit/s), OTU2e (11.10 Gbit/s), OTU2f (11.32 Gbit/s), OTU1 (2.67 Gbit/s), OTU1e (11.05 Gbit/s) and OTU1f (11.27 Gbit/s) unframed and framed BER tests • FEC testing: error insertion and monitoring • OTL 3.4, OTL 4.4, OTL 4.2 and 4.1 support • Alarms and errors generation and monitoring • OTL lane mapping, skew generation and measurement • OTU, ODU, OPU overhead manipulation and monitoring • OTU, ODU (including ODU TCM), OPU layer alarm/error generation and analysis • OTU, ODU (including ODU TCM) trace messages • Round-trip delay (RTD) measurement • OTN SDT measurement • OTN through and OTN intrusive through mode testing • Multiplexing/demultiplexing of ODU13, ODU23, ODU123, ODU03, ODU013, ODU0123, ODU04, ODU014, ODU134, ODU24, ODU234, ODU34, ODU14, ODU01234, ODU0124, ODU12, ODU024, ODU034, ODU1e4, ODUflex24, ODU2e4 and ODU124, ODU1234 with PRBS pattern and GigE and 10 GigE client mappings into OPU payloads. ODUflex at ODU2, ODU3 and ODU4 rates with full flexibility to configure the required bandwidth based on n x 1.25 Gbit/s tributary time slots with a PRBS pattern into the ODUflex payload; 40 GigE client mapping into ODU3 into ODU4 • Performance monitoring: G.821, M.2100 • Frequency analysis and offset generation including frequency sweep • Power OTN OH analysis for BERT and synchronization testing of multiple fields in the OTN OH, including GCC0/1/2
Ethernet mapping over OTN	• Ethernet mapping over OTN respectively, with GMP support • 40G transcoding capability with alarms, errors and statistics • GMP alarms, errors and statistics • GigE mapping into ODU0 using GFP-T, 10 GigE mapping into ODU2 using GFP-F, direct 10 GigE mappings into ODU1e/2e in different ODU multiplexing structures, and 40 GigE client mapped into ODU3/ODU4 • Flexibility to map up to a 10G Ethernet client signal into ODUflex

COHERENT OPTICS	
Compliance	100ZR, OIF 400ZR, IEEE 802.3cw, OpenZR+
Interface rate	400ZR DWDM amplified, 400ZR unamplified, 400ZR+, 300ZR+, 200ZR+ (2×100G and 1×200G clients), 100ZR+ and 100ZR
Tx power	Optical power Tx transceiver configuration
Wavelength	Transceiver grid configuration
Optical metrics	Test set displays the following optical metrics CD (ps/nm), CFO (MHz), DGD (ps), OSNR (dB), PDL (dB), SOPCR (Krad/s), SOPMD (ps2)
Client configuration	Ethernet client L2/3 and L4 configuration
Ethernet frame	Client Ethernet frame configuration fixed or EMIX
Ethernet client BERT	Bit error analysis using PRBS31 supporting alarm/error monitoring and injection
FED	User can enable FEC excessive degrade alarm monitoring
FDD	User can enable FEC detected degrade alarm monitoring
FEC alarms	FED and FDD alarms monitoring
FEC error monitoring	FEC-UNCOR-FR and FEC-COR-BITS monitoring
Ethernet alarms	Link down, L Fault Det, L Fault Rcd, Remote fault LOA alarms
Ethernet errors	66B Block, FEC-UNCOR-FR, FEC-COR-BITS, FCS, Jabber, runt and undersize errors
Error and alarm injection	User can inject Interface, Ethernet, PCS and BERT errors and alarms
DCO Tx alarms	Tx LOA, Tx OOA, Tx CMU LOL, Tx RefClk LOL, Tx Deskew LOL, Tx FIFO
DCO Rx alarms	Rx LOF, Rx LOM, Rx Demod LOL, Rx CDC LOL, Rx LOA, Rx OOA, Rx Deskew LOL, Rx FIFO

FIBRE CHANNEL (FC) SPECIFICATIONS

FC FUNCTIONAL SPECIFICATIONS

Testing 1X, 2X, 4X, 8X, 10X, 16X, 32X and 64X

BERT	Framed FC
Patterns (BERT)	PRBS 2E31-1, 2E23-1, 2E20-1, 2E15-1, 2E11-1, 2E9-1, one user-defined pattern and the capability to invert patterns
Error injection	Bit error and FCS
Error measurement	Bit error, 66B block, invalid marker, FCS, oversize error, undersize error, FEC-COR-CW, FEV-UNCOR-CW and Pre-FEC-SYMB
Alarm detection	LOS, frequency, LOC, no traffic, pattern loss, link down, LOCWS, LOAML, link degrade, RD
Buffer-to-buffer credit testing	Buffer-to-buffer credit estimation based on latency
Latency	Round-trip latency
Service disruption time (SDT)	Measures: last disruption, shortest disruption, longest disruption, average disruption, total disruption, and service disruption count

EXFO headquarters **T** +1 418 683-0211 **Toll-free** +1 800 663-3936 (USA and Canada)

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