FTB-700G V2 Series

OPTICAL, ETHERNET AND MULTISERVICE TESTER

EXFO TFv
Test Function Virtualization

EXFO Connect
Compatible

iSAM

COMPLETE IP6 TESTING

iOLM READY

EF READY

ConnectorMax2

Feature(s) of this product is/are protected by one or more of patent appl. US 2012/0307666 A1 and equivalents in other countries.

An all-in-one Ethernet/optical solution for field technicians who install, test and troubleshoot wired, wireline, C-RAN, FTTx, fronthaul, backhaul, small cell, DAS and data-center networks

PLATFORM HIGHLIGHTS

Windows 8.1 (bring your own device, install what you want)

Ultra-bright 8-inch multitouch screen

Built-in connectivity—choose between Gigabit interface, Wi-Fi, Bluetooth and 3G or 4G LTE via USB dongle

Lightweight and portable solution designed for field engineers or cell technicians who install, troubleshoot and maintain wired and wireless networks

OPTICAL TESTING

Dynamic range up to either 36 dB or 39 dB

Test through high-port-count splitters (up to 1 x 128)

Combined singlemode/multimode wavelengths

Event dead zone as low as 0.8 meters

iOLM-ready: one-touch multiple acquisitions with clear go/no-go results presented in a straightforward visual format

Integrated tool combines a visual fault locator, inspection probe, broadband power meter and a CW source mode

FTTA TESTING

CPRI base-station (BTS) emulation from 1.2G to 9.8G rates

CPRI remote-radio-head (RRH) emulation from 1.2G to 9.8G rates

CPRI framed and unframed BER from 1.2G to 9.8G rates with pseudo-random bit sequence (PRBS) stress patterns and latency measurements

Service-disruption-time (SDT) measurements

MULTISERVICE TESTING

Dual-port testing up to 10G

iSAM ultra-simple multiservice activation

10G multisession transmission-control-protocol (TCP) testing with bidirectional RFC 6349

Power-over-Ethernet validation within cable test

EtherSAM, RFC 2544, traffic generation and monitoring, EtherBERT, Through mode, TCP throughput and Smart Loopback

Packet synchronization including IEEE 1588 V2 precision time protocol (PTP) and SyncE

Packet capture and advanced filtering up to 10G

Fibre Channel 1x, 2x, 4x, 8x, 10x support

OTN testing OTU-1/2, OTU-1e/2e

Optical SONET and SDH testing up to 10G

Electrical SONET and SDH testing

DSn and PDH testing including ISDN PRI

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THE ULTRA-PORTABLE CHOICE FOR MULTISERVICE TESTING

The ongoing transition towards a converged network infrastructure for optical, SONET/SDH, OTN, Fibre Channel and packet-based Ethernet services requires a test tool that can cover a wide range of interfaces and rates without sacrificing portability, speed or cost. Leveraging the powerful FTB-1 handheld platform, the FTB-700G V2 Series streamlines processes and empowers field technicians to efficiently test and validate optical networks, SONET/SDH, OTN, Fibre Channel, CPRI and Ethernet circuits.

THE BEST FROM OPTICAL, ETHERNET AND MULTITEST FEATURES
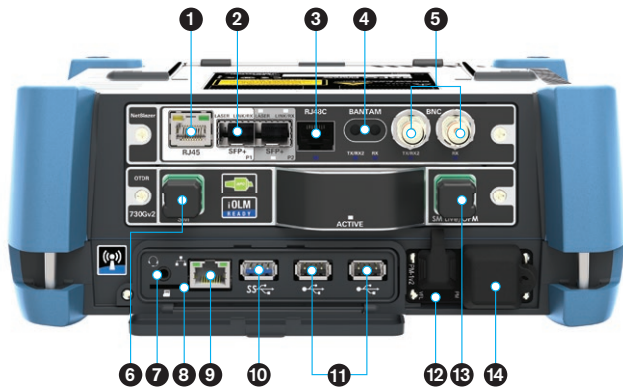
1 ETHERNET
10 to 1000 BASE-T

2 OPTICAL ETHERNET
Up to 10 Gbit/s
1000BASE-T
CPRI 1.2 to 9.8G
OBSAI 3.1G
Fibre Channel 1x, 2x, 4x, 8x, 10x
SONET/SDH up to 10G
OTN OTU1/2

3 DSn/PDH
EXT CLK

4 DSn/PDH
RX2: DS1
EXT CLK

5 Electrical
SONET/SDH
DSn/PDH
RX2: DS1/DS3
EXT CLK

6 Singlemode OTDR port

7 Mic/headset jack

8 Micro SD card slot

9 1 GigE port

10 One USB 3.0 port

11 Two USB 2.0 ports

12 VFL

13 Multimode or Singlemode live port

14 Power meter

OPTICAL

FIVE MODELS TO FIT YOUR BUDGET

The FIP-430B: complete and fully automated feature set that includes the powerful fiber image-centering system, focus adjustment and optimization, and onboard pass/fail analysis.

The FIP-435B: go one step further with the wireless probe. Includes all FIP-430B features.

The semi-automated FIP-420B: has the same features as the FIP-430B, without the automated focus adjustment.

The semi-automated FIP-425B: the wireless version of the semi-automated FIP-420B.

The FIP-410B: offers all the basic inspection features needed for manual inspection only.

100% Automated [a] | **1-step** Process [a] | **57%** Shorter Test Time [b]

FEATURES	USB WIRED			WIRELESS	
	Basic **FIP-410B**	Semi-Automated **FIP-420B**	Fully Automated **FIP-430B**	Semi-Automated **FIP-425B**	Fully Automated **FIP-435B**
Three magnification levels	✓	✓	✓	✓	✓
Image capture	✓	✓	✓	✓	✓
Five-megapixel CMOS capturing device	✓	✓	✓	✓	✓
Automatic fiber image-centering function	X	✓	✓	✓	✓
Automatic focus adjustment	X	X	✓	X	✓
Onboard pass/fail analysis	X	✓	✓	✓	✓
Pass/fail LED indicator	X	✓	✓	✓	✓
Wi-Fi Connectivity	X	X	X	✓	✓

Notes

a. Models FIP-430B and FIP-435B.

b. Data sourced from EXFO's case study, with calculation based on typical analysis time.

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REMOVING COMPLEXITY FROM THE OTDR

OTDR TESTING COMES WITH ITS LOAD OF CHALLENGES...

WRONG
OTDR TRACES

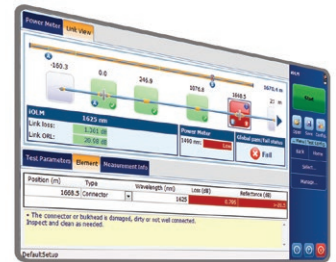COUNTLESS TRACES
TO ANALYZE

REPEATING THE
SAME JOB TWICE

COMPLEX INSTRUMENT
TRAINING/SUPPORT

iOLM | intelligent Optical Link Mapper

In response to these challenges, EXFO developed a better way to test fiber optics: The iOLM is an OTDR-based application designed to simplify OTDR testing by eliminating the need to configure parameters, and/or analyze and interpret multiple complex OTDR traces. Its advanced algorithms dynamically define the testing parameters, as well as the number of acquisitions that best fit the network under test. By correlating multipulse widths on multiple wavelengths, the iOLM locates and identifies faults with maximum resolution—all at the push of a single button.

HOW DOES IT WORK?

Dynamic multipulse acquisition → Intelligent trace analysis → Combines all results into a single link view → Comprehensive diagnosis →

Turning traditional OTDR testing into clear, automated, first-time-right results for technicians of any skill level.

Patent protection applies to the intelligent Optical Link Mapper, including its proprietary measurement software. EXFO's Universal Interface is protected by US patent 6,612,750.

Three ways to benefit from the iOLM:	**OTDR Combo (Oi Code)** Run iOLM and OTDR applications on one unit	**Upgrade** Add the iOLM software option, even while in the field	**iOLM Only** Order a unit with the iOLM application only
Three iOLM feature value packs:	**iOLM Standard** › Dynamic multipulse acquisition › Intelligent trace analysis › Map view › Diagnosis › SOR trace generation	**iOLM Advanced** All the features of iOLM, plus additional Advanced features	**iOLM Pro** All the features of iOLM Advanced, plus additional high-value professional features

Note: Refer to the intelligent Optical Link Mapper (iOLM) specification sheet for the most recent description of the added-value features available in the iOLM Advanced and iOLM Pro packs.

TROUBLESHOOTING HIGH-SPEED MULTIMODE NETWORKS WITH ENCIRCLED FLUX

Whether for an expanding enterprise-class business or a large-volume data center, new high-speed data networks built with multimode fibers are running under tighter tolerances than ever before. In the event of failure, intelligent and accurate test tools are needed to quickly find and fix the fault.

Multimode fibers are the trickiest links to test, because the test results are highly dependent on each device's output conditions. Troubleshooting with a different unit than the construction unit may mislead the technician or result in the inability to find the fault, thereby creating longer network downtimes.

For multimode fibers, EXFO recommends using an external launch mode conditioner that is Encircled Flux (EF)-compliant. The EF standard (as recommended in TIA-568 via TIA-526-14-B and IEC 61280-4-1 Ed. 2.0) is a way of controlling the source launch conditions so that tier-2 troubleshooting can be performed with maximum accuracy and consistency.

Use of an external EF-compliant device* such as the SPSB-EF-C30 is a fast and easy way to fix faulty networks.

SPSB-EF-C30

*For more detailed information about EF compliance, please read the Encircled Flux Test Solutions specification sheet.

EXFO

MULTISERVICE
POWERFUL AND FAST

The FTB-700G V2 Series offers a fully integrated DSn/PDH, ISDN, SONET/SDH, OTN, Fibre Channel, CPRI and Ethernet handheld tester, and an 8-inch multitouch screen with unprecedented configuration simplicity. Platform connectivity is abundant via Wi-Fi, Bluetooth, Gigabit Ethernet and USB ports, making it accessible in any environment.

What you need for any SONET/SDH, OTN, Fibre Channel, CPRI or Ethernet application

› Installation, commissioning and maintenance of access and metro networks

› Turn-up of SONET/SDH circuits

› Performance assessment of Carrier Ethernet services

› Validation of OTN networks and services

› Installation, activation and maintenance of metro Ethernet networks

› Deployment of active Ethernet (point-to-point) access services

› Installation and activation of Fibre Channel networks

› Testing and troubleshooting

› In-service troubleshooting of live traffic

› Performance monitoring of SONET/SDH and OTN circuits

› Round-trip delay assessment of transport circuits

› BER testing up to 11.3 Gbit/s

› FTTA validation from 1.2 Gbit/s to 9.8 Gbit/s via layer-2 CPRI protocol and unframed BER testing

SONET/SDH, OTN, FIBRE CHANNEL AND ETHERNET AT UP TO 11.3 GBIT/S

The FTB-700G V2 Series is the all-in-one solution for wired or wireless testing up to 11.3 Gbit/s.

› RJ45 port for Electrical 10/100/1000M Ethernet

› SFP+ port 1 for OTU1, OTU2, OTU1e, OTU1f, OTU2f, OTU2e, OC-1, 3, 12, 48 and 192 or STM-0, 1, 4, 16 and 64 or Fibre Channel 1x, 2x, 4x, 8x and 10x or CPRI 1.2, 2.4, 3.1, 4.9, 6.1 and 9.8 Gbit/s or OBSAI 3.1 Gbit/s and 100/1000M, 10G Ethernet and 1000BASE-T (using RJ45 copper SFP)

› SFP+ port 2 for Fibre Channel 1x, 2x, 4x, 8x, 10x or CPRI 1.2, 2.4, 3.1, 4.9, 6.1 and 9.8 Gbit/s or OBSAI 3.1 Gbit/s and 100/1000M, 10G Ethernet and 1000BASE-T (using RJ45 copper SFP)

› RJ48C port for DS1/1.5M, E1/2M and clock in/out: DS1/1.5M/E1/2M/2 MHz

› Bantam port for TX: DS1/1.5M, E1/2M, RX2: DS1/1.5M and clock in/out: DS1/1.5M/E1/2 MHz

› BNC TX: E1/2M, E3/34M, DS3/45M, STS-1e/STM-0e/52M, E4/140M, STS-3e/STM-1e/155M RX2: DS1/1.5M, DS3 and clock out: DS1/1.5M/E1/2M/2 MHz

› BNC RX: E1/2M, E3/34M, DS3/45M, STS-1e/STM-0e/52M, E4/140M, STS-3e/STM-1e/155M

Key Testing Benefits

› Up to 10G SONET/SDH

› OTN BER testing with configurable threshold settings

› Coupled, Decoupled and Through mode testing

› Error and alarm insertion and monitoring

› Overhead monitoring and manipulation

› High-order and low-order mappings

› Tandem connection monitoring (TCM)

› Pointer manipulation, including pointer sequence testing as per Telcordia GR-253, ANSI T1.105-03 and ITU-T G.783

› Performance monitoring as per ITU-T G.821, G.826, G.828, G.829, M.2100 and M.2101

› Frequency analysis and offset generation

› Automatic protection switching

› Service-disruption-time measurements

› Round-trip delay measurements

› DS1/DS3 and E1/E3/E4 testing

› Dual DS1/DS3 receiver (Rx) support

› DS1/DS3 autodetection of line code, framing and pattern

› DS1 loop codes and NI/CSU emulation

› DS1 automated multipattern BER

› DS1/DS0 monitoring including ABCD signaling bits

› DS1 FDL and DS3 FEAC

› Fractional T1/E1 testing

› ISDN PRI for DS1 or E1 interfaces

› External clock support

› 10 BASE-T to 10 GigE testing

› Dual-port testing

› 10G TCP throughput testing as per RFC 6349

› TCP throughput testing up to 1 GigE

› EtherSAM, RFC 2544, traffic generation and monitoring, EtherBERT and iSAM ultra-simple ITU-T Y.1564

› 1588 PTP and SyncE

› Through mode and Smart Loopback

› Cable testing including power-over-Ethernet

› Full line-rate packet capture and advanced filtering from 10M to 10G

› IPv6 testing

› VLANs including E-VLAN, S-VLAN and C-VLAN

› MPLS

› Asymetrical testing with Dual Test Set (EtherSAM, RFC 2544, RFC 6349 and iSAM)

› Carrier Ethernet OAM (MEF, IEEE 802.1ag, ITU-T Y.1731 and ITU-T G.8113.1 MPLS-TP)

› Fibre Channel 1x, 2x, 4x, 8x and 10x

› Framed CPRI BBU and RRH emulation from 1.2 Gbit/s to 9.8 Gbit/s

› Unframed and framed CPRI BER from 1.2 Gbit/s to 9.8 Gbit/s with RTD

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REVAMPED SETUP PROCEDURES

The new Test Configurator enables tests to be easily set up, and provides critical test information immediately after the actual setup stage. In the screenshot to the right, the RFC 2544 test was selected with Throughput and back-to-back tests enabled (frame loss and latency are disabled). The green arrow pointing up confirms that the link is up. The destination IP address is resolved and the test is ready to be executed. The Test Configurator covers all stages of testing: setup, review and execution.

The control panel has icons that provide access to the most important testing elements, buttons for the Setup, Results and Functions screens, as well as a clear pass/fail indicator. This gives field technicians the assurance that their testing time will be optimized.
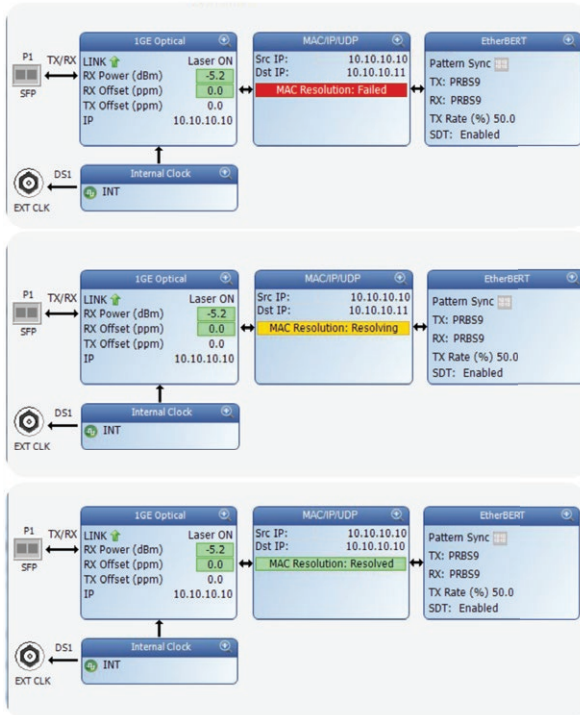
MULTISERVICE

Setting a New GUI Standard: Unprecedented Simplicity in Configuration Setup and Navigation

The FTB-700G V2 Series intelligent situational configuration setup feature guides technicians through complete and accurate testing processes (e.g.: suggestion prompts and help guides). This feature reduces navigation by combining associated testing functions on a single screen, and offers intelligent autodiscovery that enables a single technician to perform end-to-end testing.

Dedicated Quick Action Buttons

› Remote discovery to find all other EXFO units
› Laser on/off
› Test reset to clear results and statistics while running a test
› Report generation
› Save or load test configurations
› Quick error injection
› Enable second Ethernet loopback port

Assorted Notifications

› Clear indication of link status for single or dual ports
› Negotiated speed display for single or dual ports

› Power status available at all times for single or dual ports
› Pass/fail indication at all times
› Pattern and clock synchronization
› Frequency offset with valid-range color indicator
› Overhead overwrite indicator
› Error/alarm injection
› Alarm hierarchy pinpointing the root cause (when possible)

Streamlined Navigation

› Remote discovery button available at all times; no need to leave your current location to scan for a remote unit
› Testing status can be enlarged to fill the entire screen by simply clicking on the alarm status button; whether the unit is in your hand or on the other side of the room, test results can be easily determined with a simple glance at the display screen
› RFC 2544 results and graphs are also displayed in a single page; no need to navigate through multiple screens to view individual RFC subtest results
› Simplified test structure definition using task-based test-application selection, signal configuration, front-end and smart timeslot selection
› Centralized functions: error/alarm management, performance monitoring and overhead manipulation/monitoring

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Key OTN and SONET/SDH Features

Simplified BER Testing

The FTB-700G V2 Series provides the ability to preconfigure bit-error-rate (BER) thresholds that are user-defined prior to running the test. This allows for a simple pass/fail verdict at the conclusion of the test, leaving no room for misinterpretation of the test results.
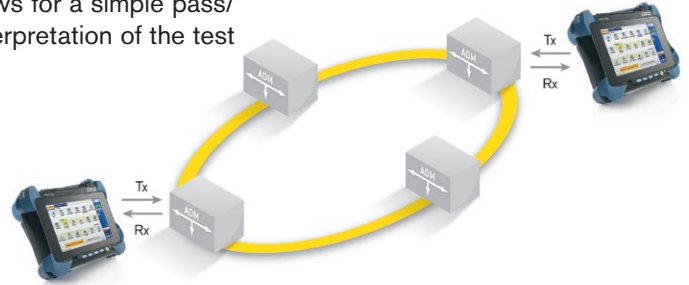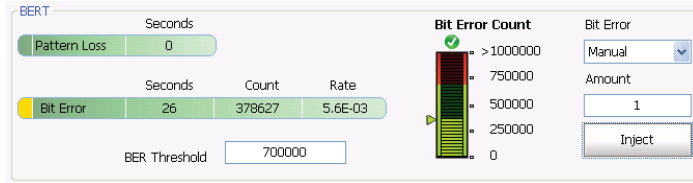
MULTISERVICE

Decoupled Mode

The Decoupled mode enables the user to independently configure the Tx and Rx ports of the FTB-700G V2 Series module. This makes it possible to test the mapping and demapping functionality of a network element or at cross-connect points in the network.

Through Mode

This mode is required for in-service monitoring of the network. The FTB-700G V2 Series can be inserted in-line on a specific link to monitor and analyze the errors and alarms in a non-intrusive manner.

Simplified Error Injection

This FTB-700G V2 Series feature enables the user to inject errors with a single click from any screen, allowing technicians to ensure circuit continuity prior to starting a test. Furthermore, the error injection functionality can be preprogrammed for any given type of error, and not just for bit errors.

Complete Overhead Monitoring

The FTB-700G V2 Series offers access to all SONET/SDH or OTN overhead (OH) bytes. Furthermore, by selecting any given OH byte, the user can retrieve additional detailed information about that byte without having to switch pages.

Talk? Listen? Inject DTMF?

With one click, field technicians can talk and listen with simplicity—no need for a clumsy butt set. The FTB-1 Pro platform allows the use of a lightweight talk/listen headset, which can be controlled via software to inject dual-tone multifrequency (DTMF) tones, and control volume and microphone levels.
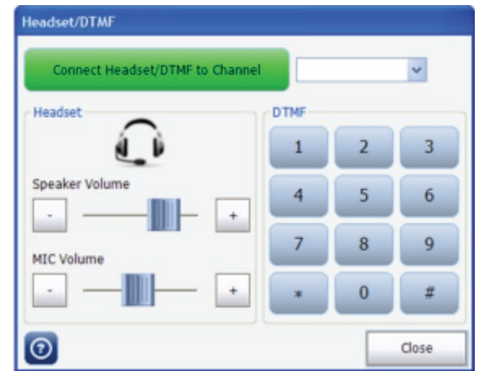
Who's Calling? What Type of Calls?

As calls come in or leave the ISDN primary rate interface, the summary results screen shows a crystal-clear analysis with its own unique call-monitoring grid. In a single glance, users can see all call information: types of calls and statistics such as idle, voice, 3.1 kHz, ringing, alerts, bit error, and pass or fail.

Centralized Control

With the FTB-700G V2 Series, field technicians have complete control at their fingertips at all times. Whether that applies to a phone book, headset activation, DTMF injection, error injection, report generation, or save and load configurations, all utilities are just a tap of a finger away from activation.
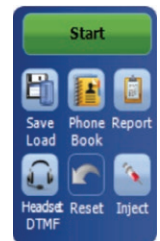
KEY ISDN FEATURES

The FTB-700G V2 Series lets you test and troubleshoot North American or European ISDN PRI configurations, and offers best-in-class ISDN PRI testing by allowing field technicians to call one or all 23 DS1 or 31 E1 PRI channels. Once connected, the user can go channel by channel to perform a BER test on individual or all channels, as well as talk and listen via a headset.
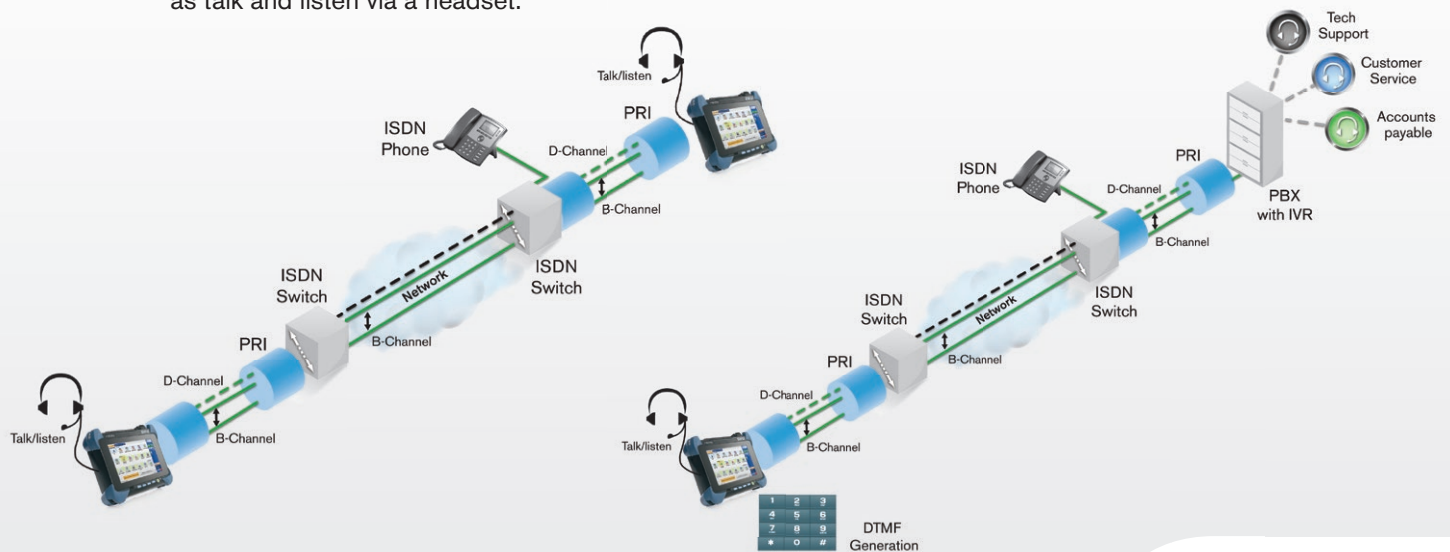
EXFO

KEY ETHERNET FEATURES

Intelligent Network Discovery Mode

Using the FTB-700G V2 Series, you can single-handedly scan the network and connect to any available EXFO datacom remote tester. Simply select the unit to be tested and choose whether you want traffic to be looped back via Smart Loopback or Dual Test Set mode for bidirectional EtherSAM, RFC 6349 or RFC 2544 results. As such, you no longer need an additional technician at the far end to relay critical information—these modules take care of everything.
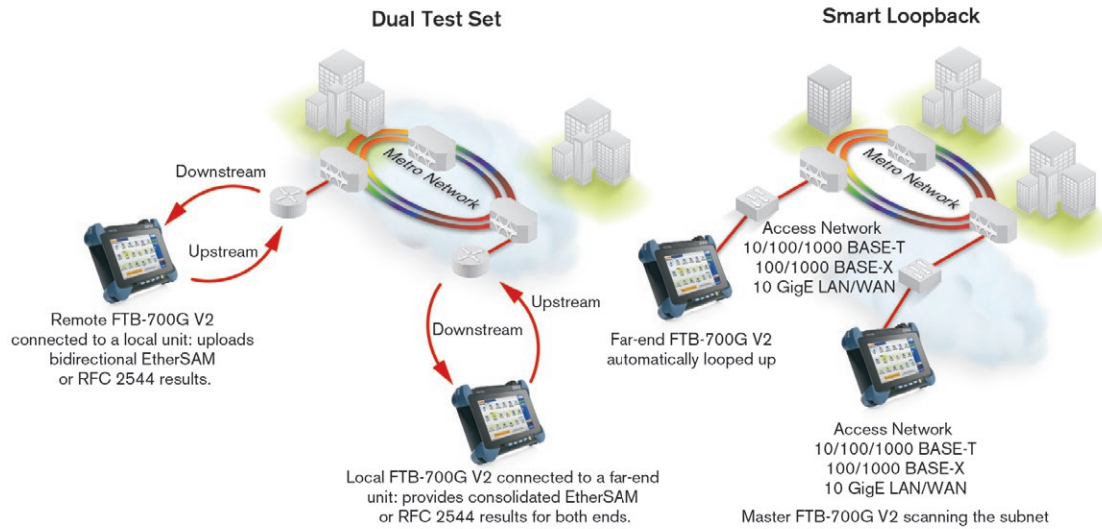

Smart Loopback Flexibility

The Smart Loopback functionality has been enhanced to offer five distinct loopback modes. Whether you are looking to pinpoint loopback traffic from a user-datagram-protocol (UDP) or TCP layer, or all the way down to a completely promiscuous mode (Transparent Loopback mode), the FTB-700G V2 Series has the flexibility to adjust to all unique loopback situations.

Dual-Port and Through Mode Testing

With dual-port testing, one technician can use a single FTB-700G V2 Series module to launch either EtherSAM or RFC 2544, and obtain bidirectional results using only one module. With traffic generation and monitoring, and EtherBERT tests, the technician can set up two distinct tests, one on port 1 and the other on port 2. Both ports can also be bound to different interfaces (e.g., 10BASE-T electrical on port 1 and 10 GigE on port 2).

VLAN/MPLS

Today's networks are expected to deliver high performance. To meet such high expectations, service providers must rely on various mechanisms, such as Ethernet tagging, encapsulation and labeling. Thanks to these additions, service providers can enhance security, scalability, reliability and performance. The FTB-700G V2 Series supports virtual-local-area-network (VLAN) tags, Q-in-Q VLAN tags and multiprotocol label switching (MPLS).
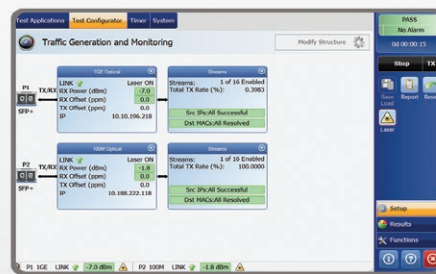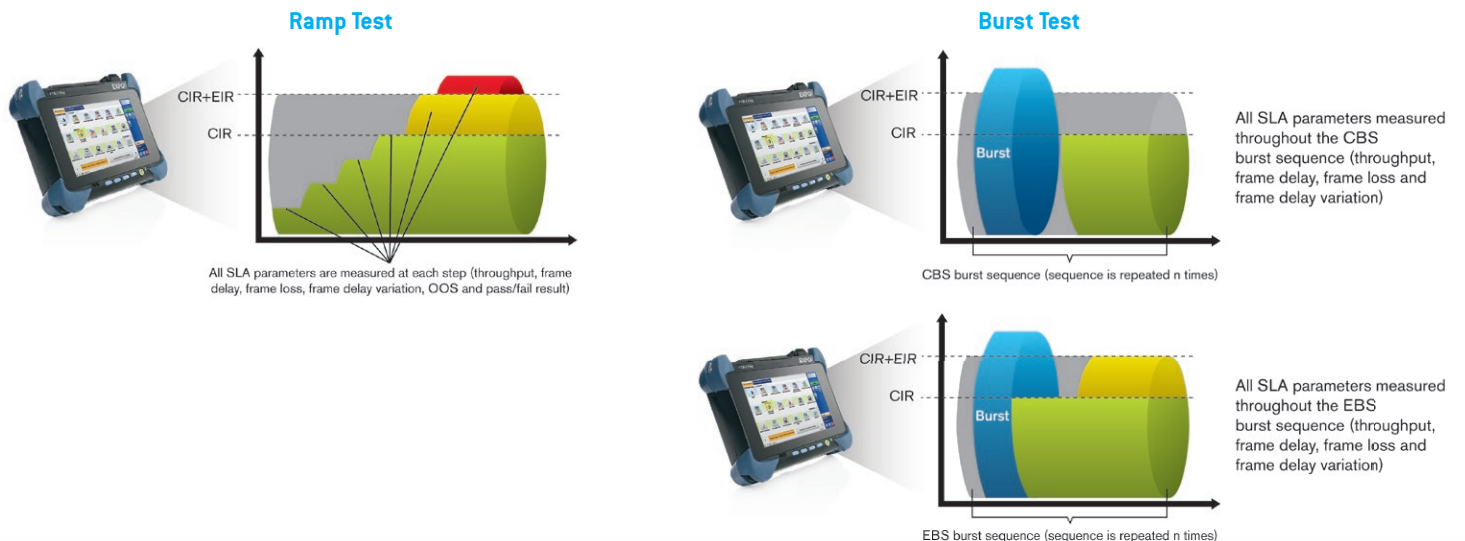
ETHERSAM: THE NEW STANDARD IN ETHERNET TESTING

RFC 2544 used to be the most widespread Ethernet testing methodology. However, it was designed for network-device testing in the lab, not service testing in the field. ITU-T Y.1564, the new standard for turning up and troubleshooting Carrier Ethernet services, has a number of advantages over RFC 2544, including validation of critical service-level agreement (SLA) criteria such as packet jitter and quality-of-service (QoS) measurements. This methodology is also significantly faster, thereby saving time and resources while optimizing QoS.

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.

Contrary to other methodologies, EtherSAM supports new multiservice offerings and can simulate all types of services that will run on the network while simultaneously qualifying all key SLA parameters for each of these services. To prioritize the different service types, EtherSAM validates the QoS mechanisms provisioned in the network, resulting in better troubleshooting, more accurate validation and much faster deployment. EtherSAM consists of two phases, the service configuration test and the service performance test.

Service Configuration Test

The service configuration test involves sequentially testing each service to validate that it is properly provisioned and that all specific key performance indicators (KPIs) or SLA parameters have been met. A ramp test and burst test are performed to verify the committed information rate (CIR), excess information rate (EIR), committed burst size (CBS) and excess burst size (EBS).

Ramp Test

CIR+EIR
CIR

All SLA parameters are measured at each step (throughput, frame delay, frame loss, frame delay variation, OOS and pass/fail result)

Burst Test

CIR+EIR
CIR
Burst

All SLA parameters measured throughout the CBS burst sequence (throughput, frame delay, frame loss and frame delay variation)

CBS burst sequence (sequence is repeated n times)

CIR+EIR
CIR
Burst

All SLA parameters measured throughout the EBS burst sequence (throughput, frame delay, frame loss and frame delay variation)

EBS burst sequence (sequence is repeated n times)

Service Performance Test

Once the configuration of each individual service has been validated, the service performance test simultaneously validates the quality of all the services over time.

Service 1

Service 2

Service 3

All SLA parameters are measured at each service (throughput, frame delay, frame loss, frame delay variation, OOS and pass/fail result)

EXFO

EtherSAM BIDIRECTIONAL RESULTS

EXFO's EtherSAM approach proves even more powerful as it executes the complete ITU-T Y.1564 test with bidirectional measurements. 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.
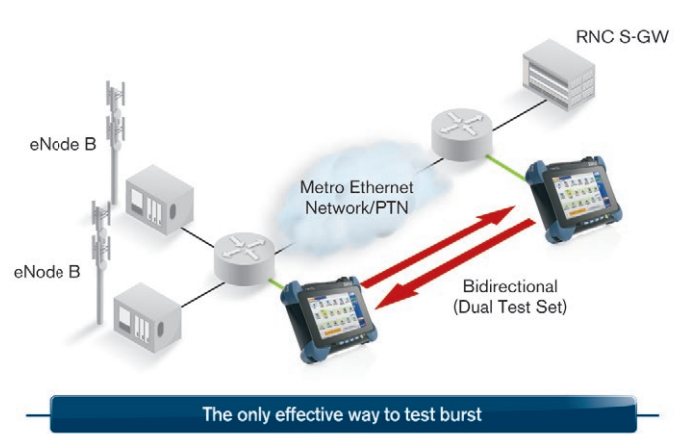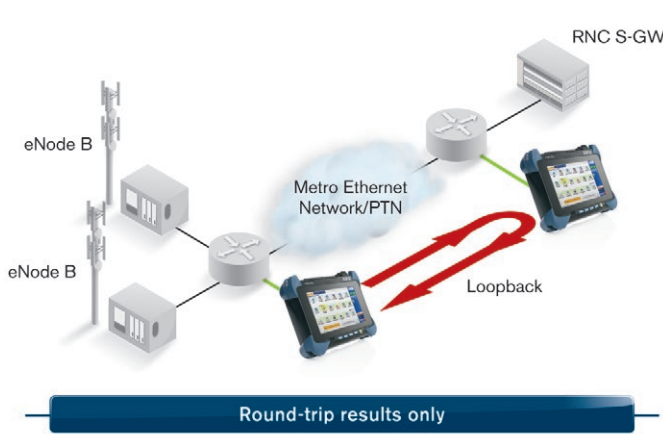
iSAM

With iSAM, which includes Y.1564 (EtherSAM) and RFC 6349, the focus is on minimalism and simplicity, making both tests as simple as possible for all users. This is in sharp contrast with the current situation in the test and measurement market today. One key aspect of iSAM's simplicity lies in its efficiency: it only requires a limited number of steps to set up, run and receive valid test results.

The core objective of iSAM is to remove friction between the user and the testing solution. The end goal is to enable field technicians of any skill level to set up and run an iSAM test, and all of this is done within a one-page setup.

The innovation does not stop there. iSAM also takes the lead in delivering the latest test and measurement standards. iSAM has achieved an industry first by introducing actual Metro Ethernet Forum (MEF) standards and thresholds to guarantee that service providers, mobile network operators and multisystem operators are able to test against the latest MEF 23.1 standard.
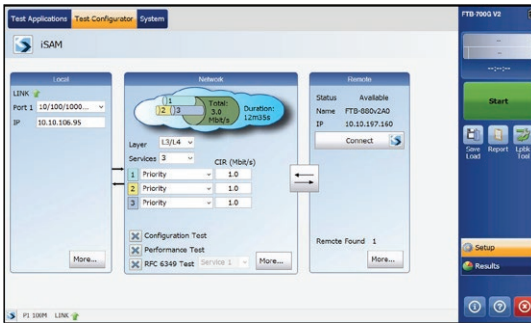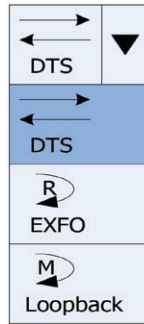
One-page setup *Multiple modes of connection* *One-page results*

CABLE TEST WITH POWER OVER ETHERNET (PoE)

The cable test helps field technicians quickly and efficiently detect cable issues. Using this feature in conjunction with the FTB-700G V2 Series, technicians can troubleshoot any cabling or installation issue by checking the cable's actual pinout, wire map, cable length, distance-to-fault and propagation delay. With the addition of PoE, technicians can check for the following: presence of power, the power-supply equipment type, power class rating, voltage, current and power in watts. Whether a technician needs to validate a basic component such as a PoE-powered VoIP phone, or an actual PoE-powered small cell, the FTB-700G V2 Series fits the bill for basic to critical devices.


EXFO

FTTA TESTING

With the FTB-700G V2 modules, field technicians can carry out a variety of FTTA tests. For instance, when installing an RRH, it is critical that all equipment be verified before the riggers have finished the construction phase. The FTB-700G V2 Series CPRI protocol feature verifies that the RRH is fully operational and that the correct small form-factor pluggable (SFP) transceivers are installed and connected correctly.

Using the FTB-700G V2 Series enabled with the layer-2 CPRI protocol, technicians can easily connect to the RRH without having to climb the cell tower. Regardless of whether the cell site's BTS is connected to the RRH, the FTB-700G V2 is always ready to emulate a CPRI-enabled BTS. Once connected to the RRH, the FTB-700G V2 is able to supply the field technician with a complete analysis of vital CPRI statistics that includes the following: optical power levels, protocol version, frequency and frequency offset, hyperframe and codeword counts, the negotiated Ethernet or high-level data link control (HDLC) control, and maintenance channels.

Having this information readily accessible enables field technicians to ensure that the RRH is working at the correct, specified line rate, and that it is timed and fully transmitting continuous frames from the top to the bottom of the tower. In addition, the reverse verification can be made by using the FTB-700G V2 Series to emulate the RRH in order to validate the CPRI link with the BTS.

Moving closer toward CPRI-enabled infrastructures, a significant challenge arises as a result of human error occurring between the RRH and the BTS; faulty configurations, bad wiring and incorrect SFPs can lead to problems when trying to initialize the CPRI start-up sequence between the BTS and RRH. The FTB-700G V2 Series test suite better equips field technicians to decipher and solve these basic yet very costly human errors.

Finally, using the FTB-700G V2 Series modules, field technicians can perform an unframed and framed layer-2 CPRI BER test from 1.2 Gbit/s all the way up to 9.8 Gbit/s. The FTB-700G V2 Series modules are able to validate that the fiber from the BTS located at the base of the tower or kilometers away in a Cloud-RAN environment is running with the expected latency and is error-free.
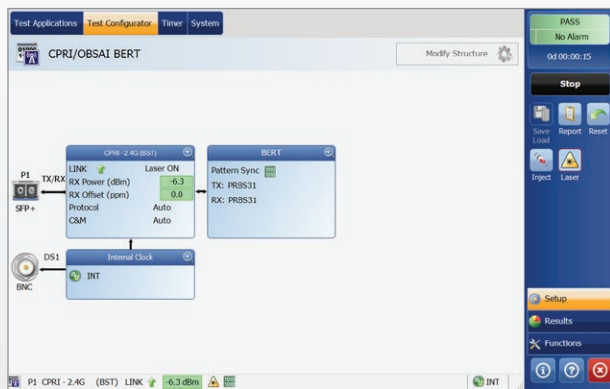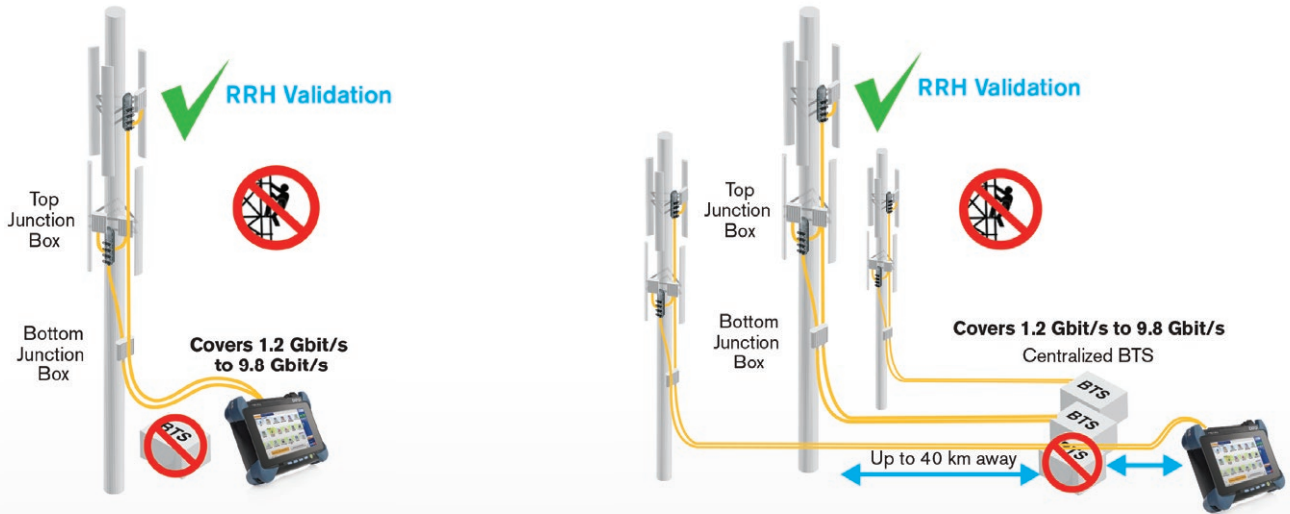
Framed CPRI BER Test
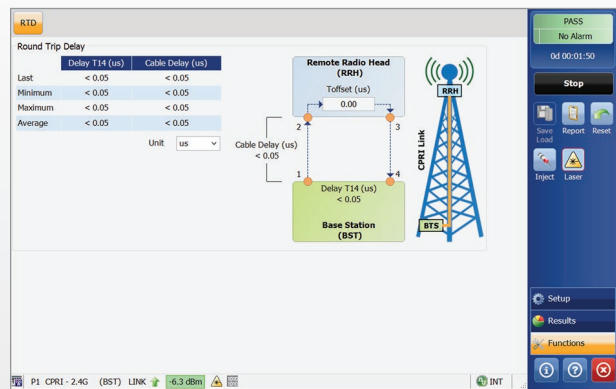
CPRI Round-Trip Delay

EXFO

TRAFFIC GENERATION AND MONITORING

The FTB-700G V2 Series surpasses the multistream offerings of typical handheld Ethernet testing devices. Up to 32 streams of traffic can be configured by a technician in order to test just about any frame format: Ethernet II, 802.3 SNAP, IPv4, IPv6, three levels of VLANs, MPLS, UDP and TCP. Each stream has an analog visual gauge and user-definable pass/fail thresholds that instantly show whether the test traffic is in or out of the expected ranges of the SLA.

Layer-2 Transparency Testing

The FTB-700G V2 Series uses a new virtual frame display that allows field technicians to easily configure multiple streams and their parameters, including the ability to modify the source medium-access-control (MAC) address and EtherType. This makes it possible to test layer-2 protocols such as Cisco discovery protocol (CDP), VLAN trunking protocol (VTP) and link layer discovery protocol (LLDP). For added simplification, there are also predefined factory configurations capable of automatically loading up to ten layer-2 protocols simultaneously.

← Up to 16 streams

Visual frame display

Voice/video/data services
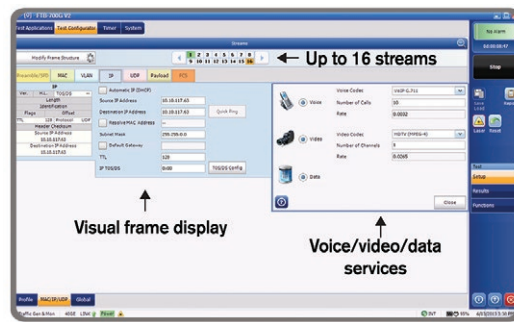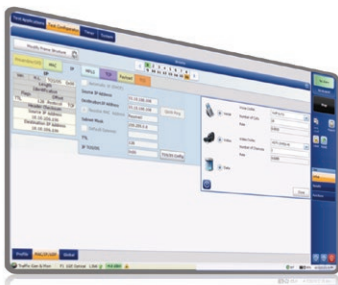
RFC 6349

The Internet Engineering Task Force (IETF) ratified RFC 6349 as a new method for validating an end-to-end TCP service. This new TCP throughput test methodology provides a repeatable standards-based test that validates TCP applications such as web browsing, file transfer, business applications and streaming video. After running the RFC 6349 test, service providers will have all the metrics needed to optimize TCP performance from within their networks or customer premises equipment.

The RFC 6349 test is important, because it includes the following steps that help locate and diagnose TCP issues correctly. The first step consists of finding the maximum transmission unit (MTU) size. This ensures that the network is not fragmenting the traffic. The second step is aimed at determining the baseline round-trip delay, which means letting the technician know that this latency value is the best-case scenario that the network under test can deliver. The third step uses either single or multiple TCP connections to fill the pipe and then report back the actual TCP throughput. Once the test is complete, all TCP metrics are clearly laid out. If changes are required to optimize the TCP performance, the technician will have all the values needed to rectify the situation. In the end, the RFC 6349 test helps to resolve any potential discrepancies occurring between the service provider network and the customer premises equipment.
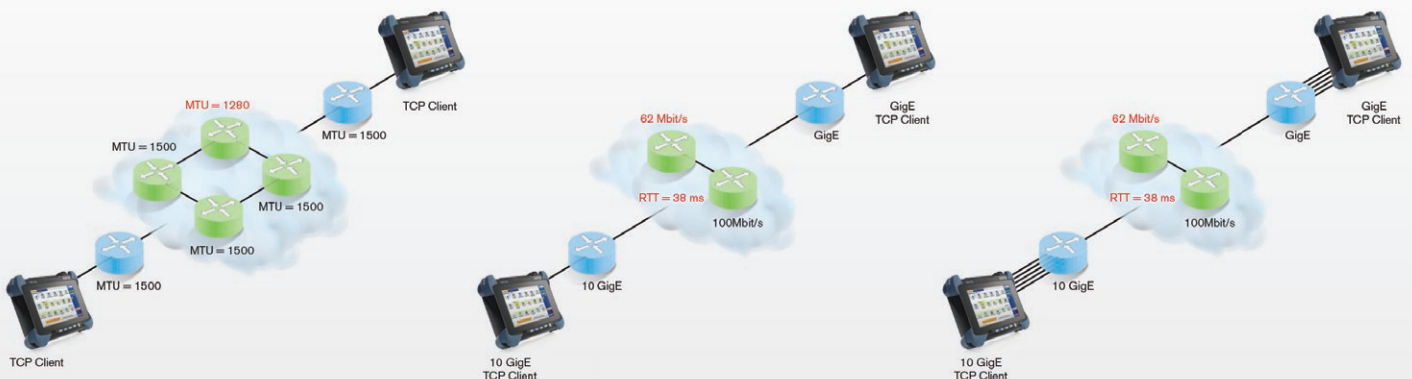
Path MTU Discovery

*Baseline RTT and Bandwidth to Determine the Ideal Window Size*

Single or Multiple TCP Connections to Enable Full Pipe Testing

EXFO

CARRIER ETHERNET OAM

Ever since the introduction of metro Ethernet networks, there has been a need to ensure *five nines* level of availability, and reliability, as well as a 50 millisecond recovery time from failures. As per PDH, time-division multiplexing (TDM) and SONET/SDH, operations, administration and maintenance (OAM) has become a crucial network component that has enabled the same quality for carrier-class Ethernet.

The FTB-700G V2 Series offers a new application that validates the mechanics of the service operation, administration and maintenance (S-OAM) tools, covering ITU-T Y.1731, IEEE 802.1ag, IEEE 802.3ah, ITU-T G.8113.1 (MPLS-TP) and MEF modes. The features of this application include continuity check generation and monitoring, loopback testing, frame loss, synthetic loss and frame delay. There is also an S-OAM link trace and responder.
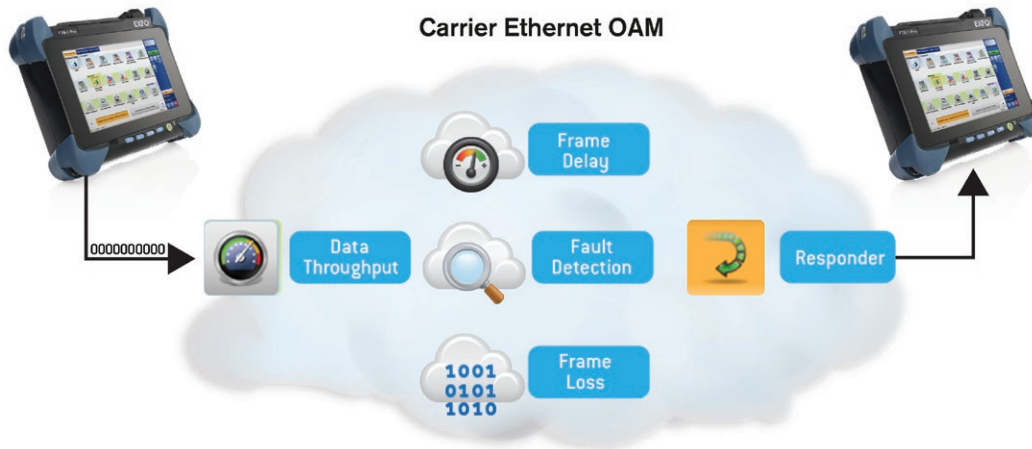
Packet Capture

The capturing power of EXFO's FTB-700G V2 Series extends far beyond basic capabilities. The FTB-700G V2 Series adds extra features and functionalities to boost test cycle efficiency and provide more value. Its packet capture tool offers comprehensive filtering, triggering and truncation methods to target specific traffic and quickly pinpoint issues in the lab and in the field.
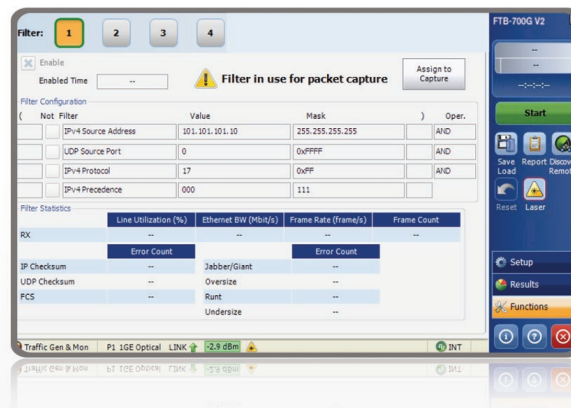
Advanced Traffic Filtering

In some cases, troubleshooting only concerns a particular traffic flow. The advanced traffic-filtering capability of the FTB-700G V2 Series allows you to restrict traffic by using up to four matching fields and operands (and, or, not). A complete set of triggers is available, such as MAC, IP and TCP/UDP fields, as well as VLAN and MPLS fields.

EFFICIENTLY ASSESSING THE PERFORMANCE OF FIBRE CHANNEL SERVICES

The FTB-700G V2 Series modules provide comprehensive testing capabilities for Fibre Channel (FC) network deployments, supporting multiple FC interfaces.

APPLICATIONS

Since most storage area networks (SANs) cover large distances, and because FC has stringent performance requirements, it is imperative to test at each phase of network deployment to ensure appropriate service levels. EXFO's FTB-700G V2 Series modules provide full wire-speed traffic generation at the FC2 layer, which allows for BER testing for link integrity measurements. The FTB-700G V2 Series also supports latency, buffer-to-buffer credit measurements for optimization, as well as login capabilities.

Latency

Transmission of frames in a network is not instantaneous, and is subject to multiple delays caused by the propagation delay in the fiber and the processing time inside each piece of network equipment. Latency is the total accumulation of delays between two endpoints. Some applications, such as VoIP, video and storage area networks, are very sensitive to excess latency.

Therefore, it is critical for service providers to properly characterize network latency when offering FC services. The FTB-700G V2 Series modules estimate buffer-to-buffer credit value requirements from the performed latency measurement.

Buffer-to-Buffer Credit Estimation

In order to regulate traffic flow and congestion, FC ports use *buffers* to temporarily store frames. The number of frames a port can store is referred to as a *buffer credit*. Each time a frame is received by a port, an acknowledgement frame is sent. The buffer-to-buffer credit threshold refers to the amount of frames a port can transmit without receiving a single acknowledgement.

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-700G V2 Series modules are capable of estimating buffer credit values with respect to latency by calculating the distance according to the round-trip latency time. This value can then be used by network administrators to optimize the network configuration.

Login Testing

Most new-generation transport devices (xWDM or SONET/SDH MUX) supporting FC are no longer fully transparent; they also have increased built-in intelligence, acting more as FC switches. With switch fabric login ability, the FTB-700G V2 Series modules support connections to a remote location through a fabric or semitransparent network.

The login process not only permits the unit to connect through a fabric, but it also exchanges some of the basic port characteristics (such as buffer-to-buffer credit and class of service) in order to efficiently transport the traffic through the network.

The login feature allows for automatic detection of port/fabric login, login status (successful login, in progress, failure and logout) and response to remote buffer-to-buffer advertised credit.

COMPLETE SUITE OF FIBRE CHANNEL INTERFACES

Interface	Signal Rate (Gbit/s)	Data Rate (Mbit/s)
1X	1.0	100
2X	2.1	200
4X	4.2	400
8X	8.5	800
10X	10.5	1200

End-to-End Networking
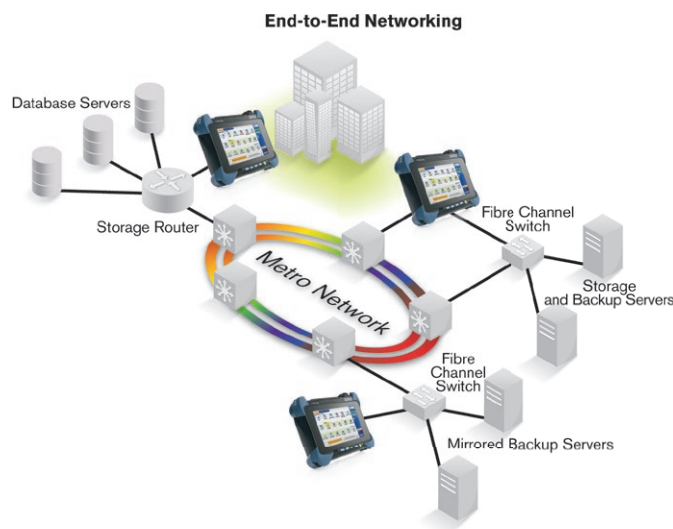
Thanks to end-to-end network testing capabilities, EXFO's FTB-700G V2 Series enables fast deployment and configuration of FC networks. Communication between the transport network, interconnection devices and end nodes can be validated with features such as BER testing, latency measurement, buffer-to-buffer credit estimation and port login capabilities.

EXFO

EXFO TFv
Test Function Virtualization

EXFO TFv

EXFO TFv—Test Function Virtualization is a cloud-based suite of defined offerings for service providers who are looking to scale their testing requirements to their specific needs. Under the EXFO TFv umbrella are FTB Anywhere floating licenses, and the newly launched FTB OnDemand time-based software licenses.

FTB Anywhere: Floating Test Licenses

FTB Anywhere is an EXFO Connect-enabled offering that allows FTB platform users to share floating test licenses and get the required functionality—anywhere, anytime. In short, the customer owns the software licenses and can share them between FTB platforms.

FTB OnDemand: Time-Based Software Licenses

FTB OnDemand allows customers to activate time-based software licenses covering a wide range of test functionalities (e.g., 100G testing) to match their exact needs. FTB OnDemand enables users to obtain a license for a specific test for a specific module for a specific period of time. FTB OnDemand is available for a number of best-in-class EXFO test modules. For a complete list of all the available modules, visit our FTB OnDemand web page.

EXFO|Connect

AUTOMATED ASSET MANAGEMENT. PUSH TEST DATA IN THE CLOUD. GET CONNECTED.

EXFO Connect pushes and stores test equipment and test data content automatically in the cloud, allowing you to streamline test operation from build-out to maintenance.

EXPERT TEST TOOLS ON THE FTB-1 PRO PLATFORM

EXpert Test Tools is a series of platform-based software testing tools that enhance the value of the FTB-1 Pro platform, providing additional testing capabilities without the need for additional modules or units.

EXpert TEST TOOLS
EXpert VoIP TEST TOOLS — The EXpert VoIP Tools generate a voice-over-IP call directly from the test platform to validate performance during service turn-up and troubleshooting. • Supports a wide range of signaling protocols, including SIP, SCCP, H.248/Megaco and H.323 • Supports mean-opinion-score (MOS) and R-factor quality metrics • Simplifies testing with configurable pass/fail thresholds and RTP metrics
EXpert IP TEST TOOLS — The EXpert IP Tools integrate six commonly used datacom test tools into one platform-based application to ensure that field technicians are prepared for a wide range of testing needs. • Rapidly performs debugging sequences with VLAN scan and LAN discovery • Validates end-to-end ping and traceroute • Verifies FTP performance and HTTP availability
EXpert IPTV TEST TOOLS — This powerful IPTV quality-assessment solution enables set-top box emulation and passive monitoring of IPTV streams, allowing for quick and easy pass/fail verification of IPTV installations. • Real-time video preview • Analyzes up to 10 video streams • Comprehensive QoS and quality-of-experience (QoE) metrics, including MOS score

EXFO

FTB-720G V2/730G V2 ORDERING INFORMATION

FTB-7XXG-XX-XX-XX-XX-XX-XX-XX-XX-XX-XX-XX-XX-XX

Model
FTB-720GV2-SM1 = OTDR 1310 nm/1550 nm
FTB-720GV2-Q1-Quad = OTDR 850 nm/1300 nm,
1310 nm/1550 nm
FTB-730GV2-SM1 = OTDR 1310 nm/1550 nm
FTB-730GV2-SM2 = OTDR 1310/1550 nm, and
1625 nm live port
FTB-730GV2-SM8 = OTDR 1310/1550 nm, and
1650 nm live port

Model Options
Optical = Optical only (without Ethernet)
Ethernet = Enables 10M to 1000M Electrical and GigE
Combo = Enables Optical and Ethernet
10M to 1000M Electrical and GigE

Base Software Options[a]
OTDR = Enables the OTDR application only
iOLM = Enables the iOLM application only
Oi = Enables iOLM and OTDR applications

Multimode Connector[b]
EI-EUI-28 = UPC/DIN 47256
EI-EUI-76 = UPC/HMS-10/AG
EI-EUI-89 = UPC/FC narrow key
EI-EUI-90 = UPC/ST
EI-EUI-91 = UPC/SC
EI-EUI-95 = UPC/E-2000
EI-EUI-98 = UPC/LC

Singlemode Connector
EA-EUI-28 = APC/DIN 47256
EA-EUI-89 = APC/FC narrow key
EA-EUI-91 = APC/SC
EA-EUI-95 = APC/E-2000

Software 700G V2 Series[c]
RT = Real-time OTDR mode (via iOLM application)[e]
iEX = iOLM EXpert mode[f]

Transport Base Options[g]
SONET = SONET testing
SDH = SDH testing
SONET-SDH = SONET and SDH testing

iOLM Software Option
00 = iOLM Standard
iADV = iOLM Advanced[a]
iPRO = iOLM Pro[a]

CPRI/OBSAI rate options
CPRI-OBSAI = Enables 1.2G to 3.1G CPRI, and 3.1G OBSAI[j]
CPRI-4.9G[h]
CPRI-6.1G[h]
CPRI-9.8G[h]

Transport Rate Options[g]
52M = 52 Mbit/s (OC-1/STM-0)[i, j]
155M = 155 Mbit/s (OC-3/STM-1)[j]
622M = 622 Mbit/s (OC12/STM-4)[j]
2488M = 2.5 Gbit/s (OC48/STM-16)[j]
9953M = 10 Gbit/s (OC192/STM-64)[h]

Ethernet Rate Option[g]
100optical = Enables 100 Mbit/s optical[j]
10GigE = Enables 10 GigE LAN/WAN[h]
GigE = 1000 Mbit/s optical and electrical[j]

Fibre Channel Options[i]
FC1X = Enables 1x Fibre Channel interface[j]
FC2X = Enables 2x Fibre Channel interface[j]
FC4X = Enables 4x Fibre Channel interface[j]
FC8X = Enables 8x Fibre Channel interface[j]
FC10X = Enables 10x Fibre Channel interface[h]

Multiservice Software Options[g]
DS3-G.747 = G.747 test capability
DS1-FDL = DS1 FDL test capability
DUAL-RX = DS1/DS3 dual RX testing
DS3-FEAC = DS3 FEAC test capability
TCM = Tandem connection monitoring
DSn = DSn test capability
PDH = PDH test capability
ISDN-PRI = ISDN primary rate interface
NI-CSU = NI-CSU loopback emulation
Cable_test = Cable test
IPV6 = Internet protocol version 6
ETH-THRU = Through mode capability
MPLS = Enables MPLS
1588PTP = Generates and analyzes 1588 PTP
SyncE = Generates and analyzes SyncE protocol
TCP-THPUT = TCP throughput
ETH-OAM = Enables Y.1731, G.8113.1 (MPLS-TP), 802.1ag and MEF
LINK-OAM = Enables 802.3ah Link OAM
ADV-FILTERS = Advanced filtering
ETH-CAPTURE = Full line-rate packet capture
DUAL-PORT = Dual port testing for any enabled Ethernet rate
iSAM = Enables simplified Y.1564 test
RFC6349 = Enables TCP testing as per RFC 6349
PoE = Enables Power-over-Ethernet capability
TRAFFIC-SCAN = Discover and monitor VLAN traffic flows
on a live signal

OTN Rate Options
00 = Without OTN rate option
OTU1 = OTN optical rate 2.666 Gbit/s[j]
OTU2 = OTN optical rate 10.709 Gbit/s[h]
OTU2-1e-2e = OTN optical rates 11.049/11.096 Gbit/s[h]
OTU2-1f-2f = OTN optical rates 11.270/11.318 Gbit/s[h]

Example: FTB-730G v2-SM1-Optical-iOLM-EA-EUI-89-RT-iEX-iADV-TCP-THPUT-iSAM-OTU1

EI CONNECTORS

To maximize the performance of your OTDR, EXFO recommends using APC connectors. These connectors generate lower reflectance, which is a critical parameter that affects performance, particularly dead zones. APC connectors provide better performances than UPC connectors, thereby improving testing efficiency.

Note: UPC connectors are also available, simply replace EA-XX by EI-XX in the ordering part number. Additional connectors available are the EI-EUI-76 (UPC/HMS-10/AG) and EI-EUI-90 (UPC/ST).
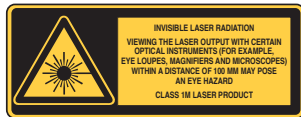
Notes
a. Available if no Ethernet option selected.
b. Available for model FTB-720Gv2-Q1-Quad only.
c. Available if Base Software selected.
d. Included if OTDR or Oi Base software selected.
e. Available for iOLM software only.
f. Available with iOLM or Oi Base software selected.
g. Available if Ethernet option selected.
h. Requires purchase of SFP+.
i. Included if Ethernet selected.
j. Requires purchase of SFP.

GENERAL SPECIFICATIONS

Size (H x W x D)	210 mm x 254 mm x 96 mm (8 1/4 in x 10 in x 3 3/4 in)
Weight (without battery)	1.7 kg (3.7 lb)
Temperature Operating	0 °C to 50 °C (32 °F to 122 °F)
Storage	−40 °C to 70 °C (−40 °F to 158 °F)
Relative humidity	0 % to 95 %, noncondensing
Battery life (extended)	OTDR = More than 6h taking 12 traces single per hour 1G = Up to 3h 10G = Up to 2h
Battery charging time	Two hours from full discharge to full charge
Languages	English, Chinese, Japanese and Korean

LASER SAFETY

INVISIBLE LASER RADIATION
VIEWING THE LASER OUTPUT WITH CERTAIN
OPTICAL INSTRUMENTS (FOR EXAMPLE,
EYE LOUPES, MAGNIFIERS AND MICROSCOPES)
WITHIN A DISTANCE OF 100 MM MAY POSE
AN EYE HAZARD
CLASS 1M LASER PRODUCT

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

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