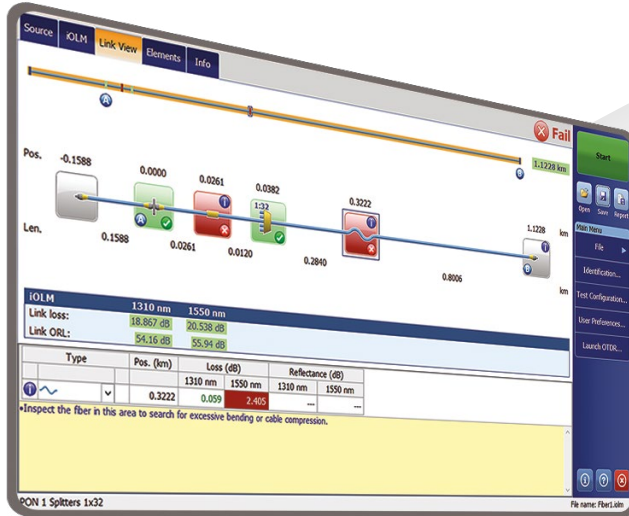# intelligent Optical Link Mapper (iOLM)

OTDR-BASED APPLICATION MAKING EXPERT-LEVEL FIBER TESTING ACCESSIBLE TO ALL

Powered by

LiNK AWARE ™
TECHNOLOGY

4 BTR BROADBAND TECHNOLOGY REPORT
2012 Diamond TECHNOLOGY REVIEWS

FROST & SULLIVAN
2016 BEST PRACTICES AWARD
GLOBAL CENTRALIZED
RADIO ACCESS NETWORKS TESTING
PRODUCT LINE STRATEGY LEADERSHIP AWARD

Available on:

> MaxTester 700B/C OTDR Series
> FTB-700C OTDR Series
> FTBx-700C OTDR Series
> FTB-7000E OTDR Series

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.

Simplify OTDR tests while optimizing characterization accuracy for all network topologies. iOLM is powered by intelligent algorithms that can uniquely adapt to the context. Still unmatched in the industry, iOLM dynamically locates and identifies all network components and faults with maximal resolution—all at the push of one button.

KEY FEATURES

Self-setting unit dynamically adapting to any fiber link

Intelligent multi-acquisitions at multiple wavelengths in a single icon-based link view

Comprehensive fault diagnosis and guidance

Consolidated bidirectional link view (patent-pending)

OTDR trace file generation (.sor)

TIA/IEC automated pass/fail thresholds for enterprise/data centers (optional)

Test two fibers at once with loopback testing mode (optional)

KEY NETWORK APPLICATIONS

Point-to-point access

FTTx last mile

LAN/WAN, enterprise and data center certification

FTTx/PON MDU

Fronthaul (FTTA, DAS and small cells) and backhaul

FTTH unbalanced/Tapered PON

Passive optical LAN (POL)

Metro core and long haul

CWDM/DWDM

Cable certification (IL/ORL measurement)

Multifiber MPO cable characterization

COMPATIBLE PLATFORMS

FTB Family Platforms

Handheld OTDR
MaxTester 700B/C Series

FTB-1v2/
FTB-1 Pro

FTB-2/
FTB-2 Pro

FTB-4 Pro

EXFO

GO BEYOND OTDR TESTING

Innovation is front and center at EXFO, and the intelligent Optical Link Mapper (iOLM) is a prime example of a game-changing solution. The iOLM lets you take advantage of the full power of your OTDR–bringing automation to a new level and enabling untrained technicians to become test experts in no time.

The iOLM integrates EXFO's fiber testing expertise into a simple, easy-to-use software that will step up your OTDR testing capabilities. Moreover, EXFO designs and optimizes each OTDR model to offer the best possible performance for its specific application, giving you a tailored solution to meet your needs and context.

iOLM—REMOVING COMPLEXITY FROM THE OTDR

OTDR TESTING COMES WITH ITS SHARE OF CHALLENGES...

WRONG OTDR TRACES

COUNTLESS TRACES TO ANALYSE

REPEATING THE SAME JOB TWICE

COMPLEX INSTRUMENT TRAINING/SUPPORT

TO TAKE ON THESE CHALLENGES, EXFO DEVELOPED A BETTER WAY TO TEST FIBER OPTICS

i OLM | intelligent Optical Link Mapper

How is the industry's most accurate fiber characterization achieved?
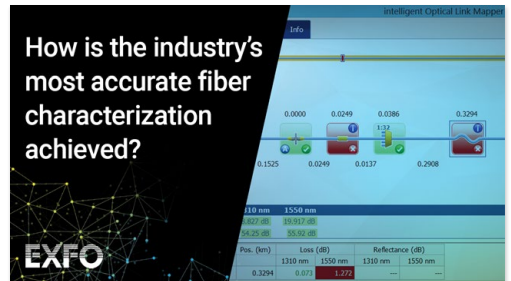
Watch it in action: **How iOLM works?**

HOW DOES IT WORK?

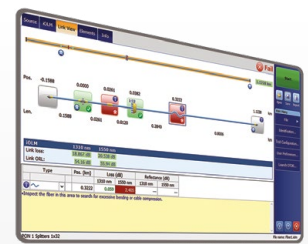**Dynamic multipulse acquisition** → **Intelligent trace analysis** → **Combine all results into a single link view and single report file** → **Comprehensive diagnosis** →

iOLM adjusts test paramaters dynamically for ANY link under test–using a mix of short, medium and long pulses as needed.

Based on the multiple acquisitions and with the help of advanced algorithms, iOLM is able to detect more events with maximum resolution.

Results are visually displayed in an icon-based fiber-link view to quickly assess each event's pass/fail status per standard selected, eliminating any risk of misinterpretation.

Delivers an analysis of failed events and suggests solutions; guides the technicians in fixing the fault quickly and successfully.

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

THREE WAYS TO BENEFIT FROM THE iOLM

1 **OTDR combo (Oi code)**
Run iOLM and OTDR applications on one unit

2 **Upgrade**
Add the iOLM software option, even while in the field

3 **iOLM only**
Order a unit with the iOLM application only

EXFO

UNIQUE FEATURES (INCLUDED IN IOLM STANDARD)

SINGLE-ENDED FIBER DEPLOYMENTS MADE EASY

Link-Aware™ technology

Optimize the test run: With one click, the unit automatically performs link recognition, sets the optimal parameters and launches multiple acquisitions and analyses—at multiple wavelengths—consolidating the results obtained for every link section and every network element. Get accurate information right away on each link element and export it to a single report.

Self-setting unit

Be the expert: Powered by Link-Aware technology, the iOLM self-manages the setting of all test parameters for ready-to-use intelligence that dramatically shortens the learning curve. Minimize training, avoid test misconfiguration, and facilitate your technicians' transition from copper to fiber.

Optical link view

Crunch the data: Leaving complex OTDR traces behind, the simplified link mapper provides a straightforward view of the fiber under test, with clear icons and pass/fail verdicts. Get actual results: end-to-end visual assessment of your link, complete with event characterization and fiber status.

Intelligent diagnostics

Let it show you the way: Loaded with countless algorithms and a database of potential network failures, the iOLM guides you through your network's problem-solving process. Say goodbye to trace misinterpretation and ensure that all your technicians—not just the most experienced ones—can efficiently fix network issues right on the spot.

OTDR trace file generation

Fits your existing procedures: The iOLM can generate a universal and enhanced Bellcore format (.sor) OTDR trace to comply with your existing reporting and post-processing requirements. This OTDR trace integrates all the additional information gathered by the iOLM, providing more complete results.

Single iOLM file per link

Consolidate the results: While iOLM gives you more link information based on multiple acquisitions, it will not annoy you with plenty of messy files for a given link. iOLM simplifies reporting. What you get in the field is what you can see and process on your PC!

Bidirectional analysis (Via FastReporter data post-processing software)

Combine the results: Recommended to ensure true splice characterization, bidirectional analysis combines results from both directions to provide an average loss for each event. Use of bidirectional analysis with the iOLM ensures that you benefit from maximum resolution on both directions (multiple pulse widths at multiple wavelengths), as well as a consolidated view.

iOLM

Supports any network topology: point-to-point, centralized PON, cascaded PON or unbalanced/tapered PON (covered by standard iOLM).

EXFO
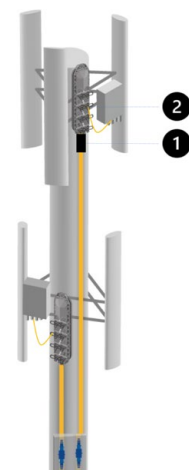
SPECIALIZE YOUR iOLM WITH OPTIMODES

Optimodes are test configurations tailored to optimize specific use cases and go a step beyond recognized iOLM performances.

Optimode: Short-link close events

Application: FTTA, data centers, FTTx, central offices

Tailored to short links with close connectors, this optimode offers the highest resolution achieved so far. No more hidden connectors creating false fails (merged losses), and no more guesswork to find out faulty connectors. When climbing up a tower, you want to know if the faulty connector is the one feeding the junction box (1) or the jumper (2) that connect to remote radio unit to quickly and safely fix issues. This in turn reduces both installation and repair time.

Demerging closely spaced connectors is also key when troubleshooting data centers or central offices with closely spaced patch panels.

SPECIFICATIONS	720C SERIES	730C/735C/750C SERIES
Maximum link length [a]	2500 m	2500 m
Maximum link loss	8 dB	10 dB
Detection of 5 m patchcord [b, c]	Up to 2.5 dB loss	Up to 3.5 dB loss

a. Total length, unidirectional or total loopback, including launch, loop and receive fibers.

b. At 1550 nm, fiber length after reflection <= −55 dB, fiber section before event must be detectable.

c. Typical.

FTTA junction boxes and jumper connecting Remote Radio Units

Optimode: Fast short link

Application: Data centers, enterprise LAN/WAN, FTTA

Fast short link (FSL) optimode is designed to quickly test short connectorized links in high-volume contexts. It tests up to five times faster than any regular iOLM characterization, and provides accurate link loss, length and high-level mapping of the link, all in less than 10 seconds per fiber. The FSL Optimode turns a powerful multipulse-width iOLM test unit into an extremely fast validation tool that enables the quick assessment of short fiber optic links.

SPECIFICATIONS		MAX-715B	720C		730C/735C	750C
Fiber type		Singlemode	Multimode [a]	Singlemode	Singlemode	Singlemode
Maximum link length [b] (m)		2500	800	2500	5000	10 000
Maximum link loss	Simplex (dB)	3	4	3	4	6
	Duplex [c] (dB)	5	6	5	6	8
Measurement time [d] (s)				< 10		

a. 850 nm only.

b. Total length, unidirectional or total loopback, including launch, loop and receive fibers.

c. Duplex measurement in loopback mode. Requires activating iLOOP.

d. Typical total time per wavelength, in Simplex and Duplex mode, excluding launch and receive calibration sequence.

## Optimode: Fast Medium Range

Application: FTTH feeder and distribution cables characterization, DCI, backhaul

Fast Medium Range (FMR) optimode will quickly test point-to-point spliced links in high volume context.

No more dilemma between ease of an automated solution with built-in diagnosis, accuracy from dynamic multipulse, and speed. Within 30 seconds, characterize a < 20 km link at 2 wavelengths.

SPECIFICATIONS	
Fiber type	Singlemode
Testing time for two wavelength [a] (s)	< 30

a. For a typical 20 km link, with 730C series.
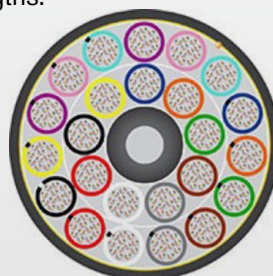
Example of a 3456 fibers cable.

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ADDITIONAL FEATURES TO BOOST YOUR EFFICIENCY

## iOLM Advanced (iADV)

Real-time

Directly from iOLM interface, activates the OTDR laser in continuous shooting mode and adjusts parameters on the fly without stopping or returning to submenus; the trace refreshes in real time, making it possible to monitor the fiber for sudden change. Perfect for a quick overview of the fiber under test, distance to break, to control field splicing or to check for obvious impairments before launching an iOLM thorough characterization, all this without toggling between various interfaces or menus.
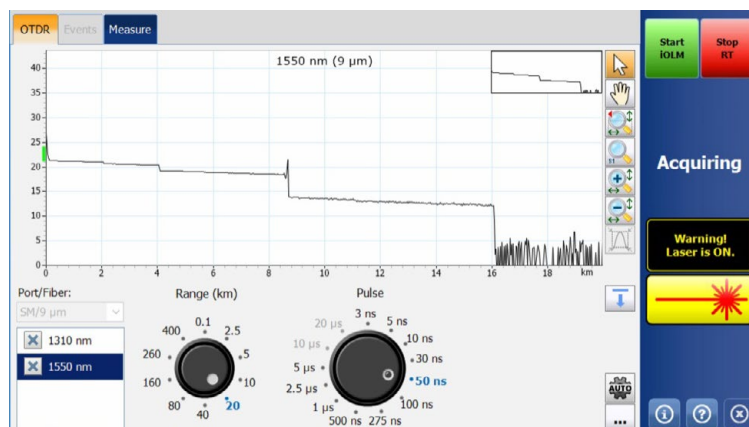

Dialing wheels allows to adjust real time acquisition parameters on the fly, immediately seeing the effect on the trace for optimal efficiency. Ready to launch the characterization? Just press the "start iOLM" button, no need to manually interrupt real time nor getting into any menus.

Advanced SOR support

iOLM uniquely delivers full job compliance without compromising on ease of use nor limiting the performance obtained from using dynamic multipulse acquisitions. iOLM manages an unrestricted number of acquisitions for optimal link characterization; simply input the pulse width, averaging time and wavelength(s) requested for the SOR file report to add it to the results package. Finally, you can consult the reported SOR trace right on iOLM.
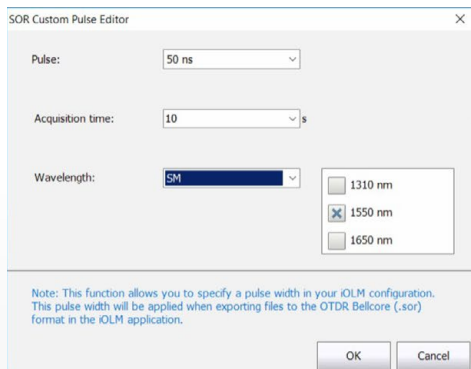
Need a specific pulse width for the SOR in your close-out package? Just ask iOLM to include it to.
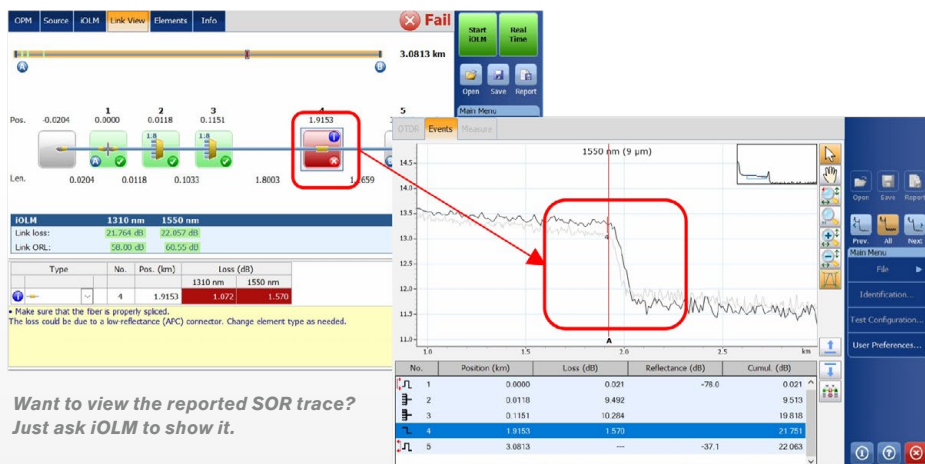
Want to view the reported SOR trace? Just ask iOLM to show it.

2:N splitter characterization

The iOLM is the only solution on the market capable of characterizing the 2:N splitter with a clear pass/fail verdict for multi-input or redundancy networks. The iOLM identifies 2:N splitters, as well as both of their input branches, allowing users to accurately document the network with one test (compared to three tests when using traditional methods).

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iOLM expert mode

Specifically designed for the fiber test expert or manager requiring more flexibility in documenting the trace files for reporting purposes.

They can create their own custom network elements, define their specific icon and own thresholds to better match network plans and avoid false failures. For example, when splicing a G.657 fiber onto a G.652 fiber type, due to the fiber core diameter mismatch, an exaggerated loss reading is expected from unidirectional OTDR test (G.657-> G.652). Being able to identify those events and apply relaxed threshold accordingly will avoid false failures without resorting to a more expansive bidirectional measurement approach for splice characterization. Another common example is a spliced pigtail connector that will combine loss from a splice and from mating.
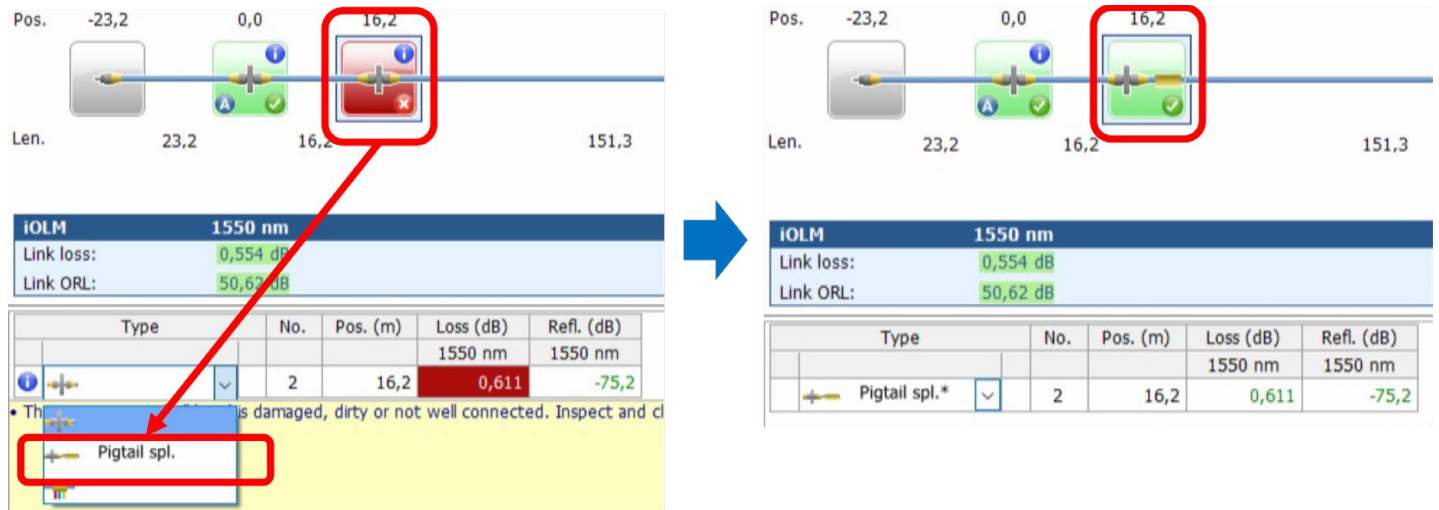

Changing event from a regular connector (threshold at 0.5db in the example) to a custom "pigtail spliced connector" will apply custom built icon and adjusted custom threshold (0.75 db in the example) thus avoiding false failure. Modified elements are tagged with an asterisk (*) for traceability.

The expert mode also allows advanced trace edition (adding extra events and delete them) or re-analyzing the trace from the field.

Optimode: SFP safe troubleshooting

Application: Point-to-point troubleshooting up to 100 km, passive CWDM/DWDM

Ideal for point-to-point troubleshooting when an SFP might be connected on the far end. When technicians are dispatched on-site, they are still unaware of what is wrong and may accidentally damage a transceiver with an uncontrolled pulse width. EXFO's patented solution prevents this risk and guarantees no damages to the SFP while troubleshooting, yielding cost savings and faster time to recovery.
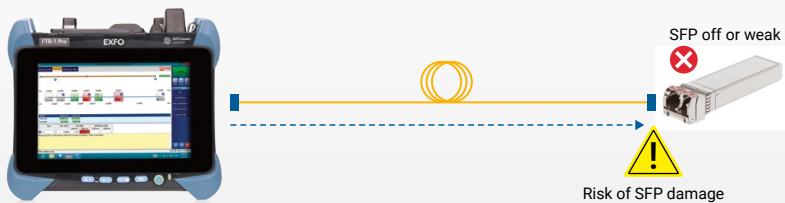
Watch it in action: **SFP safe mode**

Optimode: PON last-mile certification

Application: Last-mile FTTx

Tailored to last-mile certification, this optimode tests all connections between customer premises and the splitter (including continuity at the splitter but excluding elements after the splitter).
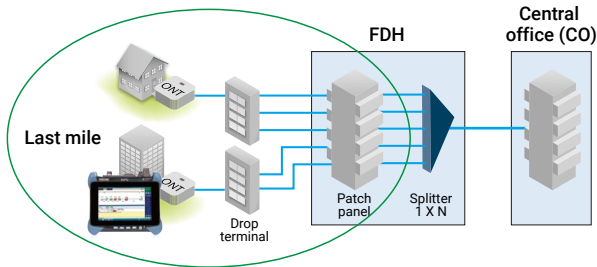

Figure 1. Certification of last-mile FTTH including continuity at splitter.
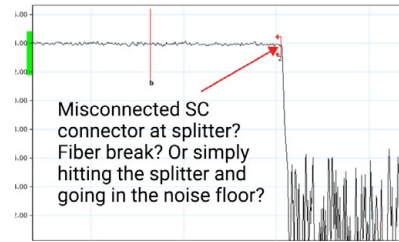

Figure 2. Last-Mile OTDR trace.

With traditional last-mile OTDRs, the splitter is indicated as a fiber end (Figure2). However, just by controlling the distance of the last mile, it is not possible to certify that the splitter is connected. This optimode verifies that the last-mile fiber segment is actually connected to the splitter, leaving no uncertainty as to the quality of the installation (Figure 3). In addition, with an OTDR equipped with a live port, this mode can be used on dark fiber or live networks.
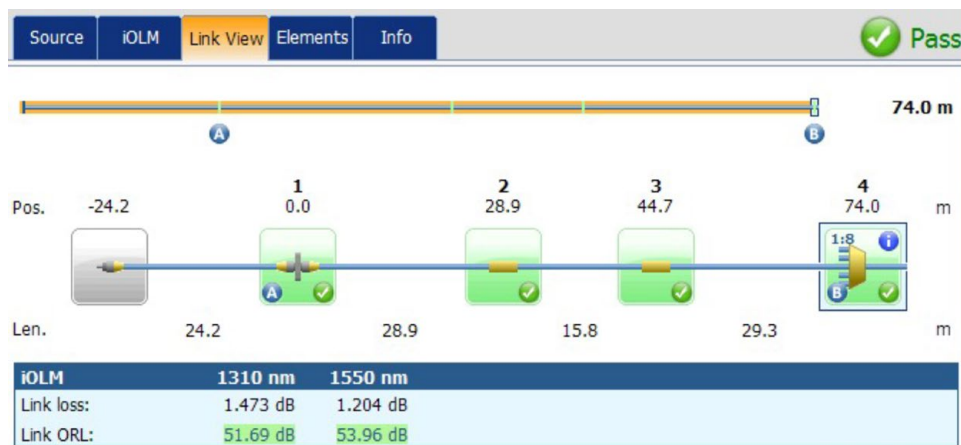

Figure 3. Test Pass–Last mile loss and ORL are within specifications. Splitter presence is confirmed, matching expected ratio and there is continuity to feeder. Last Mile installation is guaranteed.

SPECIFICATIONS		MaxTester 715B	730C/735C SERIES
Measurement time [a] (s)		35	20
Maximum link length (km)		20	20
Maximum last-mile fiber length (km)		5	5
Maximum last-mile fiber loss (dB)		2.5	2.5
Minimum fiber length after splitter or group (in the case of multistage PON)	1:2 splitter	30 m	25 m
	1:4 splitter	150 m	100 m
	1:8 splitter	400 m	150 m
	1:16 splitter	1500 m	400 m
	1:32 splitter	4500 m	1000 m
	1:64 splitter	–	3000 m

a. For a single-stage splitter, single wavelength, typical.

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iLOOP

Loopback testing mode

The iLOOP feature allows your iOLM unit to double its testing efficiency by reducing testing time by 50% compared to a traditional unidirectional test method. This intelligent application relies on the loopback single-ended measurement method to characterize two fibers at once. The application splits the results into two individual links, thus eliminating the need for post-processing. iLOOP automatically generates individual iOLM and OTDR (.sor) files, in addition to PDF reports, for all your fibers directly from the field, enabling you to close your job immediately and move on to the next fiber pair faster.

This option is particularly efficient for applications such as fiber-to-the-antenna (FTTA), distributed antenna systems (DAS) and data centers, where iLOOP enables you to simultaneously test Rx/Tx fibers with a simple loop jumper between the two fibers. Once the measurement is completed, iLOOP applies pass/fail assessments and generates a report for each single fiber.

| Test methodology | iOLM | | OTDR |
	Unidirectional	Bidirectional	Unidirectional and bidirectional
MAX-700B/C	iLOOP	iLOOP [a]	FR: PC
FTB-1/2/4	iLOOP	iLOOP [a]	FR: PC/FTB
FTB-500	iLOOP	iLOOP [a]	FR: PC/FTB

iLOOP = Loopback measurement achieved immediately in the field via iOLM iLOOP option.

FR:PC/FTB = Loopback measurement achieved via post-processing in FastReporter software using a PC at the office, or using the FTB platform in the field.

FR:PC = Loopback measurement achieved via post-processing in FastReporter software using a PC at the office.


Using the loopback test method and iLOOP option on your iOLM enables you to test two fibers at once. View only the A link, B link, or the complete A-B link including the loop.

Automated and flexible bidirectional characterization over TestFlow [b]

Combined with TestFlow test management solution, iLOOP is bringing the easiest, fastest and most flexible bidirectional characterization solution on the market. It eliminates time spent for off-line post-processing by delivering bidirectional results directly on the instrument once acquisitions are completed. This means technicians can identify failure while still on site, preventing needs for additional truck rolls.

A single technician can handle A-B and B-A acquisitions thanks to the asynchroneous approach.

For 2-technicians jobs, this flexible method also prevents spending precious time for coordination between technicians and does not waste time waiting if one them is late on site.
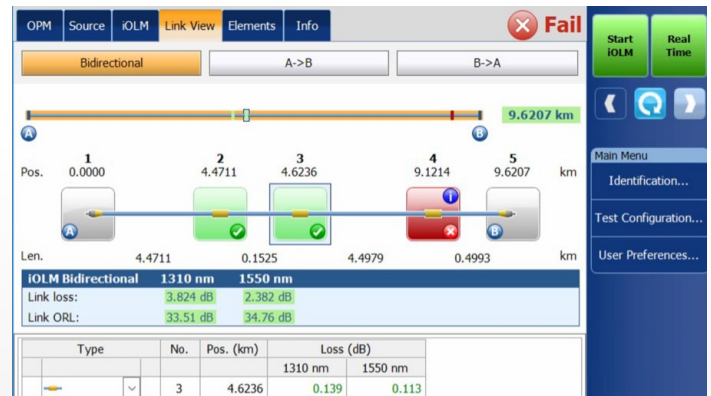
a. For singlemode fibers only. Bidirectional loopback measurement for multimode fibers achieved via post-processing in FastReporter software using a PC at the office, or using an FTB platform in the field.
b. Requires a TestFlow subscription.

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iOLM PRO [b] (iPRO includes also iADV and iLOOP feature set)

Multifiber MPO cable characterization and troubleshooting (iMF)

In combination with an external 1x12 MPO switch (supplied by EXFO), the iOLM allows for faster-than-ever testing of singlemode MPO cables, with no need to use a fan-out cable or cassette. Human manipulation is reduced by 90%, which in turn significantly reduces the risk of error. Thanks to the intelligent multifiber algorithm (iMF), a single push of the Start button initiates a fully automated test sequence of the 12 fibers and results in 12 single measurements. Refer to TK-SWITCH MPO Test Kit brochure for more information.

iCERT

Data center multistandard certification

The iCERT option turns the iOLM into an intelligent Tier 2 certifier with automated pass/fail thresholds for SM/MM cables. iOLM iCERT helps fiber installers certify or troubleshoot any enterprise or data center network to multiple cabling and application standards simultaneously. You can therefore certify the cabling according to internationally recognized standards (including TIA-568, ISO 11801), as well as the application that the fiber can carry (including IEEE or Fibre Channel standards).

Having predefined cable standards built into the application ensures compliance with test requirements of different standard bodies without risk of error during testing.

USING LAUNCH AND RECEIVE CABLES

EXFO recommends using a launch cable to compensate for the loss of the iOLM's connector, or to allow UPC network testing. Thanks to the dynamic multi-pulse width approach, for most applications, length starting from 15m are suitable, allowing usage of compact and cost-efficient launch cables.

Use of launch cable will also extend the instrument's connector life by reducing the number of matings—ultimately improving cost of ownership.

Wondering which Launch or Receive fiber length for your specific test? iOLM can recommend best suited length ranges in addition to calibrating your launch and receive fiber length for optimal results.

Typical Test Fiber Lengths

Select the expected loss for the measured link:

Unknown

According to the test configuration and the test method, the suggested lengths are:

Test Fibers	Min.	Max.
Launch	15 m	5 km
Receive	15 m	10 km

TROUBLESHOOTING OF HIGH-SPEED MULTIMODE NETWORKS WITH ENCIRCLED FLUX

EF READY

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 unit other than the construction unit may mislead the technician or result in the inability to find the fault, 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.

* For more information about EF compliance, please read the Encircled Flux test solution specification sheet.

EXFO

iOLM OPTIONS AND FEATURES SUMMARY TABLE

PACK/OPTIONS	FEATURES	MaxTester				FTB-1v2/Pro [a] FTB-2 Pro FTB-4 Pro				
		MAX-715B	MAX-720C	MAX-730C	MAX-740C	FTBX-720C	FTBX-730C	FTBX-735C	FTBX-740C	FTBX-750C
iOLM Standard	Dynamic multipulse multiwavelength acquisition	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Intelligent traces analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Single link view and event table	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Intelligent diagnostics	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SOR trace generation	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Single iOLM file per link for easy reporting	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Unbalanced/tapered PON characterization and troubleshooting	✗	✗	✓	✗	✗	✓	✓	✗	✗
	Optimode: Short-link close events	✗	✓	✓	✗	✓	✓	✓	✗	✓
	Optimode: Fast short link	✓	✓	✓	✗	✓	✓	✓	✗	✓
	Optimode: Fast medium range	✗	✓	✓	✗	✓	✓	✓	✗	✓
iOLM Advanced (iADV) [b]	Real-time OTDR	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SOR pulse and wavelength editor	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SOR trace view	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Custom elements	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Advanced link edition and re-analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2:N splitter characterization	✗	✓	✓	✗	✓	✓	✓	✗	✓
	Optimode: SFP safe troubleshooting [c]	✗	✓	✓	✓	✓	✓	✓	✓	✓
	Optimode: PON last-mile certification	✓	✗	✓	✗	✗	✓	✓	✗	✗
iLOOP [b]	iOLM loopback	✓	✓	✓	✓	✓	✓	✓	✓	✓
	iOLM automated bidirectional analysis over TestFlow [c, d]	✓	✓	✓	✓	✓	✓	✓	✓	✓
iOLM Pro (iPRO includes iADV and iLOOP) [b]	Automated MPO cable characterization and troubleshooting (with EXFO switch) (iMF)	✗	✗	✗	✗	✓	✓	✓	✗	✓
iCERT [b]	Cabling certification option	✗	✓	✓	✗	✓	✓	✓	✗	✓

a. The FTB-1v2/Pro single and dual carrier now support FTBx modules.
b. Require enabling iOLM standard.
c. Singlemode only, configuration without splitter.
d. Requires TestFlow subscription

EXFO

THE BENEFITS OF APC CONNECTORS FOR OTDR/iOLM TESTING

Like any OTDR, the iOLM will be affected by strong reflections at the unit's port. To ensure low reflection and maintain measurement accuracy, the iOLM singlemode port must be used with APC connectors. Another advantage of using APC connectors is their ability to handle harsher conditions without becoming highly reflective, while maintaining the unit's performance.

On the other hand, ultra-polished connectors (UPCs) are prone to being highly reflective when contaminated, worn, or damaged. This affects singlemode measurement and leads to premature connector replacement. Although a UPC unit is not required for testing of a UPC network, using an APC/UPC test jumper or a launch fiber (SPSB) ensures compatibility.

For best results, APC connectors are mandatory on singlemode ports when using the iOLM application.

ORDERING INFORMATION

To configure your new instrument with iOLM, please refer to the ordering guide available on the spec sheet of the selected model:
www.exfo.com/products/field-network-testing/bu3-optical/otdr-iolm-testing

To upgrade your OTDR/iOLM-ready instrument [a]:

XX-XX

Base software
Oi = Enables iOLM standard application in addition to your existing OTDR application
Oi2 = Converts your existing OTDR software into an iOLM software
00 = No change to your current base software

iOLM Software Option [b]
00 = iOLM Standard software
iADV = Enables iOLM Advanced
UPG-iADV-iPRO = Converts your existing iOLM Advanced into iOLM Pro [c]
iPRO = Enables iOLM Pro [c]
iLOOP = Enables loopback testing mode and automated bidirectional analysis over TestFlow [d]
iCERT = Enables iOLM tier-2 cabling certification

Example: Oi-iPRO-iCERT

a. For iOLM-ready instruments only (look for the "iOLM-ready" sticker on your unit or contact EXFO); if your instrument is not iOLM-ready, please contact EXFO for upgrades options.

b. Requires iOLM base software.

c. iOLM Pro includes iOLM Advanced and iLoop; iPRO not available for MAX-700B/C and 740C/Gv2.

d. TestFlow subscription required for this automated bidirectional analysis.

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