

# ONE TESTING SOLUTION

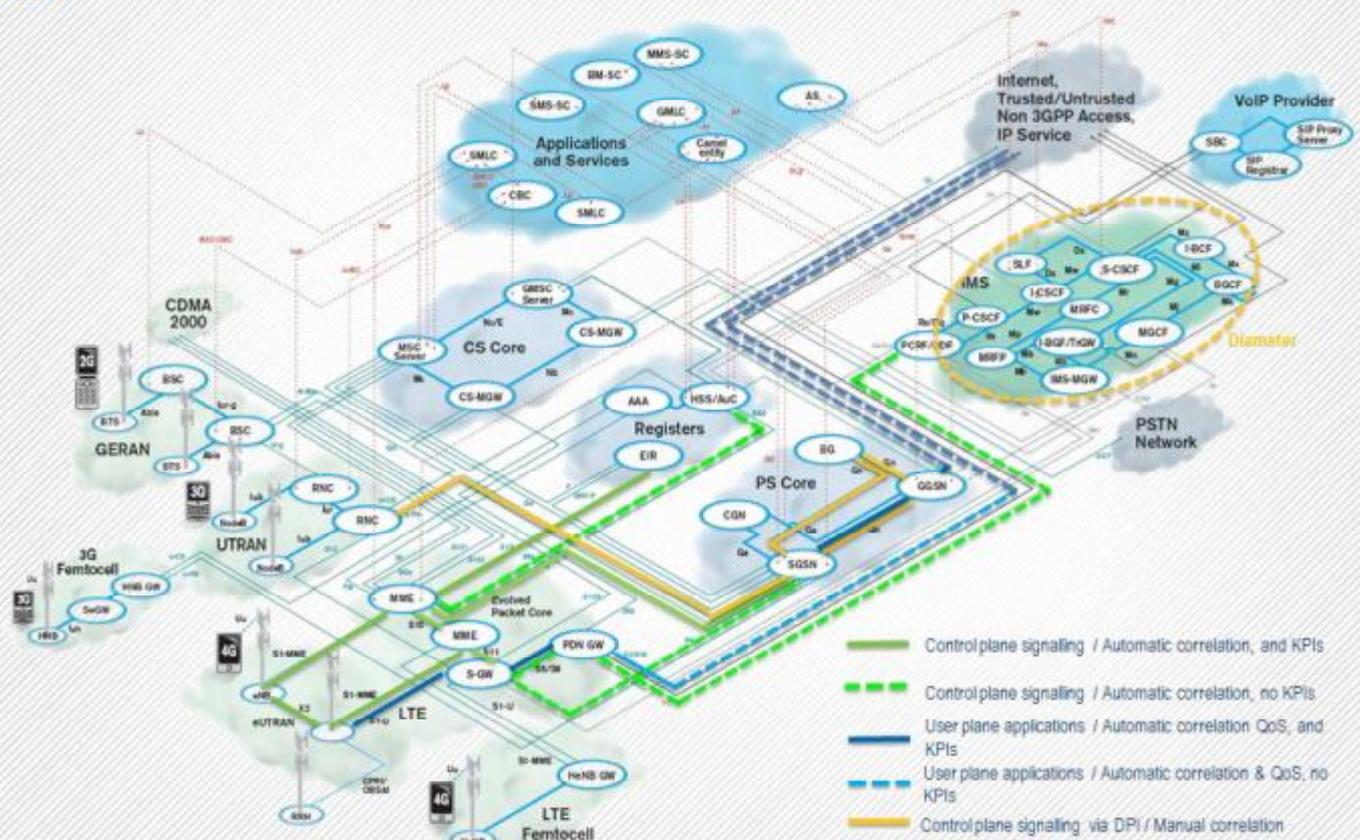
Ethernet and Optical Combined

## Měření a kvalifikace sítí FTTa/DAS

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RSM EE, Russia & CIS

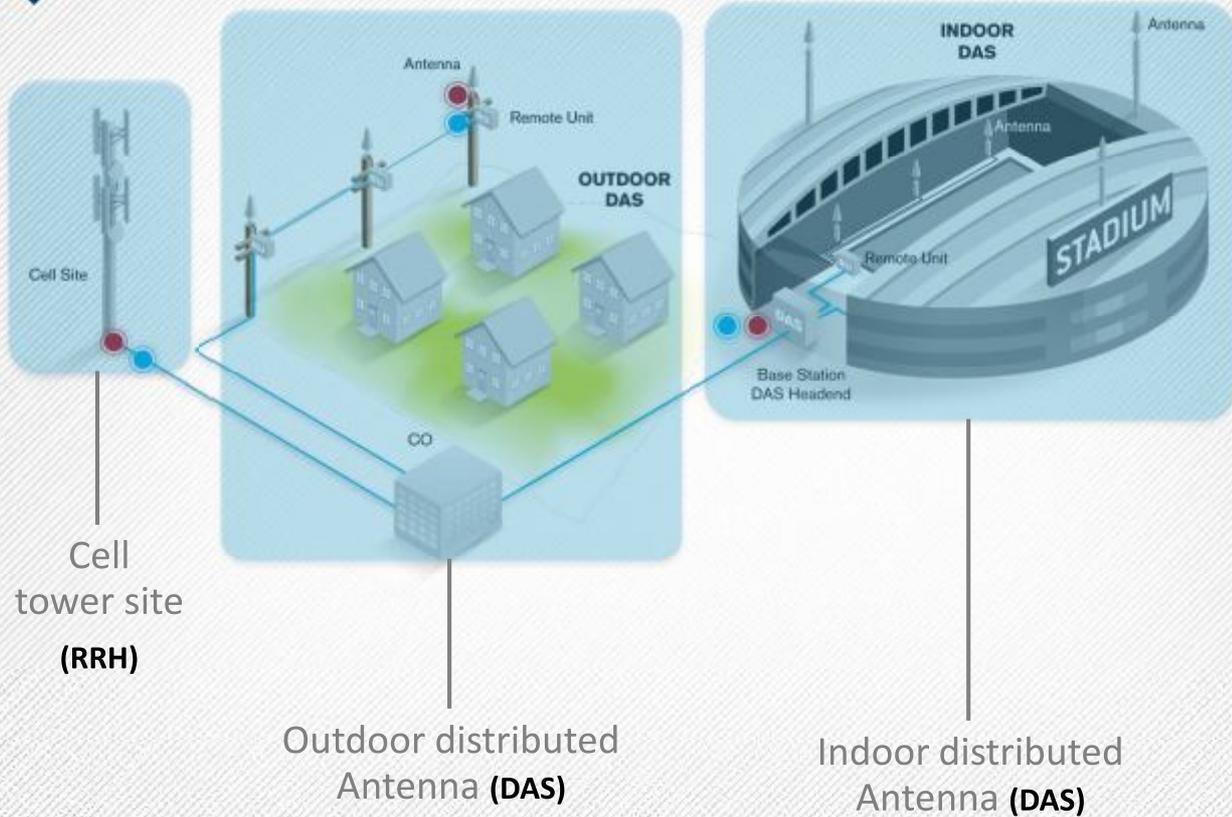
EXFO

## Obecné schema mobilní sítě

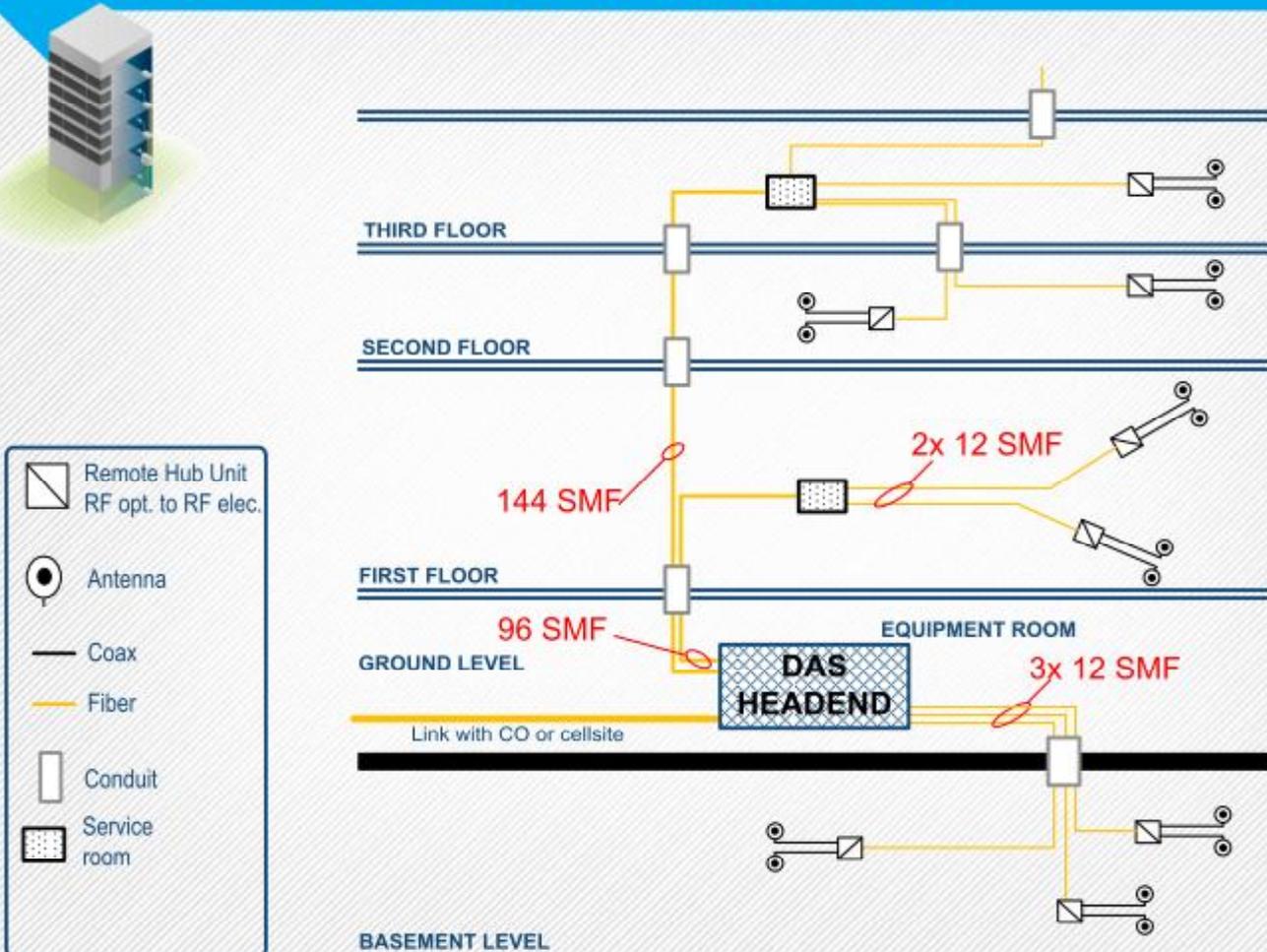


All interfaces at playground are supported by postprocessing (capture & analysis). Highlighted ones are supported in realtime.

# Úvod do fiber-based DAS



# DAS referenční architektura



# Úvod do fiber-based DAS

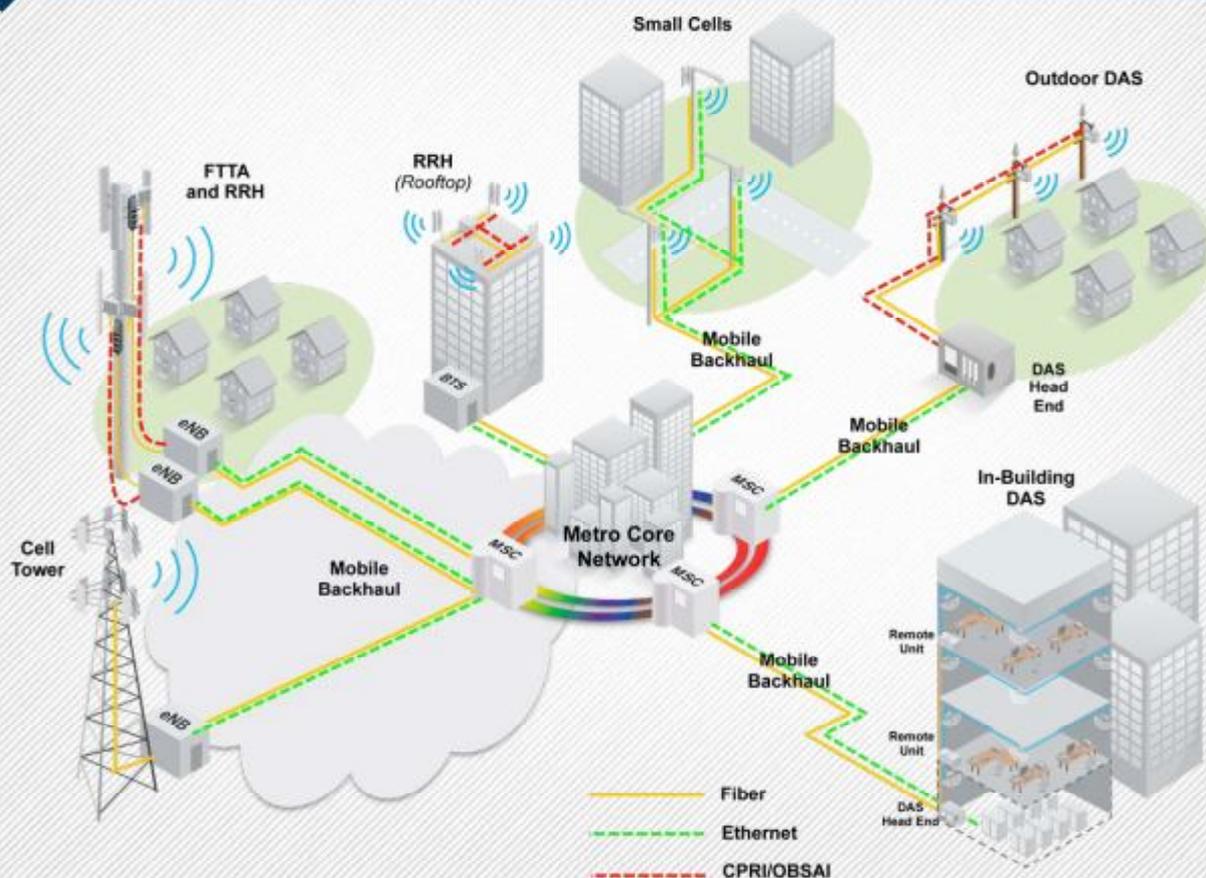
## Technology

PHYSICAL LAYER CHARACTERISTICS	DETAILS
Fiber Types	SM (new DAS) & MM (older DAS)
Connector Types	SC/APC (90% of the time)
Splice	Yes
IL Budget	Tight (less than 5 dB)
ORL	Systems requirements between 36 to 40 dB
Test equipment currently used	Microscope, OPM, OLS and OTDR

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## Today's Mobile Network Reality

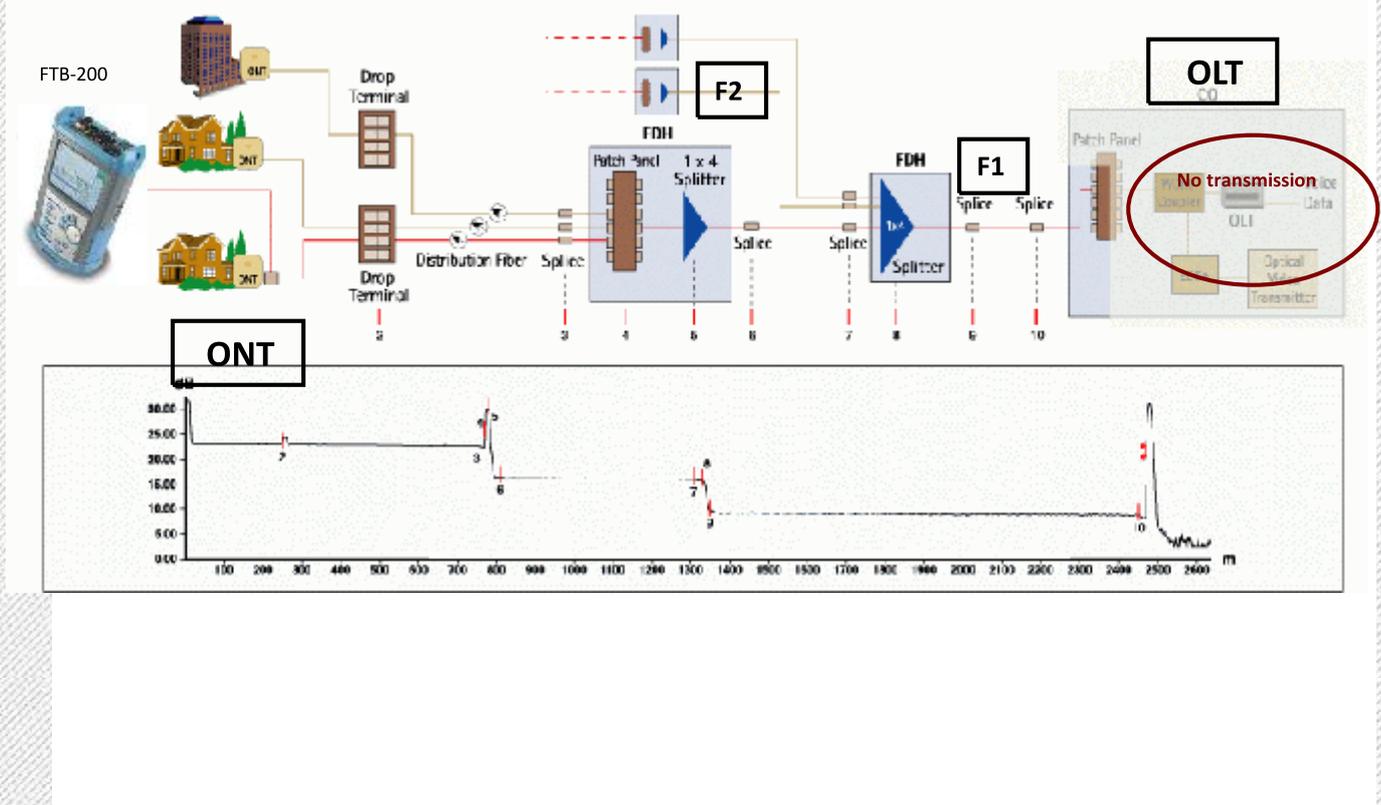
Expanding coverage and capacity through various architectures



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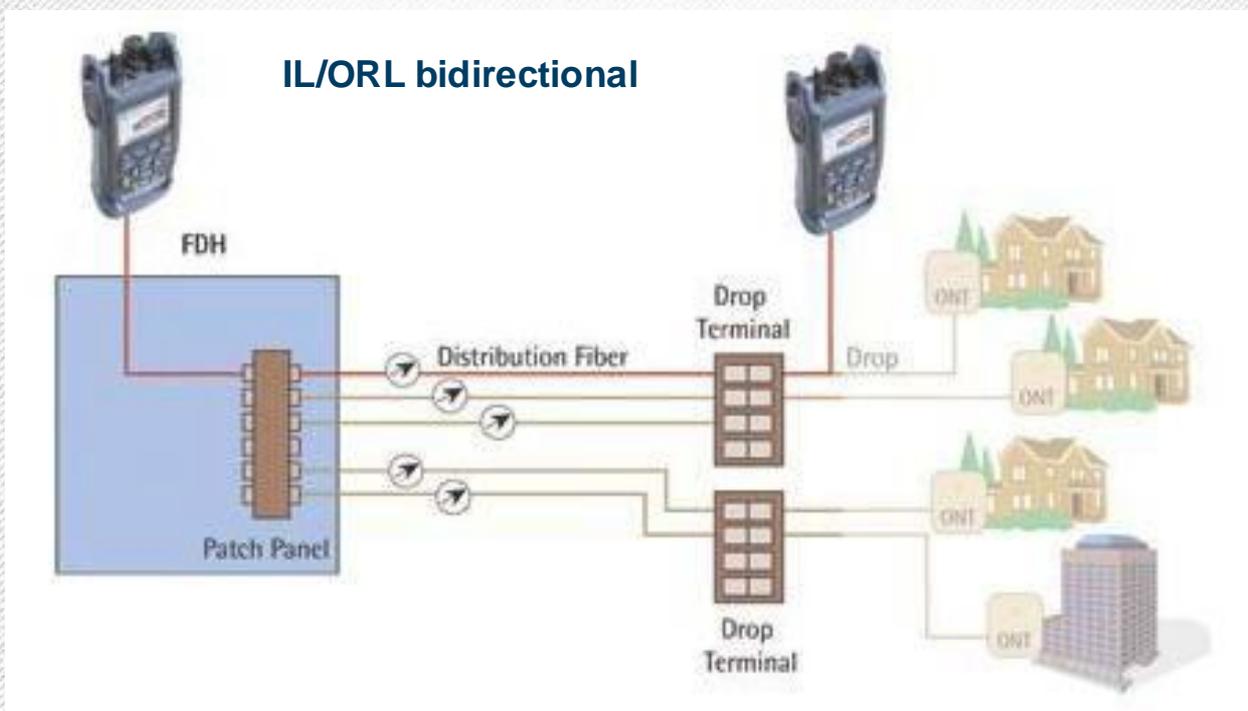
# FTTH Construction Testing Methods

## OPTICAL TIME-DOMAIN REFLECTOMETER (OTDR) TESTING



## FTTH Network Testing Methods: Distribution Fibers

### OLTS Test Method



One technician stays at the FDH, while another goes to the terminal with a second OLTS.

# Tackling Today's Mobile Network Challenges

Technological progress stops for no one. Mobile operators are always racing to be first-to-market. Field technicians must be, or even become, all-around technical experts, with abilities to efficiently address any situation they face, regardless of technology or network architecture. They can not afford to wait for external help, or come back later to complete the job.



## CONSTRUCTION

### Network Connectivity

- › Testing the Optical Physical Layer
- › Connectors [dirty and/or damaged]
- › Link Characterization
- › Network Documentation

## TURN-UP & TROUBLESHOOTING

### Service Validation

- › Services & SLAs
- › Ethernet Services
- › CPRI/OBSAI Protocols
- › Packet Transport
- › Network Synchronization

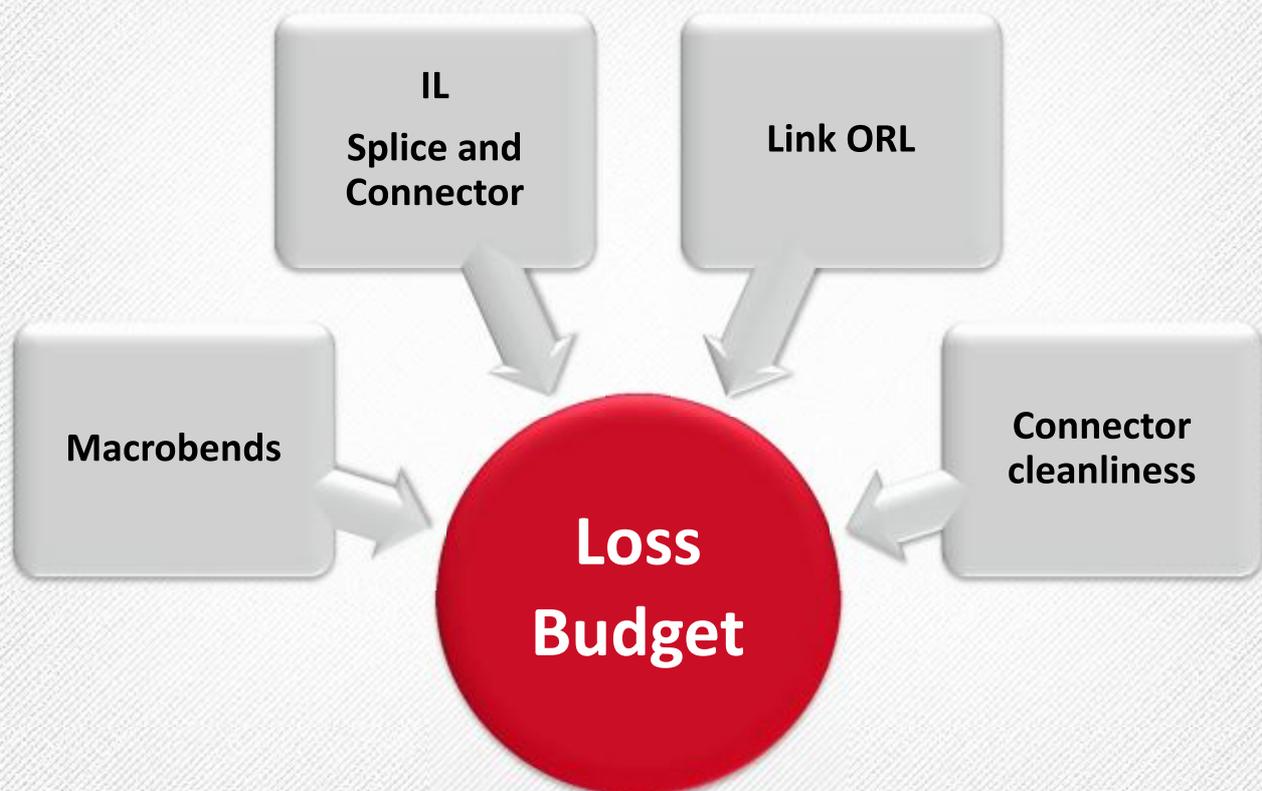
## OPERATIONAL EFFICIENCY

### Performance Optimization

- › Cloud-Based Solution
- › Automated Test Configuration
- › Automated Test Data Management
- › Asset Management

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# Které parametry sledovat během výstavby?



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### Recommended Testing Tools

Link ORL

IL

Macrobends

Splice &  
Connector

OTDR

iOLM



Key deployment  
challenges...

### OPEX CONCERNS

## MANPOWER

- Copper technicians migrate to fiber-optic testing
- No time or budget for training

### Key deployment challenges...

## OPEX CONCERNS

### TRUCK ROLLS

- Repeated truck rolls caused by wrong pass/fail criteria, wrong equipment usage, false diagnosis, wrong OTDR trace interpretation, etc.

## iOLM

Get multiple acquisitions



Analyze traces



Combine results

**LINK AWARE™**  
TECHNOLOGY



Display optical link view



## iOLM jak pracuje?

# iOLM | intelligent Optical Link Mapper

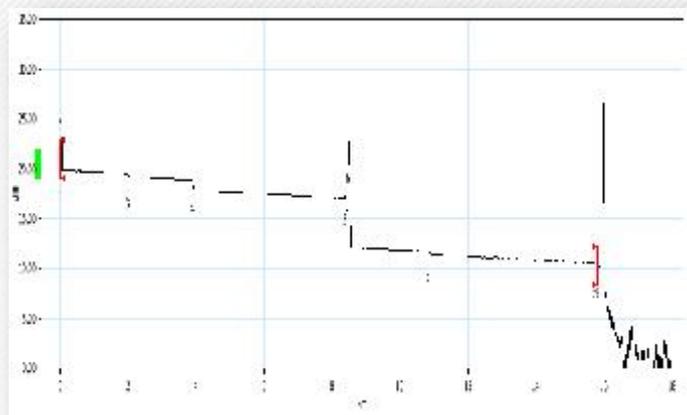


In the background  
What you see!

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## iOLM jak pracuje?

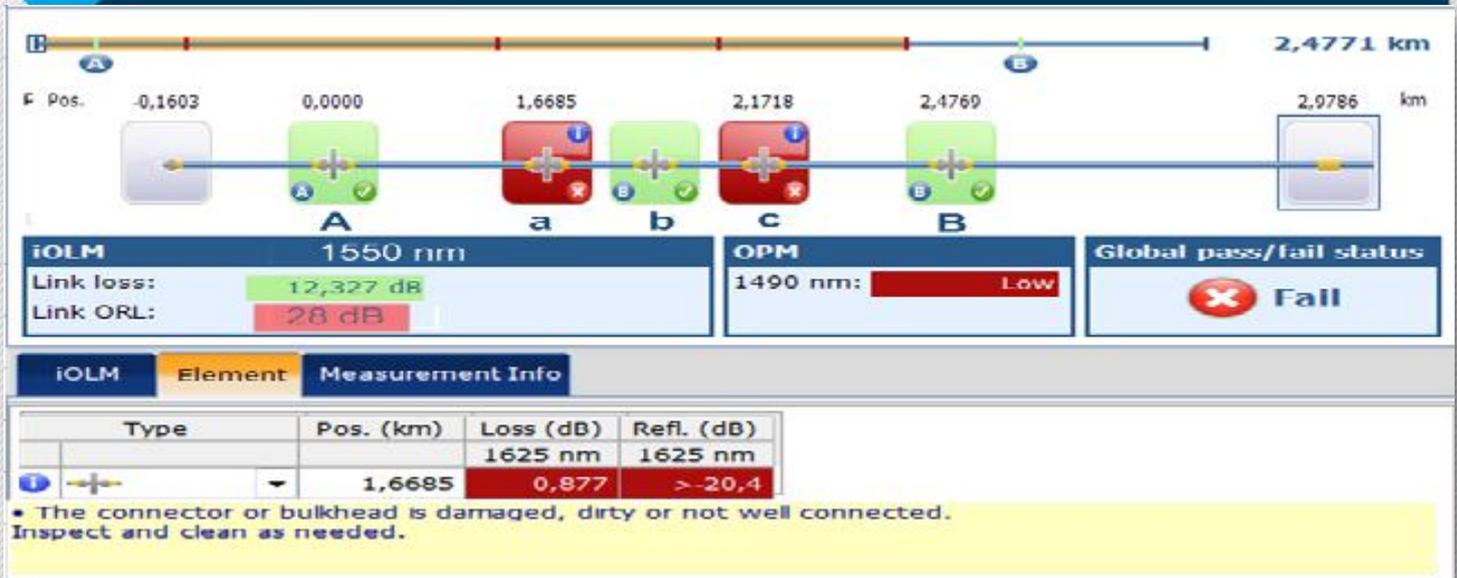
### OTDR



- › Do you know what these results mean ?
- › How many of people could setup and interpret these results ?
- › How long for a new optical technician to learn OLTS and OTDR language ?
- › How many mistakes are made in references, settings and interpretation ?
- › How to fix?
- › How much does it cost?

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# iOLM jak pracuje?



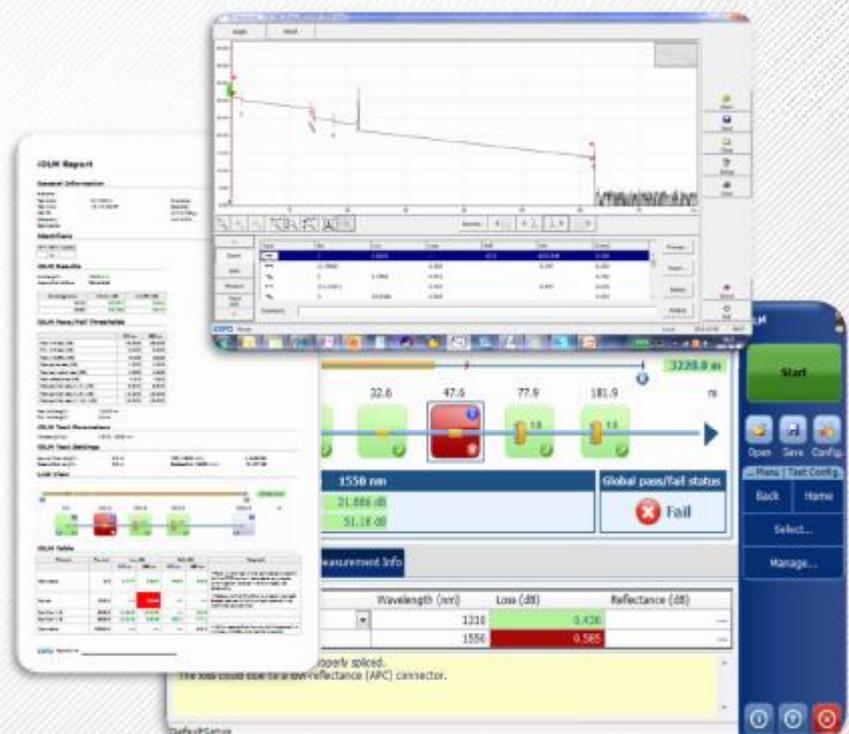
- › Do you know what these results mean ?
- › How many of people could setup and interpret these results ?
- › How long for a new optical technician to learn iOLM language ?
- › How many mistakes are made in references, settings and interpretation ?
- › How to fix?
- › How much does it cost?

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# iOLM jak pracuje?

Don't change what you do

- › OTDR-based
- › DAS/Access/metro
- › iOLM file results and report
- › OTDR file in .SOR format

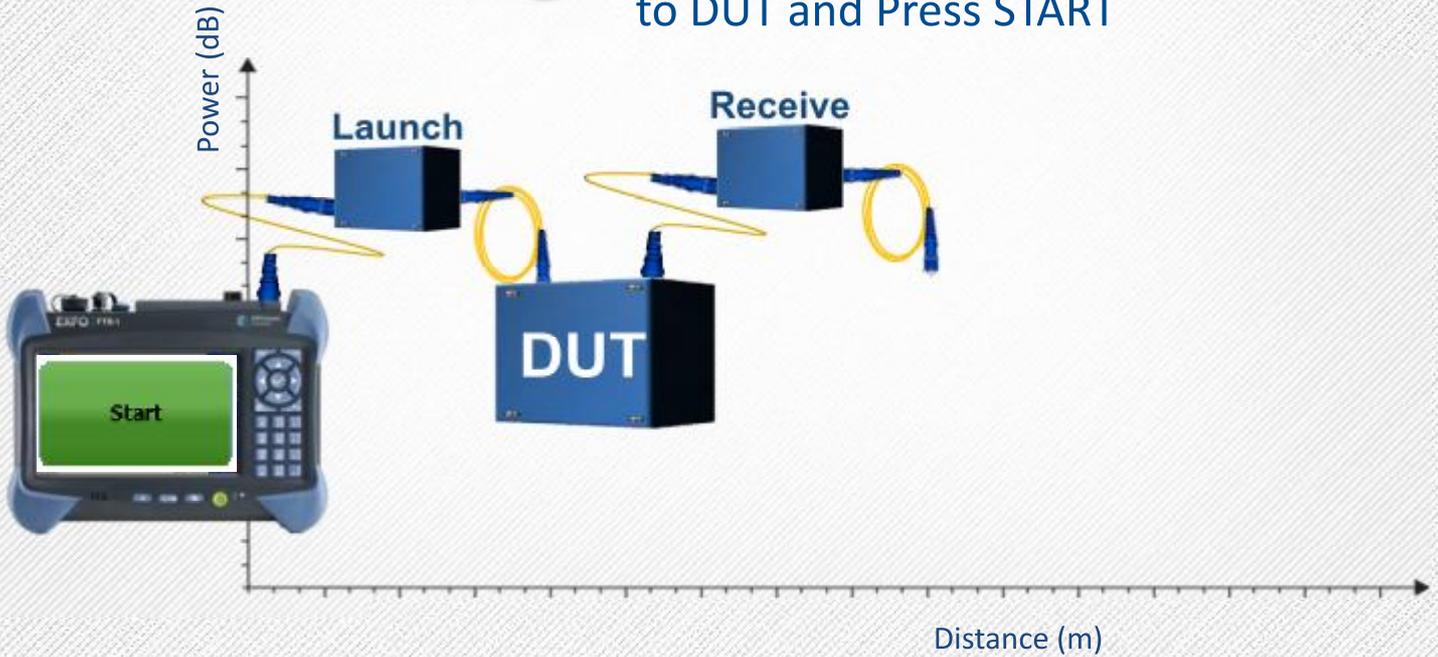


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**iOLM** | intelligent Optical Link Mapper

3

Connect Launch and Receive cables to DUT and Press START

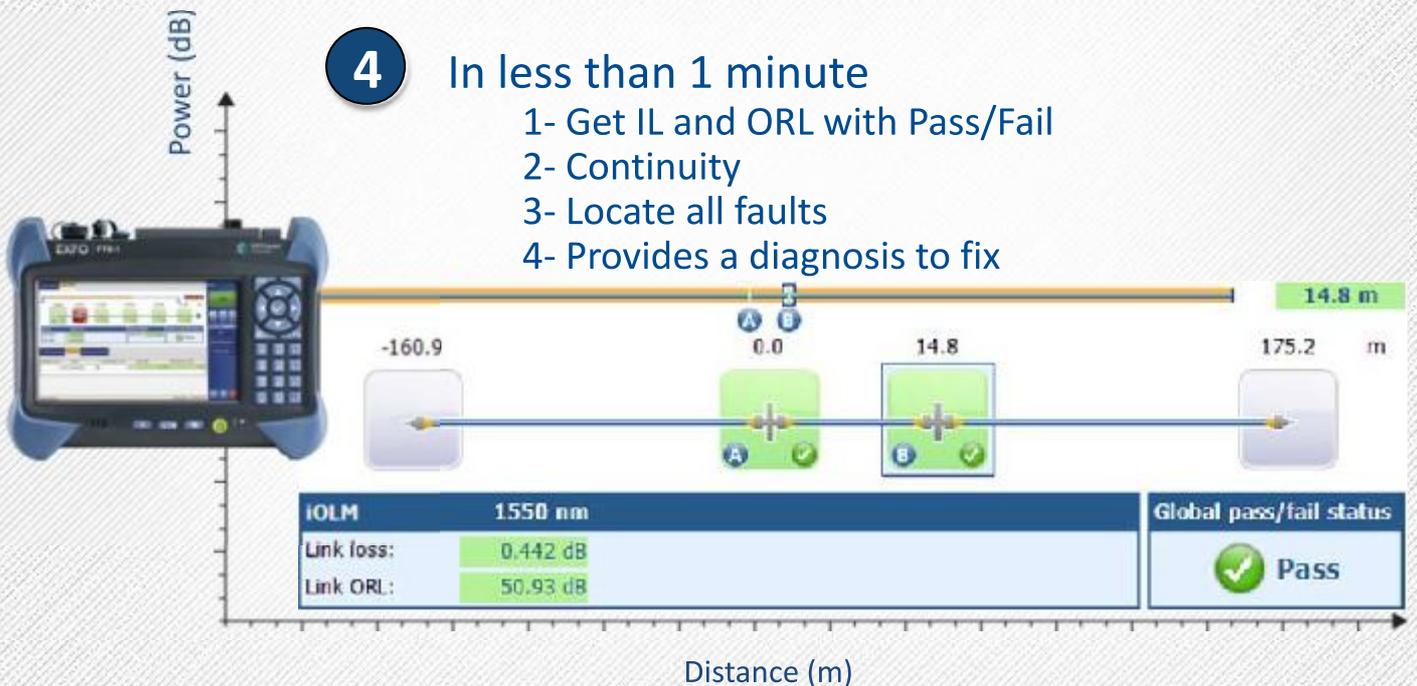


**iOLM** | intelligent Optical Link Mapper

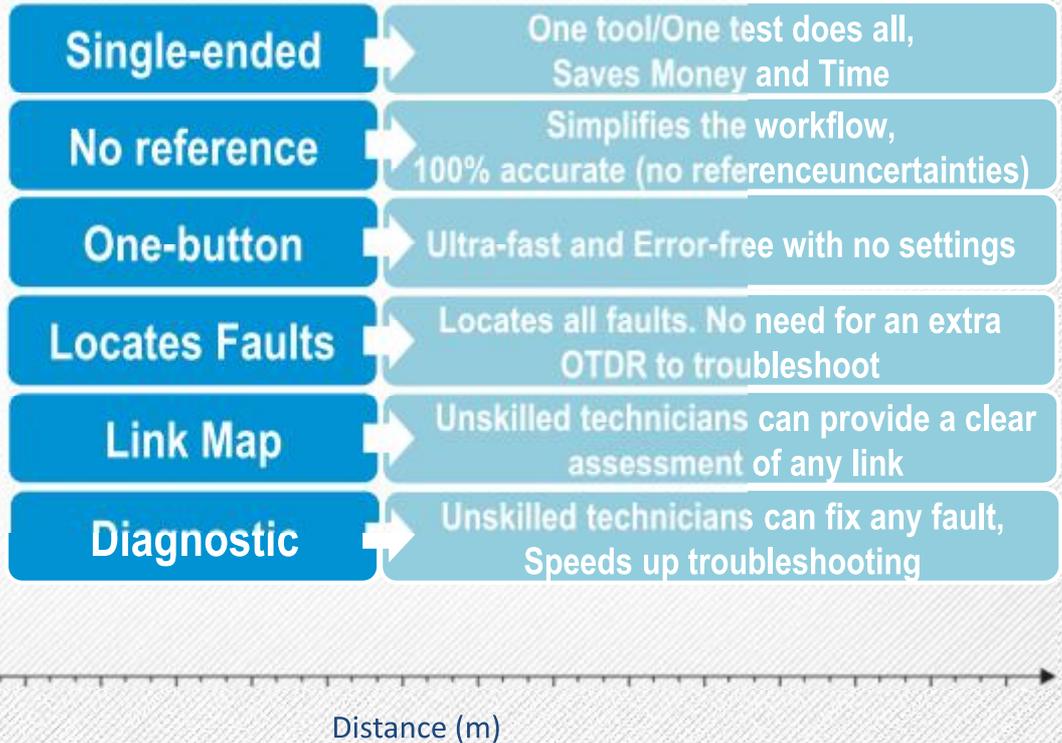
4

In less than 1 minute

- 1- Get IL and ORL with Pass/Fail
- 2- Continuity
- 3- Locate all faults
- 4- Provides a diagnosis to fix



**iOLM** | intelligent Optical Link Mapper



**iOLM** | intelligent Optical Link Mapper

Let's compare... iOLM accuracy single-ended measurements with OLTS

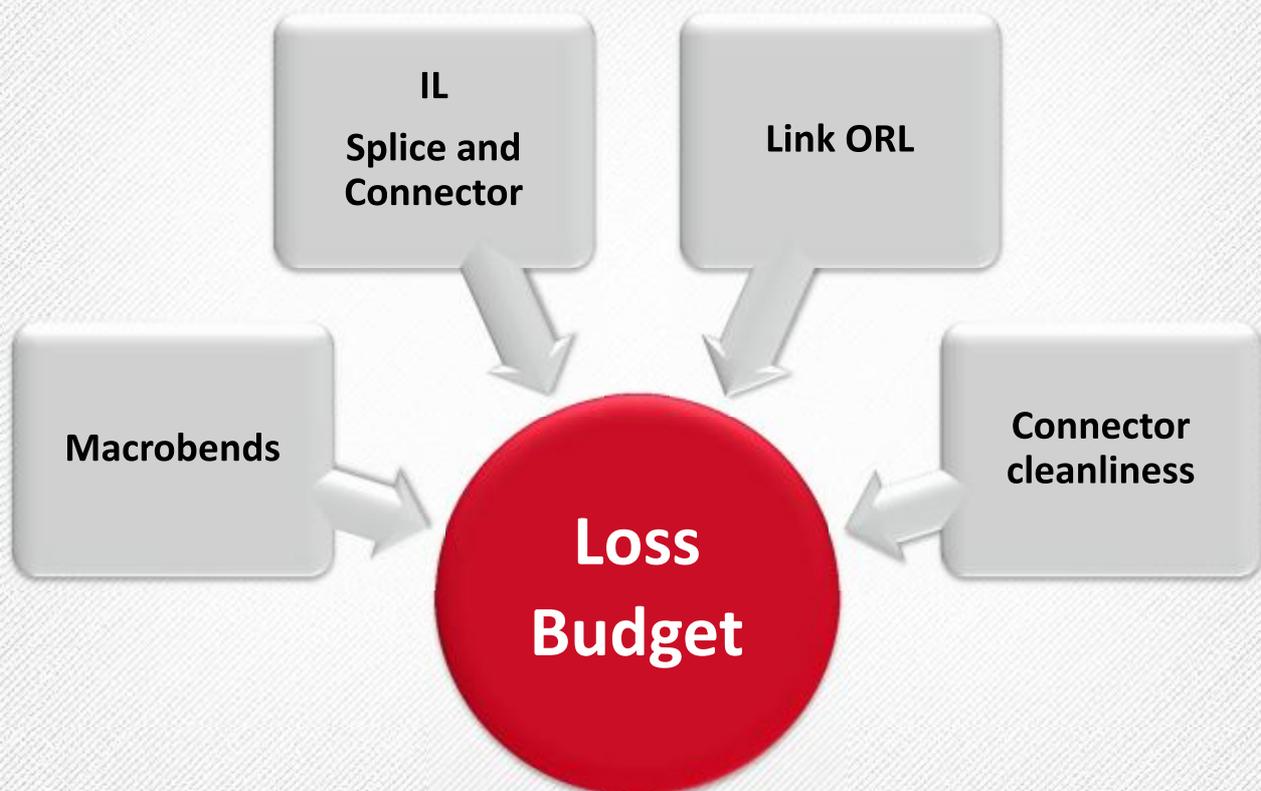


Specifications	iOLM	OLTS
Link IL uncertainty	0.08 dB	0.15 dB side-by-side
Reflectance uncertainty	0.75 dB	N/A
Short link ORL uncertainty	1 dB	0.5 dB

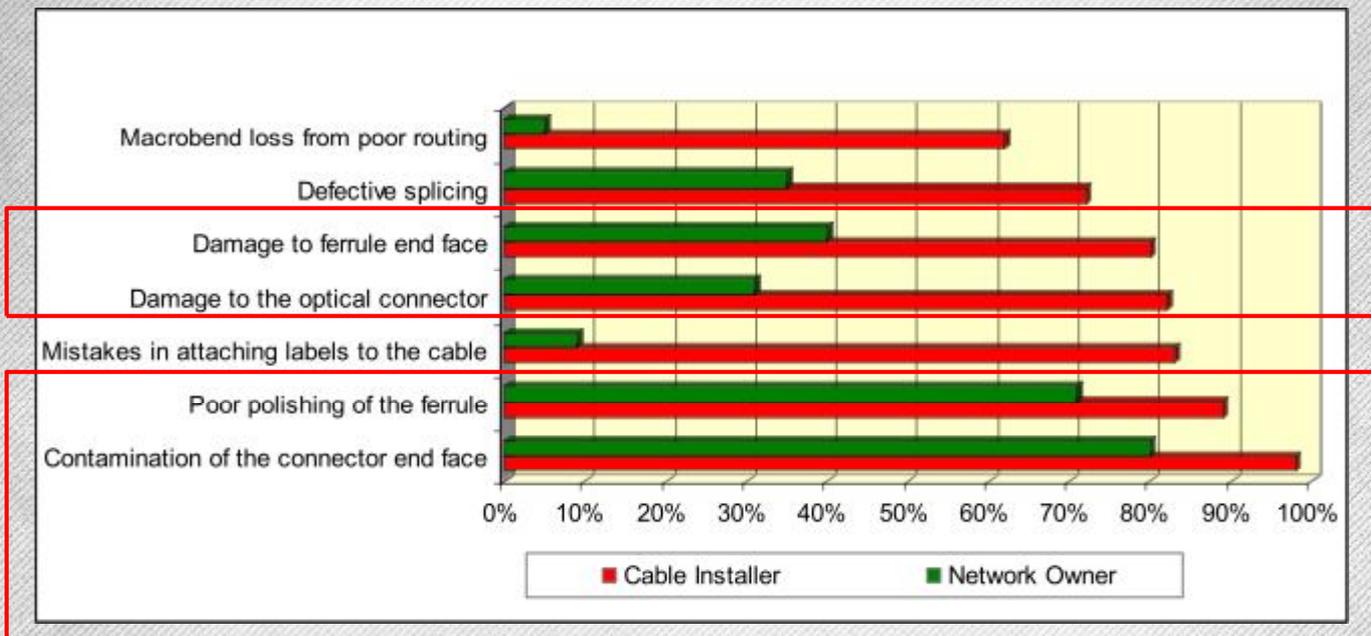
### OTDR VS iOLM

Characteristic	OTDR	iOLM
Number of technician	1	1
Technical expertise	Medium to high	Low
Number of acquisition/test per fiber	An average of 2 to 3 depending on the link complexity to fully characterize all the elements. For each acquisition, we can estimate an average of 15 sec/wavelength	1 (average of 45 sec, include all wavelengths)
Average test time per fiber including results analysis	Typically 2 to 10 minutes depending on the link complexity and technician 's skills	45 seconds to 1 minute
Graphical representation of the link	Traditional graphical representation	Link view
Provide Insertion Loss	Yes	Yes
Optical Return Loss	Yes	Yes
Provide Length of the fiber	Yes	Yes
Automatic-Diagnostics	Macrobend detection and pass/fail status	Yes, global and individual pass/fail status plus diagnosis information for each failure
Allow troubleshooting	Yes	Yes
Live testing	Yes	Yes
Offer easy transpose fiber detection	No	Yes with receive box

## What to look for during the construction?



# Škodiči...



- The chart above is a summary of a study from **NTT-Advanced Technology** that polled network owner and cable installers on the sources of network failures
- **98%** of cable installers and **80%** of network owners answered "Yes" to having contamination be the root cause of a network failure.

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# Videomikroskopy v portfoliu...

## NEW FIP-400B

FTB-Ecosystem

MaxTester 700B  
OTDR series

Standalone  
MAX-FIP Display

PC and Laptops



### 3 models

1. FIP-410B: Manual
2. FIP-420B: Analysis & Auto center
3. FIP-430B: Auto focus & Analysis & Auto center



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# PRODUCT POSITIONING

## NEW FIP-400B

FEATURES	FIP-410B	FIP-420B	FIP-430B
Three magnification levels	YES	YES	YES
Image capture	YES	YES	YES
Five-megapixel CMOS capturing device	YES	YES	YES
Automatic fiber image-centering function	NO	YES	YES
Automatic focus function	NO	NO	YES
Embedded pass/fail connector analysis	NO	YES	YES
Pass/fail LED indicator	NO	YES	YES

- ConnectorMax IEC analysis embedded in the 420/430 models
- Use the 420/430 on any device and perform P/F analysis



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## EXFO | Connect

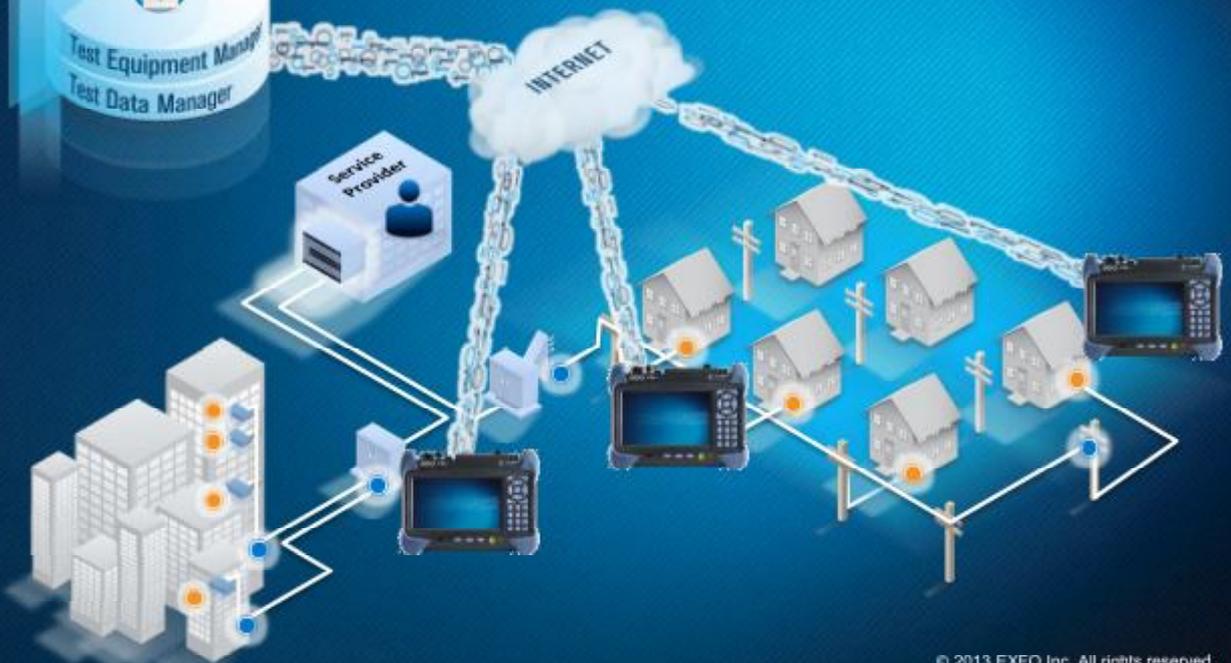


Service Provider  
EXFO Connect

Test Equipment Manager  
Test Data Manager

Cloud-based managed service designed to tackle the major operational barriers to optimizing telecom field test workflow.

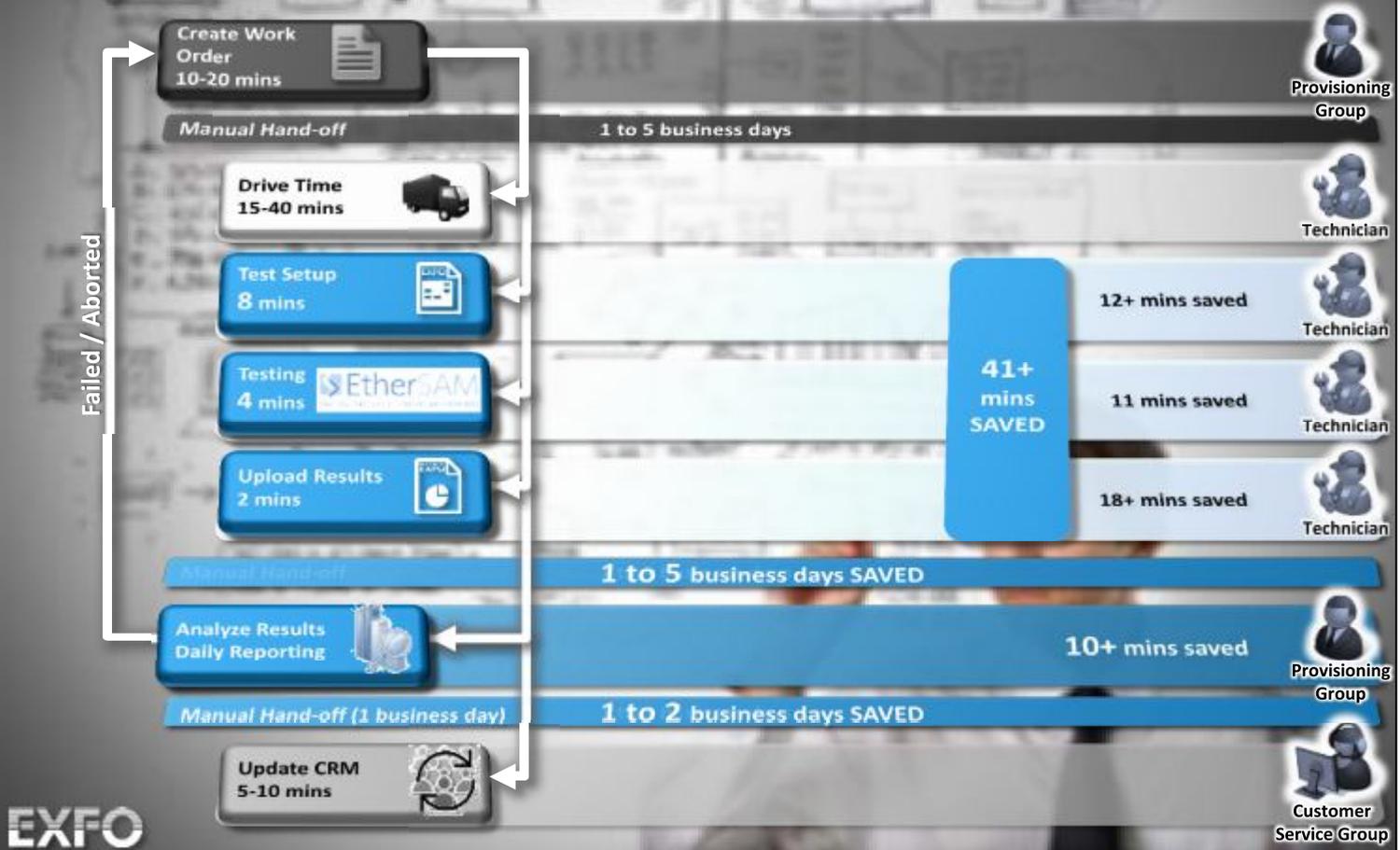
Supports FTB-1, FTB-200 and FTB-500 test platforms and optical, copper, xDSL, transport and datacom test modules.



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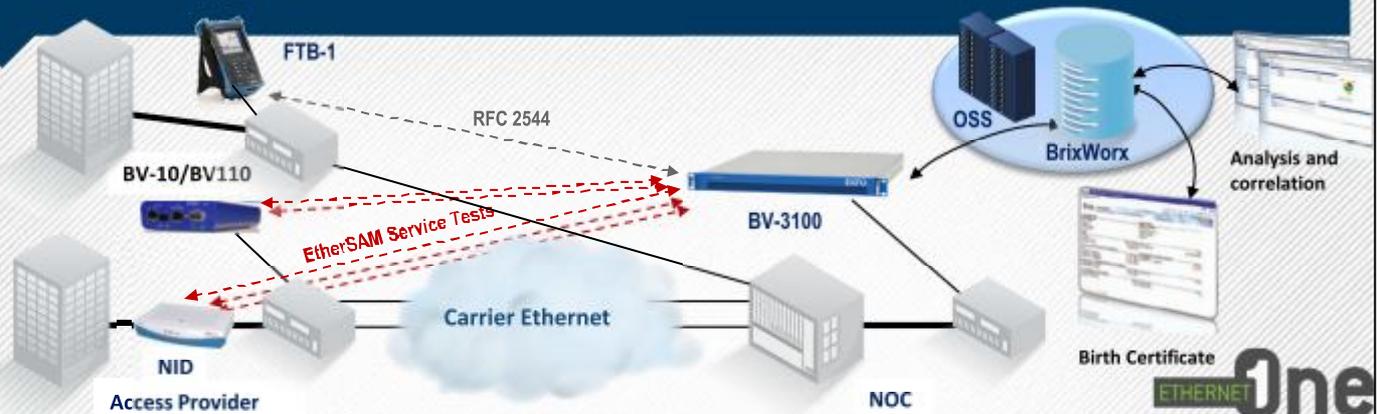
# Field Testing Process Improvement

Ethernet Service Activation Example – ‘Connecting’ the test set



## Service Turn-Up Solution

- Simultaneous install of multiple circuits – no queues



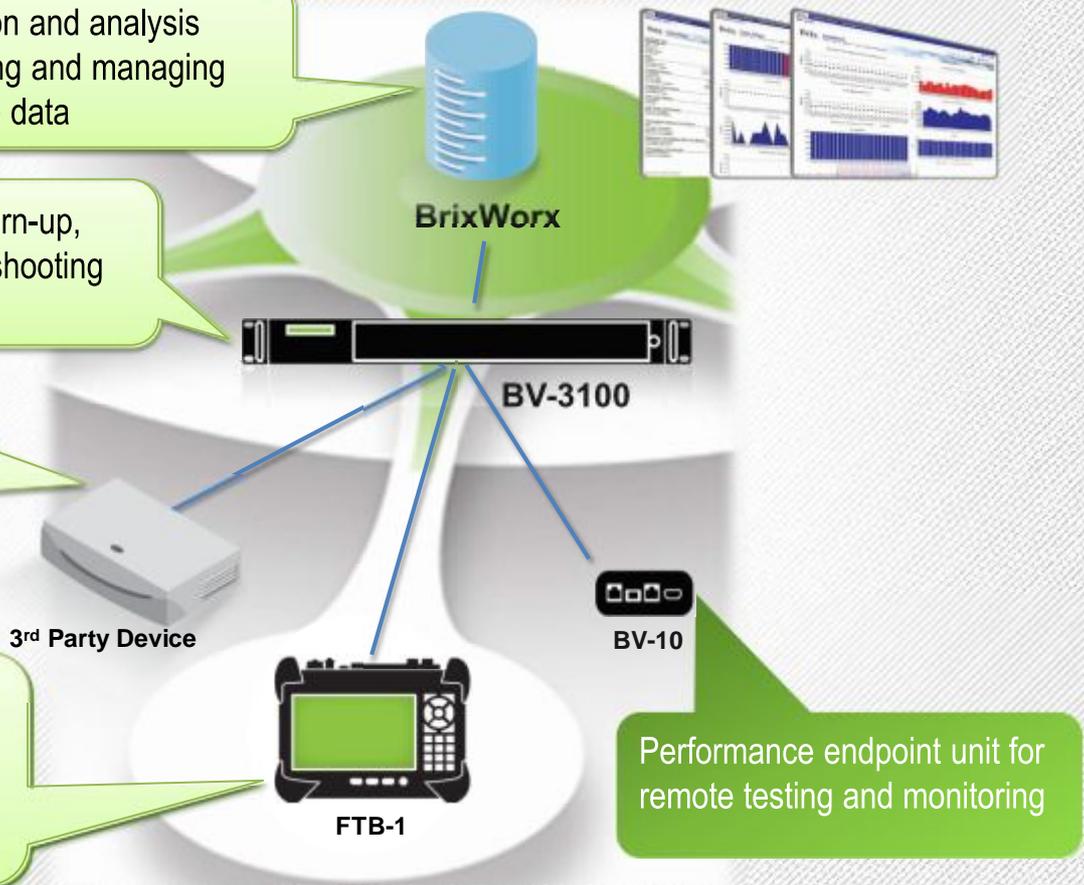
- Verify installation, provisioning, and performance of backhaul connection with line-rate test traffic
- Centralized Turn-up tests performed by executing Multi-instance EtherSAM Service tests or RFC2544 through BrixWorx
  - NOC initiated tests to Access Provider
- Test results can be stored in BrixWorx for “Birth Certificate” creation
  - Results archived for historical trouble-shooting comparison/baselining
- Benefits:
  - Single or multi-user personnel operation for turn-up concurrent EtherSAM Service tests, multi-site tests & improve speed of testing
  - Provide documentation to inspire customer confidence and traceability
  - Provide a consistent procedure to get the service running quickly and efficiently

Centralized correlation and analysis engine for provisioning and managing network performance data

Multiplay verifier with turn-up, monitoring and troubleshooting capabilities

Leveraging standards-based responder capability

Portable platform for advanced on-site testing, turn-up and troubleshooting



Performance endpoint unit for remote testing and monitoring

## One Field-Optimized Testing Solution

### FTB-700G Series



As fiber and Ethernet become the leading technologies of choice for MNOs, it makes perfect sense for field technicians to be equipped with a solution that lets them characterize fiber links as well as the services that run over it, be it Ethernet, CPRI/OBSAI, SyncE, etc.

EXFO's FTB-700G Series is the only handheld, user-friendly and automated testing solution on the market that integrates all the required testing functionalities needed to effectively activate, validate and troubleshoot mobile services into a SINGLE module.

The FTB-700G Series is the ONE testing solution that is specifically designed to address the needs of today's mobile network field technicians.

**Explore the possibilities!**

# One Field-Optimized Testing Solution

FTB-700G Series

## FIP-400B

### Next-Generation Fiber Inspection Probe

- Automatic fiber image centering
- On-board connector endface analysis
- Optimal digital image quality with three levels of magnification
- Re-engineered, rugged design with ergonomic access to all controls



## ConnectoMax2

ANALYSIS SOFTWARE

- Automatic pass/fail connector analysis in seconds
- No risk of misinterpretation
- Aligns repeatably for consistency of reports
- Available as an on-board option with the FIP-400B Fiber Inspection Probe



## iOLM | intelligent Optical Link Mapper

**The best of OTDR-based technologies**  
Events are detected with the best resolution, by using multiwavelength and multipulse widths.

**Turning complexity into simplicity**  
All OTDR traces are analyzed and integrated into a single link view converting complex data into simple results.

**Optimized fiber deployments**  
A short learning curve and low risk of misinterpretation ensure consistent test results across all test teams.



## EtherSAM

- SLA validation in a single test
- Simultaneous bidirectional testing
- Standards-based (ITU-T Y.1564)
- 100% first-time-right results
- Fast deployment



## EXFO | Connect

- Automation and business intelligence
- Cloud-based equipment and test data management

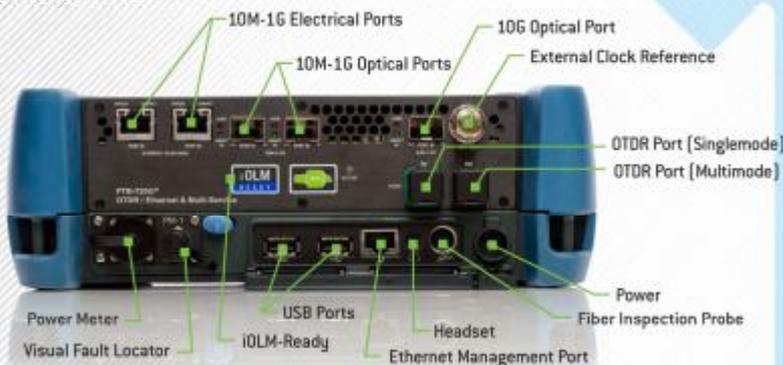


## FTB Anywhere™ Floating Test Licenses

- Budget flexibility
- Available anywhere, anytime and to anyone
- Eliminating barrier to field-testing efficiency
- Feature-rich solution

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# ONE Solution



## ONE TECH

EXFO's FTB-1 solution makes any field technician an expert. The unique combination of innovative and intuitive functionalities found in the FTB-1 gives frontline technicians the ability to accurately turn-up and troubleshoot any type of mobile network connection without requiring external intervention. A true one-tech testing solution!

## ONE TOOL

No other solution in the industry matches the FTB-1 when it comes to deploying or upgrading a large number of mobile network connections with limited resources and tight schedules. With this game-changing solution, not only can field technicians characterize a fiber link at the touch of a button, they can also turn-up multiple classes of Ethernet services with unprecedented speed and accuracy. The ultimate testing tool!

## ONE TIME

EXFO's innovative, state-of-the-art testing solution empowers field technicians with easy-to-use yet powerful automated testing and analyzing capabilities that eliminate guesswork and deliver 100% accuracy throughout the different testing phases. Enhanced productivity while eliminating unnecessary truck rolls!

## ONE ECOSYSTEM

A comprehensive, cloud-based, field test management solution that is specifically designed for the needs of installation and maintenance teams. These teams require both significant operational cost reductions in their test equipment management and maximum value from their test results.

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# Combining Ethernet and Optical in ONE Testing Solution

## TACKLING TODAY'S MOBILE NETWORK CHALLENGES

- › Activate and maintain a high number of towers and small cells.
- › Overcome limited technical resources and knowledge.
- › Work with tight schedules and budget constraints (OPEX pressure).
- › Maintain accuracy standards across the various deployed technologies.
- › Validate numerous service classes.
- › Optimize network performance.
- › Eliminate unnecessary truck rolls.

Find out more at [EXFO.com/ONESOLUTION](http://EXFO.com/ONESOLUTION)



## Un-surpassed Capabilities Day one!



CAPABILITIES	FTB-720G	FTB-720G+	FTB-730G	FTB-730G+
23B (1310/1550)	✓	✓	✓	✓
12CD-23B (1310/1550) (850/1300)	February ✓	February ✓		
OTDR	✓	✓	✓	✓
iOLM	✓	✓	✓	✓
GigE	✓	✓	✓	✓
10 GigE		✓		✓
Sonet/SDH (Up to 10G)		✓		✓
OTN (Up to 11.3G)		✓		✓
Fibre Channel 1X/2X/4X	✓	✓	✓	✓
Fibre Channel 8X/10X		✓		✓
CPRI/OBSAI (2.4/3.1G)	✓	✓	✓	✓

# What's in the 700G series release?

## Optical features

1310/1490/1550/1625/1650/Quad OTDR 12CD-23B (850/1300 & 1310/1550)  
iOLM

## Multi-Service features

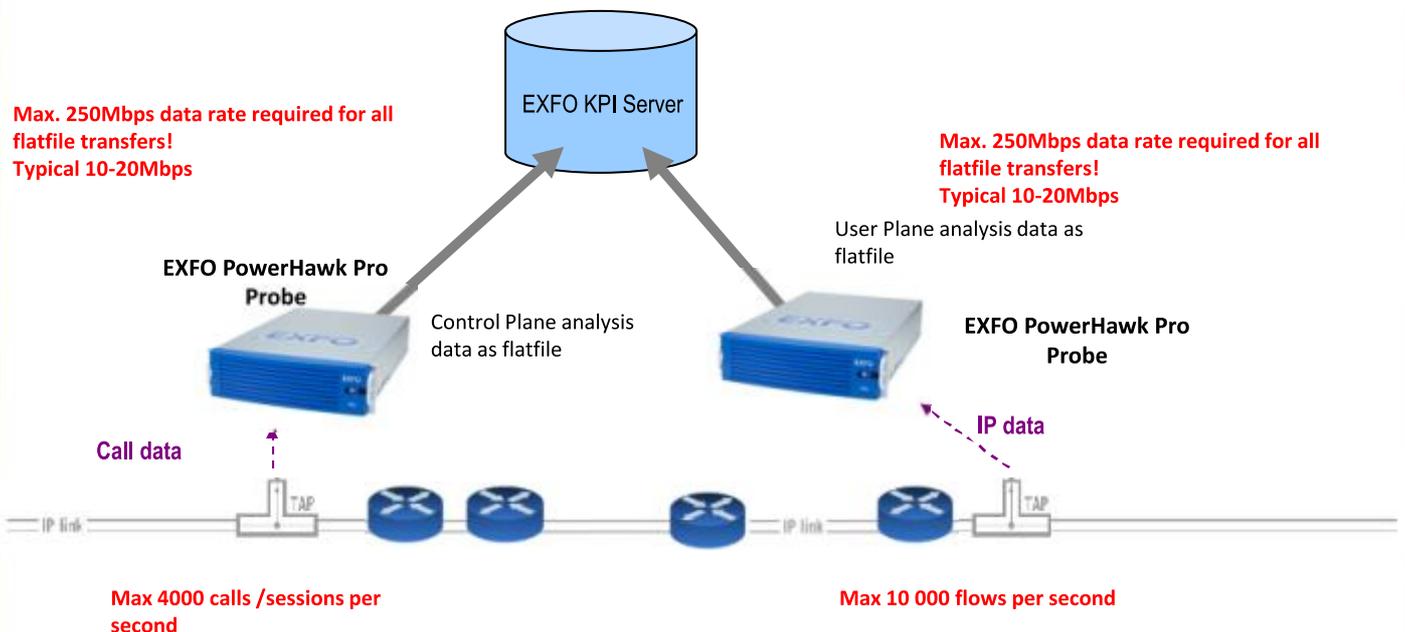
One Way Delay Ethersam/RFC 2544  
EtherSAM EBS/CBS/EMIX  
New Report Generation  
Carrier Ethernet OAM  
Tgen with 16 streams  
Visual Frame Display  
Test Configurator  
TCP Throughput

## General features

Both modules running simultaneously (may 2014)

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## Reference Architecture



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EXTO



0110  
0010  
1001001  
1001

0110  
1001  
1001  
0110