# NQMS*fiber*—Network quality monitoring system
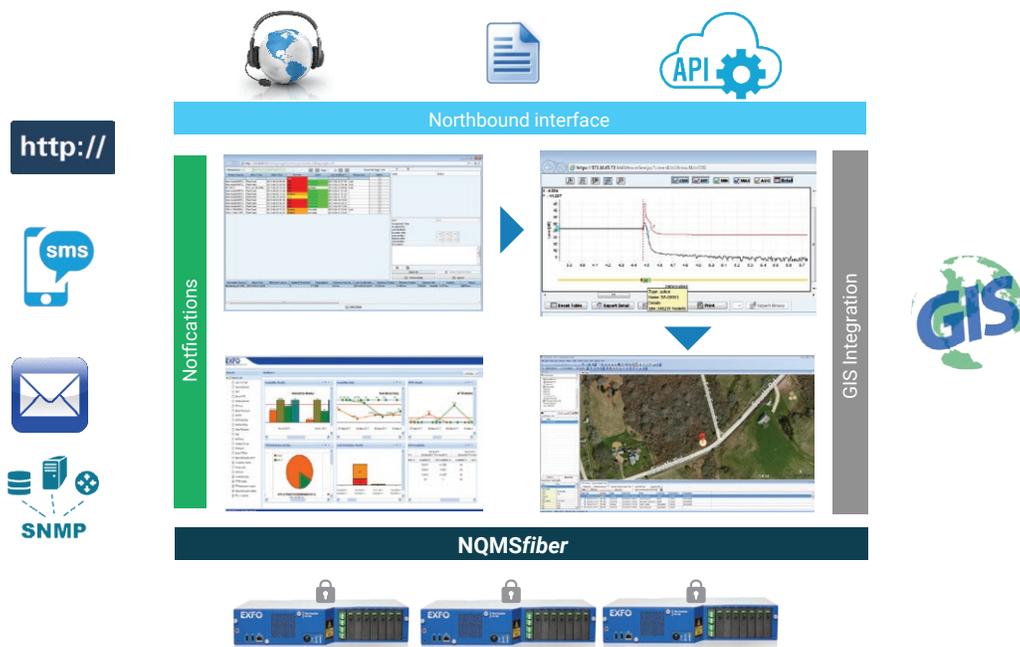
## CENTRALIZED FIBER MONITORING SOLUTION

■ The ultimate plug-and-play remote fiber test system (RFTS).



## KEY FEATURES

24/7 detection, location and tracking of fiber degradations

Secured centralized client-server solution

Comprehensive monitoring and reporting capabilities

Lit or dark fiber fault and system alerts

Turn-key fault-on-map solution with inventory and GIS (OSPInsight)

Plug-ins for out-of-the-box GIS two-way integration

One-click automatic provisioning capabilities

Web-based element management system (EMS) and remote test unit (RTU)

Unique RFTS test method for reference data management

## RELATED PRODUCTS



FG-750 Node
iOLM

Test Access
Module Kit (TAMK)

Node Optical Test
Access Unit

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## A STRAIGHTFORWARD APPROACH TO NETWORK OPERATION AND MAINTENANCE

The NQMS*fiber* network quality monitoring system is a centralized server solution that manages your cable and fiber network status. It keeps you aware of any fiber faults or degradation in your network.

NQMS*fiber* uses a central server and remote test units (RTU) deployed at key locations across the network. Featuring sophisticated functions such as alarm management and reporting, trouble-ticket handling and complete network status schematic viewing, NQMS*fiber* enables you to integrate all your network operation and maintenance activities into your existing network management systems. NQMS*fiber* also provides an easy way to integrate to your current GIS system through web services or its own network documentation based on GIS for fault-on-map feature.
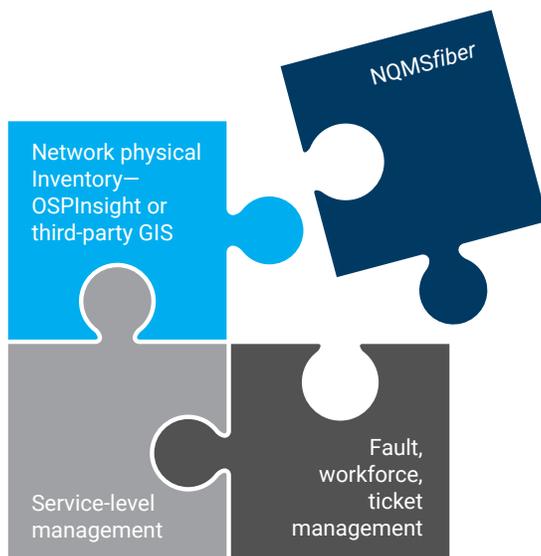


*Figure 1. NQMSfiber helps you to complete your fiber network management puzzle*

## Functions

- Configure and view network status in a topology format
- Configure, program and run alarm reports
- Request a test-on-demand and view results
- Configure monitoring and proactive maintenance tests (including detection thresholds)
- Configure, manage, view and act upon alarms
- Create and manage work orders (trouble ticketing)
- Change user profiles and access rights
- View and print fault trace with details
- Display linear view of the OSP physical link with fault distance from nearest site
  (available with OSPInSight or third-party GIS integration only)

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# THE MOST RELIABLE FIBER MONITORING SOLUTION

## Leveraging EXFO's most recent OTDR technology

NQMS*fiber* RTUs use EXFO's OTDR modules which provide high-resolution and accurate loss measurements in short and long fiber environments. All RTUs have one-meter resolution scans for resolving closely spaced events such as connectors or mechanical splices in an access site.
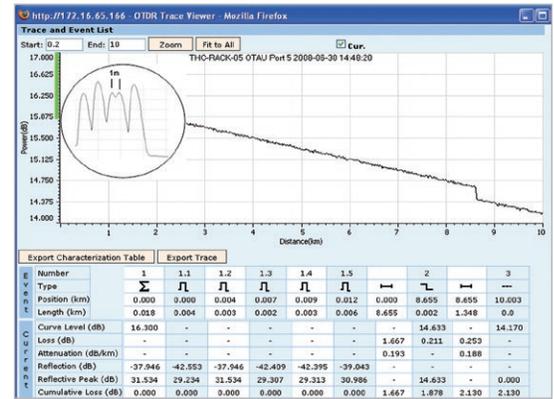


*Figure 2. High-resolution view of a fiber link*

## Learning function

Get the most out of your system, thanks to EXFO's innovative RFTS function called Learning, which automatically establishes and optimizes **fault detection thresholds** applied to each monitored link for fault-detection and avoiding false alarms due to misconfiguration and long optimization hours during fiber monitoring provisioning.
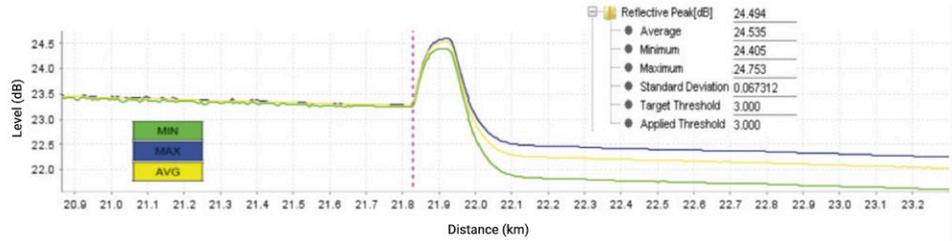


*Figure 3. Average, min. and max. values applied automatically for every single event such as reflective peaks and every section along the OTDR trace*

The learning phase ensures optimized thresholds are applied across the whole monitored link by considering:

• Signal-to-noise ratio (SNR) of the events and sections that are at the far end of the link

• Short-term varying environmental conditions, such as daily temperature variations, mechanical vibrations in interconnecting sites

## Peak-level monitoring function

Insert a stable or reproducible reflecting element such as an opened end-face or mirror and use it as a demarcation point. The reference level of this point can then be monitored at a much faster rate than the fiber backscatter level. This function also provides a wider monitoring range than a standard Rayleigh backscattering signal—perfect for ultra-long-haul networks where fiber ends may not be seen.
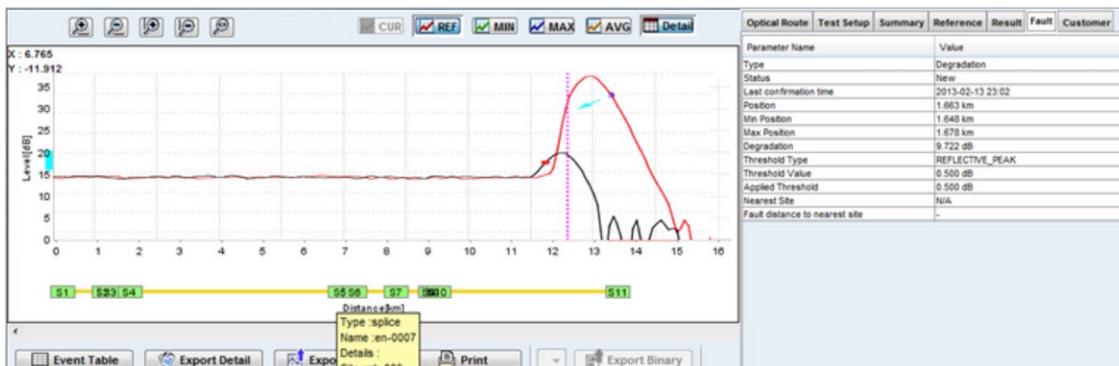


*Figure 4. Peak monitoring*

## One reference: that's all you need

The combined benefits of best-in-class OTDRs, learning function and peak-level monitoring provide powerful, fast and meaningful fiber monitoring. Choose faster scans and let the system do the work for you—there is no need for additional reference traces or for long and complicated configuration sessions.

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# WHATEVER THE DEGRADATION, NQMS*fiber* TRACKS IT DOWN

## A do-it-all solution

EXFO's FG-750 remote test units can detect, and automatically locate and track degradations, no matter what or where they are. The FG-750s measure and report accurate information to the NQMS*fiber* server (e.g., degradation or break value and optical distance from RTU site).

In the NQMS*fiber* server, alarms are defined by the system administrators according to severity, degradation value or a combination of customizable thresholds. Thus, any status change of a fiber, test or system parameter can be used to create an alarm. Whether you want to capture proactive maintenance events without creating an alarm or to send specific alerts to your corporate alarm management system, NQMS*fiber* can do it.
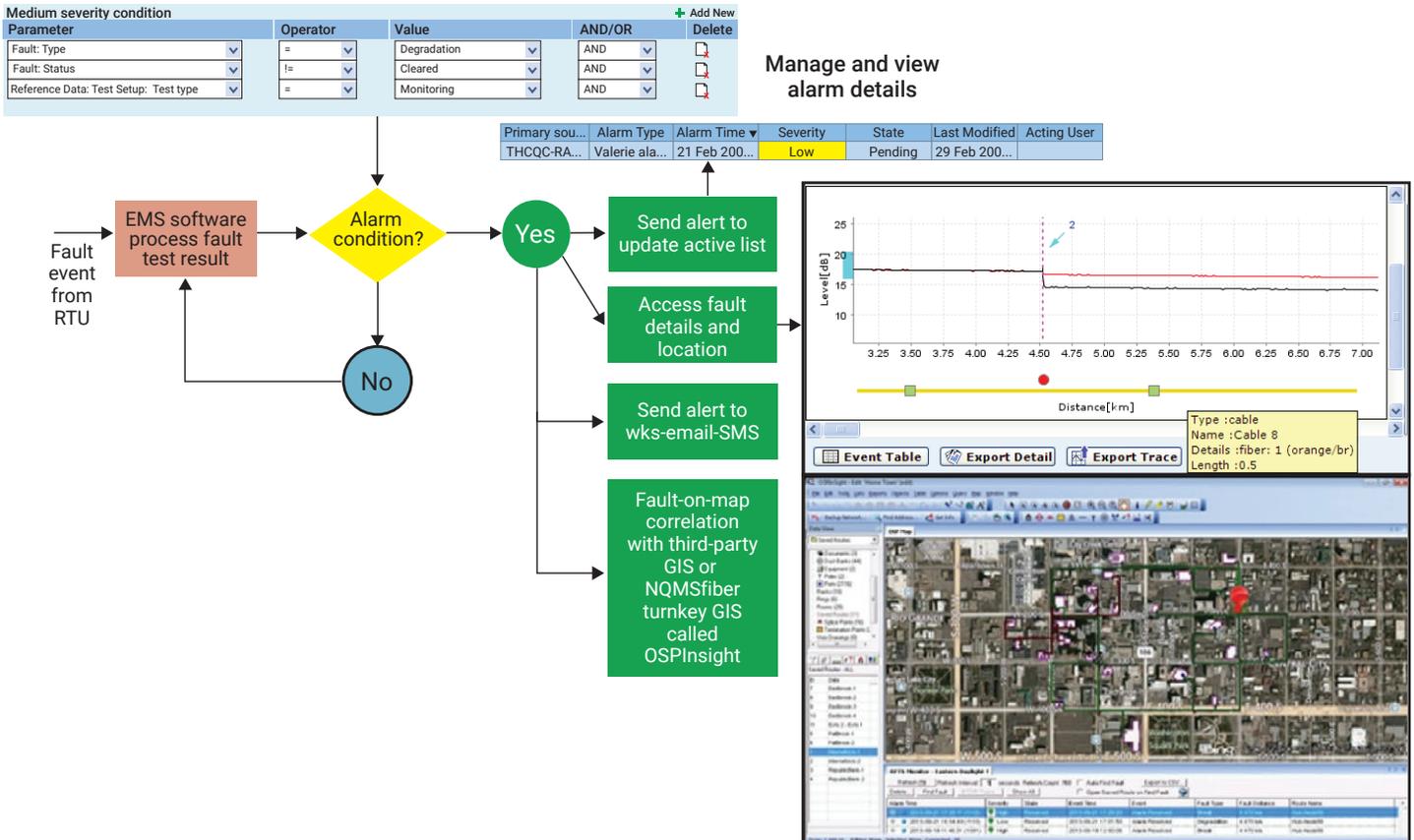


*Figure 5. Alarm management*

# COMPREHENSIVE MONITORING

## Auto-provisioning process

Once a new fiber connection is added through the RTU web interface, the RTU system automatically creates an optical route reference with a clear and easy-to-use auto-naming convention. Then, the learning phase starts automatically, and the 24/7 surveillance is activated without any additional user intervention. This simple procedure does not require deep OTDR or system knowledge.

## Regional management and topology view status monitoring

Regional segmentation of the RTUs, test ports and related alarms enables technicians to see and act only on alarms that are issued from the area or on-duty schedule they are assigned to, while managers can view multiple regions at once. This feature can also be used to generate a comprehensive schematic view of the network and its status.



*Figure 6. Regional management and on-duty schedule*

NQMS*fiber* lets you place main sites onto any background and connect them to create a regional network topology, from very simple to more complex topologies. Should an alarm occur on an optical route, it turns from green to yellow, orange or red according to the severity of the situation. Link to fault details are immediate and the RTUs and fiber routes alarm summary for this specific region are aggregated into easy-to-read tables, enabling fast correlation with other events in the network.

## Be proactive or rapidly responsive

In proactive mode, decide when and how often you wish to execute various tests. In case of degradation, no matter how small, the system will record the event and alert your staff according to the rules and conditions set.

In reactive mode, you can keep using your usual routines and turn to the NQMS*fiber* system when a loss-of-signal alarm is detected to execute an on-demand test and verify the affected link optical status. This function is available in a 100 % multitasking environment; your request will be queued, should another technician be already using the system.

## System management alarms

NQMS*fiber* monitors its own performance and RTUs health. It can create system alarms based on memory space, CPU utilization at both levels (EMS and RTUs) and fan or power supply degradation at the RTU level.

# RELIABLE, FAIL-SAFE AND SECURE SOLUTION

Allowing for secure and mobile access, the NQMS*fiber* application software is the only fully web-based RFTS solution on the market.

Standard licensing provides simultaneous access (minimum 5 concurrent users), whether they are connecting through the LAN or virtually from anywhere outside the corporate network.
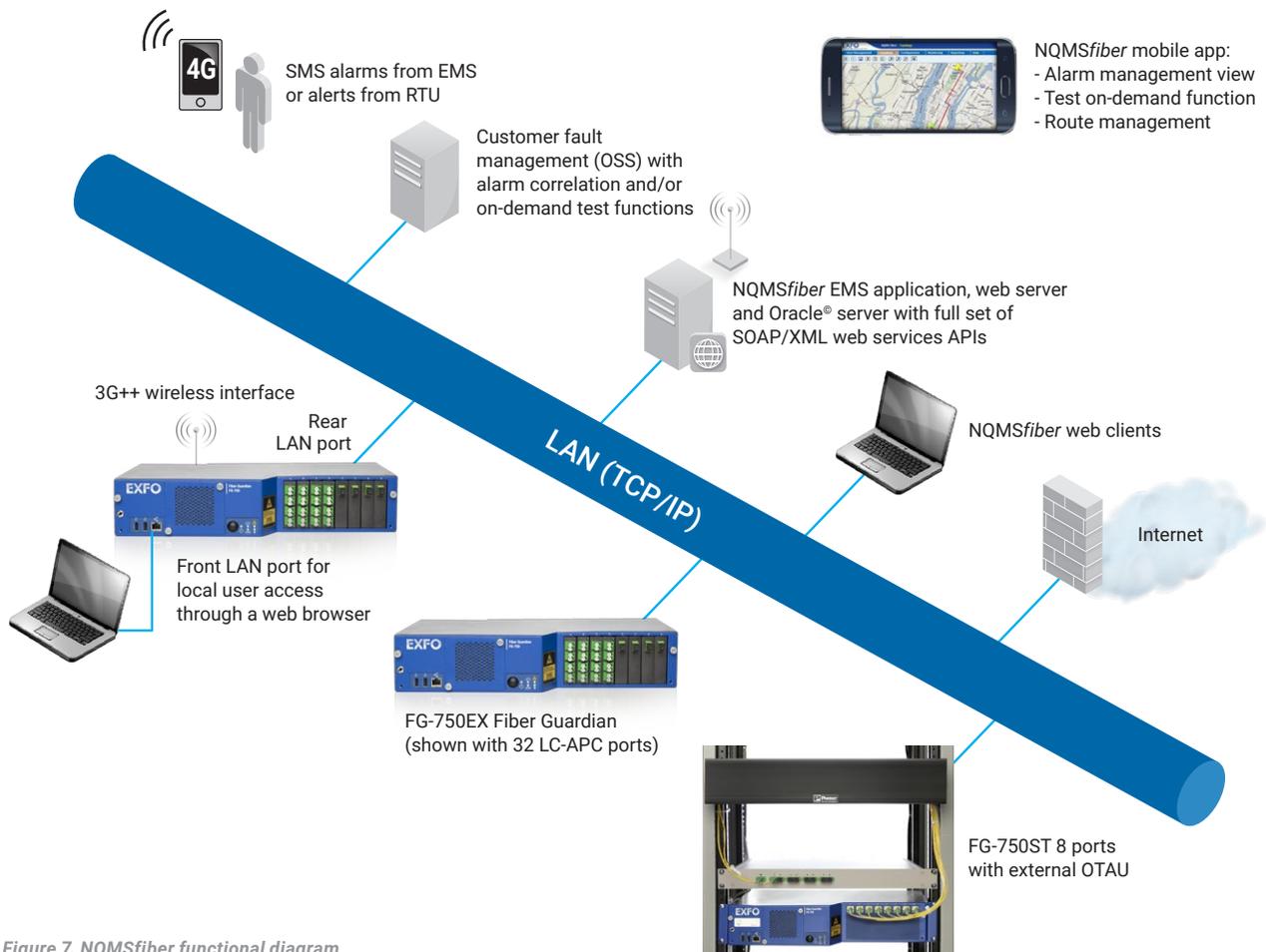


*Figure 7. NQMSfiber functional diagram*

## MEMs optical switches—extended lifetime

EXFO integrates network-grade micro-electromechanical (MEM) optical switches at the same price as traditional optomechanical switches, which usually last 10 to 100 million cycles in stable laboratory environments. Now available in the NQMS*fiber*, this MEM optical switch extends the system's switching lifetime to 1 billion cycles, in actual field conditions.

## Second server for 100% availability

In addition to its standard, primary server, EXFO offers a stand-by solution, based on enterprise-class disaster recovery (DR) function, using real-time database and files replication from primary to stand-by. This affordable solution provides no data loss and allows fast restoration should the primary server unit fail. While the switchover takes place, the FG-750 remote test units continues to monitor and execute their test schedule without any interruption.

## Mobile/smartphone access

The mobile access is a web client that is designed for smaller monitors and mobile user interface (UI) navigation tools. This option, coupled with report dashboard, insures reaction to alarm is immediate, and this efficiency ensures mean-time-to-repair (MTTR) and that availability key performance indicators (KPIs) are measured properly.

## ENHANCED SECURITY

NQMS*fiber* contains an identity and authentication module (IAM) that is hosted locally or in an external server to facilitate user administration and management among multiple FG-750s, NQMS*fiber* server and/or external applications.

IAM runs on a secure protocol (HTTPS) to enhance security and encrypt data among users, FG-750s units and the NQMS*fiber* server. The IAM can be integrated to your LDAP or Active Directory servers as well as Corporate or social media identity provider such as Facebook or Google.

This module allows you to have a single-sign on capability once the user is authenticated. Additionally, it allows you to track opened sessions and lock-out or end user sessions.
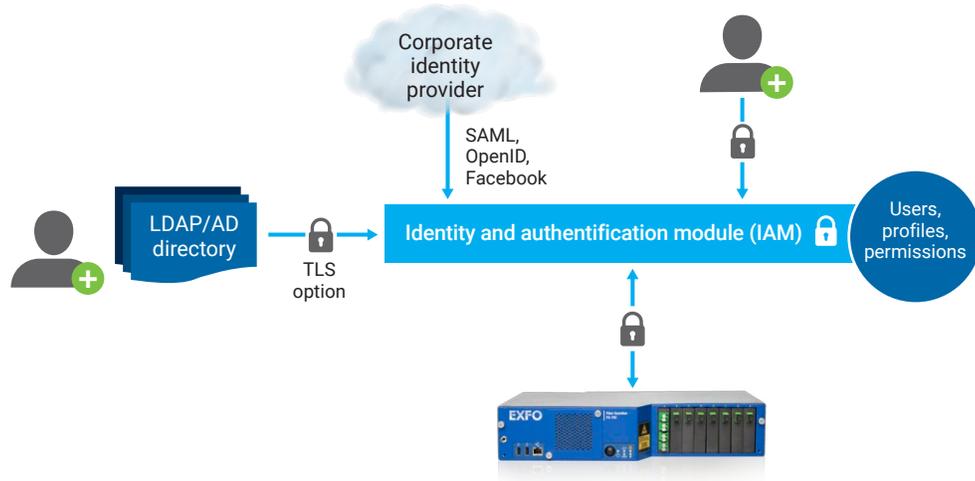


*Figure 8. Enhanced security module*

## PLUGINS FOR OUT-OF-THE-BOX TWO-WAY GIS INTEGRATION

NQMS*fiber* facilitates GIS integration through web services type protocol(s) to get fault coordinates and position.

Third-party GIS portals only have to provide three web services for complete two-way integration. By doing this, you ensure no duplication of data between your inventory/GIS database used for planning and network management, as well as now a source of information for operation and support.

EXFO provides WSDL files as an end-point example for developing the following web services functions:

1. A list of route names or IDs to be monitored to be associated to NQMS*fiber* optical route objects

2. The route inventory list with their respective distances (splices, termination points) to be displayed in the OTDR linear view (see figure 9a)

3. Upon fault event, respond with various inventory related information mainly georeferenced position but eventually more that can be passed on by NQMS*fiber* notifications to technicians concerned. The notification contains fault coordinates and a link to Google Maps (see figure 9b).
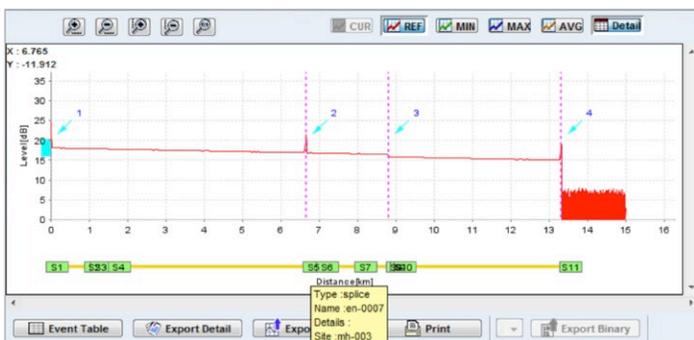


*Figure 9a. Linear view with inventory below OTDR trace from NQMSfiber web interface*
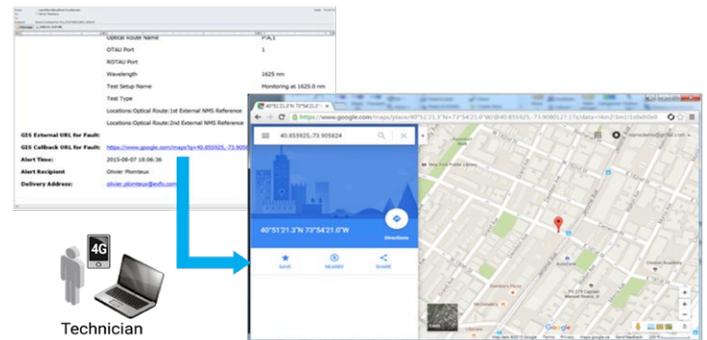
*Figure 9b. Email with GPS coordinates and link to Google Maps*

## REPORTS AND DASHBOARDS

NQMS*fiber* allows you to assign customers to one or multiple routes and obtain comprehensive reporting of events that occurred in the past weeks or months. By generating a list of fault history by customer, the system pinpoints when and what happened for true service-level agreement (SLA) management. You can also set a higher priority alert or program alarm escalation in case an event affects a specific customer.

This NQMS*fiber* dashboard function offers a network performance KPI instrument and SLA tracking tool to operation managers as part of the NQMS*fiber* baseline solution. It outperforms competitive offering because it is web-based, offers a variety of report types and has powerful capabilities to find a wide array of root causes. The type of reports that can be created are:

• Availability (%) in bar graph, line or grid (table)

• MTTR trend in bar graph, line or grid (table)

• TTR distribution in grid (table), pie chart and bar chart

• Fiber fault alarm distribution in grid (table), pie chart and bar chart

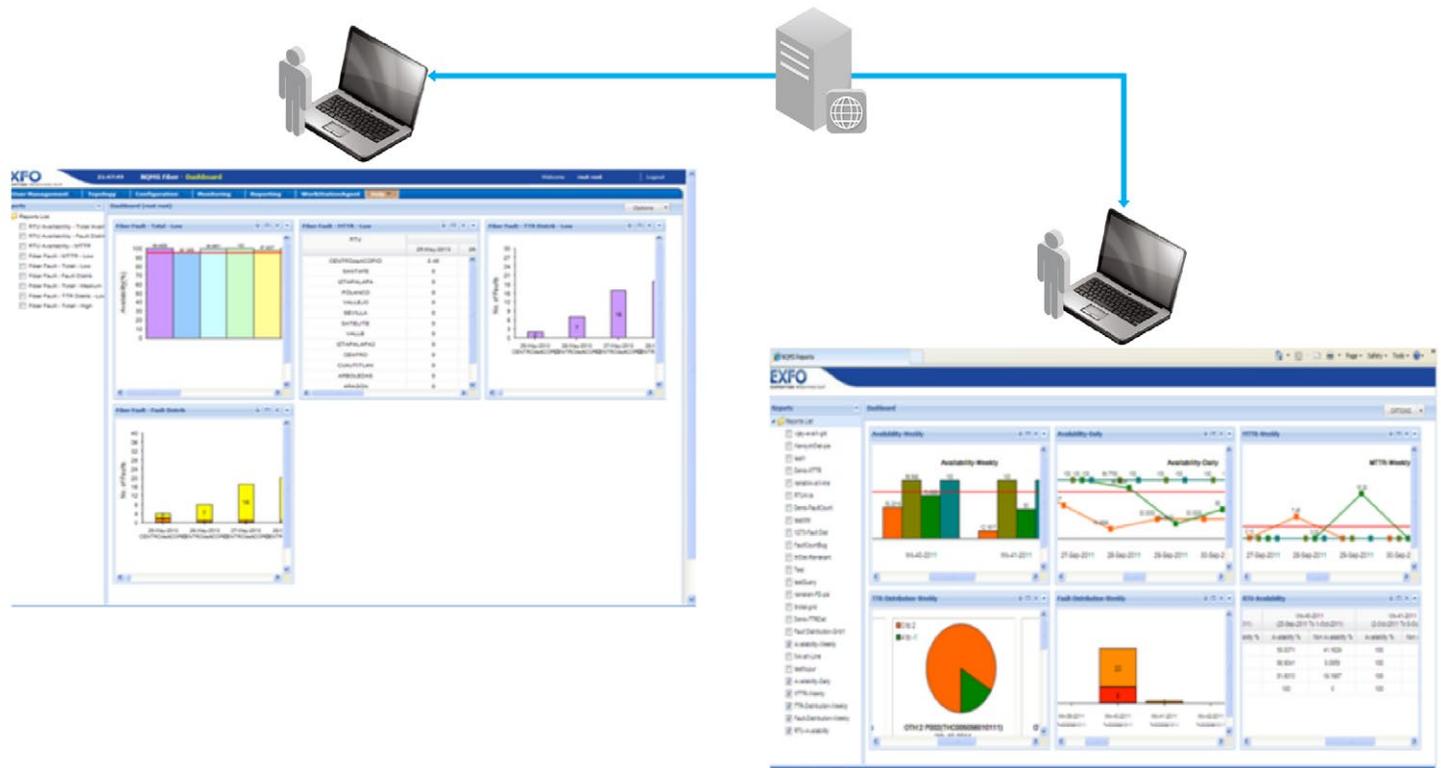The reports can also be scheduled and automatically sent in PDF, HTML, CSV file formats.



*Figure 10. Availability and TTR related custom dashboard and reports*

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# FULLY SCALABLE SOLUTION FOR ALL MONITORING NEEDS

Considering a monitoring system but your current needs do not require a fully integrated server-based solution?

EXFO's Fiber Guardian stand-alone remote OTDR unit (FG-750) along with Fiber Test Insight (FTI) is the perfect entry point to start monitoring at your own pace. It also allows you to seamlessly migrate to a complete monitoring solution without changing test units whenever you are ready to scale up.

You can afterwards include advanced fiber analytics with EXFO Xtract to assess the quality of services in a unified dashboard including multivendor equipment such as routers, switches, probes and RTUs. This scalable solution gives you visibility into how the network and end user experience will be impacted when a change, whether minor or major, occurs in your network.
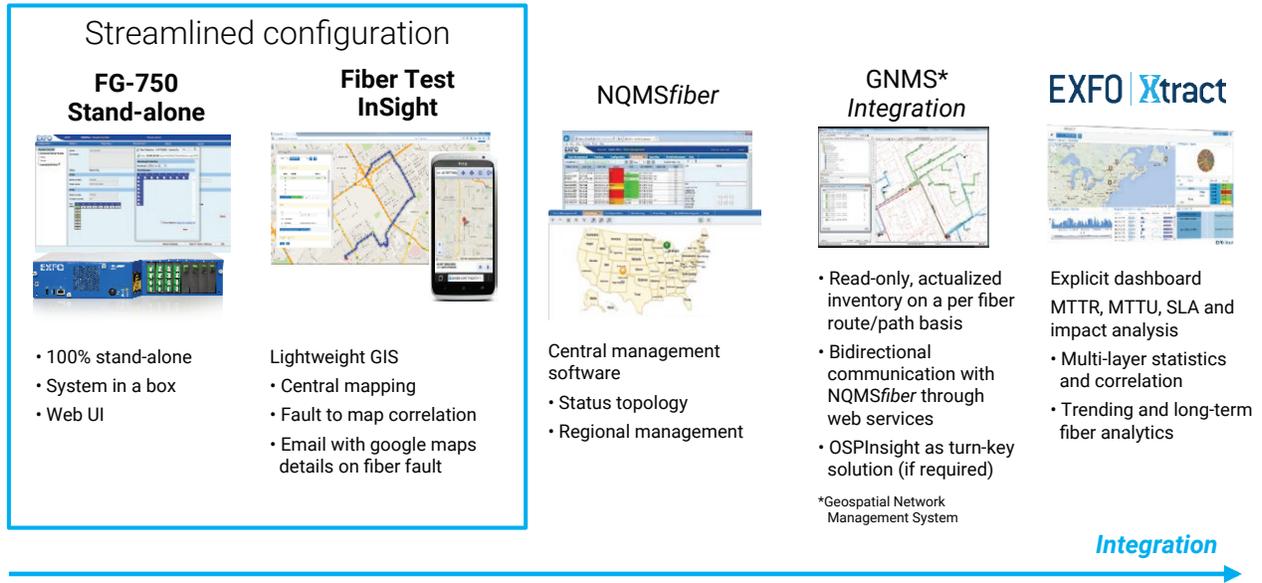
### Streamlined configuration

**FG-750 Stand-alone**

- 100% stand-alone
- System in a box
- Web UI

**Fiber Test InSight**

Lightweight GIS
- Central mapping
- Fault to map correlation
- Email with google maps details on fiber fault

NQMS*fiber*

Central management software
- Status topology
- Regional management

GNMS* *Integration*

- Read-only, actualized inventory on a per fiber route/path basis
- Bidirectional communication with NQMS*fiber* through web services
- OSPInsight as turn-key solution (if required)

*Geospatial Network Management System

**EXFO | Xtract**

Explicit dashboard MTTR, MTTU, SLA and impact analysis
- Multi-layer statistics and correlation
- Trending and long-term fiber analytics

*Integration*

*Figure 11. System and function scalability from stand-alone unit (FG-750) up to fiber analytics system (EXFO Xtract)*

To learn more about the Fiber Guardian and EXFO Xtract solutions, visit EXFO.com or contact your local sales representative to discover how you can start monitoring easily and affordably.

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## GENERAL SPECIFICATIONS

| EMS—SERVER PLATFORM | |
|---|---|
| Server platform [a] | Rackmount<br>Windows server OS or Linux CentOS (others on request)<br>Intel® Xeon processors (1 or 2) |
| NQMS application server software | Web server<br>5 or 20 simultaneous connection licensing<br>Firefox®, Chrome® and Internet Explorer® access |
| Database server | Embedded Oracle® 11g™ Standard edition |
| Options | Additional user connections<br>SNMP v2.0 alerting interface (MIB)<br>Oracle Enterprise edition for system restoration (DR option)<br>Mobile access for registered EMS users<br>GSM modem for SMS alerting<br>GSM modem for SMS alerting |

| GIS—FAULT-ON-MAP (OPTION) | |
|---|---|
| Turnkey network management system with GIS—OSPInsight | OSPM—EDIT software license based on MapInfo or ESRI<br>OSPM—VIEW software license<br>Desktop computer (optional) |
| Other certified third-party GIS integration [b] | Plugins based on web services protocol |
| Non-certified third-party GIS integration | Integration services through web services protocol or other (requires scope of work) |

| NQMS*fiber* SERVICES | | |
|---|---|---|
| SLA type | Silver | Gold [c] |
| Software warranty and maintenance (incl. third-party software) | • | • |
| 8/5 help-desk and unlimited number of remote support hours | • | |
| 24/7 help-desk and unlimited number of remote support hours | | • |
| New EMS/RTU releases and updates | • | • |
| Repair and return of hardware (FlexCare) | | • |
| Advanced end user program subscription | Per request | Automatic |

a. The NQMS*fiber* application can be hosted in a dedicated virtual environment

b. For further details about supported and certified third-party GIS software, please refer to GIS integration status and compatibility document

c. Gold support availability varies by region

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## REMOTE TEST UNIT−PLATFORM

| | | |
|---|---|---|
| Standard model−number of optical ports [a] | SC-APC or FC-APC | 1/4/8/12/24/32 ports |
| Expandable model−number of optical ports | 4-port SC-APC optical switch cassette (OSC)<br>8-port LC-APC OSC<br>12-port MTP-APC OSC<br>Maximum eight (8) OSCs per unit<br>Scalable, modular construction<br>Field-configurable | 8 to 96 ports [b] |
| Internal optical switch type | MEMs [c] | |
| Internal optical switch lifetime<br>(minimum number of cycles) | | 1 000 000 000 ($10^9$) |
| MEMs external/remote optical switch | Refers also to M-OTAUs or MEMs-based optical test access units (SC-APC); DC or AC powered. | 1U size: 1x8, 1x16, 1x32<br>2U size: 1x48, 1x72<br>4U size: 1x96 |
| Large external/remote optical switch (1 x n) [d] | High number of ports | 576/720 ports |
| Wired network interfacess | 10/100/1000 Base-T Ethernet IP-V4 and V6, one dedicated to local access | 2 |
| Unit status front LEDs | | 5 |
| Storage type and data storage (GB) | Solid state drive | 32 |
| Dual, hot-swappable and redundant power supplies | Rear swap, AC or DC | VAC   100 to 240, 50/60 Hz<br>VDC   −40/−72 |
| Power consumption steady state<br>(fully loaded with 96 ports) | Over entire operating temperature range | 35 W |
| Fan | Field replaceable<br>Front loading | 1 |
| Rack type | Drawer on rail | |
| Supported browsers for unit configuration and status view | MS Internet Explorer™, Mozilla Firefox®, Google Chrome™ | |
| Temperature | Operating<br>Storage | −5 ℃ to 50 ℃ (23 °F to 122 °F)<br>−40 ℃ to 70 ℃ (−40 °F to 158 °F) |
| Relative humidity | Non-condensing | 0% to 95% |
| Maximum operation altitude [e] | | 3000 m (9850 ft) |
| Size (for 19-in, ETSI or 23-in racks)<br>(H x W x D) | Fits in 300 mm deep ETSI rack with cabling (DC model) connected | 88 mm (2U) x 435 mm x 270 mm<br>(3 $^7/_{16}$ in (2U) x 17 $^1/_8$ in x 10 $^5/_8$ in) |
| Maximum weight (with 8 OSCs) | | 8.7 kg (19.1 lb) |
| Product Compliance | CE, CSA, RoHS, NEBS [f] | |
| Wireless network interface option | Integrated wireless communication module with external antenna (SIM not included; some conditions such as level of signal inside premises apply) | HSPA+, GSM/GPRS/EDGE and CDMA 1x RTT |