Remote fiber testing to improve SLA’s

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EXFO is the leader in the test and measurement solutions for fiber optic since 26 years. The OTDR, is used worldwide for characterization, maintenance and monitoring.

EXFO has brought to market its first generation of monitoring system RFTS in 1998. Over 300 units of remote testing are still in operation.

EXFO has introduced in 2007 a second generation solution: NQMSfiber. NQMSfiber is the ultimate fiber test system helping operators meeting the highest standards in quality of service, as well as keeping and attracting new subscribers with best-in-class 24/7 triple-play services.
Remote Fiber Test System

› 24/7 detection, location and tracking of fiber degradations.
› Automatic discovery and provisioning capabilities.
› RFTS test method for reference data management.
› Designed for core, metro and FTTx/access network requirements.
› Highly customizable.
› Web-based user interface.
NQMSfiber

- RFTS system
  - Access ENTIRELY WEB based
    - Configuration, alarms, schematic, reporting, etc
    - Access through internet easy & secure
  - One-click provisioning
    - Auto-registering
    - Auto-creation of most entities
  - Accurate, reliable and sophisticated testing solution
    - Ability to adjust thresholds on sections
    - Ability to track degradation (update loss as it changes)
Global Diagram

- SMS alerts from EMS or RTU
- OSS with alarm correlation and TOD functions
- NQMSfiber EMS application & database
- WEB server
- Mobile WEB client with OSPInsight View
- INTERNET
- LAN (TCP-IP)
- Back LAN port
- Local User with WEB browser
- Front LAN port
- RTU-700 NQMSfiber Remote Test Unit
- RTU-700 With local external OTAU
- IP Remote Optical Test Access Unit (OTAU)
How RFTS works

› Powerful alerting functions

NQMSfiber – EMS for Centralised Management

GIS System

Clear

Geo Ref

NOC

NQMS fiber EMS

Oracle DB

Ethernet

ODF

field.engineer@domain.com

NOC

Centralised:

➢ User Management
➢ RTU Access
➢ Reporting
➢ Alarm Management
➢ Administration
Remote Test Unit

- Modular, powerful and scalable

- No need for mouse, monitor & keyboard

- USB and RS-232
- AC or DC power In
- Front LEDs display The RTU status
- Rack-mount brackets
- Extension BUS for additional optical module
- Contact C relay for FG status
- Rear LAN port & modem
- Optical module OTDR + SWITCH 8/16 port OTAU Std, 32 Ports available 48 (2U)
- Controller Unit XP embedded
- Management port DHCP front LAN port
- Output ports FC-APC SC-APC LC-APC
OTDRs

› Up to 256,000 sampling points for higher trace resolution
› Event dead zone of 0.8 m and attenuation dead zone of 4 m
› From 37 to 50 dB dynamic range
› 1310, 1550, 1625 and 1650 nm wavelengths
› 50 dB module can test over distances of up to 250 km
› Up to 175 km on live monitoring with extended range mode
› Single, double, triple and quad wavelengths
Optical Switches

Switches

› Internal Switch optical ports: 1 / 8 / 16 / 24 / 32 and 48
› External Switch optical ports: up to 128
› Wavelength range: 1290-1655 nm
› Switching time: 30 ms
› Optical switch lifetime (min number of cycles): 1,000,000,000

Internal Switch

External Switch
Monitoring Scenarios

Both Active (In-Service) and Passive (Dark) Fibre Monitoring

- All testing will be in a ‘round robin’ sequence
- Priority can be given to specific ports if required
- 1650nm testing now supported
New In-Service CWDM Monitoring Scenario

Active or In-Service Monitoring – In-Band

- No need for extra filters; reduces Ins. Loss
- CWDM dedicated wavelength needed
Advanced Testing – ROTAU Deployment

- Reduces hardware requirement = Saving money
- Used in cases where cables are at, or nearly at, full utilisation.
## Next Generation Testing

### Four Test Methods
- Monitoring
- Proactive Maintenance
- Test On Demand
- Ad-Hoc Test

### Monitored Values
- Injection Level
- Events
- Loss Total/Cumulative
- Sections
- Peak Levels

### Table: Parameters

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<thead>
<tr>
<th>Event</th>
<th>1.0</th>
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<table>
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<tr>
<th>Event</th>
<th>Curve Level (dB)</th>
<th>Loss (dB)</th>
<th>Average</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std. Dev.</th>
<th>Target Threshold</th>
<th>Applied Threshold</th>
<th>Attenuation (dB)</th>
<th>Reflection (dB)</th>
<th>Reflective Peak (dB)</th>
<th>Cumulative Loss (dB)</th>
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Learning Phase

Learning Phase ensures optimized thresholds are applied across the whole monitored link by considering:

- 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, etc.,

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<th>Curve Level (dB)</th>
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<td>0.1</td>
<td>0.1</td>
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<td>0.1</td>
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Learning Phase

› For monitoring long links, it is expected that traces will be more noisy at the far end due to attenuation.
› If ‘tight’ threshold are applied for event detection, false alarms can occur.
› Learning Phase ensures that the best thresholds are applied for each event across the link.

So what? No second reference needed, no confirmation testing needed. When there is an alarm, it is real!

<table>
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<tr>
<th>Targ. Thresh.</th>
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<th>0.1</th>
<th>0.1</th>
<th>0.1</th>
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<th>0.1</th>
<th>0.1</th>
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<tbody>
<tr>
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<td>0.1</td>
<td>0.1</td>
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<td>0.20</td>
<td>0.1</td>
<td>0.1</td>
<td>0.4</td>
<td>-</td>
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</table>

› Real alarm means:

Time and money saving
Solution Highlights

› RFTS Outstanding Value
  › Secure, multi-user test unit
    › Secure log-in (user name & password)
    › Multiple users can log-in at same time
    › Local Administrator have additional permissions
    › Log-in/log out event viewer
  › WEB UI
    › View/export traces & results
    › Perform manual tests
  › Reliable transmission of faults
    › RTU can alert (SMS and email)
    › Relay contact toggle when system or optical fault
RFTS + GIS system

- Documenting your network to enable efficient support
- Reduce TTR
- Totally integrated with RFTS solution
- Advanced reporting
- Route management
  - Faults on map
RFTS system & GIS

Dual-window view optical/physical for NIS/GIS EDIT
Customer Reporting - SLA improvement

- **Alarms reporting based on:** Region, RTU, Optical Route or customer, and according to severity
- **Network Availability** - % of time network is available on a per route basis, based on choice of alarm severity level(s) for defining a non-availability situation.
- **MTTR Trend** – weekly or monthly per region, per RTU, ..
- **TTR Distribution** – per location, according to time-elapsed
- **Fault Distribution & Trend** – per week, per month, #of alarm according to severity by location aggregation selected
### Solution Highlights

- **Real KPIs about your network**
  - Measure how frequent a given fiber is in alarm per given period of time
  - One click and obtain total alarm duration of all alarms from the last X days

#### Alarm report

<table>
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<tr>
<th>No.</th>
<th>Alarm ID</th>
<th>Alarm Creation Time</th>
<th>OSP Route Name</th>
<th>Pending Duration</th>
<th>Acknowledge Duration</th>
<th>Alarm Duration</th>
<th>InProgress Duration</th>
<th>Severity</th>
<th>Fault Type</th>
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<td>Central  - switch</td>
<td>00:47:48:39</td>
<td>00:14:19:44</td>
<td>00:32:58:24</td>
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<td>2</td>
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</tbody>
</table>

- **Trending analysis on the entire cable (cable template)**
EXFO RFTS system

› 100% WEB RFTS
   › Centralized software operation, no hassle with stations’ maintenance
   › Enhance staff mobility

› Automation in configuration

› Added value function—Learning, Proactive maintenance, extended mode

› Up to 250km with ULH OTDR
   › 175km with extended mode monitoring on live fibers
   › Highest resolution, best measurement range on the market

› Advanced reporting functions such as auto-generation & sending

› One RTU solution is lowest price on the market

› EXFO has the stand-alone Remote Test Unit version.
The Fiber Guardian

The stand-alone Remote Test Unit

Very easy to install and provision (20 mins)

Has its own Web UI

No additional PC or server required

Powerful alerting methods.

Fiber Guardian + GIS

Now available

Can monitor multiple routes (switch)
How FG works

- Powerful alerting functions

Fiber Guardian – Stand alone solution

GIS System
Clear

NOC
Clear

Ethernet

internet

ODF

field.engineer@home.com

update
Fiber Guardian – Stand-Alone Solution

WEB Browser GUI

WEB Source

WEB services

Alerting system

Alerting TOD

Ad-hoc test, capture alerts

SOAP XML

SNMP

GSM/GPRS

TCP/IP

SMS gateway

FG-720

TCP/IP

NQMS fiber RTU controller

Trace Compare

OTDR analysis

Apps

Email, XML

TCP/IP
EXFO offers three versions of its fiber monitoring system:

- Fiber Guardian: Stand alone unit
- Fiber Guardian + GIS: Stand alone unit + GIS
- NQMSfiber: Server(s) + RTU(s) + GIS (optional)
SLA Improvement

› Improving service quality with RFTS system:

› Quick fault location: Minimum down time
› See problem before impacting service.
› Operator will be alerted with simple degradation. Action can be taking before situation gets worst
› Reporting and trending analysis: Proactive maintenance.
› Schedule maintenance with minimum impact
Questions?
Please visit us at our booth to see the remote test unit and get additional information.
Thank you
Kamel SOUILAH
System Sales Engineer
kamel.souilah@EXFO.com