

AFCS Application

Remote Fiber Test and Monitoring

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Present Mode Operation (PMO)

- ▶ When a service failure occurs, technicians troubleshoot the cause of the fault by evaluating alarm data and trying to re-establish communications
- ▶ When a physical fiber failure is discovered, maintenance crews gather test equipment and travel to nearest point of presence with visibility to affected link
- ▶ Maintenance crews must find proper fiber port to do an OTDR test
- ▶ The OTDR provides an optical trace which indicates distance to the physical problem. This information is relayed to the NOC where technicians go through documentation to correlate optical distance to a physical location.
- ▶ The location determined from the NOC is sent back to maintenance crew which is dispatched to location to look for the fault
- ▶ After the fault is found, repair cycle can begin

Challenges, Limitations and Issues with PMO

- ▶ There are a myriad of challenges, limitations and issues with the Present Mode of Operations (PMO)
- ▶ Excessive time and resources are being used to
 - Determine actual cause of the problem
 - Locate where maintenance personnel can access network to check problem
 - Driving to test access point to perform OTDR test
 - Relaying OTDR trace to the NOC for physical location
 - Driving and locating actual problem
- ▶ There are added risks of removing the wrong fiber to perform the OTDR test which can result in another network failure

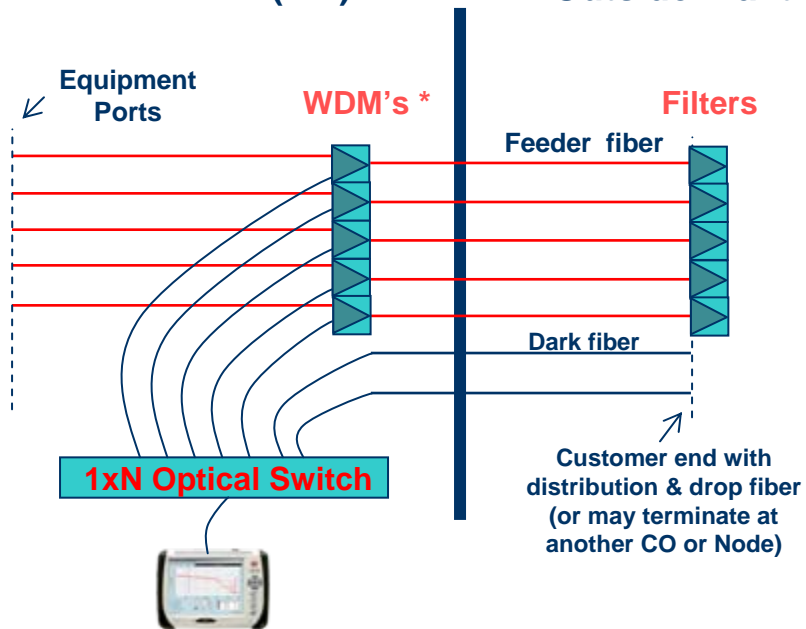
How Can AFCS Help?

- ▶ **Testing and monitoring the network:** When a break occurs, the OTDR takes a trace and RFTS software sends an alarm showing where the physical fault occurred for quicker repairs. An NxM optical switch can also switch around faulty fibers and equipment ports until serviced

Option with 1xN Optical Switch

- ▶ Provides the ability to test & monitor

Central Office (CO) Outside Plant



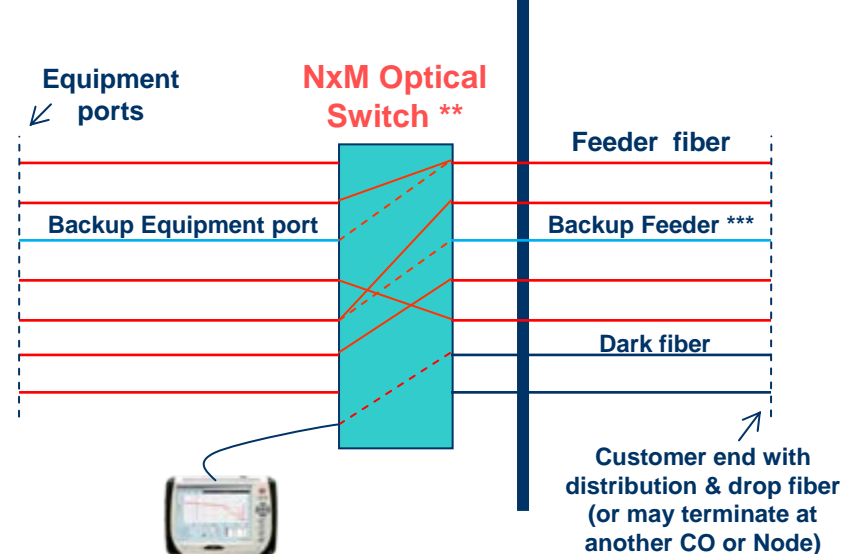
OTDR Test System

(*) Fiber Distribution Frame (FDF) is not shown, but is typically positioned in CO before the OSP

Option with NxM Optical Switch

- ▶ Provides the ability to test & monitor, and switch around faulty fibers & equipment ports

Central Office Outside Plant



OTDR Test System

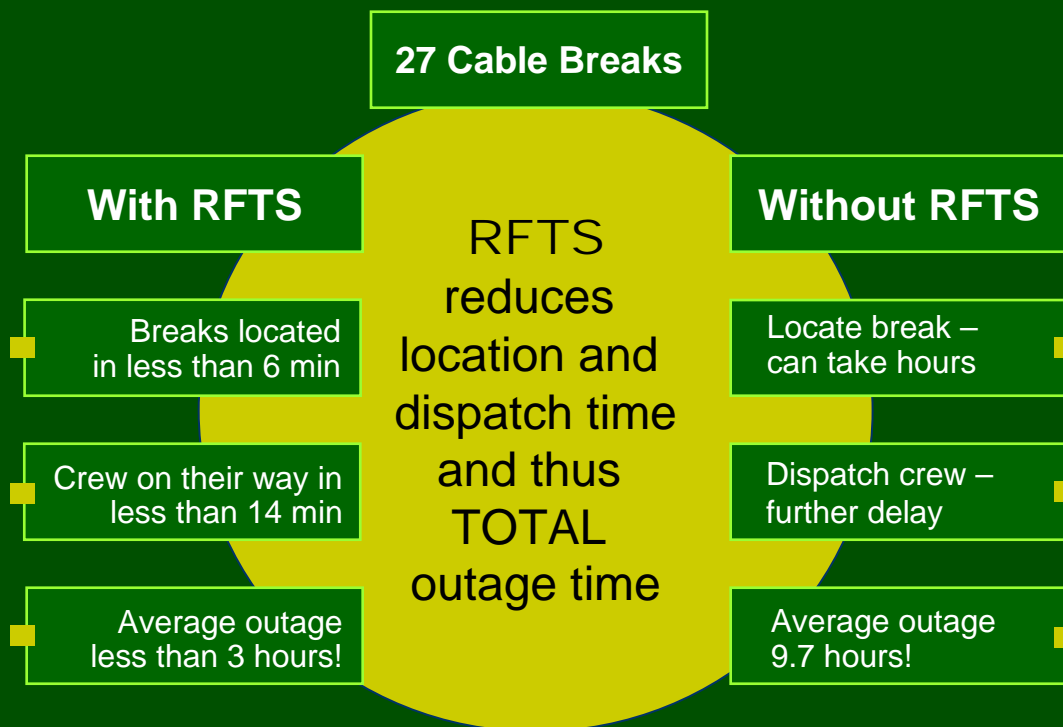
(**) With internal or external optical taps and supporting FDF functionality
(***) Backup feeder going to another switch

Technical Benefits

- ▶ Non-intrusive 24/7 network surveillance
- ▶ Automated alarms for immediate notification and identification of fault locations
- ▶ Switch around faulty fibers and equipment ports
- ▶ Identification of physical problems before they occur
 - Alarms on attenuation level changes.
 - Alarms and identifies inconsistent trouble locations (trees blowing into cables, freezing and thawing, etc.)
 - Identifies high attenuation locations due to bend radius or cable management issues
- ▶ Report generation – automated
 - Alarm history
 - Specific alarm events
 - System status
- ▶ Saves operation costs and improves turn-up of new services
- ▶ Dramatically reduces fiber down time
- ▶ Security – detects fiber intrusion (taps) and physical fiber changes

Financial Benefit - Reduced Network Downtime

- ▶ The example below is data from a major carrier that tracks the time to repair a damaged fiber with and without a RFTS. There were 27 breaks in this example. Time to repair without RFTS was 9.7 hours, with RFTS is less than 3 hours.
- ▶ With the ability to switch around faulty fibers and equipment ports, actual downtime may be further reduced.



Benefits of the Application

- ▶ Quantitative Financial Benefit Calculation
 - ROI and financial benefits are dependent on data value on the damaged fiber, maintenance and technician costs, etc.
 - Customers have documented the following benefits:
 - ▶ 70% Reduction in network downtime
 - ▶ Proactive/preventative maintenance, eliminating network downtime
 - ▶ 70% improvement in sub-contractor repair costs
 - ▶ Improved QOS and SLA compliance
 - ▶ Fewer people involved in network problem resolution

Benefits of the Application

- ▶ Who Can Benefit from the Application
 - Telecom carriers: RBOCs ILECs IXCs, CLECs, MSOs, ASPs, ISPs
 - Metropolitan area network providers
 - Cable companies
 - Banks and financial institutions
 - Data center owners
 - Utilities
 - Dark fiber providers
 - Submarine networks
 - Government agencies