

Case Study

Optical Network Monitoring System (ONMSi) Ensures Municipality Fiber Network Availability

Municipalities increasingly rely on fiber optic networks to interconnect utility services and other facilities together. These networks provide voice, video, and data transmission for many applications such as public safety and transportation. They also interconnect vital public services such as electrical substations, water wells, and pumping stations.

Occasionally, a municipality leases spare fiber capacity to external clients such as telecommunications service providers, businesses, and educational and governmental institutions.

The Challenge

One such municipality found maintaining this fiber optic network difficult. It required high levels of expertise and was often economically burdensome. And naturally, both internal and external clients expected high levels of service and availability. The resiliency of the fiber optic infrastructure is critical for fire protection and emergency services. Hours of network downtime can be caused by a fiber outage with catastrophic consequences for those services.

External clients leasing the fiber network had requested a strict service level agreement (SLA) that included a guaranteed time to repair. If the network is unavailable for a longer period than the SLA specifies, the municipality may have to pay significant penalties.

The Solution

Optical fiber can carry data at speeds in excess of 10 G within these networks. However, performance and connectivity can be jeopardized if the network has dirty connectors, high loss splice points, and strong back reflections. To meet these challenges, the municipality looked for a remote fiber test system that could ensure the performance of the fiber network, minimize the downtime in the event of a fiber outage, and reduce the need for extra maintenance resources.

The municipality chose VIAVI as a partner and the company promptly deployed the ONMSi. By placing remote optical test units (OTUs) at strategic points in the network, VIAVI was able to ensure maximum network coverage at a minimum cost—only two OTUs were required to cover a city of hundreds of thousands of people.

The OTU includes an optical time domain reflectometer (OTDR) and an optical switch to connect to multiple fiber paths. It scans the network 24/7 looking for any fiber degradation on OTDR traces, automatically detecting and locating any faults. The user is immediately notified with a trouble ticket detailing the exact nature and location of the fiber fault.

In the case of a fiber cable cut, ONMSi identifies the fault in minutes compared to the hours needed by traditional methods. Mean time to repair (MTTR) is significantly reduced since the exact location of the cut is identified for immediate repair by the field service teams. Often during a cable cut, operations-center personnel are overloaded by system alarms and calls. This reduces the time spent on understanding exactly what is happening. ONMSi is essential in pinpointing whether the outage is caused by the telecom equipment or by the outside plant. The system is also effective in detecting any fiber degradation before it affects network services, preventing possible outages. Maintenance can be scheduled outside of traffic peak time to ensure continued performance.



The Results

Deploying the VIAVI ONMSi system enabled several very beneficial results:

- ONMSi characterized the network to produce baseline performance standards. During this phase, the municipality discovered that repairs had been made to several fiber routes since their initial deployment. One route that was documented as 3 km actually turned out to be 5 km. This issue had not caused an outage, but it had increased the system loss and reduced performance.
- The municipality gained immediate visibility into network performance at any given time. Traditionally, network performance is only measured at installation and at time of repair, providing a limited view of actual fiber performance. Now, customers calling in for service could be told the status of the network in real time.
- ONMSi improved field service team utilization. Because ONMSi detects fiber degradation before any service outage, maintenance can be better planned to synchronize with other network interventions. Truck rolls and interventions can be kept to a minimum while ensuring improved network performance.
- There was a significant reduction in MTTR. The municipality reported that MTTR times were reduced from 8 to 4 hours—a 100% improvement—ensuring that SLAs are kept for fibers leased to external clients.

Importantly, the municipality can now attract revenue from new external customers as the service is available with a fiber monitoring system that ensures performance and SLA conformance.

The VIAVI Solution

The VIAVI Solution consists of two main components:

1. Hardware: two OTU-8000 units deployed at two different office locations. Each unit was equipped with an OTDR and an optical switch.
2. Software: applications enabling the following:
 - Access for multiple system users
 - Web access
 - SMS and email notifications
 - SNMP for integration with other systems
 - GIS/Google mapping
 - Reporting and analytics



ONMSi Geographical Map Display