

<b>Title</b>	<b>Supervision and Management System Solution for Emerging FTTX/H : Live In-Service Monitoring, Test and Diagnosis.</b>
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**Summary:**

We propose a centralized remote supervisory and management system, for point-to-point, ring and tree topology passive optical networks (PONs). This includes the emerging time division multiplexing (TDM) technology of Fiber-to-the-X (X is H for home) FTTX/H Gigabit PONs . The Kingdom of Saudi Arabia, used to be an early adopter for new telecom technologies, is making tremendous advances towards next generation FTTX/H deployment. In 2008, the King Abdullah Economic City (KAEC in Jeddah, KSA) contracted with Ericson to deploy FTTX/H everywhere in KAEC. Furthermore, STC already launched FTTH services in a number of quarters in Riyadh city. FTTX managers, however, are still missing an efficient administration and management solution and technology appropriate for TDM-PON even for very few customers per fiber. Despite the appearance of some partial solutions, centralized and completely integrated and efficient solution, as proposed in this project, is still missing. Some service providers, like NTT (Japan) is trying to develop by themselves a centralized management solution for their optical access systems and more specifically FTTX/H networks. They report that more than 80% of installed PON failures occurs within the first/last mile, i.e., within the distribution/drop segments of the network. When a fault occurs, technicians must be dispatched to identify, locate and fix the failure. The time, labor and truck roll request for a fault, dramatically increase the operational expenditure (OPEX) and erode profit margin. Furthermore, long repair time causes customer dissatisfaction and complaints. Therefore, a centralized monitoring (i.e., from the CO) is highly desired because it provides instantaneous full in-service information and control for service providers.

The purpose of this project is to develop a centralized supervisory and management system that enables remote monitoring, test and diagnosis functionalities of an FTTX/H network from the CO in order to:

- Remotely acquire adequate and detailed information about the network, and automatically recognize the network architecture from direct and instantaneous measurements. This information is very sensitive for the network planning and service provisioning engineers and units, since this always gives them up-to-date full information about the network. This feature helps reducing the capital expenditure (CAPEX) of the fiber optic access network infrastructure.
- Perform In-service monitoring and in-time detection of any power deterioration and degradation in any segment (or leg) in the network in addition to performing the appropriate test and diagnoses operations. This feature is highly useful for maintenance group, since this allows them to intervene in the right time, before service interruption or service quality deterioration. This reduces the operational expenditure (OPEX) and substantially helps for customers' satisfaction.
- Identify accidental and non-accidental faults in any segment in the optical access network in addition to generating alarms and intervention recommendations for the technicians. This highly reduces the time the technicians spend on identifying accidental faults, decreases the mean downtime of the network and increases the quality of service.

The ultimate objective of this project is to reduce the capital cost or expenditure (CAPEX) related to the installation and deployment of new fiber optic access network, an upgrade of an existing optical system, and the service provision for new customers, buildings or quarters. Furthermore, this project is focused on reducing the operational expenditure (OPEX) related the network maintenance, repair, and customers complaints.

