

Power Distribution Automation Communication Solution Based On EPON

Background

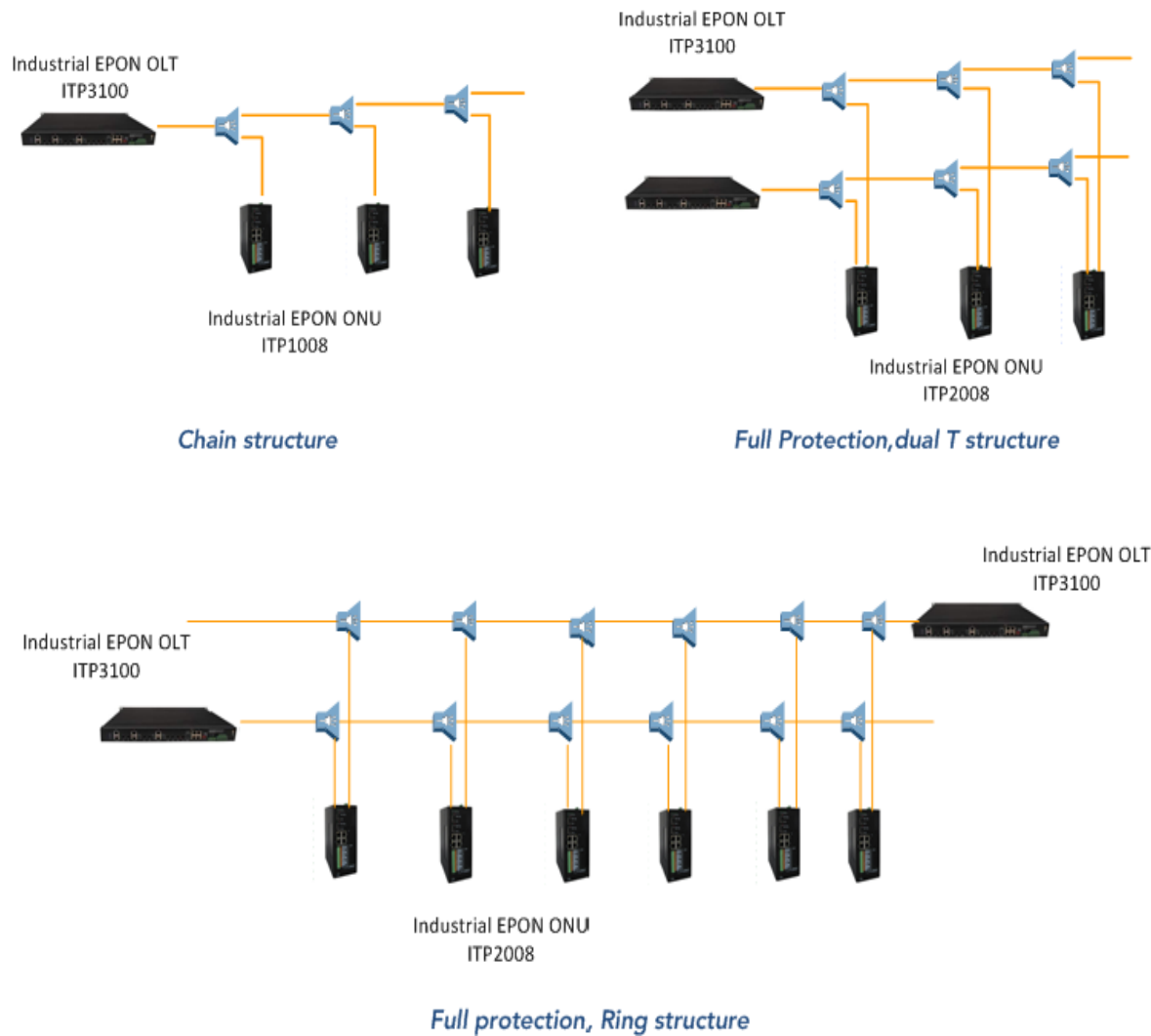
Increasing numbers of power grid components— such as secondary substations, distributed energy sources, virtual power stations, microgrids, public charging stations, and private households – must be integrated into the smart-grid communication network. New energy applications, such as meter data management or demand response, lead to additional communication needs. The communication networks for distribution automation systems (DAS) are considered as the last mile connectivity for electric utilities. In this respect, the design of a cost-effective and reliable network architecture is crucial.

Distribution Automation Communication Solution

Ethernet Passive Optical Network (EPON) is regarded as a promising and attractive fiber-based communication technique for advanced distribution automation

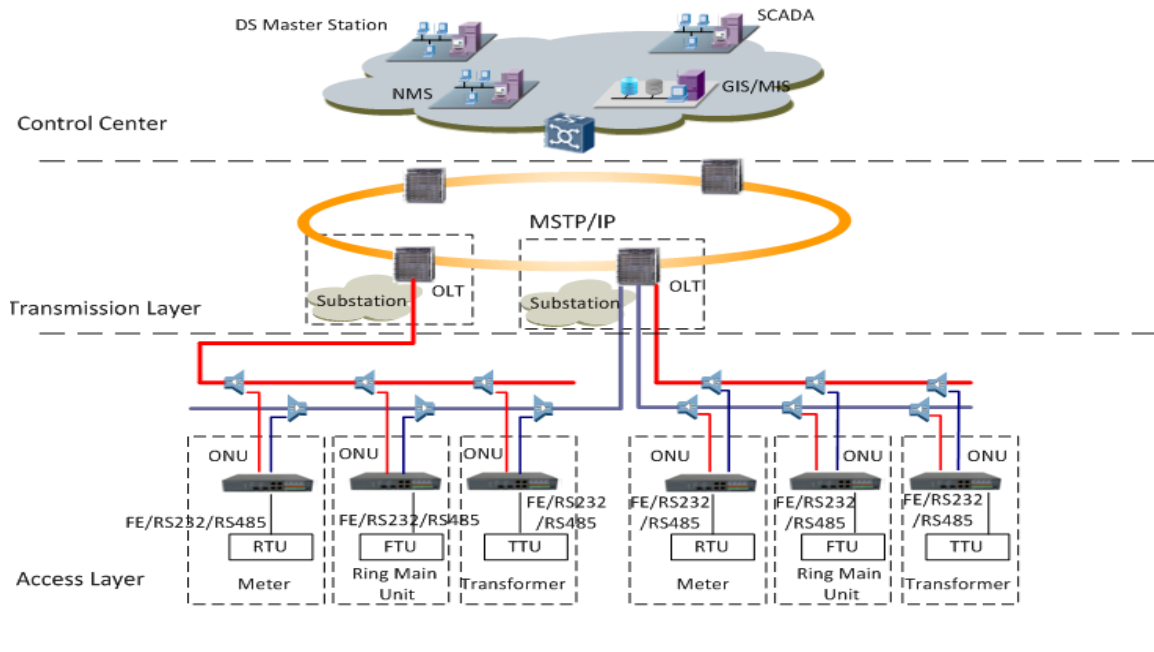
The advantage of fiber-optic cable is its dielectric and EMI/RFI noise immunity characteristics, which make it an ideal fit in the high-voltage operating environment. EPON is a kind of the point to multipoint (P2MP) single fiber bidirectional optical access network structure, it greatly saving the cost of optical fiber. The system supports bidirectional data transmission at high bandwidths inside a single fiber without using power. The network topology adopted by Telesail's EPON is well-suited to the ring and chained structures of power distribution networks. This network topology optimizes the investments in fiber optical and allows extensions to the grid. It incorporates 1+1 protection with a 50 ms protection switching on links between sites and the power distribution units. It allows utilities to bring back large amount of data on a frequent basis. Also it can provide true, real-time, two-way broadband communications.

Our flexible and efficient EPON based communication solutions for smart grids enable optimal monitoring and control of smart power grids and thus an efficient and reliable power supply.



EPON-based Distribution Automation Communication Solution

The following figure demonstrates the networking of the EPON-based distribution automation solution (DAS) .



Telesail EPON based communication infrastructure comprises of Optical Line Terminal (OLT), Optical Network Unit (ONU), and the ODN(Optical Distributed Network).

At each substation, and industrial grade EPON OLT ITP3100 is used to aggregates traffic from various applications back to the control center or to neighboring substations. Its uplink could access the existing communication networks on the power distribution communications networks. The application can be IED/RTU for SCADA, intelligent meter reading, electricity measurement, online electricity sales, WiFi access point, VoIP, corporate network access, and video surveillance etc. The OLT can be deployed on a ring-based architecture or on partially-meshed architecture (supporting RSTP and MSTP) .When faults occur at a node or a link, the OLT could swiftly switch to the backup uplink. It provide high reliability which recovery time from failure in less than 50 milliseconds.

The ODN devices are used on the access layer as an optical communications link between the OLT and the Optical Network Unit (ONU). The ODN transmits the monitoring data it collects from FTUs, RTUs, and TTUs to the OLT at slave stations. It could also realize terminal control by sending the scheduling and setting data to the FTU, RTU, and TTU via the ONU.

Telesail has launched the TP1208/1008 , it is the industrial grade ONU for private power networks with support serial interfaces RS232/RS485 for SCADA. It can remotely collect and transmit information and provide video monitoring as well. With the device, the distribution system can collect more information from distribution terminals, offer sophisticated distribution services, and provide better services for customers.

Solution Highlight

Telesail's smart integrated solution for power dispatch network are dedicated to solve the power distribution automation business concerns, through the network, equipment and overall reliability design, to provide no-stop power dispatch service.

- Multi-service support: Telesail EPON products support routing, switching and multiservice capabilities, enable the power utilities to support real-time applications across the full extent of the network. EPON olt uplink to IP/MPLS network via various interface like GE,10GE etc. EPON ONU TP1208 can support FE,RS232,RS485 interface to meet various service requirement.
- Flexible bandwidth allocation and guaranteed QoS: EPON allocates bandwidth for each user by the dynamic bandwidth algorithm (DBA), DiffServ, PQ/WFQ or WRED and can guarantee the QoS.
- Good security: Optical path encryption and ONU authentication are used to make sure the data security.
- Full Fiber protection: Any two EPON interface in OLT can be set master-slave mode. Each EPON ONU also equipped two EPON interface worked in switchover mode. Flexible fiber protection function make it greatly improve the network reliability.
- Centralized and intelligent OAM: Provide ONU with centralized management, remote monitoring/commissioning/maintenance and remote online upgrade..