

Automated Meter Reading (AMR) Solution Based On EPON

Background

As technology continues to improve in price/performance, the number of municipal utilities implementing automatic meter reading (AMR) systems continues to grow. AMR(Automatic Meter Reading) is a technology gives utilities the ability to obtain meter-reading values remotely without having to physically visit and manually read the customer's electric meter. In AMR system, staff do not need to leave the office to read meters. The meters' data is automatically gathered by the computer system.

Smart metering is not simply a matter of deploying new devices at customer sites. Realizing its full potential requires the deployment of an Advanced Metering Infrastructure(AMI) that can support two-way communications and diverse applications.

There are numerous communications technologies that may be incorporated into an AMI. Conventional access/backhaul network technologies can be used include GSM/GPRS/3G, WiMax, PLC, meshed wifi networks, 870MHz unlicensed radio, Zigbee etc. It is recommended that power utilities consider private AMIs and smart meter communications network rather than rely on public network service provider for connectivity and data transport.

The smart Grid is the future of power grids. As the closest part with customers, an efficient power distribution and consumption system is critical within the smart grid.

At present, Fiber optic is the best option to be the power utilities' communications infrastructure for smart grids. In response to smart grid's challenges and requirements, Telesail offered a field-proven Ethernet Passive Optical Network (EPON) solution to roll out distribution automation and Advance Metering Infrastructure (AMI) as well as FTTH service.

Solution Introduction

Utility communications networks are traditionally built to carry information between the utility control center and all remote sites — information that is used to manage capacity, to monitor and control the system, to bill customers and to provide mobile radio communication.

In a typical automated meter reading system, connected to each meter is a Meter Transmission Units(MTU) that transmit the meter data through RS485/RS232 interface to a Data Collector Unit(DCU) on a defined interval. DCU is a network device that receives and processes the meter reading information. DCUs can serve a cluster of neighborhood meters.

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

Telesail deploy several EPON Optical Line Terminals (OLTs) TP6900/TP3500/TP3100 inside the power distribution room, where the OLTs upload data to the control center. Each OLT provides 4 to 128 Ethernet Passive Optical Network (EPON) ports. Optical fiber composite low voltage cable (OPLC) is routed out from these PON ports, to optical splitters, and then to Optical Network Units (ONUs). Industrial grade EPON OLT ITP3100 integrated with DCU, which greatly improve the network process capability.

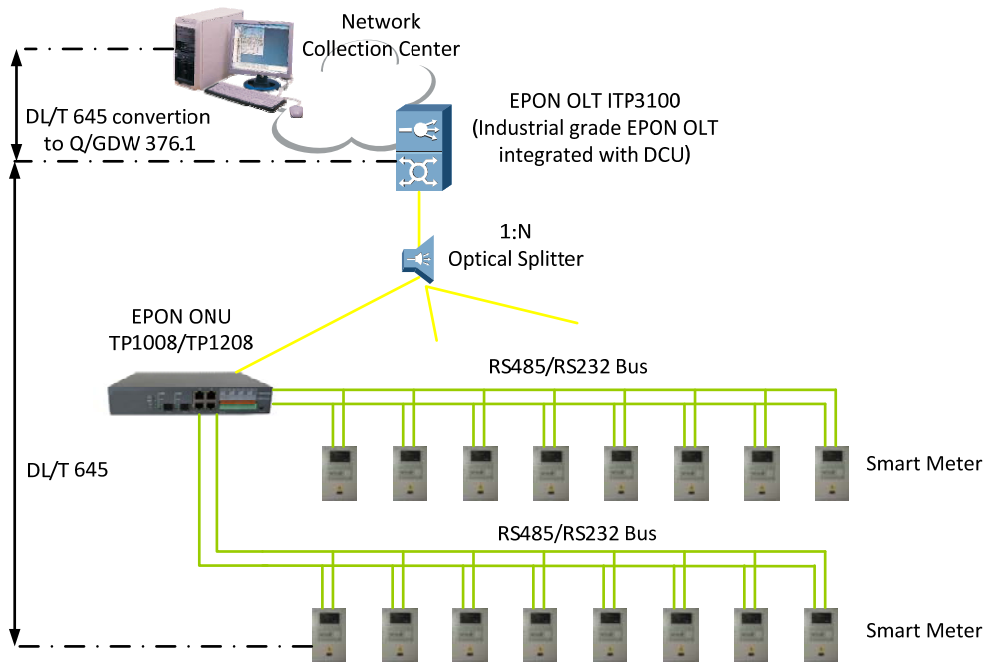
Telesail TP1208/TP1008, which are deployed in the power distribution cabinet located in the residential building. The ONUs can interface the meter either directly or via a MTU connected to the meters on each floor of the building, through RS485 or RS232 cables to collect metering information in real time, as well as support smart grid applications including power outage notification and alarm information, load management, historical data and readings etc.

1. EPON ONU connected to smart meter through RS485 or RS232

TP1008/TP1208 can provide 4 RS485/RS232 interface. It enables Advanced Metering Infrastructure (AMI) services for meters with serial interfaces. For 2-wire RS485 network, a maximum of 32 smart meters nodes can be connected within 1000m.

Industrial grade EPON OLT ITP3100 integrated with DCU which can realize the protocol conversion function from DL/T645 to Q/GDW376.1. In this mode,

meter data can be transparently transmitted from smart meter to OLT, that can greatly reduce the burden on the server in NCC.

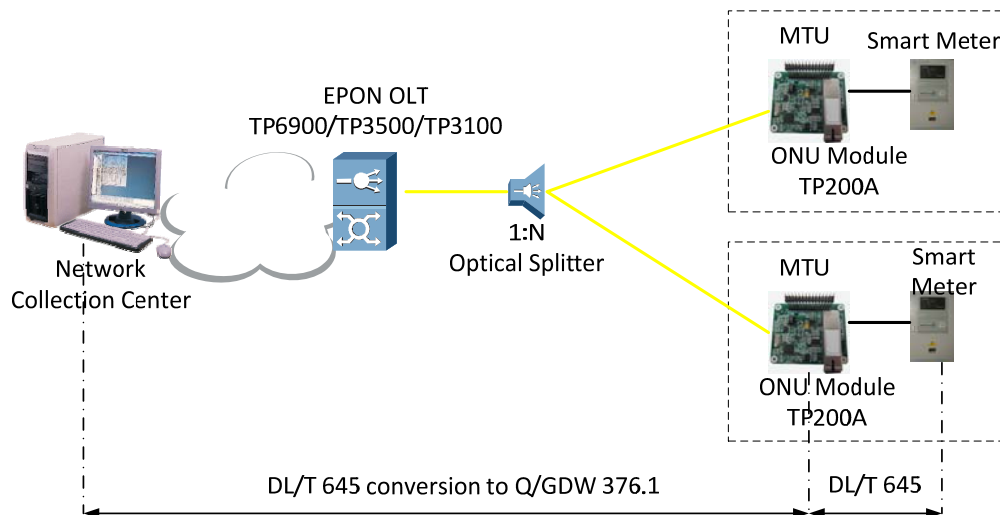


2. Metering system equipped with EPON ONU Module

Telesail provide different types of EPON ONU embedded module integrated inside the electricity meters or MTU/DCU. It can support the transparent transmission of multiple electric power communication regulations such as IEC60870-5-101/104, EC61850, CDT and DNP. It provide provide EPON network both back to the utility's network collection center(NCC) and into the customer's home. The resulting two-way communications network gives utilities greater efficiency, more reliable service delivery.

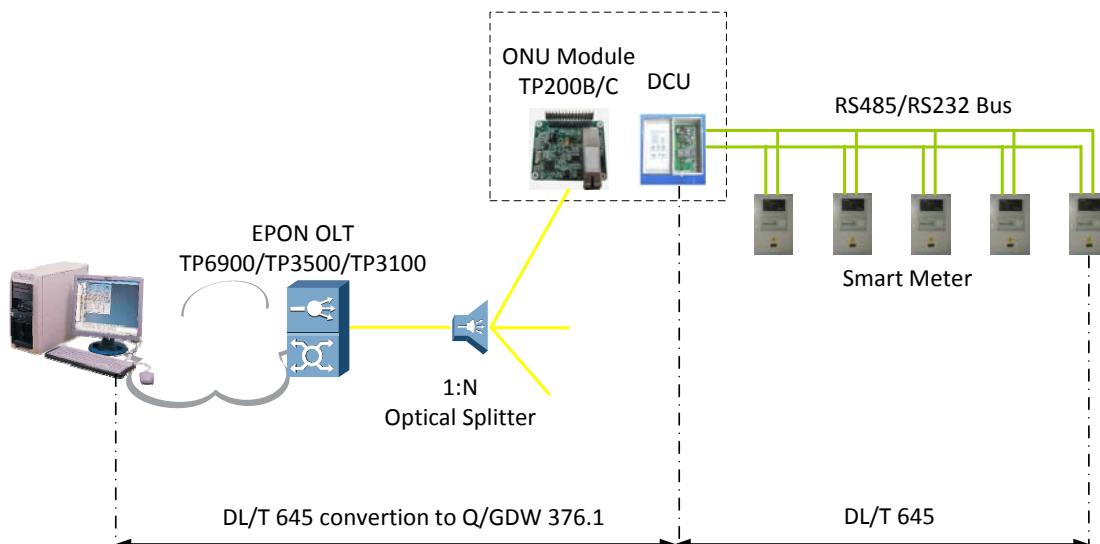
a) MTU—TP200A embedded EPON ONU module integrated with smart meter

TP200A onu module work as MTU to communicate with meter through DL/T645 protocol vir RS485/RS232. And TP200A onu module communicate with NCC through Q/GDW376.1 protocol via IP network. TP200A can realize the protocol conversion function from DL/T645 to Q/GDW376.1. In this mode, it require NCC has powerful data process ability with the meter quantity growing. It also can work as DCU to transparent transmit the meter data.



b) DCU—TP200B,TP200C embedded EPON ONU module integrated with DCU

TP200B/TP200C onu module integrated with DCU to communicate with meter through DL/T645 protocol via RS485/RS232. And TP200B/TP200C onu module communicate with NCC through Q/GDW376.1 protocol via IP network. TP200B/TP200C can realize the protocol conversion function from DL/T645 to Q/GDW376.1. In this mode, protocol conversion function can be realized on ONU module or DCUs.



Customer Benefits

Telesail's EPON solution has brought many benefits, including the following:

- To help municipal utilities optimized its power consumption data collection

system into an IP-based one, signifying a further step towards the smart grid network. This new IP-based system streamlines data collection, facilitates metering, and offers a two-way communication platform to remotely manage power consumption, enhancing service capabilities.

- Telesail's EPON solution uses an efficient Network Management System (NMS) that does not require a large number of maintenance personnel. As a result, customer can easily manage and maintain the entire network.