

**AM3440/CCPB-8GEHHSWa\***

**G7820**

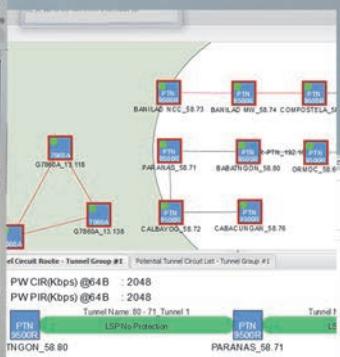
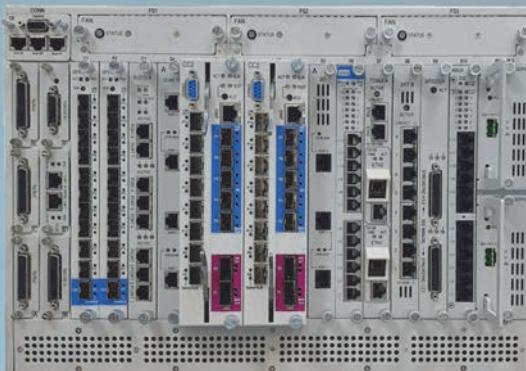
**G7860A**

**G7800**

**O9400R-PTN/PTN10G**

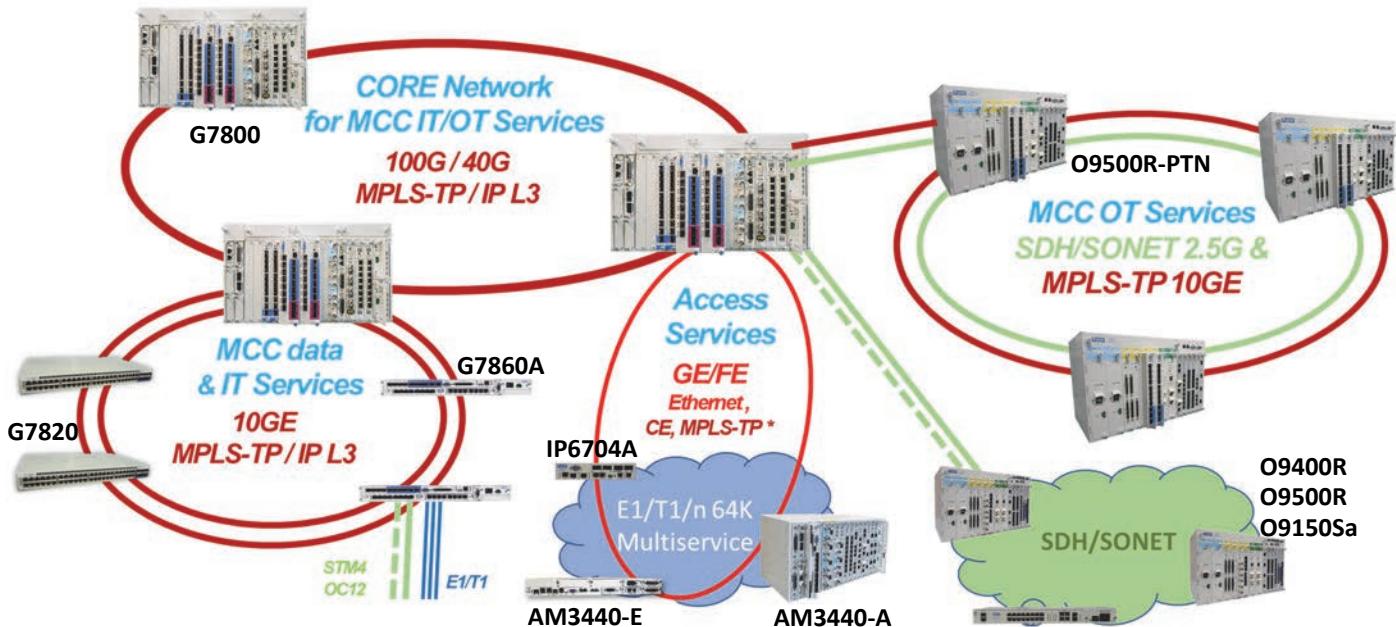
**O9500R-PTN/PTN10G**

**iNET EMS**  
**iNMS NMS**



Loop Telecom owns a large expertise of Multiservice Access and Telecommunication Transport for Industries and large infrastructures. We provide Mission Critical Communication (MCC) over TDM/PDH links, SDH/SONET and now primarily over Packet with PseudoWire emulation. We produce Packet Network Transport (PTN) equipment using MPLS-Transport Profile, Carrier Ethernet and IP L3 transport protocols.

Our MPLS-TP solutions support Mission Critical Communication for Power Utilities, Air Traffic Control, Railway-Mobility, Oil & Gas, Defense and Carriers for customers who require high level of bandwidth stability, latency and security to transport voice communication, SCADA, signalization, power control, etc.



Loop Telecom supports solutions for

- Packet Core Network and Aggregation Network for OT/MCC and IT transport,
- Hybrid Network TDM SDH/SONET and packet MPLS-TP for MCC and easier migrations,
- Access network Multiservice TDM and IP/Ethernet with packet transport,
- High rate MPLS-TP/Carrier Ethernet data networks.

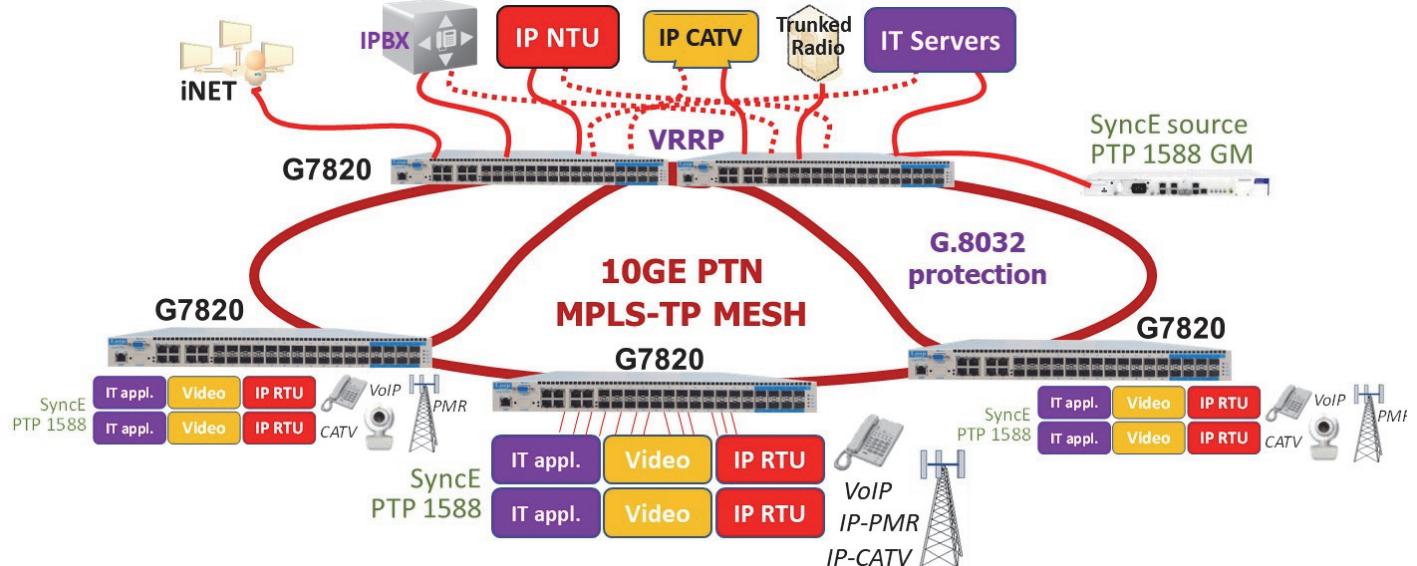
MPLS-TP is a natural evolution for TDM/SDH/SONET infrastructures to carry low-rate multiservice together with a high volume of packets. Its features also include deterministic/static and bidirectional LSP paths, low latency, precise QoS with CIR/PIR and OAM.







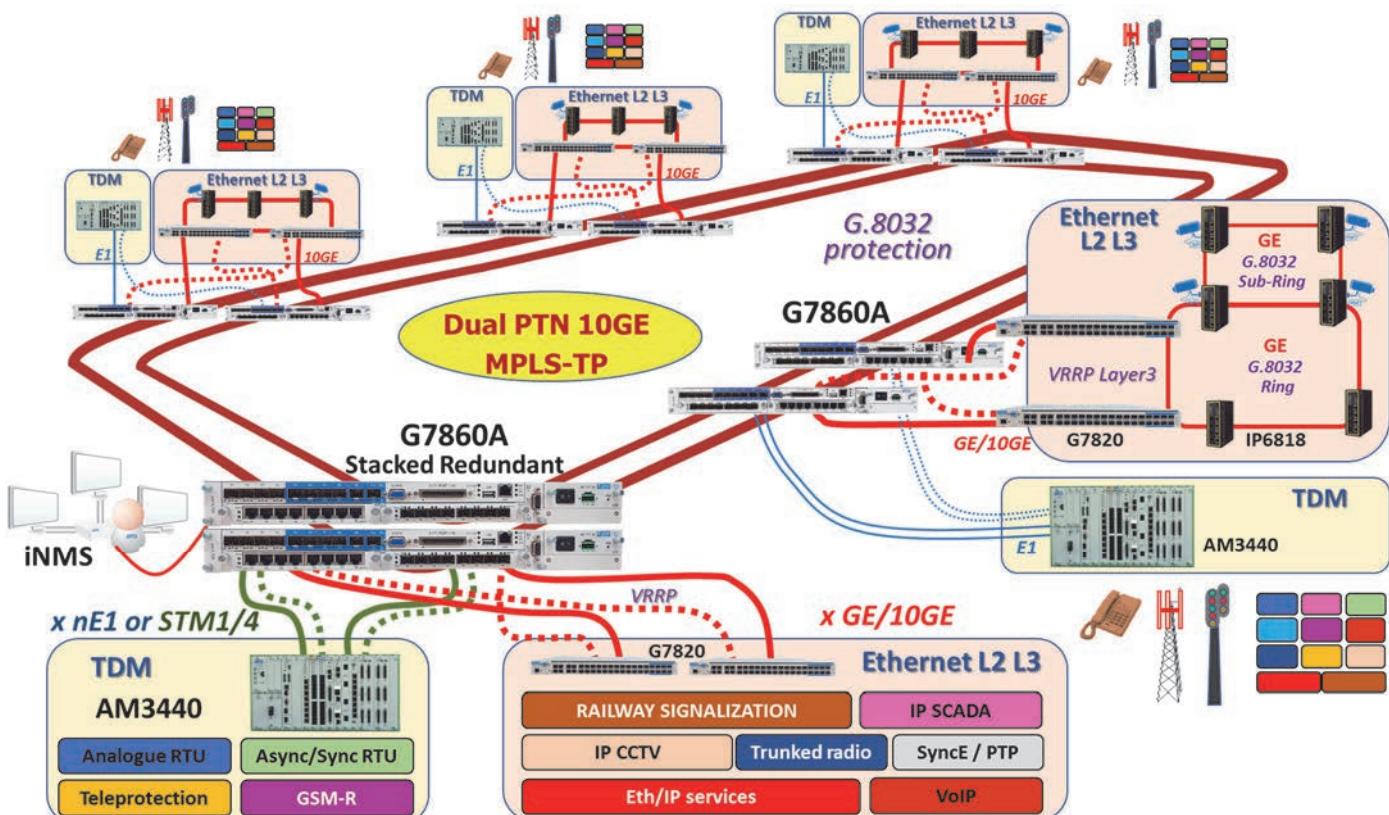
## Core deployment in MPLS-TP for Industrial and IT applications



The deployment of G7820 for industrial network can save some CAPEX and OPEX cost. First, G7820 will be used to deploy a MPLS-TP Core transport network ring or Mesh with 10GE or aggregate  $n \times 10GE$  pipe. Thanks to the number of FE/GE ports (copper or fiber depending on 24S or 48T model), G7820 can be used as an access switch supporting multiple ERPS v2 Ethernet rings, including sub-rings and with Carrier Ethernet structure of many devices. The IT applications can be routed at the access with VRRP over MPLS-TP PW and the MPLS-TP will optimize the maximum bandwidth in the Core. Frequency synchronization is provided by SyncE with ESMC on Core and, the timing synchronization with the option PTP-1588v2 Ordinary/Boundary/Transparent with ToD and 1-pps outputs.

The deployment of these G7820 and Tunnel/LSP can be assisted by the iNET management system.

## Network infrastructure for long distance Railway infrastructure

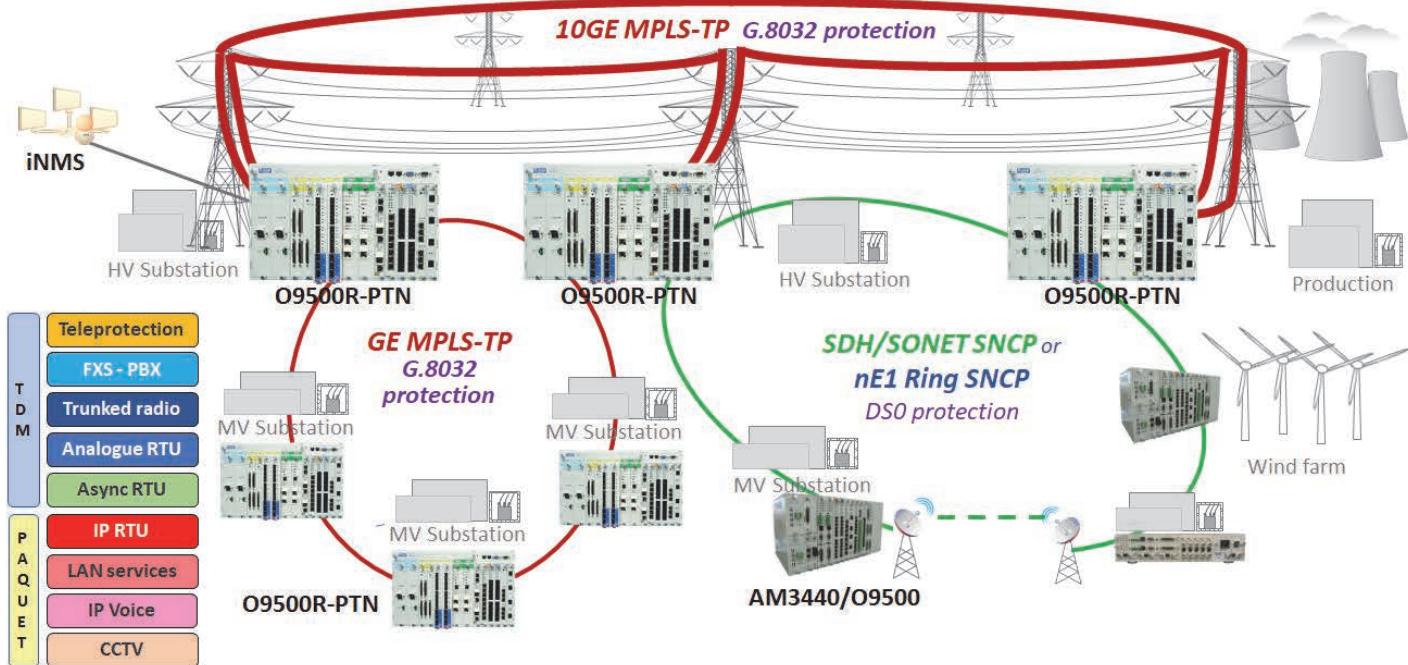


Railway companies are moving MCC applications from SDH to packet transport and IP/Ethernet applications are growing very fast. The G7860A MPLS-TP switch with E1/T1, STM1/4 access is a powerful economic solution to deploy telecom for Railway. Thanks to Traffic Engineering engine mechanisms it supports the low-rate SCADA and signalization together with highly variable data as video and IT applications.

Two G7860A can be stacked to support full redundancy of CPU, interfaces and provides two parallel 10GE rings networks along the railway line. It can perform the multiplexing and grooming of DSO and it can cross-connect local E1/T1 in STM-n/OC-n interfaces.



## MPLS-TP Loop Telecom solutions for Critical Communication in Power transport



New power grid infrastructures require large amounts of packet communication transport. But even if reduced, TDM multiservice will continue existing for a long time to carry conventional SCADA and teleprotection for power distribution management. In addition, SCADA is shifting towards low-rate Ethernet complaint to IEC61850 protocols.

All these technical applications require a very stable bandwidth, low latency with high level of security of transport.

Loop Telecom PTN MPLS-TP hybrid systems are the key solution of those Power National and Distribution grid telecom infrastructures.

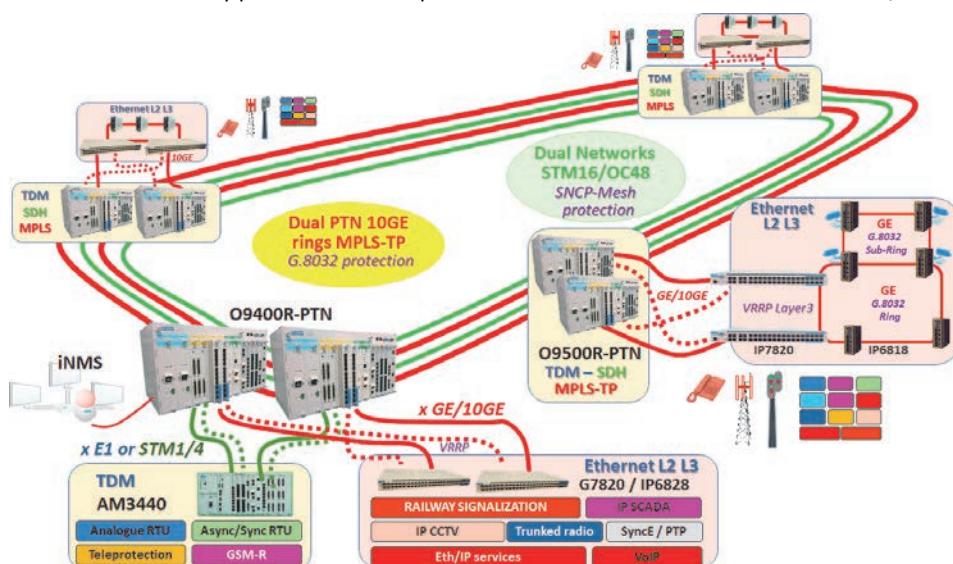
- We use GE or 10GE fiber to carry the mix traffics in Mesh infrastructure with large bandwidth and high security transport
- We provide Multiservice Access for SCADA, teleprotection, voice RTU/analog/VoIP, data sync/async... as integrated in the MPLS-TP machine with O9500R-PTN or as two chassis with O9400R-PTN and AM3440 DACS,
- We guarantee for TDM/Legacy and IP/Ethernet low rate SCADA... with fixed bandwidth and lower latency when connecting many nodes,
- We support together MPLS-TP backbone and SDH/SONET or E1/T1 ring network for smooth migration.
- iNET-EMS or iNMS-NMS manage and create end to end TDM circuit over TDM, MPLS-TP together with VPWS/VPLS Ethernet distribution.

## Critical communications for Transportation/Mobility, Power, Oil and Gas, Chemical complex, sometimes request to work in parallel TDM/SDH/SONET and MPLS-TP

### O9400R-PTN/O9500R-PTN run together 10GE networks and STM16/OC48 networks

Different users look to maintain conventional transport infrastructure together with the deployment of large Packet backbones because of maintaining zones without migration or existing engineering rule or certainly the need of time to migrate special applications.

Thanks to their dual processors (one for TDM/SDH/SONET/PDH and one for PTN MPLS-TP switch), each with a redundant CPU and matrix, we can simultaneously provide both transport infrastructures and also Multiservice and IP/Ethernet access.



#### O9400R-PTN and O9500R-PTN support:

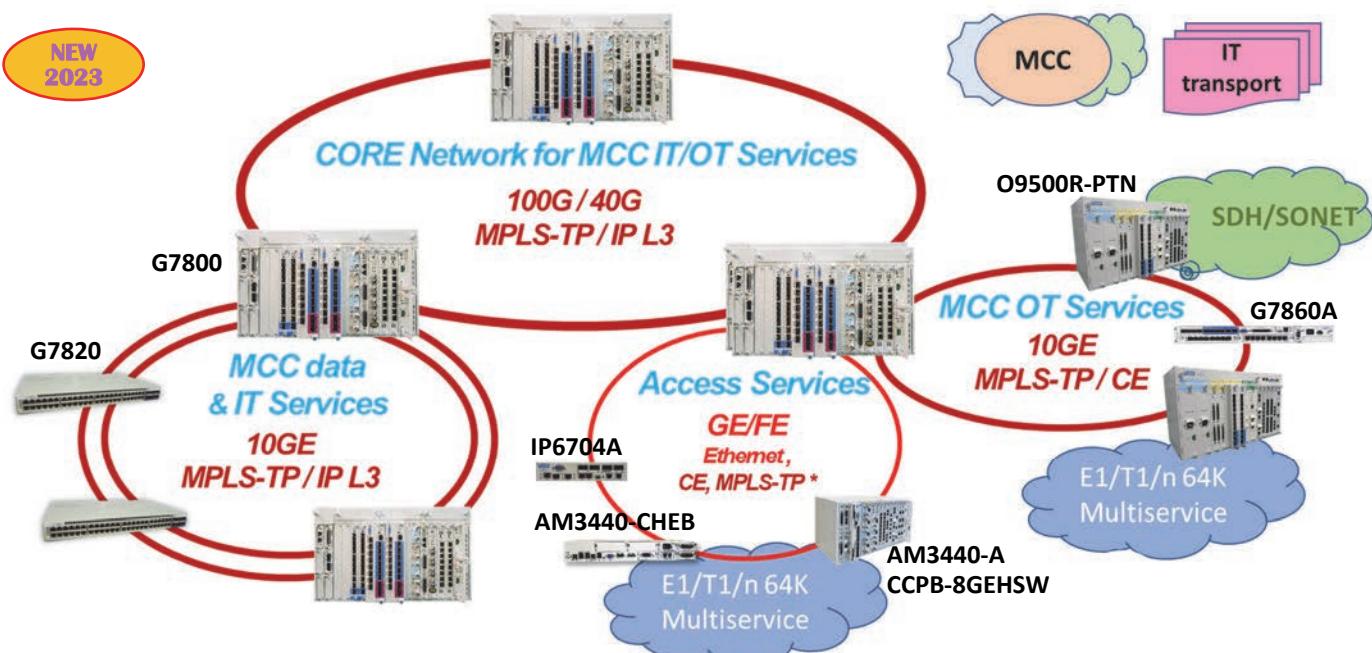
- SDH/SONET ADM/TM STM16/OC48,
- MPLS-TP/CE/IP L3 100MB Switch,
- Multiservice PDH DCS DS0/DACS,
- Full Redundant components,
- A-to-Z circuits over TDM and PWoMPLS-TP,
- Ethernet over CE then MPLS-TP VPWS/VPLS,
- MPLS-TP/CE ERPS G.8032 protection and
- SDH/SONET MSP, SNCP, MS-Spring, dual homing protection,
- Migration per circuit from TDM transport to
- Packet PW or to native Packet applications,
- Circuit over VCxx protected by PWoMPLS,
- Single NMS for all functions of TDM and Packet networks by iNET or iNMS with the conception of network as TDM organization,
- Single system for multiple function nodes to reduce OPEX cost,
- and more



## for CORE Network or Access IP/Ethernet, SDH and Multiservices



Loop-G7800: a modular system for Core Network MCC and IT services or for dedicated services OT or IT

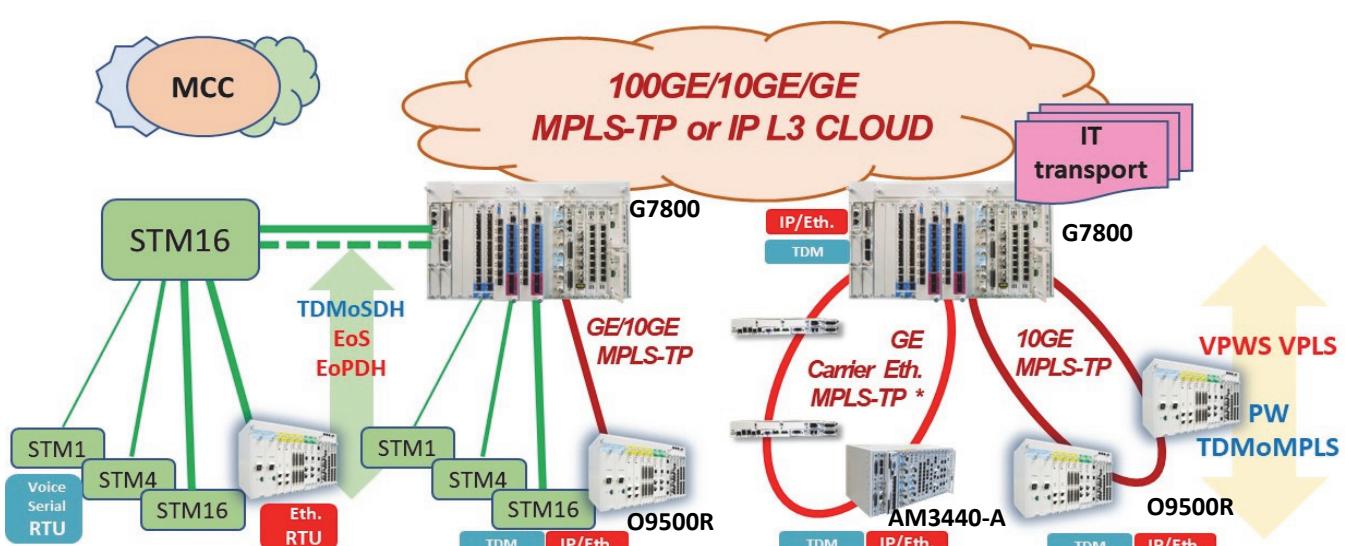


Thanks to the modularity of the **Loop-G7800** and the 400Gbps switch CC2, this equipment can be configured for many applications together or per network application. The 40/100GE interfaces, up to 30 x 10GE interfaces with MacSec encryption make this device as node of Core transport infrastructure for MCC IT/OT. To increase the IT performances the IP L3 routing over MPLS-TP PW with his protections and OAM or over dedicate ports integrate the G7800 network in the global IP Network.

Such a solution makes simple the deployment of pure IT/Data/Video network and MCC or precise Access networks over an unique Core Network.

The **Loop-iNET EMS** or **Loop-iNMS NMS** assists operator in the deployment of OT and IT applications over Tunnel/LSP and VPWS, VPLS or H-VPLS with Traffic Engineering Engine. This makes simple to operate and easy to monitor the full network for multiple missions.

## Loop-G7800: Migration of SDH/SONET infrastructure to large MPLS-TP for OT MCC and add IT transport



Because of the capability to use each slot for  $n \times 64K$  Multiservice, with a 128 E1/T1 cross-connect for TDM and TDM-PseudoWire interfaces, and high number of SDH/SONET tributaries with VCxx conversion to direct TDMoMPLS-TP or to CEP(VCxx)oMPLS-TP make the G7800 as a powerful reconfigurable Multiservice access and migration node.

The system will give to customer the possibility to migrate all OT services TDM/Synchronous/Voice over packet, and the legacy interfaces to Ethernet with high QoS, latency control, low bidirectional transit time difference... At the same time customer can add high Ethernet or IP volume for pure IT application without disturbing the OT services.

The **Loop-iNET EMS** or **Loop-iNMS NMS** assists operator in the deployment of all services OT with Multiservice interfaces (voice, serial...) and Ethernet and all the transport over E1/T1, SDH/SONET, their packet conversion and MPLS-TP or CE or IP L3 transport.



## Migration of networks save Legacy constraints and give traffic



Power industry : Replacement of infrastructure STM1/4 by GE and deployment of IEC61850 substations

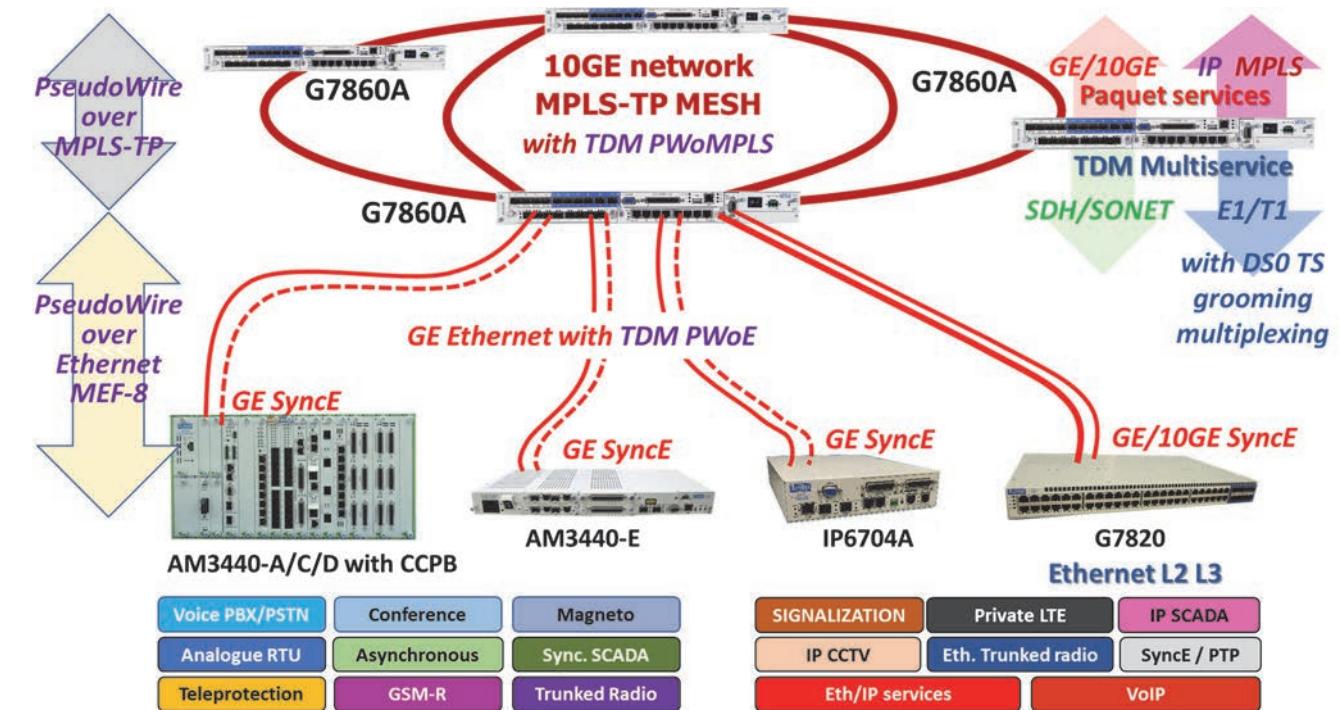


The Power Industry is very cautious on the critical communication particularly for the communication between Teleprotection devices and Phase Measurement Units. The long distance legacy communication between power substation was based on SDH/SONET that generally warranty less than 1.5ms of transit time between two nearest substation. Thanks to the AM3440 series installation with TDMoE PseudoWire emulation this transit time can be 1ms or less and cross many nodes with few ns increase and satisfy to the life of teleprotection. This industry is changing all elements of substation as measuring, relay, telecommand... from serial, analogue to pure Layer 2 Ethernet devices with a small messages exchange as GOOSE and a real strategy of deployment and protection named IEC61850.

The AM3440-E-CHEB (1U) or AM3440-A-CHPA (5U) with CCPB-8GEHSW switch are Multiservice cross-connect to support local TDM network, with Gateway to encapsulate/emulate these service in packet and with performant Gigabit Ethernet switches of 8 or up to 32 GE with SyncE WAN and Carrier Ethernet transport protocol, in the future MPLS-TP, to organize the transport of mandatory stable PW for TDM/ SCADA Ethernet and to optimize the IP/Ethernet traffic with CIR/PIR and TRTC (2 Rates 3 colors) QoS.

Such Gigabit Ethernet solution can replace with success STM1/4 SDH transport and provide an efficient communication between substation with SyncE frequency synchronization and PTP 1588v2 timing support.

## Migration of Multi-Services TDM applications to packet transport



For large infrastructure with many existing TDM/PDH nodes it could be easier or more cost effective to deploy a mixed infrastructure with a PseudoWire Emulation from the edge device over Ethernet or IP using the existing links toward the MLPS-TP concentrator and then carry the PseudoWire over MPLS-TP. The existing AM3440 multiplexer can be upgraded by the exchange of standard CPU CCA/CCB by the combined CPU + PW Gateway CHPA. For small nodes use IP6704A or AM3440-E.

In future, the AM3440-E/CCPA will be upgradable with GE MPLS-TP switch to build MPLS-TP tunnels from TDM EDGE.





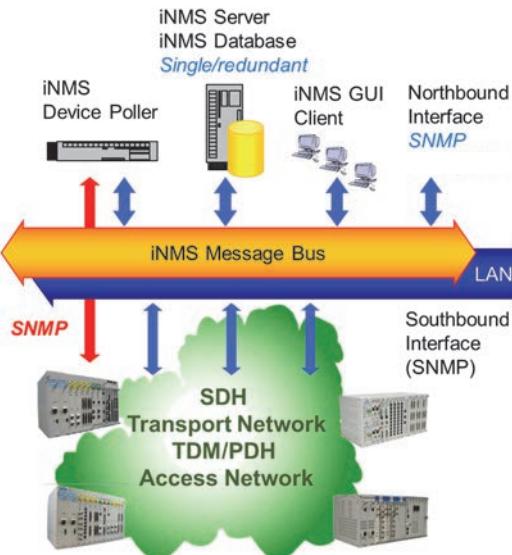


# Management, Monitoring of SDH, PDH, PWE3, MPLS-TP, WDM



**iNMS-NMS Loop-iNMS (Integrated/Intelligent Network Management System)** is a set of software programs supporting the Loop equipment compliant to TMN. This system manage the device of Transport Network (SDH), Access Network (PDH), Ethernet with PseudoWire-Emulation and PTN over MPLS-TP. This includes the support of multiple GUI, End-to-End commissioning with several services for small to very large infrastructure with an optional NBI to communicate with to an umbrella NMS.

The iNMS system is a Software package running under Linux with Oracle 19c Database Server with up to 50 simultaneous GUI on MS Windows platform. iNMS support several thousand SNMP Loop nodes and 3rd-Party NE and all service can work on Virtual server for easy evolution of resources. All servers, database, pollers can be build with redundancy, in option with High Disaster Recovery and High Availability Real-Time Cluster (HARC) with Real-Time Data Replication and system redundancy. The iNMS provides his administrators and High Level NMS with GUI of devices and Network views. Its performs the End-to-end service management of Access Multiservice plus TDM/SDH/SONET and PTN MPLS-TP transport with planning proposition and the automatic commissioning of the nodes.

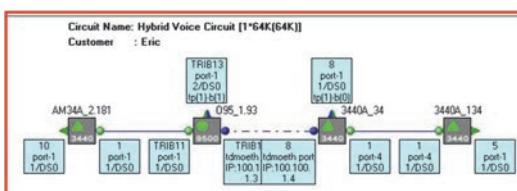


- Full SNMP supports functions including commands, alarms, and statistics gathering,
- Viewing and printing of all node statistics, alarm reports, configurable report design,
- Enriched topology management with GIS geographic maps, zoom and drag-and-drop,
- Views of optical cable connection, cross-connection, panel view, and resource trees,
- Clock Distribution Map,
- System Redundancy and Protection,
- Efficient performance monitoring in real-time and history for PM, NE and circuits,
- Alarm management with notification via email, GSM message (SMS), with filtering,
- Root Cause Analysis accurately diagnoses faults on NEs and managed circuits by status and severity levels,
- System Access Security and many options to customize your requirement.

**iNMS creates/monitors TDM Circuits and PseudoWire over IP/Ethernet, MPLS-TP and multi-segment transport, multiple protections and OAM at different levels:**

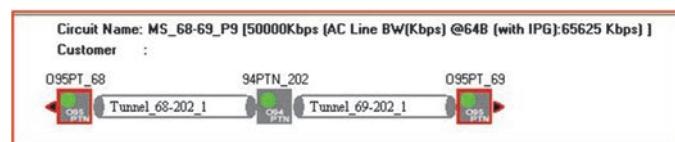
**iNMS provides the proposition, allocation and commissioning of**

- PseudoWire End-to-end Circuits TDM, TDM PWoIP, TDM PWoEth, TDM PWoMPLS for Ethernet the VPWS and VPLS over MPLS-TP,
- Hybrid Multi-Segments Circuit : Access TDM + PWE3 transport (over IP/Ethernet/MPLS-TP) + TDM,



**Multi-Segment Circuit**

- For the G7820, G7860A, PTN10G and future G7800 MPLS-TP devices and these infrastructure, iNMS supports with allocation and commissioning the PWoEth and PWoMPLS, the Ethernet VPWS/VPSL with Tunnel, LSP their protection and the monitoring,
- OAM for End to End are available for the PW and LSP, at both ends for bidirectional transmission,
- PWs and Tunnels are created with Traffic Engineering setting of CIR, PIR, PBS and the Color Metering policy per default or adapted to the particular item.



**Traffic Engineering  
for Tunnel & PW  
with Green-Yellow-Red**

