Loop Telecom
Multiservice Access & Transport solutions for Oil and Gas infrastructures

- *TDM/PDH Multiservice access for analog, voice, sync/async data, SCADA*
- *PMR, Trunked Radio, 2G to LTE, Conference communication,*
- *IP/Ethernet SCADA, critical...with ultra-stable bandwidth, low latency...*
- *Teleprotection for power distribution*
- *CCTV and access control*

Transport of Multiservice and Ethernet services over fiber and Radios as:

- *SDH/SONET*
- *TDMoE or TDM PseudoWire Emulation transport over IP/Ethernet*
- *10GE/GE PTN with MPLS-TP or Carrier Ethernet*
- *CWDM fibers*

...with Intelligent NMS and EMS systems

Multiservice Access and Transport for Oil & Gas

Loop Telecom develops and produces Multiservice Access DACS DS0 over fiber, copper and Packet. We produce Telecom Transport solutions SDH/SONET, TDM over Ethernet and PTN MPLS/Carrier Ethernet Network infrastructures and Ethernet industrial Switches with intelligent management.

Loop Telecom actively supplies customers in the following markets:

- ***Power Companies,***
- ***Oil and Gas Companies,***
- ***Military and National infrastructures,***
- ***Transportation including: Air traffic Control, Railway/LRT/MRT and ITS,***
- ***Telco for Utilities or Industries ...***

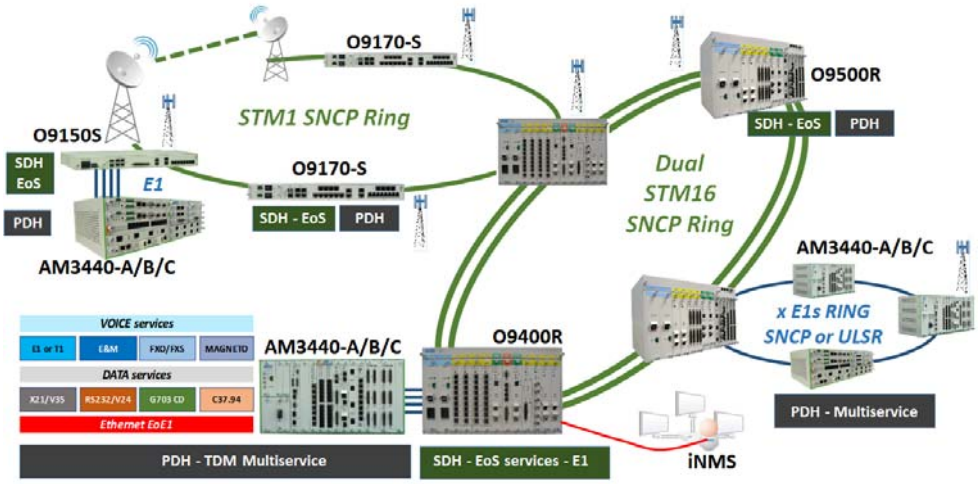
Access & SDH/SONET Transport with low latency and high security level for all services ...

At the EDGE of network the **AM3440, AM3430, O9550** provide the Multiservice access of all Voices, PMR, Analogs, low rate synchronous, asynchronous RTU or Ethernet RTU/PLC thanks to the multiple modular interfaces. They convert these information to n x 64Kbps, E1/T1, VC12 TDM circuits with the right synchronization.

The conventional deployment in Oil & Gas is using Fiber SDH/SONET network. **O9400R** SDH/SONET STM16/OC48 carries TDM multiservice circuits and Ethernet EoS from site to site or central nodes with SNCP, MS-Spring rings and MSP protection full redundancy and low latency. To save CAPEX and OPEX the **O9500R** IMAP combined the Multiservice and SDH/SONET transport. **O9150S** SDH and **O9170S** IMAP provide the same service over STM-1. All devices are managed by iNET or iNMS centralized systems with automatic commissioning and monitoring/alarm system of the network.

Loop Telecom solutions for Oil & Gas support:

- **Telephone System**
- **PMR / Trunked Radio**
- **PDH SCADA**
- **IP SCADA**
- **LAN interconnection**
- **CCTV**
- **Access Control**



Access Multiservice over New Generation Packet MPLS-TP secured Transport ...

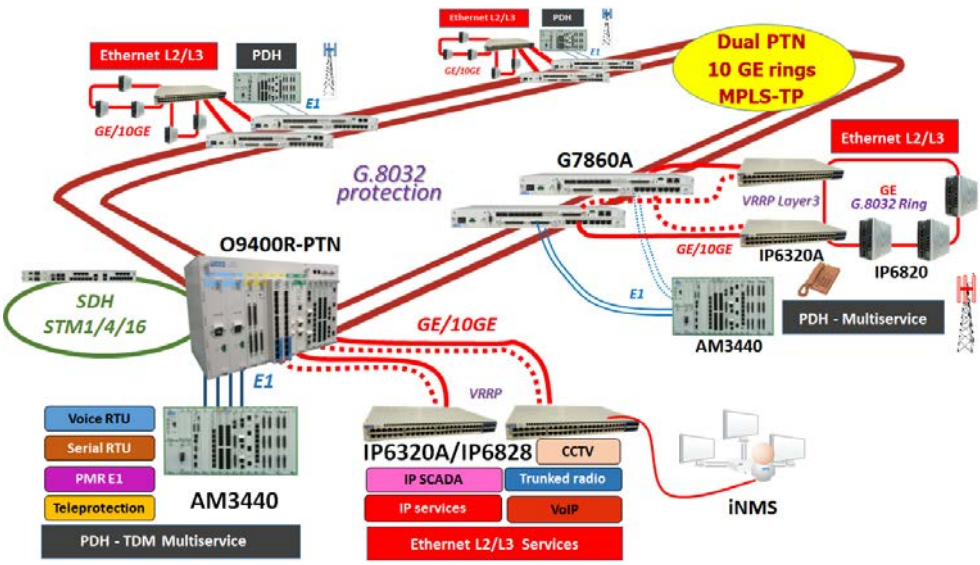
As applications are moving to packet communication, Ethernet demand grows dramatically, but TDM multiservice require stable bandwidth, low latency and protection in transport. Loop Telecom PTN with MPLS-TP protocols combine in 10GE pipes the guaranty TDM PseudoWire and the evolutive Ethernet traffics with a similar management of circuits with LSP deployment.

G7860A MPLS-TP with 6 10GE up to 22GE, 80 E1 and 8 STMxx interfaces, transport TDM and IP over 10 Gigabit with frequency and phase synchronization, OAM, fixed and optimize bandwidth control and LSP protection... more flexible than SDH/SONET.

O9400R, **O9500R** SDH/SONET systems with 200GB MPLS-TP switch **PTN** card are supporting together the PTN MPLS-TP, the SDH/SONET networks and the Multiservice access.

Deployment for new Oil and Gas infrastructure can be a combination at EDGE of Multiservice/PDH **AM3440, AM3430, O9550** for access, **IP63xx/ IP68xx** Layer 2 and 3 industrial switches and the **G7860A** or **O9400R-PTN** for transport.

All Multiservice, SDH/SONET, IMAP, PTN MPLS-TP/CE devices, Switches are managed and hybrid circuits are created end-to-end from/to TDM by crossing PseudoWire over MPLS-TP by the iNET or iNMS centralized systems with automatic commissioning.

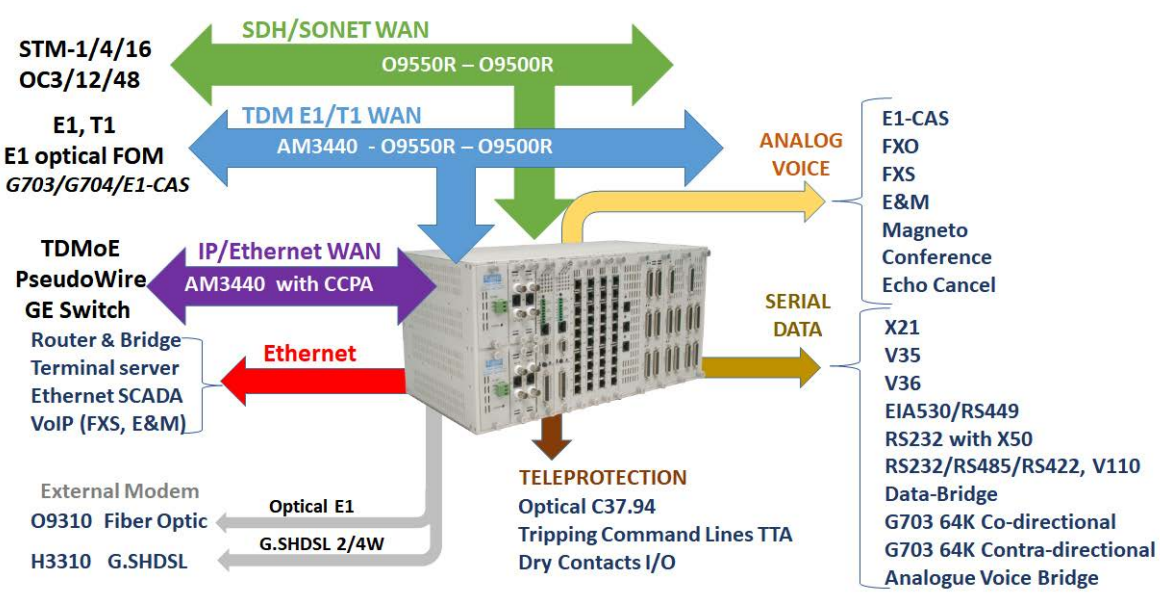


Loop Telecom works closely with his partners and final users to develop and add particular features of the Multiservice interconnections to support the standard ITU-I/EN interfaces and also old fashion or legacy applications and to be compatible with other equipment from many vendor for replacement.

Loop Telecom Multiservice multiplexers support almost all types of voice/analog, serial data, SCADA interfaces, dry contact, teleprotection and Ethernet with High stability...

Different types of Loop equipment are supporting partially or the full range of interfaces as:

PDH DACS
AM3440-A/B/C/D
AM3430
DACS w. STM uplink
O9550A/C
SDH/SONET IMAP
O9500-R
O9170-S
TDMoE devices
IP6704A
IP6763
PTN-MPLS-TP
O9500-R-PTN

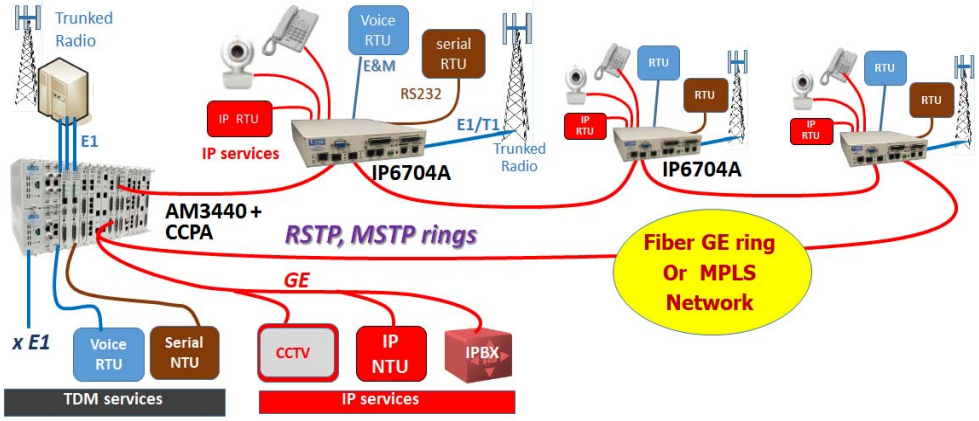


Migration of Analog Voice, serial RTUs, SCADA over Ethernet fiber, IP or MPLS networks

Multiservice PDH rings or buses can be partially migrated to a Transport over GE fiber or over an existing IP/MPLS network but maintain the both ends TDM conversion with existing analogue, serial, contact interfaces for applications with synchronization.

Loop solutions are available with SyncE GE WAN, as a compact device **IP6704A** that combine a TDM access multiplexer, a PseudoWire Emulation gateway and a Layer 2 switch for LAN traffic and QoS application. For many interfaces the **AM3440** with the **CCPA** CPU is a TDMoE gateway for 64 E1 PseudoWire (PW). They support end to end voices, low rate data interfaces plus the Ethernet traffic with QoS. They support 16 and 64 PW of n.64Kbps.

All are manageable by iNET and iNMS with the mix circuits TDM+PW+TDM



Ethernet Industrial Switches

For different industrial applications Loop Telecom manufactures a range of Switches with common and dedicate features. We recommend you for Oil & Gas the following industrial grade switches that support more than –20 to +70°C.

IP6320B
Layer 2/3
8xGE/10GE and 48xGE
IEC61850-3

IP6820
Layer 2
GE SFP =6xGE/POE+
RS232/485, Contacts
IEC61850-3

IP6810
Layer 2
5xFE/POE
RS232/485
IEC61850-3

IP6828
Layer 2/3
Modular 4xGE/10GE
3x 8GE/POE+/SFP
EN50121-4

IP6818
Layer 2/3
4 GE SFP +
4 GE POE+
EN50121-4

Loop produce many other equipment as fiber and copper extension, EDD...

Multiservice TDM/PDH DACS

Models	E1500-2S	AM3430	AM3440-A/B/C/D	O9550R-A/C/D	V4150
Multiplexer	CSU/DSU	Multiservice: Voice - Data - Teleprotection - Ethernet DS0/n.64Kbps			-
	DS0 DCS	TDM/PDH - DS0 Cross-connect DCS - Non blocking			
SDH/SONET	-			SDH/SONET ADM/TM	SDH/SONET
TDMoE PWE3	-		With TDMoEA card		-
Aggregate Inf.	1 E1	4 E1/FE1 copper/fiber	Any E1/T1 copper/fiber	4 STM1/4, any E1 or T1	Any E1, T1, STM/OC
PDH protection	-	1+1, SNCP 64K	1+1, SNCP-64K	1+1, SNCP-64K	E1/T1 1+1
SDH protection	-			SNCP & MSP 1+1	SNCP & MSP 1+1
Tributaries slots		4	A= 16, B=7, C=9, D=9	A= 16, C=9, D=9	8 slots
FE1/FT1	0, 1 or 2 E1	4 E1/FE1	A= 64E1/T1, B= 28E1/T1, C=36E1/T1, E1/FE1/CAS		504 E1/T1
Voice	-	E&M 2w/4w, FXO, FXS, E1-CAS, Magneto*, Conferences* , VoIP*, Echo Cancel			-
Serial sync	-	V35, X21*	X21, V35, V36, IEA530, n 64Kbps to 2Mbps		-
RS232/RS485	-	RS232/RS485	RS232/RS485/RS422 sync, async		-
Teleprotection	-	Fiber C37.94	Fiber C37.94, TTA card : Teleprotection Tripping lines		-
Others	Dry contact, G703	G703 64K co-dir	G703 64K co-directional, Dry contact , G.SHDSL 2w/ 4w		-
ETHERNET EoPDH	Bridge/Router	Bridge	Bridge - Router		-

SDH/SONET/Hybrid and PTN with MPLS-TP transport

System	O9150	O9170	O9400R	O9500R	IP6750	G7860A
SDH	SDH	SDH	SDH/SONET	SDH/SONET	-	SDH/SONET
Multiservice n 64K	-	TDM/PDH	-	TDM/PDH	-	-
MPLS-TP	-	-	PTN MPLS/CE with card	PTN MPLS/CE with card	PTN CE	PTN MPLS/CE
Chassis	Fixed 1U	Fixed 1U	Modular 6U	Modular 6U	Modular 1U	Modular 1U
Aggregate	2 STM1	2 STM1	4 STM1/4/16 - 4 OC3/12/48 6 x 10GE MPLS/CE for PTN version		2 GE	6 x 10GE PTN
SDH protection	MSP, SNCP	MSP, SNCP	MSP, SNCP, MESH SNCP, MS-SPRING*		-	Access MSP
CE/MPLS-TP	-	-	6 x 10GE, 16 GE		2 GE SFP,8 GE,Cb	6 x 10GE, 20 GE
EoSDH	4 FE , GE*	4 FE, GE*	4 GE + 4 GX SFP per card		-	No
Maximum E1/T1	16 E1	8 E1	504 E1/T1,E3/T3	252 E1/T1, E3/T3	16 E1/T1	80 E1/T1
PDH services		E1, FE1, G703 CD		E1/FE1, T1, G703 CD		
Voice, Serial,	-	FXS, FXO, E&M, RS232,RS485	-	idem AM3440	-	-

TDM PseudoWire Emulation End to End Gateway and Switch

Models	IP6702A	IP6704A	IP6750	IP6763	AM3440 With CCPA*	TDMoG card O9400R
System	PseudoWire Gateway standalone 1U				CPU Card for DACS	Card for SDH
PseudoWire Emulation (PWE3)	SAT unframed, CESoPSN framed, MEF 8 (CESoEth)*					
				CEP SDH		CEP SDH
Number of PW	16	16	64	512	64	512
Emulation of services	E1/FE1, T1/FT1, serial	E1/FE1,T1/ FT1,serial,voice	E1/FE1, T1/FT1	E1/FE1,T1/FT1,VC12/3/4	E1/FE1,T1/FT1,serial,voice	E1/FE1,T1/FT1,VC12/3/4
Clock recovery	ACR for 4 remotes	ACR for 4 remotes	ACR/DCR for 64 rem.	ACR for 32 remotes	ACR for 4 remotes	ACR for 32 remote
WAN or LAN	1 FX SFP + 3 FE	2 FX/GX SFP + 2 FE/GE	2 GX SFP + 4 x 2 GE Cb	2 GE Cb GE + 3 FE/GE	2 GE Cb GE	2 GE Cb GE + 4 FE/GE
		SyncE	SyncE & PTP1588v2		SyncE	SyncE
Tributaries SDH/SONET	-	-	-	4 STM1 or 1 STM4	-	STM1/4/16 O9400R
Tributary PDH	1 E1/T1	2 to 10* E1/T1	0 to 16 E1/T1	0 to 32 E1/T1	64 E1/T1 backplane	up 388 E1/T1,18 E3/DS3
DTE n x 64K	1 RS422/V11, X21	X21,RS232, V35	-	-	see AM3440	-
Voice	-	FXO, FXS, E&M, Magneto				* = in development
G703 64k, C37.94		G703, C37.94				

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