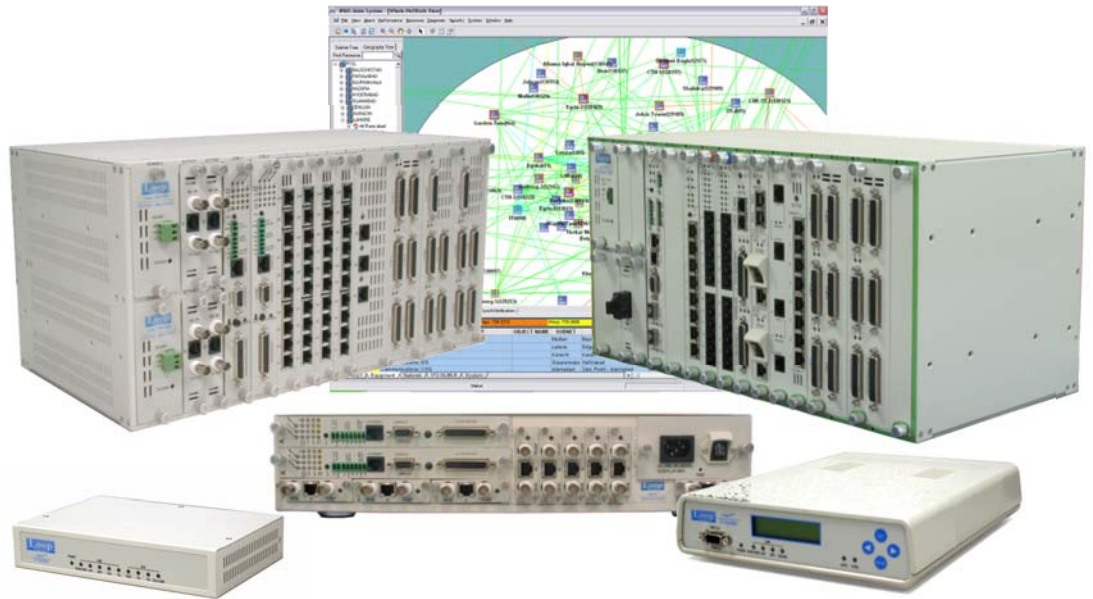# PDH/TDM DACS
Multiservice Access Multiplexer

Loop Telecom

AM3440-A/B/C
AM3440-D
O9550-A/D
V4150
E1510-S
E1500-2S
T2500-2S

iNET   EMS
iNMS NMS

Loop Telecom has developed and produced since 1981 CSU/DSU, then TDM multiplexers and has built a complete range of E1/T1, E3/T3 Digital Access Cross Connect (DACS) to support multi-services applications.

These solutions are tracking single DS0 to high density interfaces, they support uplinks TDM/PDH or SDH/SONET up to STM16/OC48, TDMoG PseudoWire encapsulation over IP/Gigabit Ethernet and recently PTN transport over 10 GE with MPLS-TP or Carrier Ethernet.

These high-quality devices with redundant functions provide high speed DS0 circuit protection. We support many different interfaces for voice, analog, low and high rates synchronous/asynchronous with standard or special protocols, Ethernet and dedicated interfaces for Power Companies, Oil & Gas, Air traffic Control, Railway, Military…

We provide different NMS including a high-level iNMS for large infrastructures particularly in Telco and Utilities.
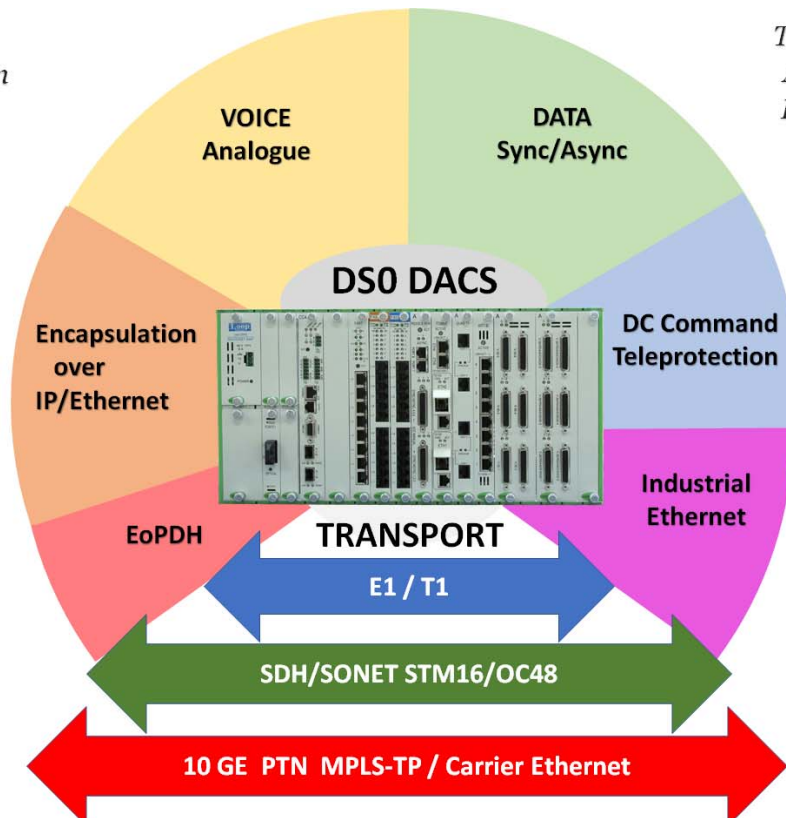
ENERGIES
Power Production and transport
Oil and Gaz

TELCO OPERATOR

DEFENSE

VOICE Analogue

DATA Sync/Async

DS0 DACS

Encapsulation over IP/Ethernet

DC Command Teleprotection

EoPDH

Industrial Ethernet

TRANSPORT

E1 / T1

SDH/SONET STM16/OC48

10 GE PTN MPLS-TP / Carrier Ethernet

TRANSPORTATION
Air Traffic Control
Railway – Subway
ITS

INDUSTRIES
Chemical
SCADA

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Several thousands of the DACS AM3440 Series are installed over the world. It supports almost all existing interfaces. It is a fully modular and redundant device and exists in different sizes.

AM3440-A

5U PDH ADM multiplexer:

- Redundant CPU and PS
- 12 slots and 4 mini slots of 4 E1/T1 backplane each
- DACS 64 x 31TS, 128Mbps
- E1/T1 protection: 1+1, ring SNCP DS0 or ULSR E1
  - E1, T1, copper or fiber
  - Voice E1-CAS, FXO/FXS/ E&M/Conference/Magneto
  - Serial X21, V35, EIA530
  - RS232, RS485, RS422, bridge
  - C37.94, Teleprotection
  - Ethernet bridge and router
  - TDMoEthernet/ TDMoverIP

AM3440-B/C

2.5U/3U PDH ADM multiplexer same as AM3440A except

- B= 3 slots and 4 mini slots
- C= 5 slots and 4 mini slots
- DACS 28 x 31TS/ 36 x 31TS

AM3440-D

2U PDH ADM multiplexer same as AM3440A except

- Redundant CPU and PS
- 9 mini slots,
- DACS 36 x 31TS
- Circuit protection: 1+1 and ULSR E1

Loop Telecom has accumulated a large knowledge to convert and transport over TDM or IP networks the different types of links: analog signals, voices, synchronous, asynchronous or legacy interfaces, dedicate to the teleprotection or radio, dry contacts… and Ethernet. We supply different multiplexers with cross-connect to groom low rate n x 64K or sub-rate signal over TDM E1/T1 or SDH/SONET or Ethernet/IP networks with a high respect of reliability, synchronization, latency of the customer applications.

PDH or TDM DS0 Multiplexer DACS

The DACS multiplexer uses the Time Domain Multiplexing (TDM) transmission based on synchronous transmission with reserved bandwidth multiple of 56/64kbps channels or Time-Slots (TS). The E1 of 2.048Mbps supports 32 TS and the T1 1.544Mbps with 24 TS. The Plesiochronous Digital Hierarchy (PDH) was the old technology to exchange TDM between two nodes with little different clock and not synchronized by using elastic buffer to compensate. Now all DACS like AM3440 are synchronized, but currently we name it as "PDH" instead of TDM equipment with DS0 support.

AM3440 Series Protection

The chassis can be equipped fully redundant with dual CPU with cross-connect and dual power supply. Each pair of E1/T1 from contiguous cards can support 1+1 line and card protection. The optional circuit protections can be applied at the n x TS level. The DS0 SNCP Automatic Protection Switching is provided by 3E1 cards and the ULSR E1 protection can be applied on a FE1 ring.

DS0 SNCP APS for single 64k TS or n x TS circuits

This protection uses 2 E1/T1 links with 3E1 (3T1) cards. These E1/T1 can be transported by SDH, Microwave, DSL or Fiber for clear channel E1/T1 links.

The protected n x 64Kbps circuits are sent in both E1/T1, in working path and protection path. Codirectional traffic is also sent at the other side in same E1/T1 as working path and protection path. According to different settling rules the receiver of last node switches from working path to protection path. The recovery of bidirectional circuit can be operated within 8ms.

The DS0 SNCP can be applied on data or voice with E1-CAS. The working and protection E1 can carry multiple DS0 DNCP n x 64Kbps and other non-protected TS.
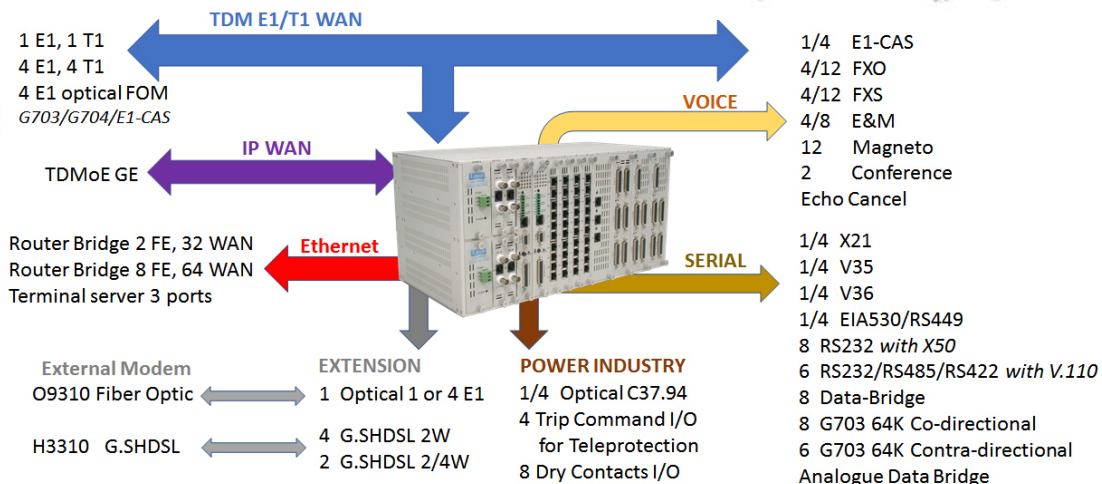
ULSR E1 /T1 APS

This protection is based on the E1 ring. The working path uses one direction (or one pair) of the E1 and the protection path uses the codirectional pair of the E1. This solution is provided by the CPU with optional firmware for small ring of device and the recovery time of circuit do not excess 200ms.
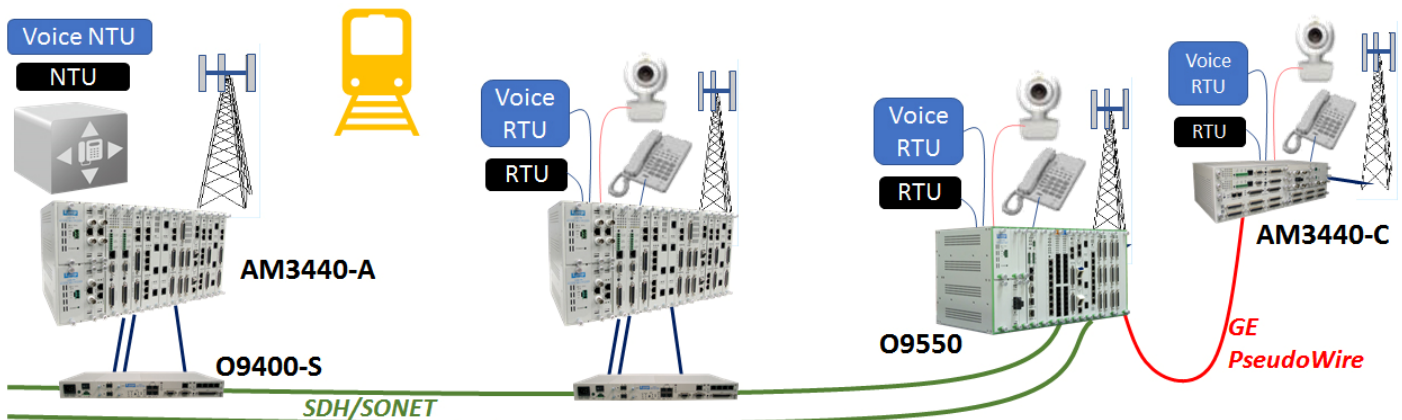
WAN and Tributary Interfaces

Each E1/T1 can be set as WAN or tributary and can support G703, G704 and CAS mode with automatic CAS generation for Voice interfaces.

All cards E1/T1, voices, serial, Ethernet, optical, G.SHDSL or dedicating card for power industry can use any slot according to his size full or mini slots.

TDM E1/T1 WAN

1 E1, 1 T1
4 E1, 4 T1
4 E1 optical FOM
G703/G704/E1-CAS

IP WAN

TDMoE GE

Router Bridge 2 FE, 32 WAN
Router Bridge 8 FE, 64 WAN
Terminal server 3 ports

Ethernet

VOICE

1/4	E1-CAS
4/12	FXO
4/12	FXS
4/8	E&M
12	Magneto
2	Conference
Echo Cancel	

SERIAL

1/4 X21
1/4 V35
1/4 V36
1/4 EIA530/RS449
8 RS232 *with X50*
6 RS232/RS485/RS422 *with V.110*
8 Data-Bridge
8 G703 64K Co-directional
6 G703 64K Contra-directional
Analogue Data Bridge

External Modem

O9310 Fiber Optic

H3310 G.SHDSL

EXTENSION

1 Optical 1 or 4 E1

4 G.SHDSL 2W
2 G.SHDSL 2/4W

POWER INDUSTRY

1/4 Optical C37.94
4 Trip Command I/O for Teleprotection
8 Dry Contacts I/O

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Analog Voice, Conference and RTU communication for Railway

Loop Telecom supplies TDM DS0 multiplexing solutions to different railway companies around the world. In the single equipment per node we support different applications requested on railways lines:

- the voice from central PBX with E1-CAS or FXO to FXS on stations,
- the service voice between two stations with FXS to FXS in PLAR mode,
- the conference from Central station to 16 stations with FXS, E&M and RS232 interfaces,
- the NTU to RTU communication in Voice E&M, Magneto or RS232, RS485 as Point to Point or Multipoint,
- the E1 trunking radio (PMR),
- and many Ethernet applications as IP-Video, ticketing ...

All nodes are secured by redundant CPUs, Power supplies, WAN links and if necessary all tributary interfaces with chassis.

Air Traffic Control: Voice, Analog and Data Transmission

The Air Traffic Control in airports must manage many parameters over a surface 80 to 200km^2 or more, with several applications that are remotely managed. The transmission must be done with high level of reliability and low and stable latency.

The Radar application now built in Ethernet, but many installations over the world are using asynchronous or analog transmission... We provide solution with our E&M interfaces with the Radar to central is connected with V29TC modems to support the analog modulated line or in directly in asynchronous. AM3440 or O9550 with the 8UDTEA RS232 card and a dedicate support firmware is carrying the synchronization of the asynchronous interfaces together with burst radar signal.

Each site will include the connections to:

— The Radar as E&M or RS232,

— The RTU for power and others,

— The weather station,

— The analog radio communication between the control tower and the aircraft,

— All theses communications are mandatory duplicated by DACS and broadcasted to a recorder,

— The phone to central to sites and service phone between sites,

— The security with dry contact for doors or other events to TRAP and the IP camera over Ethernet.

All applications: analog, voice, data and Ethernet are multiplexed, duplicated if necessary for recording and exchanged from remote sites to central or between remotes site over E1 connected by fiber interfaces over 100km or by TDM radio. All sites are synchronized by the central node from a PRC clock or from Telco operator E1. Each node using redundant CPU, cross-connect and WAN interfaces provides a high level of security in its mission.

A large number of Loop Telecom AM3440 and O9550 DACS and SDH have been installed by our partners in civil and military airports around the world to transport the application of Air Traffic Control. These equipment are also used to transport the control of the signalization along the landing runway and the power distribution in such large sites.

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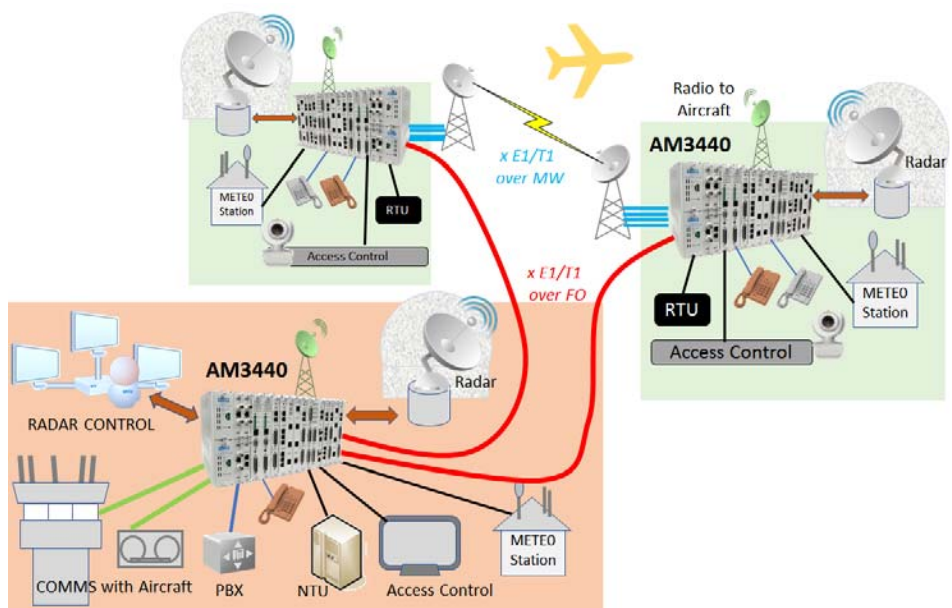
These chassis are used in concentration nodes applications with a large number of analog and industrial interfaces. The multiple End-to-End circuits are set by iNMS.

O9550-A
5U Modular PDH DACS and ADM SDH/SONET multiplexer:

- Redundant CPU and PS
- 4 aggregate interfaces STM1/4 OC3/12 with MSP and SNCP protection
- 12 slots and 4 mini slots of 4 E1/T1 backplane each
- Clock PDH and clock SDH
- DACS 504+64 E1 x 31TS or 672+52 T1 x 24TS
- E1/T1 protection: 1+1, ring SNCP DS0 or ULSR E1
  - E1, T1, copper or fiber
  - Voice E1-CAS, FXO/FXS/ E&M/Conference/Magneto
  - Serial X21, V35, EIA530
  - RS232, RS485, RS422, bridge
  - C37.94, Teleprotection
  - Ethernet bridge and router
  - TDMoEthernet/ TDMoverIP

O9550-C
3U Modular PDH DACS and ADM SDH/SONET multiplexer:

- Same as O9550-A except
- 4 slots and 4 mini slots
- DACS 504+36 E1 x 31TS or 672+27 T1 x 24TS

V4150R
6U Modular PDH DACS DS0 with redundant CPU and PS

- 8 slots for 63 E1/T1, 3 T3 or 2 STM1/OC3 interface
- DACS 504 E1 x 31TS or 672 T1 x 24TS

Loop Telecom produces a large range of SDH/SONET and Hybrid with multiservice DS0 DACS equipment. The O9550 is a very high density multiservice PDH DACS with four SDH/SONET uplinks for utilities, transportation or defense application.
The V4150 is a very high density system supporting in a single chassis 504 E1/T1 interfaces, with E3/T3, STM1/OC3 and 504E1/672T1 DS0 non-blocking cross-connect matrix for Telco voices/lease lines or large utilities concentration sites.

High Density Multiservice DACS
connected to TDM E1/T1, SDH/SONET and Ethernet WANs

This multiplexer multiservice based on E1/T1 DS0 cross-connection can be integrated in TDM network with E1 or T1 interfaces, in SDH/SONET through itds 2 x 2 STM1/4 interfaces on CPU cards and in Ethernet/Gigabit Ethernet through its combo FE/GE interfaces with TDM PseudoWire Emulation End to End (PW3E) to another PW3E device. All three WANs can be active together.
The DACS and TDM network will run with the same clock, the SDH has its own clock and we will make care to the clock of the 2 PW3E multiplexers, the local can carry the clock to the remote device.
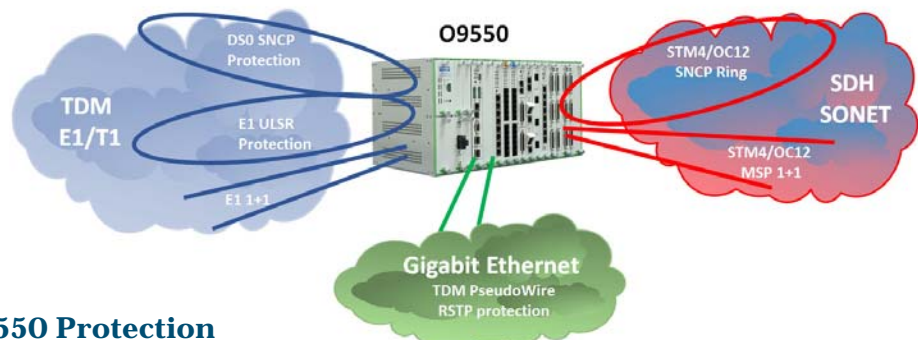
O9550 Protection

The chassis can be equipped fully redundant with dual CPU with cross-connect and dual power supply. SDH/SONET cards support MSP and SNCP protection with one or two CPU. Each pair of E1/T1 from contiguous cards can support 1+1 line and card protection. The optional circuit protections can be applied at the n x TS level. The DS0 SNCP Automatic Protection Switching is provided in ring by 3E1 cards and the ULSR E1 protection can be applied on a FE1 ring. All PDH protections are describes in page 2.
The TDM PseudoWire over GE are protected with RSTP.

WAN and Tributary interfaces

All AM3440 cards are available for O9550-A/C, but their firmware is different. This DACS supports:
- WAN cards 1 or 4 E1 or T1, copper or fiber interfaces with mode G703, G704 and CAS with CAS fabric,
- Voices cards with E1-CAS, FXO, FXS, E&M, Magneto and Conference cards,
- Serial interfaces X21, V35, V36 and EIA530 with rate n.64kbps or sub-rate with V110,
- Serial Async/Sync RS232, RS485 and RS422 with sub-rate with X50 or V110, Terminal Server, Omnibus
- Analog Bridge and Digital Bridge to support multipoint, G703 64k Codirectional/Contra-Directional
- Interfaces for Power Industries C37.94 and Teleprotection
- Dry contact Input/Output to carry contact open/close or generate SNMP trap
- Ethernet Router, Bridge and switch with 2/8 ports, 64 WAN EoPDH from 64kbps to 8Mbps
- 2 GE Combo WAN, 2 GE LAN with TDMoE/TDMoverIP encapsulation of 4 E1/T1 backplane.
All interfaces, cross-connect, encapsulation, filtering, alarms are set through console/SNMP ports, over TS or DCC in Text menu, Windows craft, iNET-NMS and iNMS with automatic commissioning in SNMP.

High Density DS0 DACS, E1/T1, T3 M13, STM1/OC3

This high density cross-connect system is used by Telco operator to groom and cross connect leased lines or specialized applications for large public applications and to convert voice traffic from E1 law A to T1 law μ between continents.
This system is also used by the different large Power companies to groom and cross-connect up to 672 T1 from remote sites with the high level of reliability and very short latency.
Many V4150 can be linked together directly over STM1/OC12 interfaces or to a O9400R to multiply the density of E1 or T1 interfaces. To provide 1:N protection on E1/T1 we can daisy chain a Protection Relay Shelf . The V4150 supports E1 120/75ohms, T1, T3 interface with multiplexing M13 to 28 T1 and G.727 T3 to 21E1. All interfaces E1, T1, T3 and STM1/OC3 use the same clock synchronization.
All circuits cross connection of this chassis and eventually remote chassis can be operated by iNMS system with an automatic commissioning which saves CAPEX and OPEX when customers renew the existing installation.

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Power transport High Voltage Substation

Loop Telecom supplies many Power companies for the production and the national or distribution grids. These applications use TDM DS0 circuits with high level of reliability, protection, low latency and accurate frequency and phase synchronization to optimize the transport of energy and provide a automatic mesh power distribution over the territories.
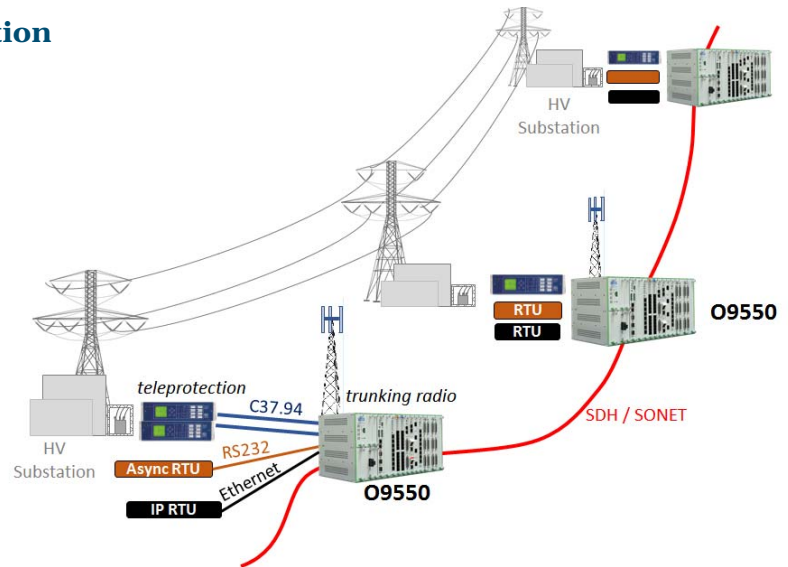
Each level of the power transport 380KV, 110kV… to 400V use different type of teleprotection, SCADA, and environment interfaces or tools. Loop telecom has integrated all these modular interfaces in his DACS AM3440 or hybrid DACS with SDH/SONET O9500R and O9550. These devices can be configured for each need with common CPU, interfaces and MNS.

As WAN interfaces we provide E1/T1 over microwave, fiber optic, STM1/4 or OC3/12 standard fiber or with CWDM or OTN multiplexing solutions.

Now Loop deliver also WAN transport with 10GE PTN card over MPLS-TP or Carrier Ethernet networks.

For Power and Grid infrastructures we provide:

- Interfaces for Teleprotection as fiber C37.94, G703 64K, X21 synchronous,

- Digital interfaces to command remote circuit breaker with measurable and programmable round-trip delay or simple dry contact transport card,

- Low level async/sync or analogs interfaces for Point-

to-point or Point-to-multipoint SCADA application with redundant pooling server of RTU connected in each nodes,

- Voice FXS/FXO/E&M communication to PBX or voice services,

- Data/contact to Ethernet or all signal TDM over IP/Ethernet conversion

- Ethernet bridge, switch and full router with VLAN for IP RTU/NTU communication but also for IP trunking radio,

- tributaries E1/T1 interfaces for TDM PMR.

All interfaces in each node can be remotely set, controlled, monitored from the NMS iNET or iNMS (see page7). The NMS administrates the nodes and creates automatically the end to end circuits .

Oil and Gaz plan or Chemical Industrial complex for SCACA, Process Control, Services and Security communication
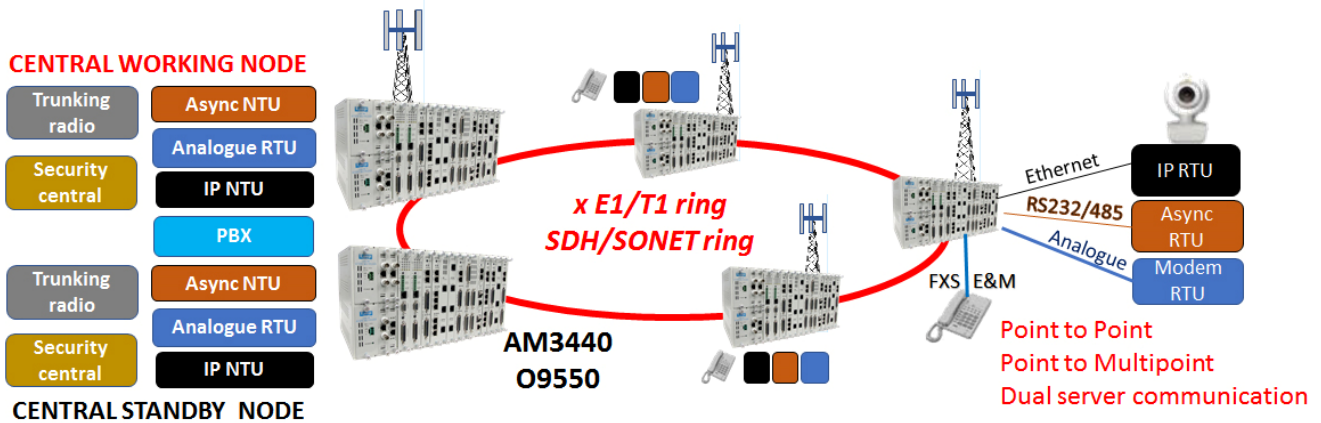
Many installations in Oil and Gaz or Chemical complex are managing the process control and SCADA over Ethernet RTU. But as the site was installed more than 10/20 years ago several applications are always based on analog RTU, or with integrated modem to provide the timing information or low rate asynchronous or synchronous communication. The Loop DACS care for all applications and provide the absolute QoS for application based also on IP transport.

We have integrate several protocol, but we can transmit all signals transparently for proprietary application.

As particular features we support Point to Multipoint interfaces with pooling communication mode between central and remote for analog connection or RS232/RS485 applications.

We also support the SCADA automatic communication from nodes to two working and standby NTU.

Thanks to the TDMoE cards, the AM3440/O9550 can also encapsulate these signals to cross Ethernet pipes.

Then the customer will be able to migrated step by step his applications and WAN to Ethernet/Gigabit Ethernet.

Ethernet Transport over PDH - EoPDH

All Loop TDM/PDH devices can carry bridged or routed Ethernet over FE1 or group of E1. The Router/Bridge cards support up to 64 WAN. Bandwidth of each WAN can be set from n x 64Kbps to 2Mbps with HDLC, HDLC Cisco, PPP-BCP, PPP routed or Frame Relay or can

support up to 8Mbps in MLPPP over 4 E1.

These cards with 2 or 8 LAN support VLAN, Q-in-Q, VLAN-ID mapping and QoS .

These cards are supporting Static routing, RIP 1 and 2 and OSPF over WAN or LAN interfaces.

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Loop E1 or T1 TDM/PDH converters supports unframed or framed lines at n x 56kbps or n x 64kbps for different applications.

E1510-S

Economic E1 G703 / FE1 G704 Interfaces Converter supports:

- E1, HDB3, 75 and 120 ohms
- 1 DTE interface :
- X21 or V35 or
- 10/100BT Ethernet bridge
- Rate n x 64Kbps n=1-32

- Dip-switches selection

E1500-2S

CSU/DSU E1 2Mbps G703, FE1 G704 Multiplexer:

- WAN G703/G704/E1-CAS
- E1, AMI/HDB3, 75/120 Ω
- 1 or 2 DTE interfaces with TS0 selection, as:
- X21,V35,IEA530,RS232 or G703 64K codirectional
- 10/100BT Bridge or Router
- 8 Alarm inputs
- Rate n x 56/64Kbps n=1-32
- In-band menu and SNMP management HDLC/PPP
- Line and DTE interfaces remote monitoring and loop

T2500-2S

CSU/DSU T1 1.544Mbps FT1 D4/ESF framing supports:

- WAN T1, AMI/B8ZS, 100 Ω
- 1 or 2 DTE interfaces with DS0 selection, as:
- X21,V35,IEA530,RS232 or G703 64K codirectional
- 10/100BT Router
- Rate n x 56/64Kbps n=1-24
- In-band menu and SNMP management HDLC/PPP
- Line interface monitoring and loops

Loop Telecom has manufactured since 1991 CSU/DSU for E1 and T1 public and private Telco operator to install in customer premise and deliver data or data with voice service. These products are not only interface converter but termination line with high monitoring. For large WAN infrastructure we have implemented two DTE mux function and SNMP router management with secure Radius access to optimize the OPEX cost.

E1/T1 Converter and Dual ports Multiplexer

The **E1510-S** and **E1500-2S** are E1 converter for E1 WAN 75ohms with dual BNC and 120ohms with RJ48 female connectors for G.703 networks. Both support unframed 2.048 kbps and framed G.704 n.64kbps, with n = 1 to 31. The E1500-2S also supports n.56kbps. We can select each TS per interface and not necessarily contiguous. **E1510-S** is an economic E1 converter with single DTE or Bridge interfaces set by DIP-switches. Line and DTE loopback can be done locally during the installation and an auto-test give the status of the converter on LED.

E1500-2S and **T2500-2S** are more sophisticate devices with one or two DTE or Bridge or Router interfaces. DTE interfaces can order X21, V35, IEA530, RS232 or G703 64K codirectional, but also 8 alarm inputs to generate SNMP trap dry contacts change on AM3440 with dry contact card. One or two Bridge or Router interfaces can support up to 31 WAN HDLC or PPP.

These devices can be supplied as E1/T1 drop & insert multiplexer with one E1/T1 local interfaces and a DTE or Ethernet.

They are full CSU/DSU, we can access remotely to the line and DTE interfaces over TS in Telnet/SSH or SNMP or locally with RS232 port. We can remotely launch the loop tests, get performance of last 24 hours with 15mn test, last 7 days in 24h summary line. We can get the alarm history of WAN line and DTE and the Threshold: Bursty Seconds, Severely Errored Second, Degraded Minutes .

Simple Voice and LAN Extension
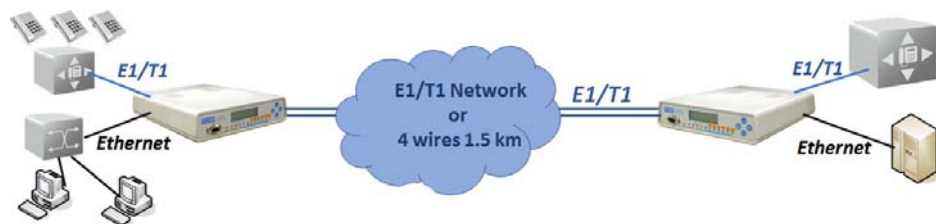
E1500-2S and **T2500-2S** can share easily a 2Mbps E1 line with a FE1 for PBX as E1-CAS or E1-ISDN or T1 voice and a LAN transport. This line can be a single dual copper pair line of maximum 1.5km without any network to carry simple or double interfaces like an economic DSL line.

BTS deployment
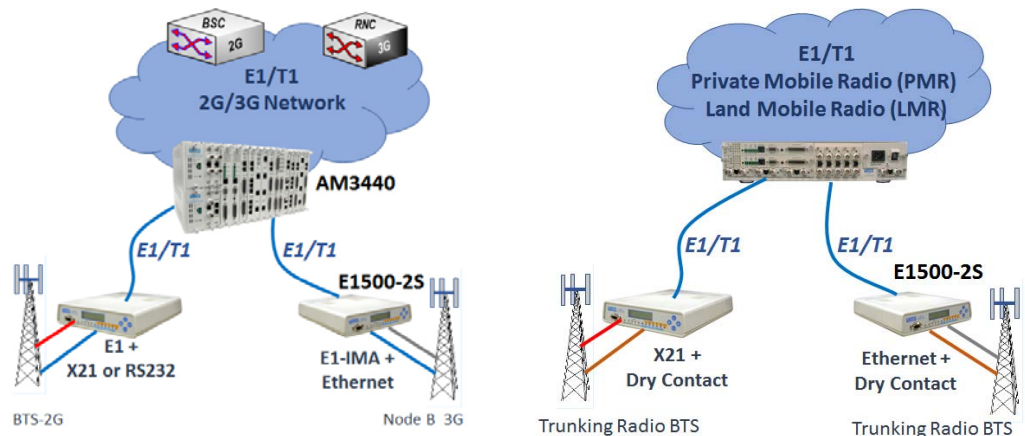
Loop Telecom supplies **AM3440** DACS multiplexers and **E1500-2S** and **T2500-2S** line terminations to deploy BTS for 2G or 3G in E1-EMI or BTS for different trunking radio or Private Radio Mobile Radio (PMR) named also Land Mobile Radio (LMR). The E1 transports generally the voice and data mobile information but also the management and access control of the BTS. E1500-2S and T2500-2S provide both interfaces E1, E1-IMA or X21 for payload and Ethernet, RS232, X21 or only dry contacts for BTS administration according to the mobile technologies. The E1550-2S /T2500-2S economical end of line devices are Telnet/SSH HDLC or SNMP v3 manageable from central site or by iNET or iNMS central NMS system.

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iNET

Loop-iNET, based on scalable and modularized architecture, is an intelligent network management software for Element Management Layer (EML) and Network Management Layer (NML) based on Telecommunications Management Network (TMN) model. It provides a GUI (graphical user interface) for the management of a communications network containing Loop Telecom products and 3rd-parties NE .

This solution is running:
- Web based application following design of thin client computing
- Supported server platform: MS Windows
- Database server: MySQL RDBMS
- Hot standby server redundancy option with automatic failover to provide high availability (HA)
- System access security with role-based user access control. The access privilege can be customized through any combination of operation functions and managed NEs, user access log
- Multi-hierarchical subnet structure allows users to provide multi-level network topology display
- SNMP based management system that supports SNMP functions including commands, alarms, and statistics gathering. Other protocol support includes Network Time Protocol (NTP).
- Up to 100,000 Network Elements (NEs)
- 3rd-party NE management capability

The robust and reliable design on distributed system architecture provides flexible and scalable solution for network expansions.
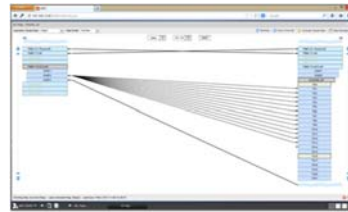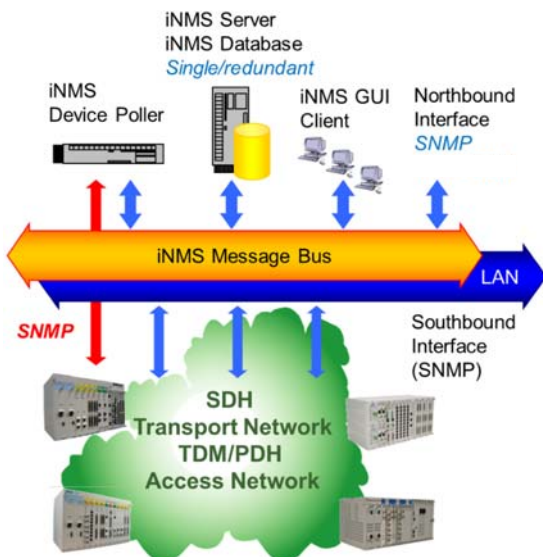
iNET-LCT

This light Window software is a Local Craft Interfaces.

This basic version of the iNET NMS is permitting to set-up node per node locally or over the network and gives the vison of all setting and cross-connects of the device.
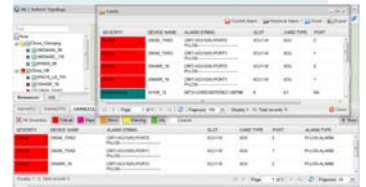
iNMS-NMS

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 PseusoWire-3E and PTN over MPLS-TP.

This is a GUI, End-to-End commissioning with several services for small to very large infrastructure with a NBI to access to a head NMS.

INMS provides to administrator:
- High Level NMS
- GUI of device and Network view
- End-to-end service management with automatic commissioning of 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
- PseudoWire Circuit Management
- Efficient performance monitoring in real-time and history for PM, NE and circuits
- Alarm management with notification via e-mail, GSM message (SMS), with filtering
- Root Cause Analysis accurately diagnoses faults on NEs and managed circuits by status and severity levels
- System Access Security

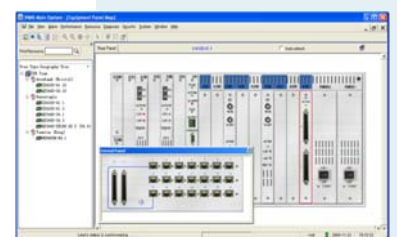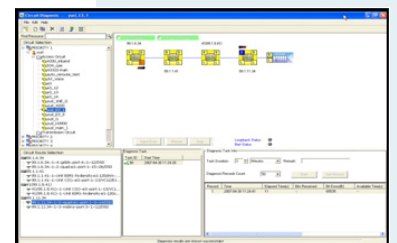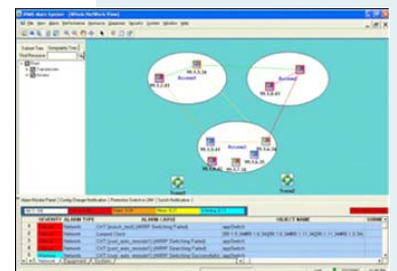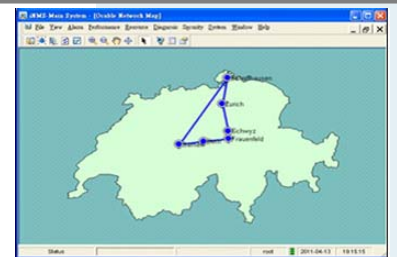And many options to customize your requirement.

The iNMS system :
- The software runs Linux with
- Database Server: Oracle 10g,11g
- User-friendly GUI on MS Windows platform. Up to 50 GUI clients simultaneously are logged.
- iNMS support several thousand SNMP Loop nodes and 3rd-Party NE .

All servers, database, pollers can build with redundant with High Disaster Recovery option.

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Models	E1510-S	E1500-2S T2500-2S	AM3440-A	AM3440-B AM3440-C	AM3440-D	O9550R-A	O9550R-C	V4150
System	E1 converter	E1/T1 CSU/DSU Multiplexer	PDH/TDM DACS			HYBRID PDH DACS & SDH/SONET		PDH DACS SDH/SONET
	Desktop 1U tray	Desktop 1U tray	Modular 5U ETSI	Modular 2.5U / 3U	Modular 2U ETSI	Modular 5U ETSI	Modular 3U ETSI	Modular 6U ETSI
	1 CPU	1 SNMP CPU	2 redundant SNMP CPUs			2 redundant SNMP CPUs		2 red. SNMP CPUs
	AC or DC or AC&DC	AC or DC	2 DC48v redundant	AC or 2 DC48v red.	AC or 2 DC48v red.	2 DC48v redundant	AC or 2 DC48v red.	2 DC48v redundant
Aggregate interfaces	1 E1/FE1	1 E1/FE1 or 1 T1/FT1	Any E1 or T1 interfaces can set as WAN interfaces			4 STM1/4		Any E1, T1, STM, OC interfaces
			SNCP-PDH 64k with 2 x 3E1-SNCP card, E1/T1 1+1 ports			2 ring SNCP or 2 MSP		
SDH function	-	-				ADM, TM, cross-c. VC11/VC12/VC3/V4		VC11/VC12/VC3/V4
PDH backplane	WAN: 1 E1/FE, trib: 31x64kbps or 2Mb	31x64kbps or 2Mb 24x56/64kbps,1.5M	64E1 / 52T1, 128Mbps	B=28E1/16T1, C=36E1/24T1,	36E1/ 9T1, 72Mbps	4 x 63E1+ 64E1 or 4 x 63T1 + 52T1	4 x 63E1+ 36E1 or 4 x 63T1 + 24T1	504 E1/672 T1 DS0, 8 STM1/OC3
PDH cross connect	No	DS0 Multiplexer	Full non blocking DACS					
PDH protection	-	-	E1/T1 1+1, SNCP-64K circuits, ULSR-PDH circuits			E1/T1 1+1, SNCP 64K circuits		E1/T1 1+1
Tributaries	1	1 or 2	4 mini slots, 12 slots	4 mini slots, B= 3slots,C=5slots	9 mini slots	4 mini slots, 12 slots	4 mini slots, 5 slots	8 slots
FE1/FT1 card	-	0 to 2 FE1 or FT1	1 or 4 E1 or T1, 4E1 or T1 fiber		1 or 4E1 or T1, 1FO	1 or 4 E1 or T1, 4E1 or T1 fiber		63E1,63T1,3T3MX3
G703 64k	-	0 or 1 co-direction.	8 co-directional or contra-directional		-	8 co-directional or contra-directional		-
Voice FXO, FXS	-	-	cards 4/12FXS or 4/12FXO		cards 4FXS or 4FXO	cards 4/12FXS or 4/12FXO		-
E&M, Magneto	-	-	cards 4 and 8E&M 2/4w and 8 Magneto		cards 4 E&M 2/4w	cards 4 and 8E&M 2/4w and 8 Magneto		-
Conference	-	-	card 2FXS, 2E&M and 2RS232		-	card 2FXS, 2E&M and 2RS232		-
PLM	-	-	cards PLM Line or Monitor cards PLM line/Mon			cards PLM line or Monitor		-
X21/V35/IEA530/ RS232	0 or 1 X21/V35	0 or 1 X21/V35/ IEA530/RS232	cards: 1 X21, 1 V35, 1 V36, 1 RS232 or 4 X21/V35/EIA530 or 6 RS232		cards: 1 X21, 1 V35, 1V36, 1 RS232	cards: 1 X21, 1 V35, 1 V36, 1 RS232 or 4 X21/V35/EIA530 or 6 RS232		-
Rate	n x 64Kbps	n x 56 or 64Kbps	n x 56 or 64Kbps	n x 56 or 64Kbps	n x 56 or 64Kbps	n x 56 or 64Kbps	n x 56 or 64Kbps	n x 56 or 64Kbps
Sub-rate 64Kbps	-	-	X50 or V110	X50 or V110	X50	X50 or V110	X50 or V110	-
RS232/RS485 async	-	-	8 RS232/RS422/RS485 async, X50, TS		card 3 TS	8 RS232/RS422/RS485 async, X50, TS		-
C37.94	-	-	cards 1 or 4 FO		card 1 FO	cards 1 or 4 FO		-
Teleprotection TTA	-	-	2 slots card for 4 ports		-	2 slots card for 4 ports		-
OCU-DP	-	-	cards 1 or 8 OCU-DP		card 1 OCU-DP	cards 1 or 8 OCU-DP		-
Dry contacts	-	0 or 8 inputs	Card 8 inputs / 8 outputs		-	Card 8 inputs / 8 outputs		-
G.SHDSL	*see H3310*	*see H3300-3S*	cards 4 G.SHDSL 2W or 2 G.SHDSL 2/4w		-	cards 4 G.SHDSL 2W or 2 G.SHDSL 2/4w		-
ETHERNET EoPDH	E-Line	E-Line, E-LAN	E-Line, E-LAN		E-Line, E-LAN	E-Line, E-LAN		-
Bridge	1 x 10/100BaseT	0 to 2 x 10/100BaseT	2 x 10/100Bt mini cards Bridge/Router, 8 x 10/100Bt card Switch/Bridge/Router		2x10/100Bt mini card, Bridge/Router	2 x 10/100Bt mini cards Bridge/Router, 8 x 10/100Bt card Switch/Bridge/Router		-
Router	-	0 to 2 x 10/100BaseT						
Nb WAN and BW	1 WAN n.64kbps to 2Mbps	31 or 24 WAN n.64kbps to 2Mbps	32 or 64 WANs per card from 64Kbps to 2 or 8Mbps MLPPP		32 WANs per card n.64kbps to 2Mbps	32 or 64 WANs per card from 64Kbps to 2 or 8Mbps MLPPP		-
Encapsulation	-	-	TDMoE card: 2GE WAN and 2GE LAN		-	TDMoE card: 2GE WAN and 2GE LAN		-
CESoPSN, SAT, AAL1	-	-	Supports 64K to 8MB over 64 PW-3E		-	Supports 64K to 8MB over 64 PW-3E		-
Environment	Fanless	Fanless	Fanless	Fanless	Fanless	Fanless	Fanless	Fan
Size (WxHxD)	210 x 41.5 x 140 mm	216 x 55 x 285 mm	432.4 x 220 x 224mm	438 x 110 x 224 mm 438 x 132 x 224 mm	438 x 88 x 224 mm	432.4 x 220 x 224mm	438 x 132 x 224 mm	433 x 264 x 223.5 mm
Temperature	-5 to +55°c	0 to +50°c	-10 to +55°c	-10 to +55°c	-10 to +55°c	-10 to +55°c	-10 to +55°c	-10 to +55°c
Standard compliances	FCC Part 15 Subpart B, Class A - CE - Safety IEC60950-1							
Other compliances			IEC61850, EN50121-4*			IEC61850, EN50121-4*		
Management	Telnet Craft	Telnet Craft	Telnet/SSH Craft	Telnet/SSH Craft	Telnet Craft	Telnet/SSH Craft	Telnet/SSH Craft	Telnet Craft
Local Port, over TS	RS232 and TS	RS232, Eth and TS	RS232, Eth and TS		RS232, Eth and TS	RS232, Eth and TS	RS232, Eth and TS and DCC SDH	RS232, Eth and TS
SNMP	from AM3440	v1, v3	v1, v3	v1, v3	v1, v3	v1, v3	v1, v3	v1, v3
LCT Interface			Node administration Windows GUI					
iNET (EMS)			Windows GUI , Graphic cross connect, vision of programed circuit					
iNMS (NMS)			Support Transport, Access, PW3R or MPLS-TP circuits, automatic nodes commissioning, synchronization,					

* in development or qualification

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