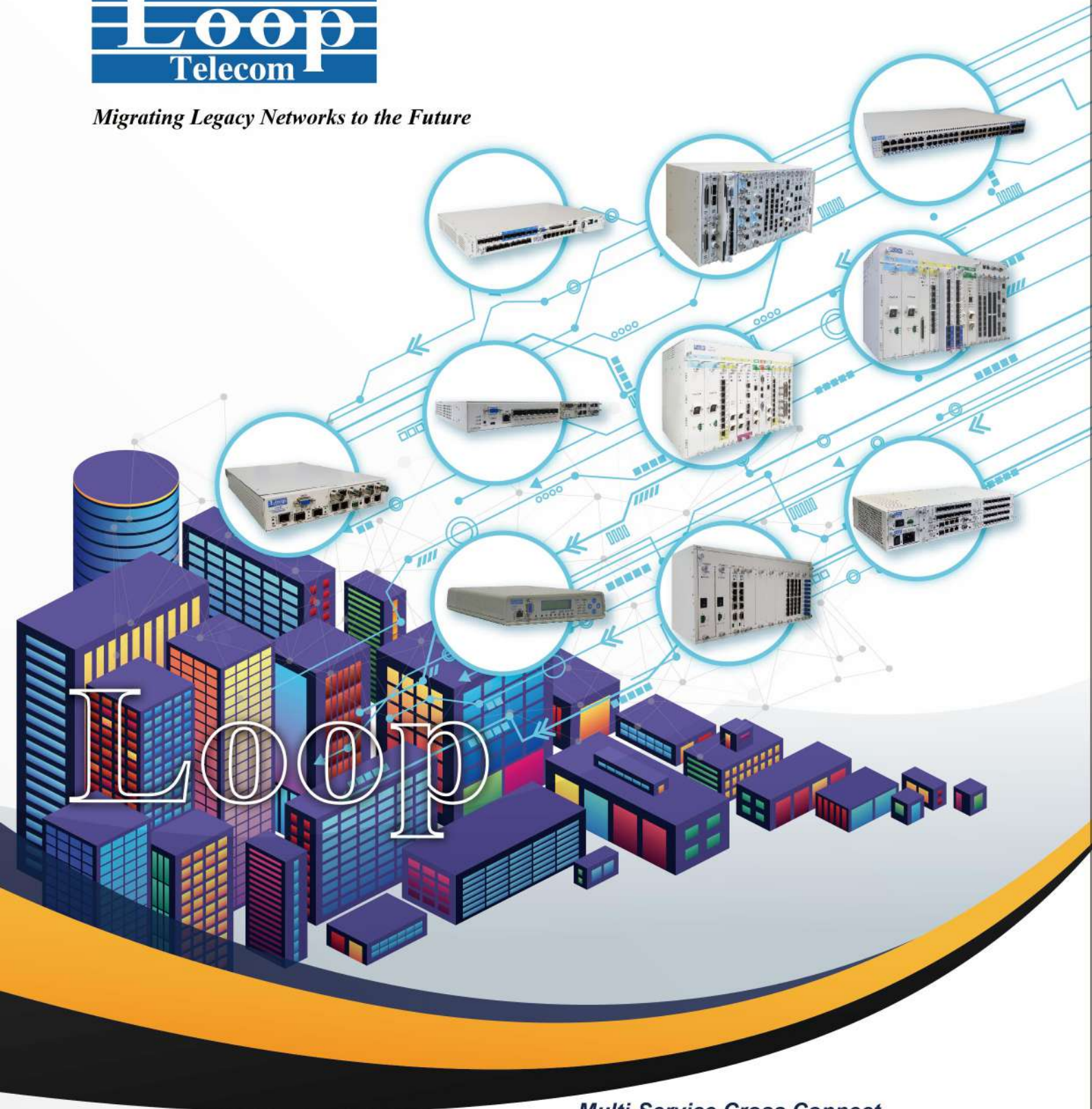




Migrating Legacy Networks to the Future



2021

Catalog



Multi-Service Cross Connect

SDH/SONET Transport- MSTP

Multi-Service Transport Platform

TDM over Ethernet Pseudowire

10GE PTN / MPLS-TP / Carrier Ethernet

Ethernet Access

Ethernet Switch

FOM and G.SHDSL Line Extension

Network Management solutions



Corporate Overview

Loop Telecommunication International, Inc.

www.LoopTelecom.com

Company Overview

Founding

In 1991, a group of established professionals from the communications industry founded Loop Telecom. These industry leaders, with decades of experience and years of service at Alcatel, Verizon, British Telecom, Tellabs and AT&T, realized the largely untapped engineering and production capabilities of Taiwan. Just ten years after founding, with its Western-style engineering and management, Loop Telecom met the earnings, market, and product diversity requirements to go public with its IPO. It is currently traded on the Taiwan Stock Exchange Corp., or TSEC (3025).

After finding success in its initial market coverage of just a few countries, including the United States, and Taiwan, Loop Telecom has expanded its market outreach to over 80 countries around the world. Several sales offices have been established including Taiwan, Belgium, the United States and Australia. Several TAC centers (Technical Assistant Center) have been setup including TAC-EMEA in Greece covering EMEA, TAC-CSA in Colombia covering Central and South America, TAC-USA in USA covering North America and TAC-SEA in Malaysia covering South East Asia.

Diversification of Product Lines

Today, Loop Telecom has a strong portfolio of over 60 products in a wide range of technologies, including multiservice access for analogue, voice, data, and dedicate data for power industry with DS0, E1, T1, DS3, E3, OC3/STM-1, OC12/STM-4, OC48/STM-16 transport over TDM, SDH, TDMoE PseudoWire and PTN with MPLS or Carrier Ethernet. We produce also IP Access and Router and last mile or backhaul over fiber or G.SHDSL.

We produce the following product lines:

- Multi-Service Cross Connect
- SDH/SONET Transport- MSTP
- Multi-Service Transport Platform
- TDM over Ethernet Pseudowire
- 10GE PTN / MPLS-TP / Carrier Ethernet
- Ethernet Access
- Ethernet Switch
- FOM and G.SHDSL Line Extension
- Network Management solutions



Philosophy

Mission

The mission of Loop Telecom is to provide communication users and service providers with the technology needed for connecting end-point devices and their access to core networks to form complete services. Loop Telecom is dedicated to developing products/solutions that not only perform their main functions well and meet all ETSI/ANSI network standards, but also offer end-users, network operators, and service providers with user-friendliness, efficiency, and economy. Today, in addition to our focus on engineering, production, and marketing, we also provide solutions as a System Integrator combining engineering technology, product definition, sales, and service based upon our decades of experience.

Loop Telecom customers include world-wide carriers, cellular operators, internet service providers, utilities, transport industries, airport networks, military networks, and government networks.

Loop Telecom products provide a wider range of features and fit more applications than many other brands in order to facilitate access to all types of communications networks, including IP, MPLS, SDH/SONET, optical, wireless, and legacy TDM systems.

Strengths

As a smaller company among giants, Loop Telecom offers fast and personalized responses to meet its customers' specific needs. Because Loop products are cost effective as well as cost competitive, customers can also be more competitive in service level and in cost.

Quality Policies

Quality and Reliability

Increasing network complexity calls for standards-based computerized management and control. Loop Telecom strives to create products that offer functionality beyond their primary purpose; while adhering to strict network standards, every product is designed for ease-of-use and customized options. With Loop Telecom products, customers have the option to include redundancy in their systems architecture – in transmission links, in network elements, and down to duplicated plug-in cards.

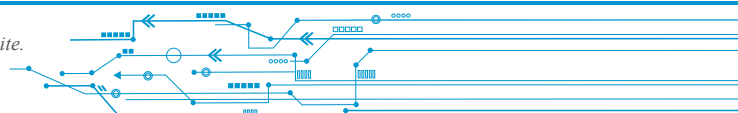
Certifications

As an ISO 9001/ISO 14000 approved company, Loop Telecom customers can be assured of continuing and consistent quality control in all phases of production. All products have United States, Canadian, and Pan-European certifications commensurate with our world-wide market.

Loop Telecom holds a Certificate for Quality Management System TL 9000-H, as well as TL 9000/ISO 90001.

Environmental Policy

Loop Telecom's mission is to maintain sustainable business development and expansion while recognizing the importance of protecting the environment. Through a process of continuous improvements and





environmental protection awareness, Loop Telecom is committed to pollution prevention and to protecting the environment by making better use of the Earth's resources, developing green products, improving production methods, reducing harm to the environment, complying with all laws, doing its best to prevent pollution by stressing environmental education, and promoting environmental protection awareness.

RoHS and WEEE Compliance Statement

Loop Telecom's products comply with Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment, dated 27 January 2003, including ANNEX. All products also comply with WEEE Directive 2002/96/EC.

Services

Staffing

With main office in Taiwan, Loop Telecom has a workforce of over 181 engineers, sales representatives, and support staff. To provide optimum product quality and specialized orders, staffing at Loop Telecom emphasizes engineering.

Sales Strategy

Loop Telecom's distribution channels include representatives, distributors, in-country partnerships, OEM agreements with companies wanting to have products sold under their name, and a direct sales force in selected market areas.

Its philosophy is to invest in and partner with well-established companies with reputations for integrity, quality, and after-sales service in their market places. By becoming a faithful partner, Loop Telecom assures a solid foundation for the continued preference for its products.

Production Capacity

Loop Telecom has ample space for expansion. The factory production capacity is currently determined by the automated testing facility used in final quality assurance for completed products. This capacity will be expanded in concert with growth.

After Sales Customer Relations

To respond to customers' needs, Loop Telecom has offices and repair facilities worldwide. In addition to the headquarters location in Taiwan, sales support offices are in the United States, Europe and Australia. Furthermore, a distributor network is established worldwide. Repair facilities, in addition to the factory, are located in the United States and in Europe.

Members of the Loop Telecom Field Applications Engineers (FAE) Department are veterans not only in the application of Loop Telecom products, but also in the interworking with products from other manufacturers. FAE members travel extensively to render assistance in the installation and operation of Loop Telecom products.



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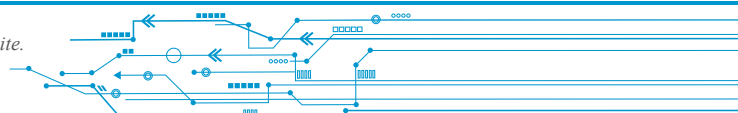
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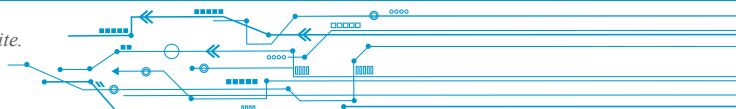
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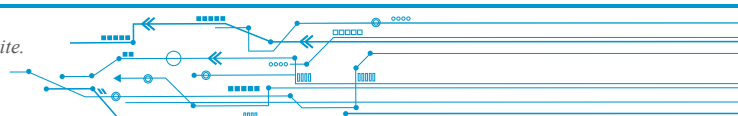
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Product Category

Core Network Transmission

WDM



WDM1800-CHAAa



WDM1800-CHBa

PTN/SDH/SONET/TDM



O9150Sa



O9400R



O9170



O9500R



V4150



Network
Management



TDMoE



G7860A



IP6820
(G.8032)



G7860A



G7820

IP/Ethernet

Last Mile Multi-



AM3440-
CHPAa/CHPCa



AM3440-A/C



AM3440-D



AM3430



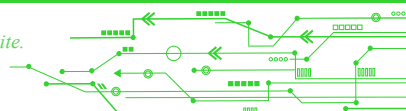
AM3440-CHEA



IP6750 (CE)



IP6340





service Access



O9550-A/C



O9550-D



O9340S



C5600



AM3440-
CHE8GEHSWa



IP6810



IP6820

Customer Premise Equipment



H3300-3S



H3310S



H3308S

G.SHDSL

Fiber Optical
Multiplexers



O9310



O9210S

CSU/DSU



T2500



E1500S



E1590



IP6702A



IP6704A



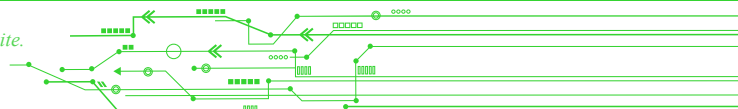
IP6510-LN



IP6610

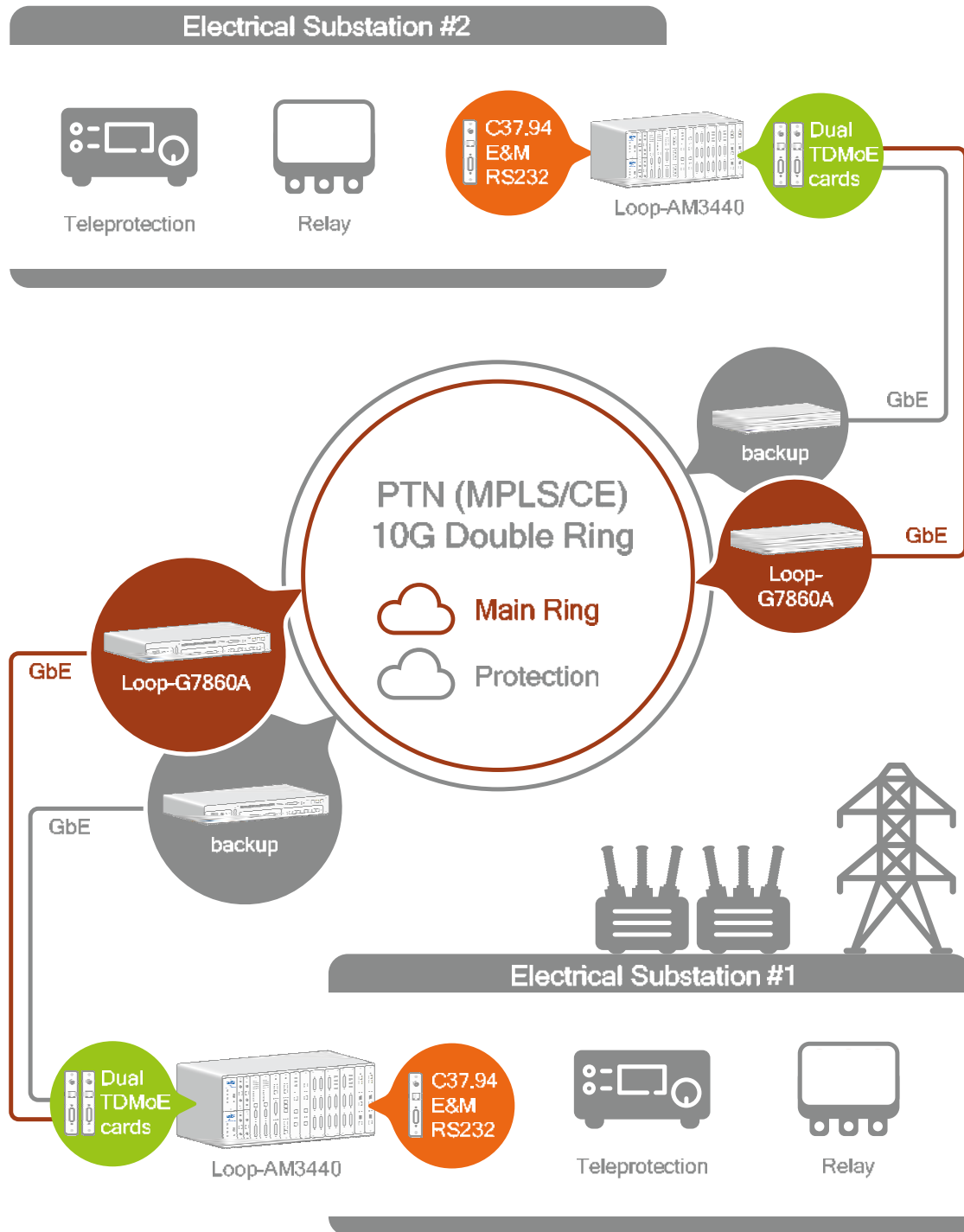


IP6608
(CE)



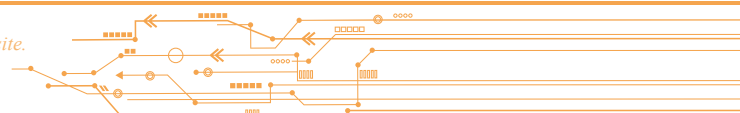


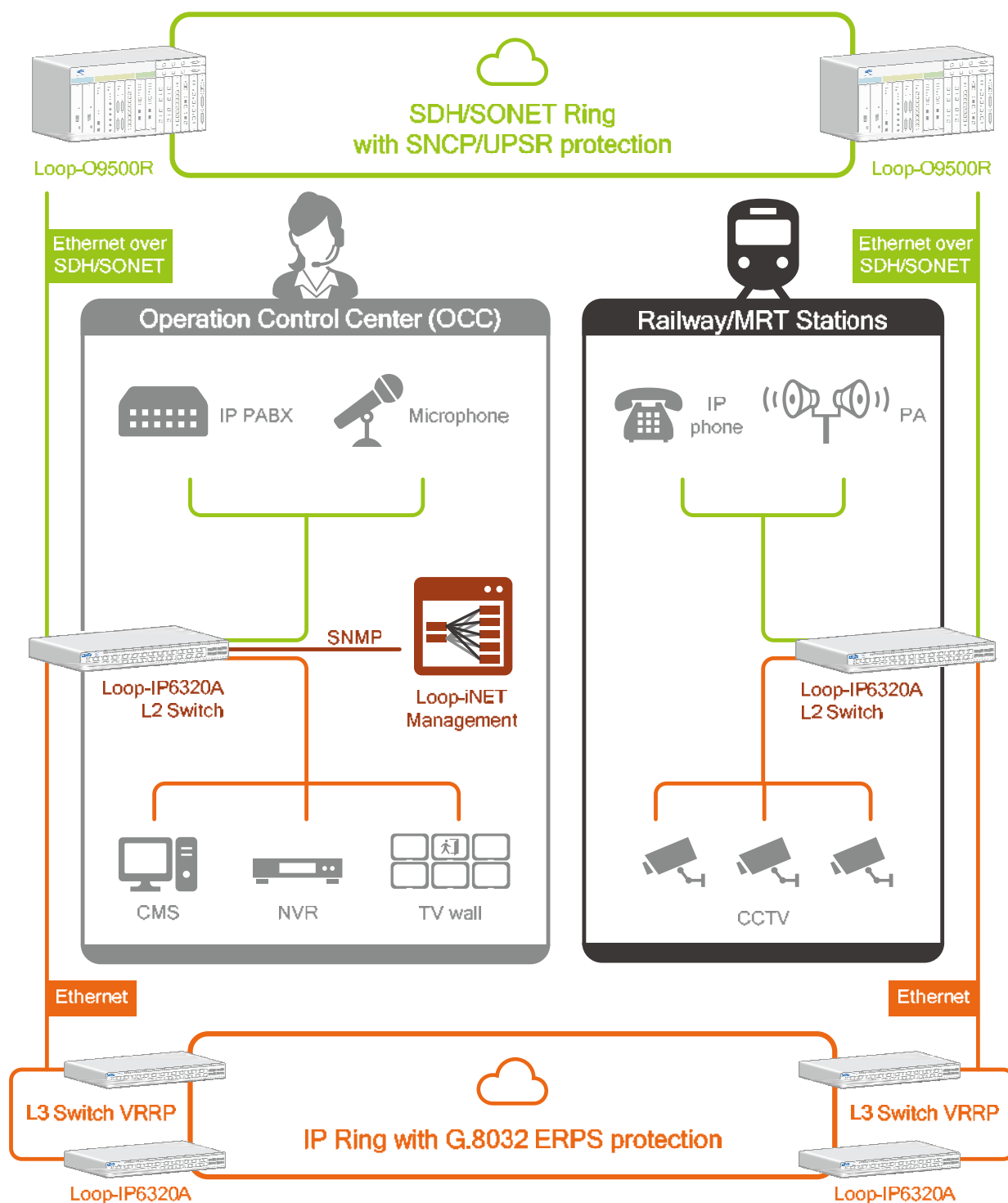
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Power Electrical Substations: Communication with Protection

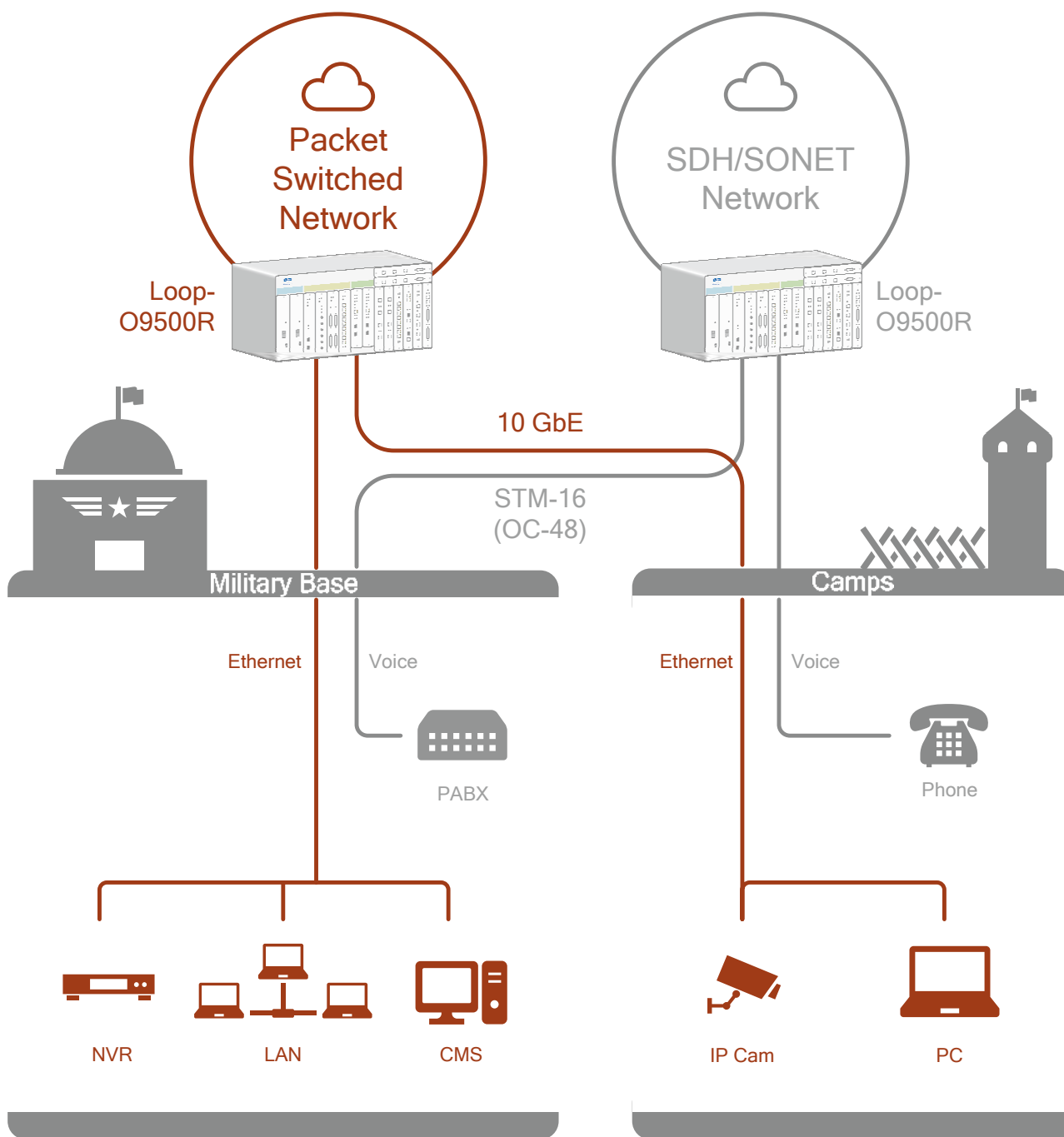
- Dual Loop-G7860A PTN 10G rings with OAM for backbone protection at node level
- Loop-AM3440 Access Multiplexer with voice interfaces to merge substation signals onto backbone transport
- Loop-AM3440 uplink with dual TDMoE modules for link protection, protection switching time < 50 ms





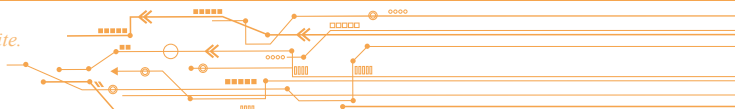
Transportation: Communication between Stations and OCC

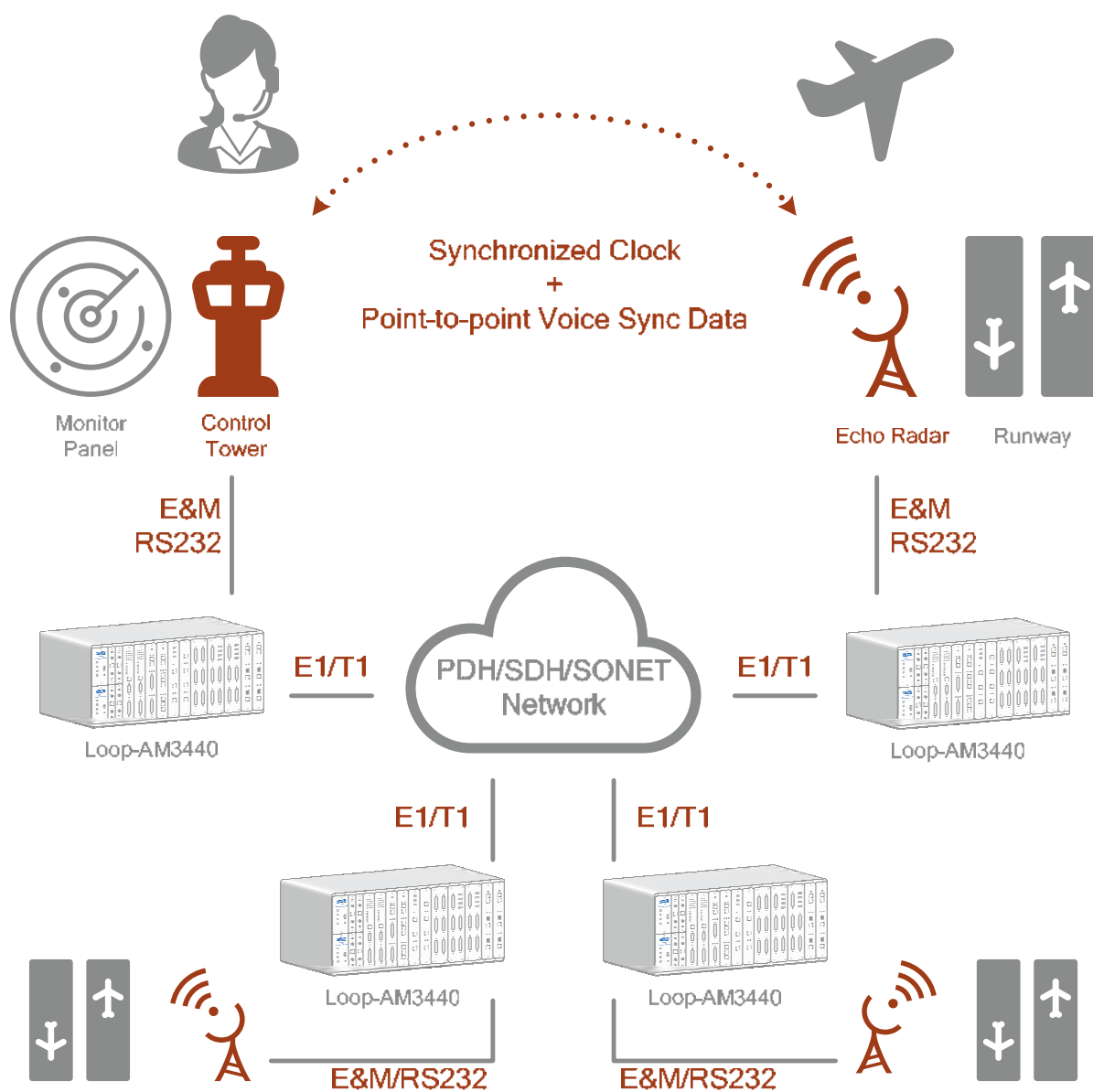
- Management, communication, and video surveillance over substations bridged via Loop switches and ADM
- Dual Ring: IP phone and IP voice traffic via SDH/SONET ring, and CCTV footage via IP ring
- Loop-IP6320A and O9500R compliant with EN50121-4 standards for Railway Substation Environment



Military Communication

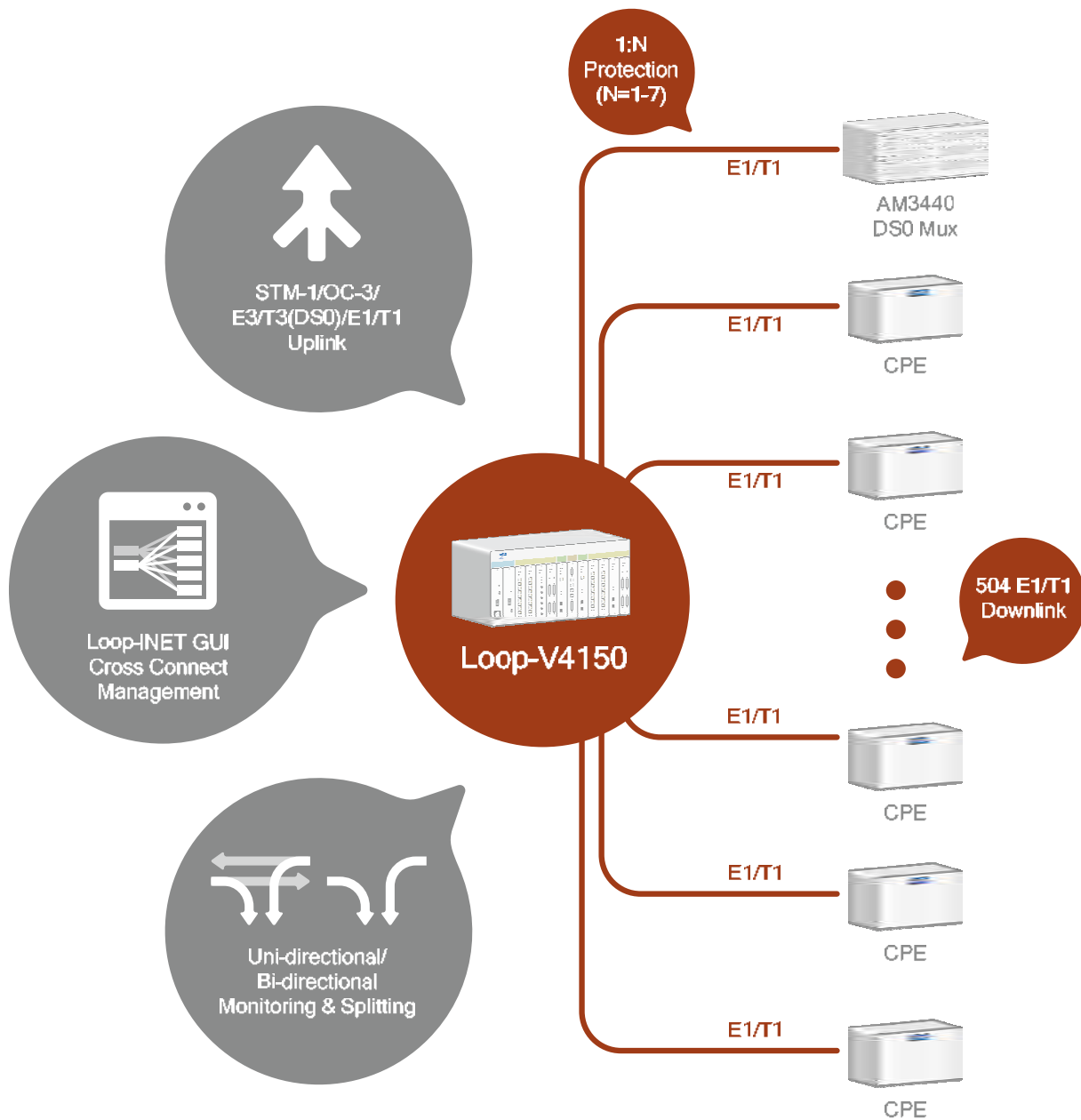
- Communication between military sites via PSN and SDH/SONET network
- IP camera via Ethernet for surveillance, Voice devices via SDH/SONET for communication
- Loop-O9500R for PSN and SDH/SONET transportation and end services aggregation





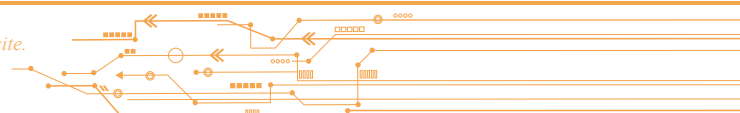
Aviation Radar Clock Stability for Air Traffic Control

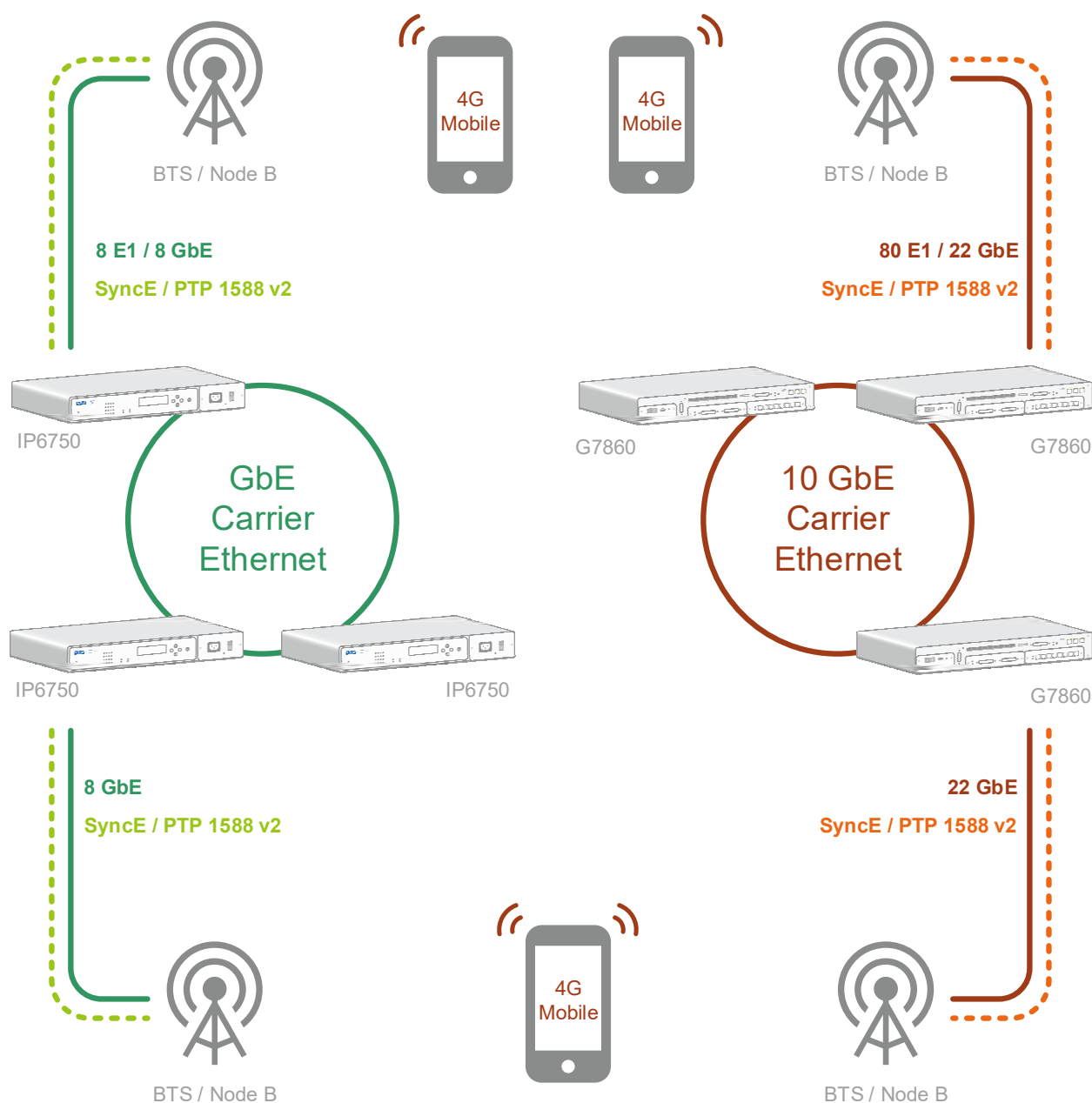
- Correct and synchronized signals transmitted via radars at civil aviation or military sites
- AM3440 TDM Multiplexer transmit Clock and synchronized data via 8UDTEA module voice interfaces



Telecommunication: New Generation DS0 Cross Connect System

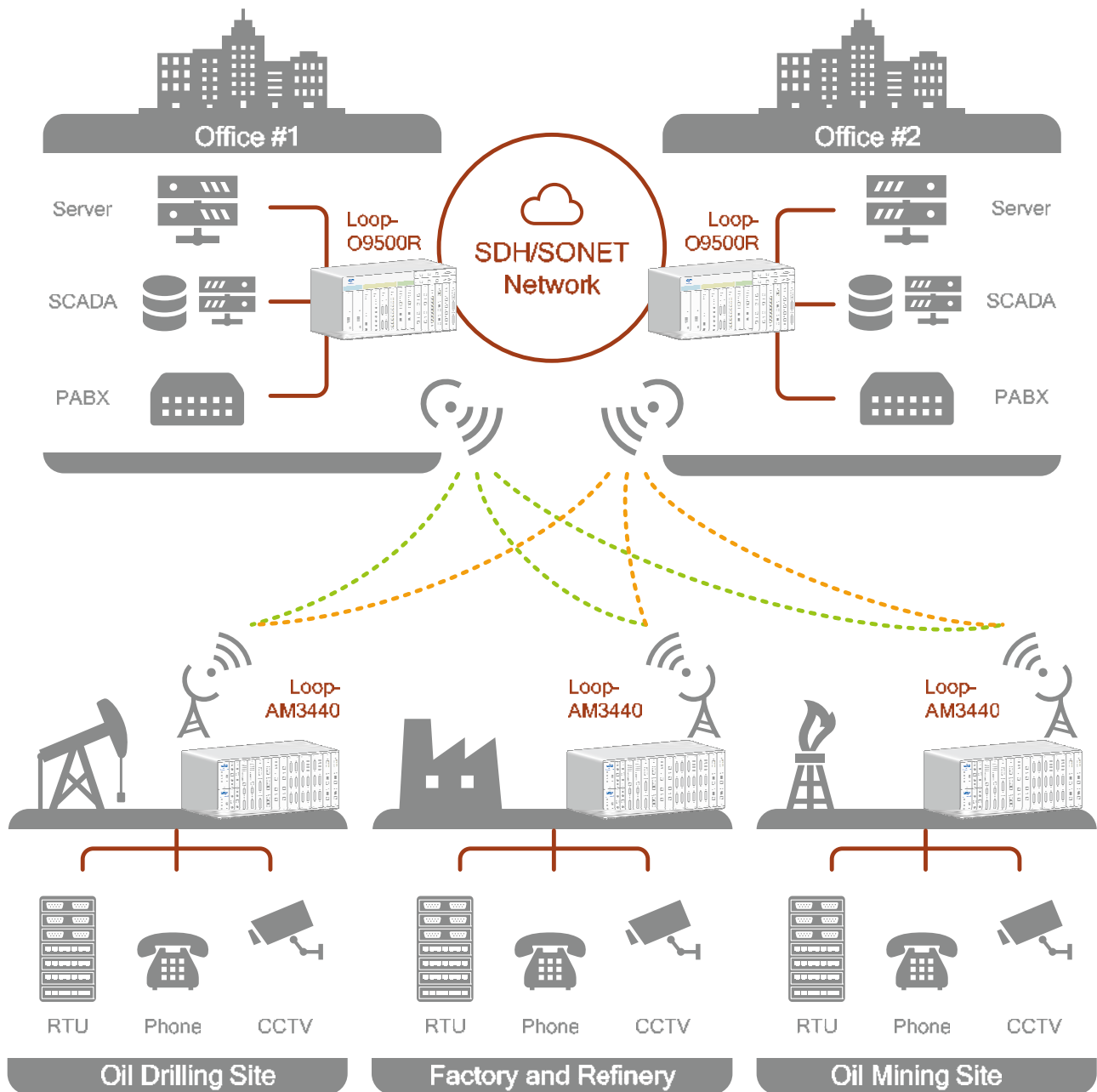
- New generation models blessed with modern technology provide high quality and long withstanding services.
- Loop DS0 Cross Connect units provide scalable TDM grooming solution to maximize E1/T1 channel fill rate.
- Cross connection management by GUI Loop-INET for intuitive operation experience





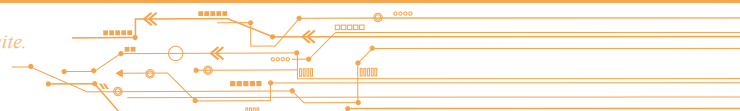
Telecommunication: Mobile Infrastructure

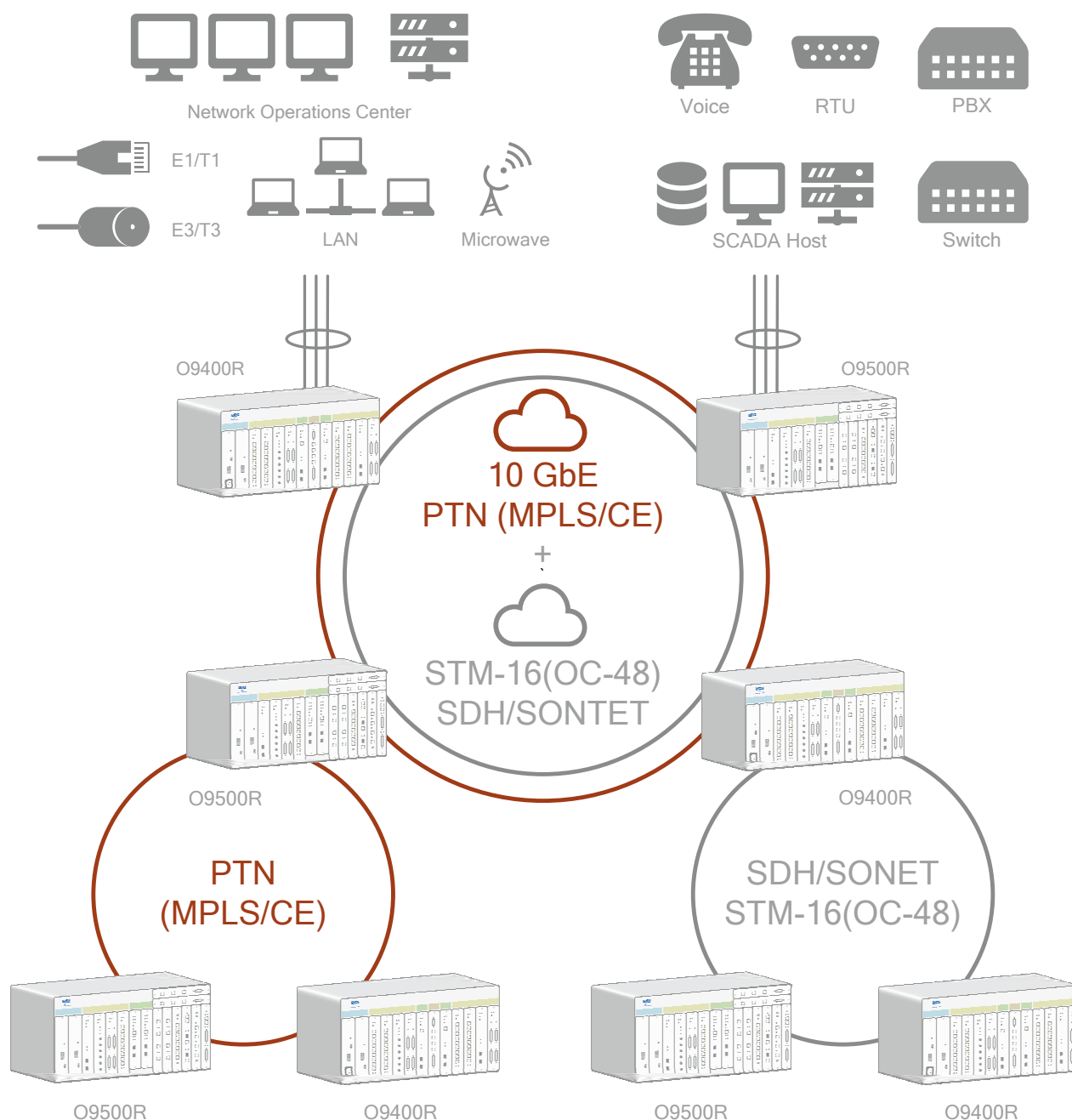
- Loop-IP6750 and Loop-G7860 high bandwidth grooming for PTN Carrier Ethernet backhaul
- Support time and phase synchronization over PSN: SyncE and PTP 1588v2



Oil and Gas: Communication between Remote Sites and Offices

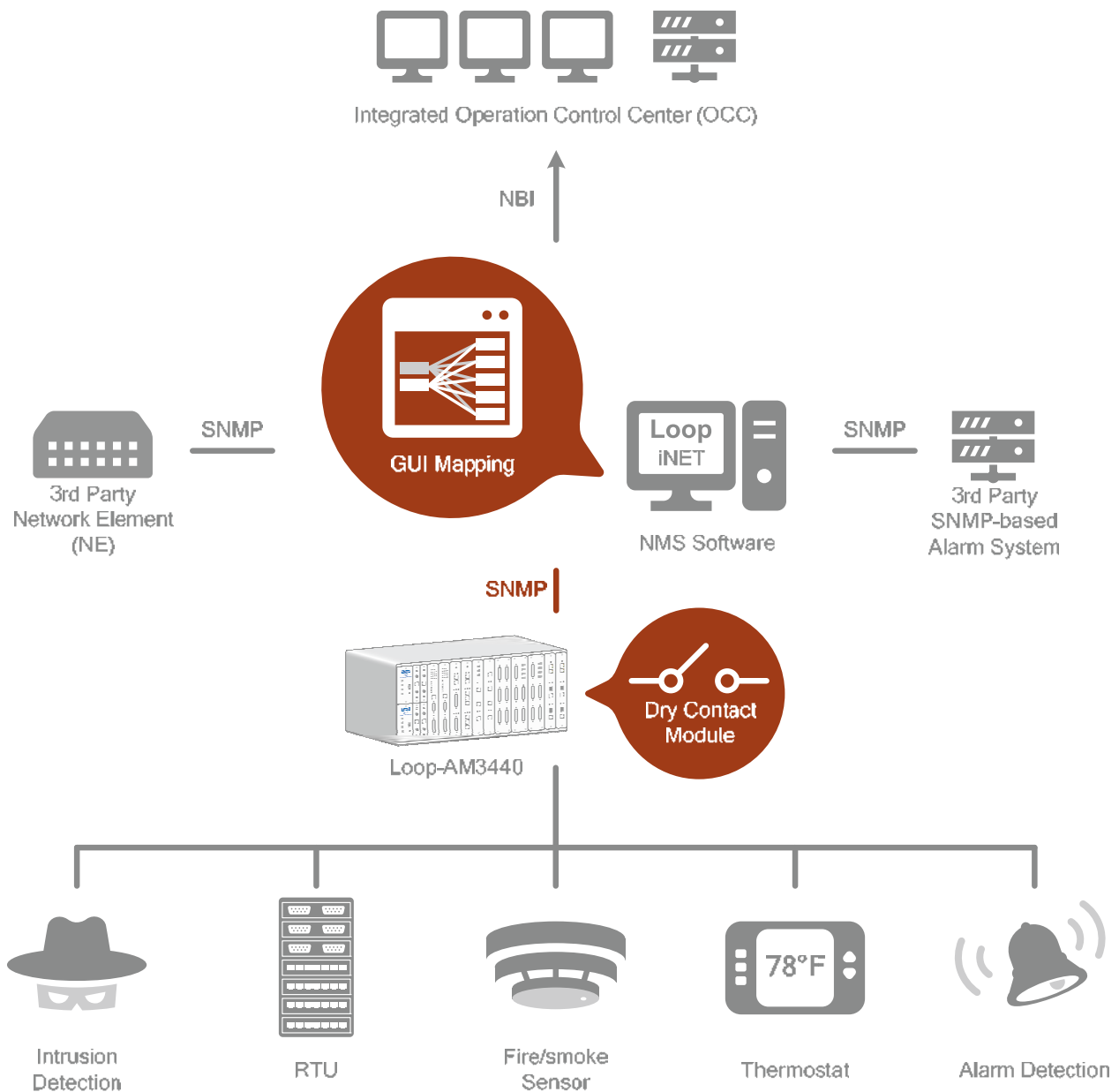
- TDM and Ethernet devices aggregated by Loop-AM3440 and transported via packet microwave radio
- Remote sites monitored by offices in metropolitan areas real-time via SDH/SONET backbone network





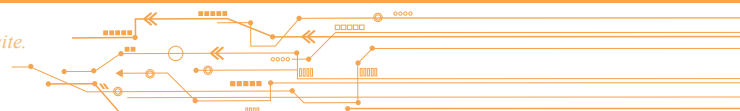
PTN Ring, SDH/SONET Ring, and Dual Ring Backbone Architecture

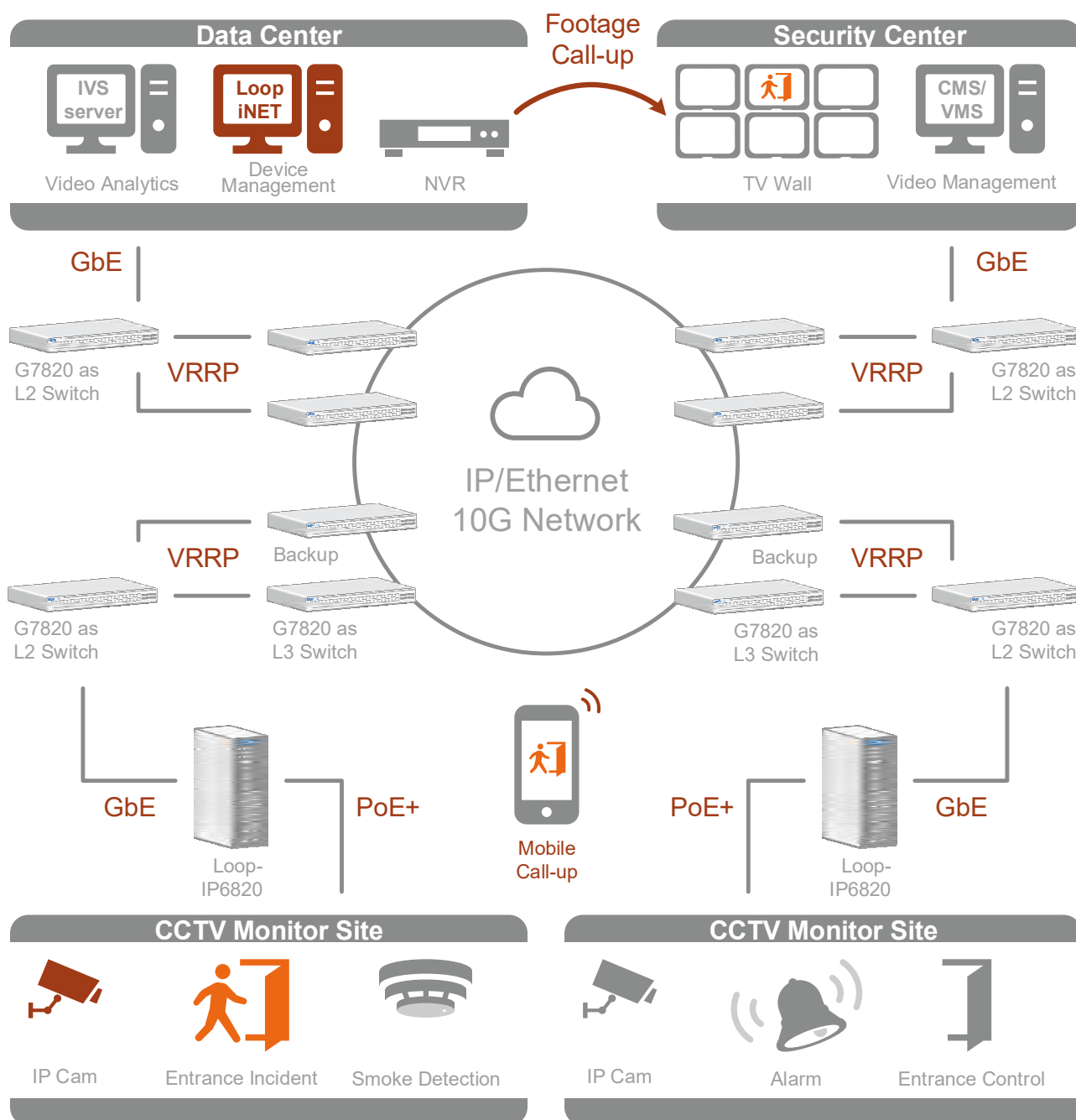
- Dual Networks: critical services via SDH/SONET; bandwidth demanding services via PTN
- Integrated management system capable of end-to-end service management and diagnostics
- A range of module repertoire to select from to answer customer's requirement



Intelligent Network Management System (NMS)

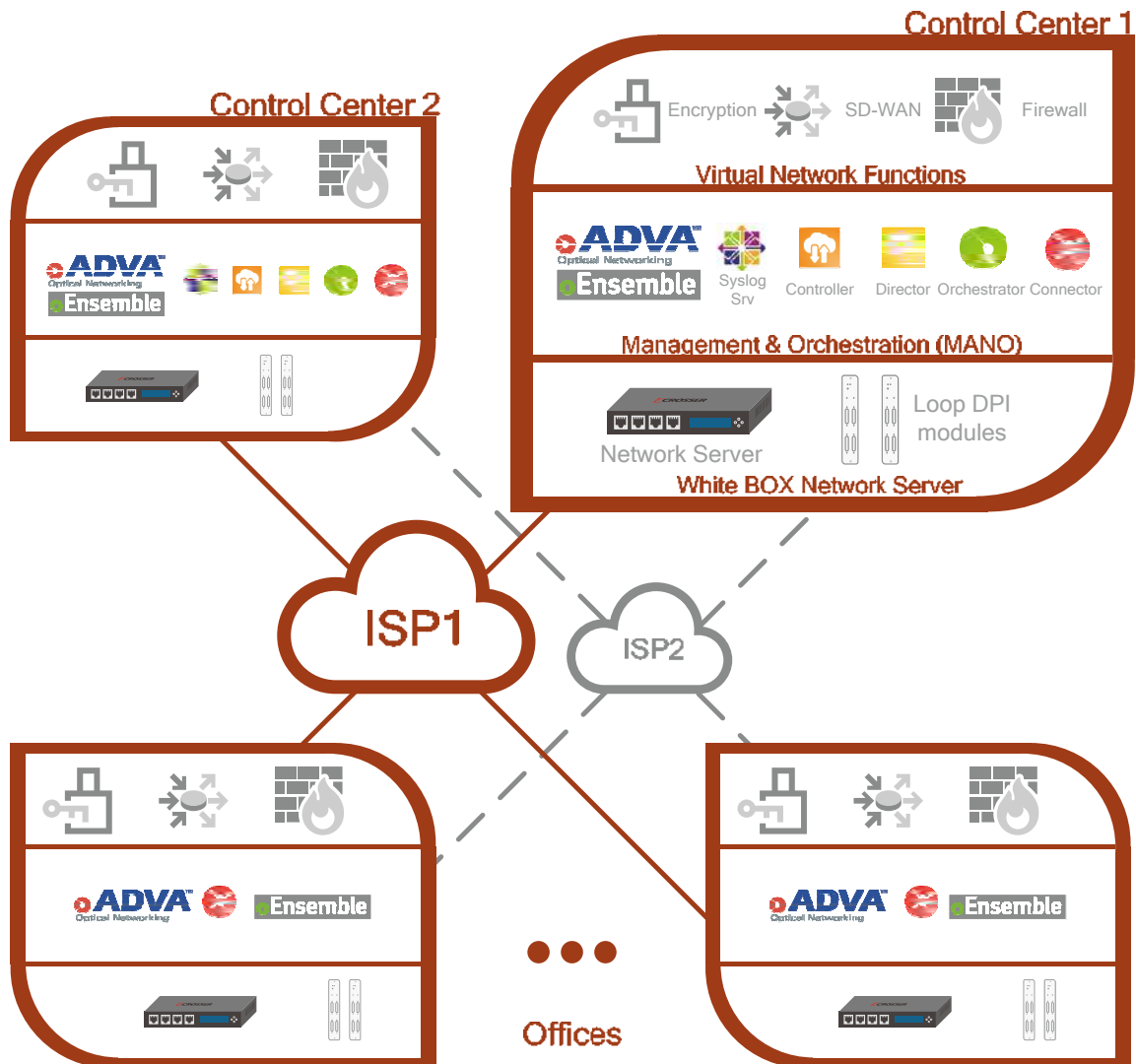
- End device signals transported by Loop-AM3440 Dry Contact to OCC for management and operation
- Trapping & polling via SNMP integrated by Loop-iNET for alarms, events, and diagnostics
- Graphical User Interface (GUI) on Loop-iNET for user friendly cross-connect mapping over NEs





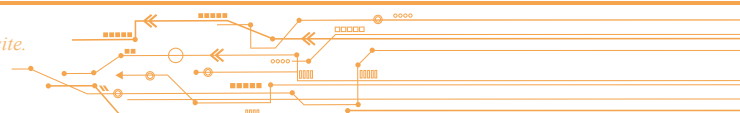
CCTV Surveillance for Access Control

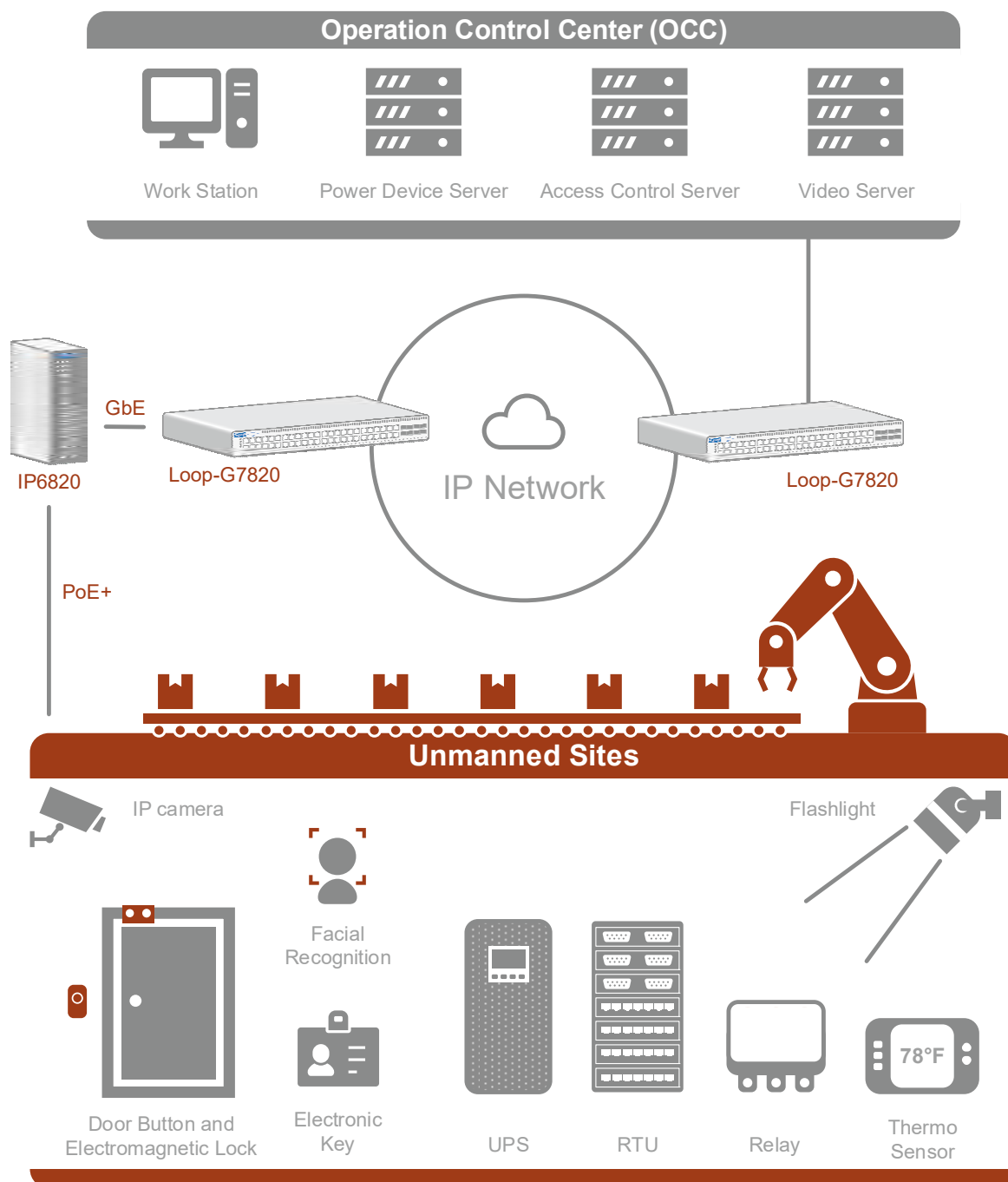
- Network CCTV system enables Security Center to access footage upon call-up via Loop-iNET.
- VRRP paired L3 switches provide redundancy for protection at node level for service continuity and stability.
- Footage transported over IP6820 and G7820 via IP/Ethernet back to Data Center and Security Center



Network Function Virtualization (NFV) for Information Security

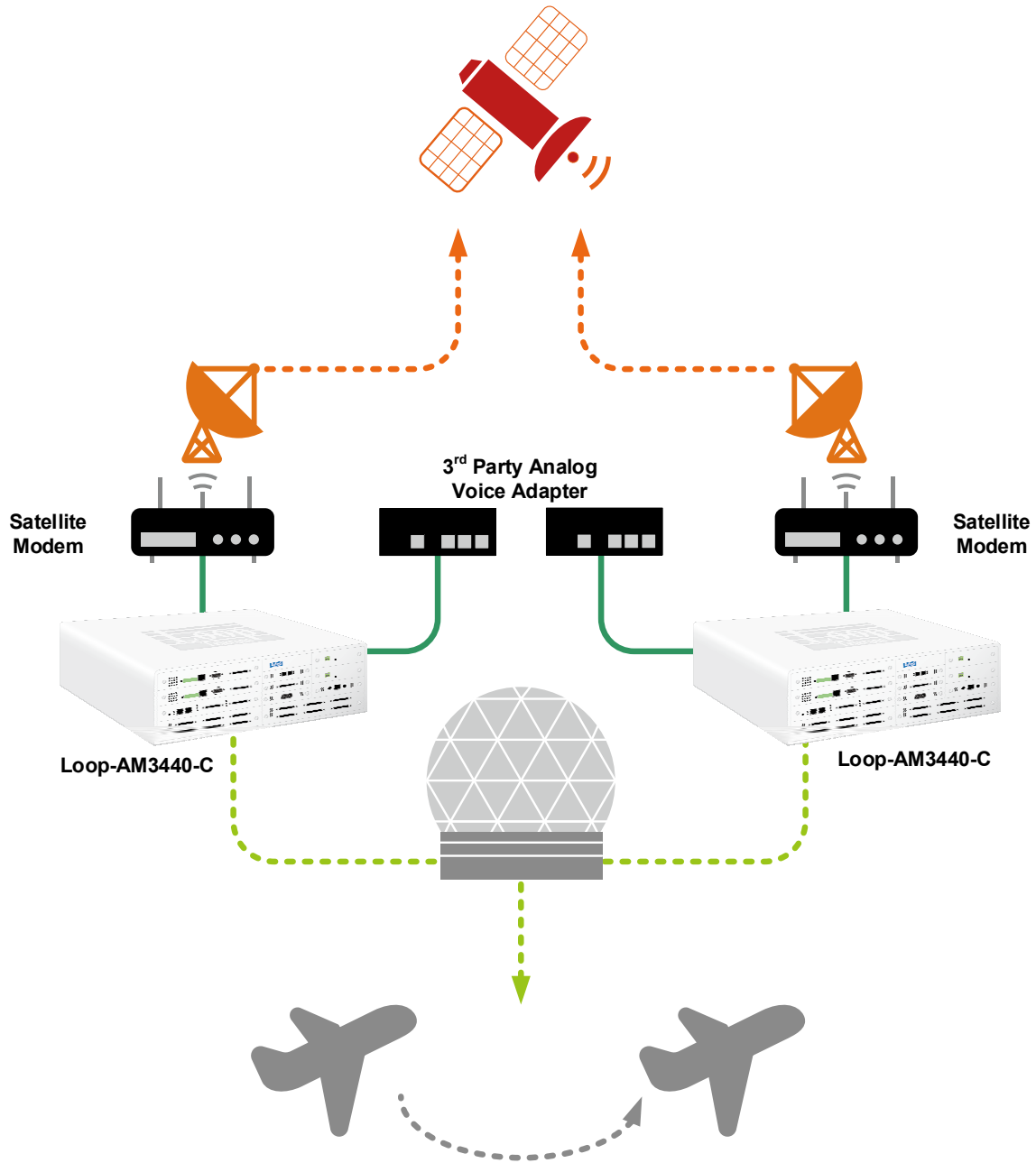
- Virtualized Network Functions (VNF) for integrated information security
- Management, control and orchestration over VNFs at remote offices via Carrier Ethernet
- NFV as a flexible, cost-effective, and scalable platform for next generation information security





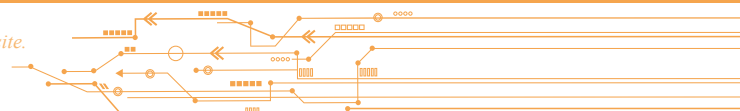
IIOT Communication with Unmanned Sites

- Working status and readings of all devices at unmanned sites collected and monitored for operation
- Entrance and access controlled and monitored via IP cameras, electronic keys/locks, and digital devices
- Real-time diagnostics and events reported to OCC via Loop-IP6820/G7820 hauling over IP Network



Mission Critical Communication: Air Traffic Control via Satellite

- Loop-AM3440-C is used to send multiple DS0s over satellite links to remote locations
- Support transportation between phone and air-to-ground radio communications





Network Management

Loop-iNMS Integrated Network Management System	18
Loop-iNET Intelligent Network Element Management System (EMS)	26
Loop-LCT Graphical Configuration Tool	32



Loop-iNMS Integrated Network Management System

Features

- User-friendly GUI (Graphical User Interface)
- GUI client runs on Microsoft Windows platform.
- Server software runs on Linux
- Database Server: Oracle 11g/12c/19c
- End-to-end service management
- Fully supports all SNMP functions including commands, alarms, and statistics gathering
- Scalable up to 50 separate GUI clients simultaneously logged into the iNMS server
- Allows viewing and printing of all node statistics and alarm reports
- Configurable report design provides routine and on-demand reports
- Enriched topology management integrated with optional GIS geographic maps
 - Features zoom and drag-and-drop functionality
 - Views of optical cable connection, cross-connection, panel view, and resource trees increase service availability
- Robust and reliable configuration management scales to add additional network elements in distributed system architecture
- Efficient performance monitoring in real-time and history PM data at the NE level and circuit level
- Alarm management provides automatic notification via e-mail, GSM message (SMS), and audio alarms with advanced filtering system
- Root Cause Analysis (RCA) accurately diagnoses faults on NEs and managed circuits by status and severity levels
- System Access Security
 - Role-based user access control.
 - Customizable through any combination of operation functions, geographical locations/areas, and NEs
- Customer support management, advanced circuit diagnostics, and server self-management
- Advanced optional functions include
 - SNMP Northbound Interface (SNMPNBI)
 - Root Cause Analysis (RCA)
 - Clock Distribution Map (CDM)
 - Report Management Generic (RMG)
 - High Availability Real-Time Cluster (HARC) with Real-Time Data Replication and system redundancy
 - Disaster Recovery (DR) for System Redundancy
 - 3rd-Party NE Management (3rdNE)
 - Pseudowire Circuit Management (PWCKT)
 - Circuit Group & Circuit Alarm (CGCA)
 - Circuit-Level Performance (CPERF)
 - DS0 SNCP Circuit Management (DS0SNCP)
 - PDH ULSR Ring Circuit Management (PDHRING)

Description

Loop-iNMS (Integrated/Intelligent Network Management System) is a set of intelligent software programs used for providing a Graphical User Interface (GUI) for the management of a communications network containing Loop Telecom products. It can be categorized into 3 groups below:

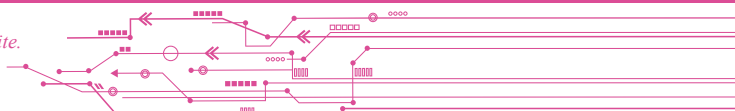
- (1) TDM Access, which includes E1 CSU/DSU, HDSL CSU/DSU, and IDSL CSU/DSU
- (2) Optical Transmission, which includes SDH/SONET ADM (Add-Drop Multiplex)
- (3) IP/Ethernet interfaces

The GUI runs on a user-supplied computer running Microsoft Windows platform. Via LAN or WAN, up to 50 separate GUI clients can be concurrently logged into iNMS.

Workforce management is facilitated by multiple levels of login security, which provide the network manager great flexibility in work assignments. The hierarchical grouping featuring cities, buildings, and rooms allows rapid access to the desired network elements.

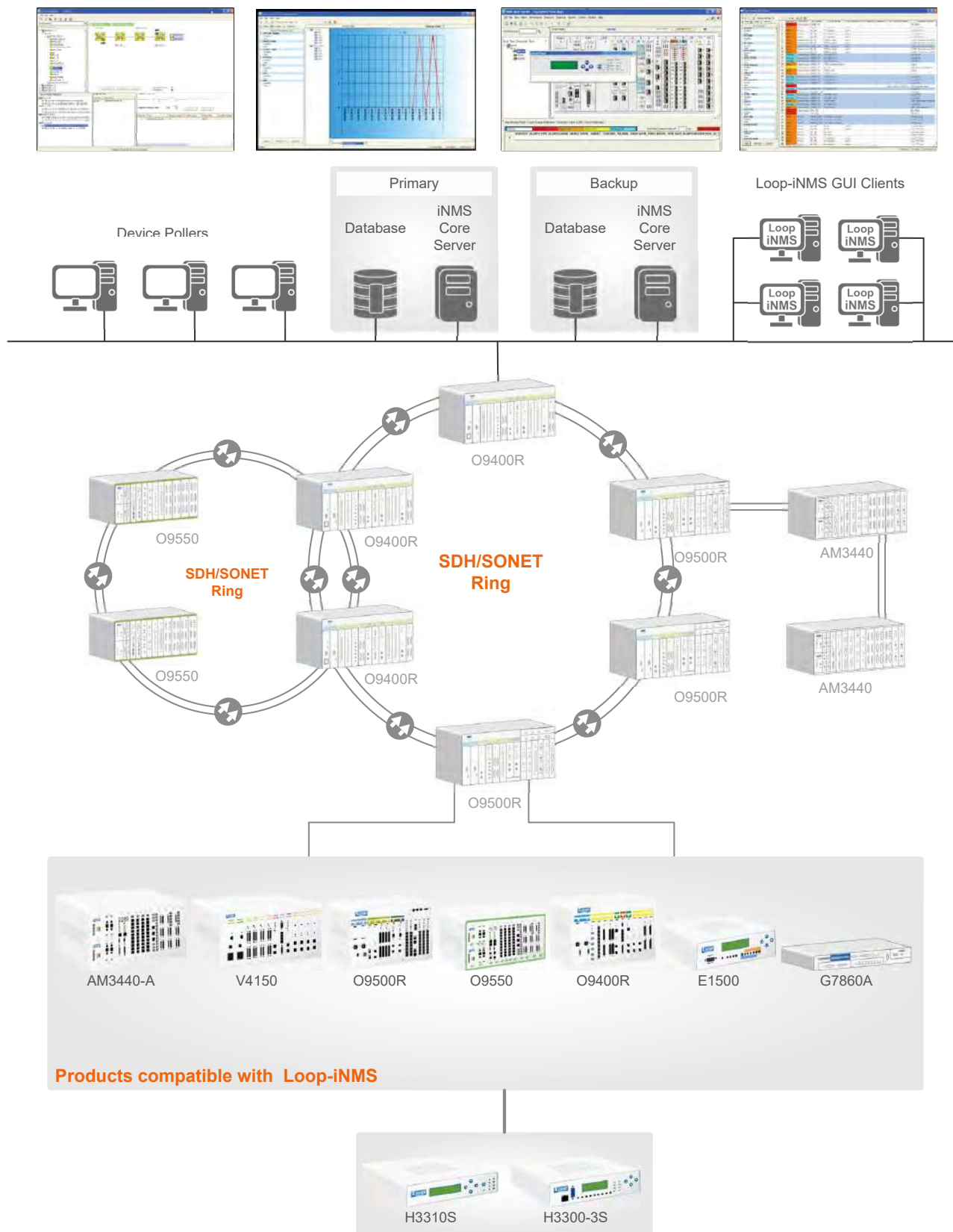
All SNMP provided functions are available in Loop-iNMS. This includes the execution of all commands, the gathering of all statistics, and the display of all alarm conditions in real time. Maps and reports can be printed as well as viewed directly from the iNMS GUI clients.

The support of Southbound Interface with NEs includes SNMP v1, v3, and others upon request. The northbound interface is SNMP based. Loop-iNMS is flexibly designed in a way to support nearly all types of southbound and northbound protocol sets. Customization adaptation into different protocols is allowed and is available upon request.





Loop-iNMS Architecture





The Loop-iNMS basic components are Device Poller, iNMS core and iNMS GUI Clients as shown in the top part of the diagram. The Loop-iNMS is capable of managing all the devices from Loop.

iNMS Main Core

- Runs on Linux/Regular PC server
- Self-sustaining iNMS core is the background engine supporting FCAPS services
- Optional northbound interface engine is an advanced feature available upon request
- Supports TCP/IP socket connections for DPs, iNMS server, Database server, and GUI clients running on different PCs and servers in order to manage a large network when required
- Redundancy option is supported

DP (Device Poller)

- Runs on Linux/Regular PC server
- Manages the southbound interface to the NE using SNMP protocol
- Provides regular polling of the current status of every NE
- Presents all real-time status changes to iNMS GUI client for display
- Supports regular polling of performance data
- Management Protocols supported between NE and DP are SNMPv1 or v3

GUI Clients

- Runs on Windows 7 Professional or Windows 10 Professional
- Supports up to 50 concurrent GUI clients

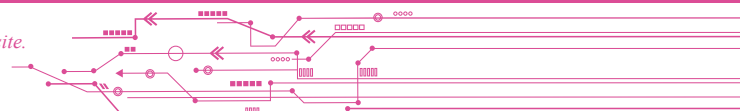
Loop-iNMS Basic Functions

Topology Management

- Offers topology view for:
 - Optical cable connection topology
 - Transmission NE connection topology
 - Access NE connection topology
 - PTN (Packet Transmission Network) NE connection topology
 - Entire network NE connections topology
 - Panel view of equipment (NE)
 - Circuit route view
 - NE internal cross-connection
 - Menu tree view
 - Geographical Network topology view
- Supports zooming in and zooming out of topology views
- Allows users to create a desired layout to reflect the actual network
- Offers drag-and-drop approach for a user to create an NE icon

Configuration Management

- Provides configuration collection
- Supports multi-condition queries; adding, deleting, and modifying operations on configuration information stored in the iNMS database
- Supports configuration synchronization
- Provides remote control on NE's configuration
- General parameters setting
- Activation and release of cross-connections
- Synchronization clock-source setting
- Remote download of firmware for upgrading or maintaining NE
- Remote upload and download of NE configuration through iNMS
- Provides NE-level cross-connection configuration





Circuit Management

- Provides circuit management for:
 - Creation
 - Deletion
 - Query
 - Modification
 - Display and Highlight on GUI topology
 - Database commitment for circuit information
- Provides multi-condition queries; adding, deleting, and modifying operations on circuit information stored in the database
- Provides circuit selection options of shortest path, minimum hop, load balancing, and minimal cost
- Provides a list of un-finished fall-back plans for troubleshooting and rescue operations ports TDM Circuit rate including:
 - N x 64K
 - E1
 - T1
 - E3
 - DS3
 - STM-1/4 or OC-3/12
 - STM-1/4/16 or OC-3/12/48
 - N x VC12 (N=1 to 63 for Ethernet pipe)/VT15 (N=1 to 84)
 - N x VC3/STS-1 (N=1 to 3 for Ethernet pipe)
 - N x VC4/STS-3 (N=1 to 4 for Ethernet pipe)
- Supports circuit route discovery for existing circuits
- Supports circuit deletion

Alarm Management

- NE alarm/event collection
- Alarm filtering
- Circuit-level alarm
- Alarm display
- Alarm history
- Alarm notification

User & Security Management

- Supports adding, deleting, and modifying operations on user account and a group of users
- Provides operation privileges and scope assignments
- Provides history command log for 3 to 12 months
- Supports multi-condition queries on history command log records
- Supports command log

Diagnosis Management

- Supports three types of diagnosis:
 - NE level diagnosis
 - Circuit level quick diagnosis
 - Circuit level advanced diagnosis
- Supports diagnosis report generation

NE-Level Performance

- Port-based performance task creation, deletion, display and query
- Port-based performance data display, query and report generation in tabular and graphical form. Report can be exported and saved in Microsoft Excel (Microsoft Excel versions 2010 or later).



- Performance counter collection in 15 minute or 24 hour intervals

iNMS Self-management

- Supports real-time monitoring on iNMS software processes
- Supports real-time monitoring on the status of the connections between NEs and DPs
- Supports database backup and recovery
- Supports server disk usage monitoring
- Provides online help for OAM&P operation
- Provides Time & Date Synchronization mechanism between iNMS and NEs

Loop-iNMS Advanced Optional Components

SNMP-based Northbound Interface (SNMPNBI)

- Port-based performance task creation, deletion, display and query
- Port-based performance data display, query and report generation in tabular and graphical form. Report can be exported and saved in Microsoft Excel (Microsoft Excel versions 2010 or later).
- Supports SNMP v1/v3 NBI

Report Management Generic (RMG)

- Supports pre-defined & fixed report templates

Root Cause Analysis (RCA)

- User-defined fault policies.
- Root cause analysis based on fault policies

Clock Distribution Map (CDM)

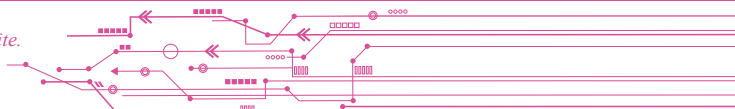
- For TDM Network (both 64k Access and SDH transmission)
- Manual or scheduled clock loop detection

System Redundancy and Protection

- High Availability Real-time Cluster (HARC) Solution
 - Provides geographical system protection with dual iNMS services and an independent system on each site
 - HARC status monitoring
 - Manual and automatic HARC protection switching
 - Real-time data replication automatically for the database of iNMS system
- Disaster Recovery (DR) Solution
 - Provides geographical system protection with dual iNMS services and an independent system on each site
 - DR status monitoring
 - Manual DR protection switching
 - Hourly/Daily data replication automatically for the database of iNMS system

3rd-Party NE Management (3rdNE)

- Manages entire network with one software platform
- Provides capability to manage devices from 3rd-party equipment vendors and Loop devices, which is not fully supported by iNMS
- Shows network element (NE) connectivity and alarm status
- Accesses to telnet and SSH to a NE. Provide URL to bring up 3rd-party equipment web-based management system





Circuit Group & Circuit Alarm (CGCA)

- User-defined circuit group and group category
- Default category for hybrid multi-segment circuit to support TDMoE and conference applications.
- Alarm status monitoring and display by category, group and circuit.

Pseudowire Circuit Management (PWCKT)

- As part of the management solution for Loop pseudowire products to provide emulated Ethernet services over a packet-switching network (PSN).
- Provides Loop TDMoE solution supported by AM3440, O9500, IP6810, IP6820, and IP6702, including pseudowire resource management.
- Supports Loop PTN solutions.
- Pseudowire circuit sub-module for IP switching based, per UDP number bundling circuit.
- Hybrid circuit sub-module coming with pseudowire circuit management over a PSN network and multi-segments circuit management over TDM and PSN network.

Circuit-Level Performance

- Circuit-based performance task creation, deletion, display and query
- Circuit-based performance data display, query and report generation in tabular and graphical form. Report can be exported and saved in Microsoft Excel (Microsoft Excel versions 2010 or later).
- Performance counter collection in 15 minute or 24 hour intervals

DS0 SNCP Circuit Management

- PDH DS0 SNCP circuit creation, deletion, query, modification and display
- Enable, disable and view PDH SNCP link
- Support quick/advanced diagnosis and diagnosis reports

PDH ULSR Circuit Management

- PDH ULSR circuit creation, deletion, query, modification and display
- Enable, disable and view PDH ULSR link
- Support quick/advanced diagnosis and diagnosis reports

Third-Party Hardware System

Hardware Recommendation table

Note 1: Hardware system shall be provided by SI or end-customer.

Note 2: This recommendation is for reference only. Please consult with a Loop representative for precise hardware spec and quantities.

Item	Mandatory/ Optional	Name	Suggested Model	Remarks
1	M	PC Server with Linux	Small Intel Dual-core PC server (rack mount or standalone) Medium Intel Quad-core PC server (rack mount or standalone)	Used as the Loop-iNMS main server if low-cost PC server is preferred.
2	M	Desk-top PC with 22" (or above) LCD and Windows 7/10 Professional 64-bit	Intel dual-core PC	Used as the Loop-iNMS GUI client(s)



PC Server Specifications

Note: This recommendation is for reference only. Please consult with Loop representative for precise hardware spec and quantities.

For project needing more than 100 NEs, please consult with Loop FAE for recommendation.

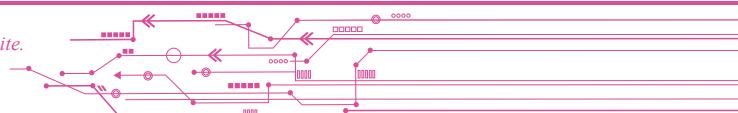
Item	(Rack Mount) Low Capacity	(Rack Mount) Medium Capacity	(Tower) Low Capacity	(Tower) Medium Capacity
	Dell PowerEdge R320	Dell PowerEdge R420	Dell PowerEdge T320	Dell PowerEdge R420
Typical Application	Up to 50 NEs*	Up to 100 NEs*	Up to 50 NEs*	Up to 100 NEs*
Processor	1 x Intel® Xeon® E5-2407 4C (2.20GHz or above)	1 x Intel® Xeon® E5-2430 6C (2.20GHz or above)	1 x Intel® Xeon® E5- 2403 4C (1.80GHz or above)	1 x Intel® Xeon® E5- 2430 6C (2.20GHz or above)
Memory	8GB RDIMM** 1333 MHz	8GB RDIMM** 1333 MHz	8GB RDIMM** 1333 MHz	8GB RDIMM** 1333 MHz
Hard disk	500GB 7.2K SATA 3.5 "	500GB 7.2K SATA 3.5 "	300GB 15K 6Gbps SAS 3.5 "	300GB 15K 6Gbps SAS 3.5 "
DVD R/W	DVD R/W	DVD R/W	DVD R/W	DVD R/W
RAID Controller	Embedded SATA	Embedded SATA	PERC H310	PERC H310
NIC	Dual Port 1GbE	Dual Port 1GbE	Dual Port 1GbE	Dual Port 1GbE
Operating System	Linux / CentOS-7.7 (or RHEL-7.7) 64-bit	Linux / CentOS-7.7 (or RHEL-7.7) 64-bit	Linux / CentOS-7.7 (or RHEL-7.7) 64-bit	Linux / CentOS-7.7 (or RHEL-7.7) 64-bit

* Based on high capacity NE, like AM3440-A. Dual-Core or 3-Core processor machine is only good for network less than 50 NEs. **It is strongly recommended to separate iNMS application server from Database server to a network with more than 100 nodes.**

** Memory requirement = (4GB system minimum + number of nodes x 8MB) x 1.4

Desktop PC Specifications for GUI client

Item	Desktop PC for GUI Client
Typical Application	For all numbers of NEs
Processor	Intel Core i5 (3.2 GHz) or above
Memory	Memory/8GB DDR3 or above
Hard disk	SSD (Solid State Disk) Flash 128G (500MB/s read, 450MB/s write) or above Hard Disk SATA3 500GB/7200rpm or above
DVD R/W	DVD R/W
Sound card & Speaker	Sound interface and Speakers
NIC	10/100/1000M
Graphics	GeForce 600 Series or above
Mouse	USB Wheel or Optical Mouse
Monitor	22" LCD (1024*768) or above
Operating System	Microsoft Windows 10 OS shall be installed inside the SSD above.





Third-Party Software

Item	Name	Mandatory/ Optional	Description	Remarks
1	Microsoft Excel	M	One Microsoft Excel (2010 or later) for each GUI client	MS Excel is required for various report functions on iNMS. The report function will NOT work without MS Excel. (for MS 2010 or later)
2	Oracle Database (To be purchased from Loop as a bundle)	M	(1). Oracle Standard Edition Two (SE2) bundled with Loop iNMS	Applicable to database server up to two processors.
			Or (2). Oracle Enterprise Edition (EE) bundled with Loop iNMS	For database server which has more than four processors and need the advanced features in Oracle database.

Standards

ITU-T M.3100—Generic Network Information Model.
ITU-T M.3200—TMN Management Service: Overview.
ITU-T M.3400—Management Functions



Loop-iNET Intelligent Network Element Management System (EMS)

Features

- Web based application following design of thin client computing
- Windows style user desktop environment
- Supported browsers: Firefox(32-bit); Internet Explorer (IE)
- Supported server platform: MS Windows
- Database server: MySQL RDBMS
- Multi-language support (upon request)
- Automatic load balancing for the major components to increase performance of iNET server
- Hot standby server redundancy with automatic failover to provide high availability (HA) for the major system components
- 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 inherits privileges automatically from group privilege
- System operation and user access log
- Multi-hierarchical subnet structure allows user 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 ICMP, NTP, and Syslog.
- Up to 100,000 Network Elements (NEs) and unlimited concurrent user connection logged into the iNET server
- Network elements of same model with different versions managed by iNET simultaneously
- Scheduled statistics reports can be displayed and saved in MS Excel/PDF format.
- Enriched topology management provides zoom-in/zoom-out and drag-and-drop functionalities in view, subnet view, link and NE panel status
- Alarm management that provides automatic suppressing and notification via Email with advanced filtering system
- Build-in system monitoring and NE connectivity tool with NE connectivity status for system administration purpose
- Robust and reliable design based on distributed system architecture which provides flexible and scalable solution for network expansions.
- Performance management shows current statistics for the NEs and system
- Advanced optional functions:
 - Currently Active Alarm Summary (CAAS)
 - Graphical Cross-connection Tool (GXC)
 - North Bound Interface: v1/v2C/v3 (NBI)
 - Disaster Recovery (DR)
 - TDM Circuit Marker (TDMCKT)
 - Ethernet connectivity fault management (eCFM)
 - Loopback/BERT tool (DGN)
 - File Transfer (FT) supporting NAT configuration
 - Trend Grapher (TG)

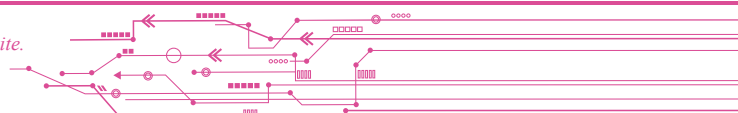
Description

Loop-iNET, based on the scalable and modularized architecture, is a set of intelligent network management software programs which can be taken as both Element Management Layer (EML) and Network Management Layer (NML) based the Telecommunications Management Network (TMN) model. This program is flexibly designed to manage your network regardless of size or complexity. You can add or remove any component as you want without affecting operations of the system. It provides a GUI (graphical user interface) for the management of a communications network containing Loop Telecom products.

The workforce management is facilitated by the multiple levels of login security, which provides the network manager great flexibility of work assignment. The hierarchical grouping feature, cities, buildings, and rooms, allow rapid access to the desired network element.

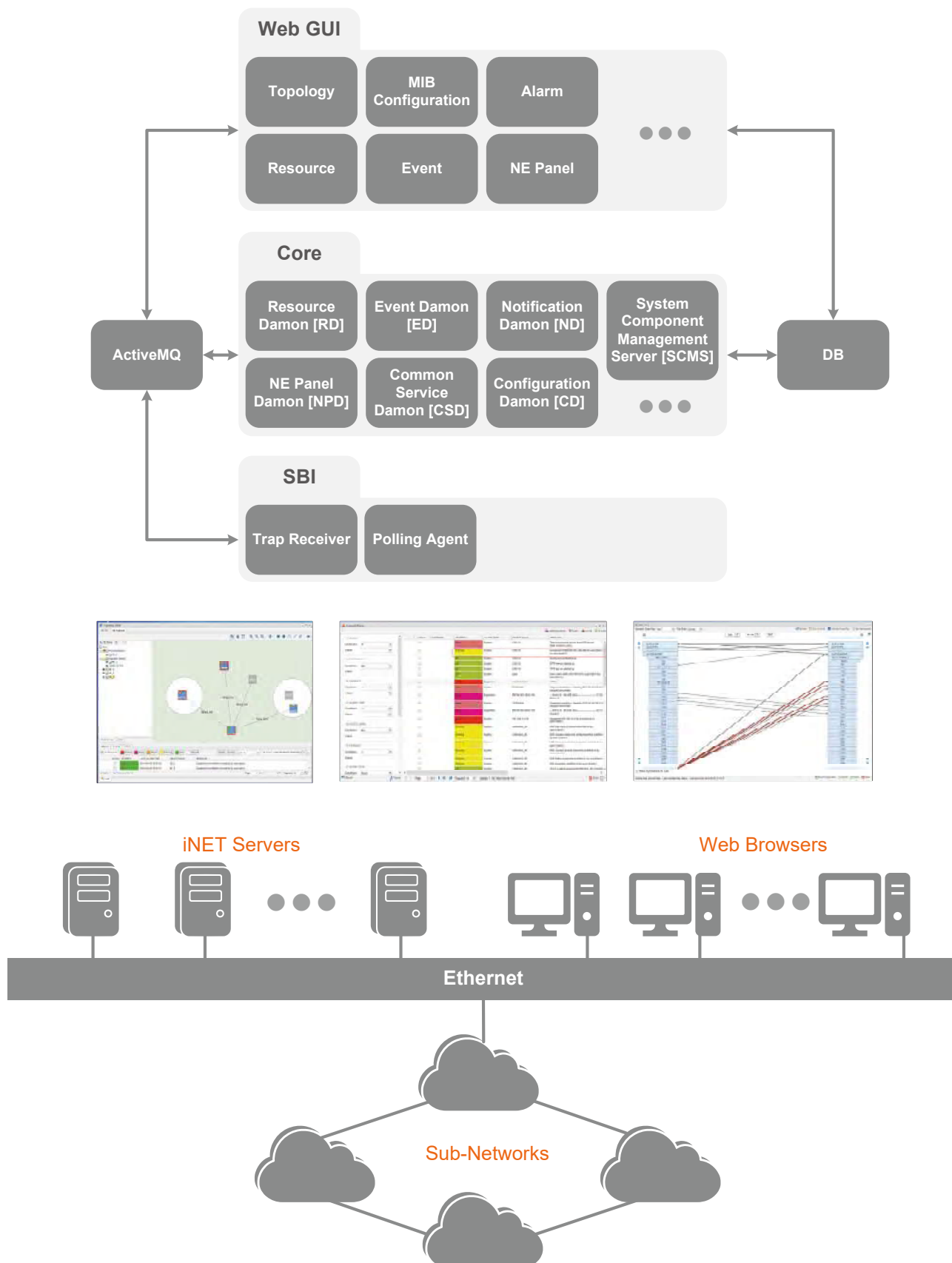
All SNMP provided functions are available in Loop-iNET. This includes the execution of all commands, the gathering of all statistics, and the display of all alarm conditions in real time. The map and the reports can be printed as well as viewed directly from the iNET.

By offering feature-rich functionalities, Loop-iNET maximizes the network efficiency, minimizes the operating costs and reduces the potential risks. Moreover, it supports the protocols of SNMP, NTP, and more (upon request). Customization adaptation into different protocols is allowed and upon request.





Loop-iNET Architecture





Loop-iNET Main Functions

Topology Management

- Offers topology view for:
 - NE/Subnet topology
 - Panel view of equipment (NE)
 - Resource tree
 - MIB tree
- Supports zooming in and zooming out of topology views
- Allows users to create a desired layout to reflect the actual network
- Offers drag-and-drop approach for a user to create an NE icon
- Port-level topology link

NE GIS View

- Manages physical NE locations
- Generic map view

NE Auto-Discovery Management

- Manages multiple discovery agents
- Discovers non-SNMP equipment
- Supports IPv4/v6
- Supports SNMPv1/v2c/v3

Configuration Management

- Provides remote control on NE's configuration
- General parameters setting
- Provides MIB based monitoring and setting on NE, including diagnosis and performance.

Alarm Management

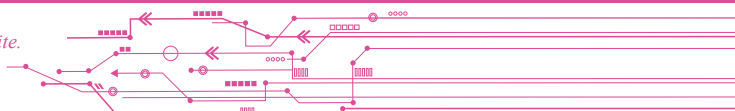
- System/NE alarm/event monitoring including SFP network interface module status collection and threshold alarm setting
- Alarm filtering
- Alarm display
- Alarm history
- Alarm notification via email or SMS
- Configurable alarm audio

User & Security Management

- Supports adding, deleting, and modifying operations on user account and a group of users
- Provides operation privileges and scope assignments
- Provides user operation log
- Supports multi-condition queries on user operation log
- Provides user access log
- Supports multi-condition queries on user access log

iNET Self-Management

- Supports real-time monitoring on iNET software processes
- Supports real-time monitoring on NE connectivity
- Supports database backup and recovery
- Provides date and time synchronization between iNET and NE
- Provides cloud disk to share files over the network





Loop-iNET Advanced Optional Components

System Redundancy and Protection

- Disaster Recovery (DR) Solution
 - Provides geographical system redundancy and an independent system on each site
 - DR status monitoring
 - Automatic data replication between redundant sites
 - System failover and recovery using hot-standby/warm-standby mechanism

Graphical Cross-Connection Tool

- NE-Level Cross Connect Configuration
- Provides equipment cross-connect creation/deletion/display views.
- Supports Normal/SNCP/ULSR cross-connection types

eCFM(Ethernet Demarcation Device Connectivity Fault Management) Tool

- Point-to-Point diagnosis for supported IP based devices
- Supports VPLS and Hub/Spoke modes

File Transfer

- Configuration upload/download
- Firmware download

Currently Active Alarm Summary(CAAS)

- Display Equipment CAAS by different severities
- Query CAAS information based on query conditions

Note: This function is available on some selected Loop products supporting CAAS function as listed in iNET User's Manual.

North Bound Interface(NBI)

- Supports SNMP v1/v2c NBI for Alarms
- Supports SNMP v3* NBI
- Other NBI components are available upon request and additional NRE costs are per-project based. Please contact Loop sales representatives for details.

* Future Option

Trend Grapher

- Real-time data traffic monitoring
- Trend report for performance management in simple and clean graphics

Threshold

- Set threshold for alarm triggering
- Support TG sensor setting for now

TDM Circuit Management

- Supports TDM circuit marker
 - PDH normal circuit marker creation, deletion, query, modification, route discovery and route table export (Not including cross-connection creation/deletion)
- Supports circuit group manager
 - Circuit group creation, deletion, modification, and route table export



PTN Circuit Management

- As part of the management solution for Loop pseudowire products to provide emulated Ethernet services over a packet-switching network (PSN).
- Provide service provisioning function to Loop PTN solutions including circuit creation, deletion, modification, and discovery

TDM Diagnostics Management

- Graphical Loopback/BERT test tool
- Port level diagnostics
- Topolink level diagnostics

Third-party System Hardware

Note 1: Hardware system shall be provided by local SI or end-customer.

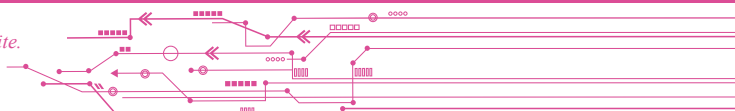
Note 2: This recommendation list below is the minimum system hardware requirement and it is for reference only. Please consult with a Loop representative for precise hardware spec and quantities.

Hardware Specifications for iNET Server

Item	Descriptions
Typical Application	For all numbers of NEs
Processor	Intel Xeon® E5-2600 series v2 or above
Memory	8GB or above
Hard disk	160GB/7200rpm or above
DVD R/W	DVD ROM
NIC	10/100/1000M
Graphics	GeForce 600 Series or above
Mouse	USB Wheel or Optical Mouse
Operating System	Windows Server 2008 R2 Enterprise Windows Server 2008 R2 Foundation/Standard Windows Server 2012 R2 Foundation/Essentials/Standard Windows Server 2016 Foundation/Essentials/Standard Windows Server 2019 Windows 7 Professional, Enterprise, Ultimate (32 or 64 bit) Windows 10 Professional

Hardware Specifications for iNET Client PC

Item	Descriptions
Typical Application	For all numbers of NEs
Processor	Intel Core i3 2.4 GHz or above
Memory	4GB or above
Hard disk	160GB/7200rpm or above
DVD R/W	DVD ROM
Sound card & Speaker	Sound Interface and Speakers
NIC	10/100/1000M
Graphics	GeForce 600 Series or above
Mouse	USB Wheel or Optical Mouse
Monitor	22" LCD (1024*768) or above





Operating System	Windows XP Professional Windows 7 Professional, Enterprise, Ultimate (32 or 64 bit) Windows 10 Professional Windows Server 2008 R2 Enterprise Windows Server 2016 Windows Server 2019
Web Browser	Firefox (32-bit) /Internet Explorer (IE)

Third-party System Software

Third-Party Software / Open Source Software

Item	Type	Mandatory/ Optional	Description	Name	Remarks
1	Java Runtime Environment	M	One for each iNET server	JDK	Version 6~8
2	Web Server / Application Server	M	iNET can run on Apache Tomcat or Jboss AS	Tomcat	Version 8
3	Database	M	Relational database management system	MySQL	MySQL Community Server version 5.7
4	Java Messaging	M	JMS (Java Message Service) message broker	ActiveMQ	Version 5.4 or above
5	Web Browser	M	One browser for each iNET thin client	Firefox	V52 Extend Support Release (ESR) Version 77~81
				IE	Version 11
6	Microsoft Excel	O	iNET report is in character-delimited format. One Microsoft Excel for each user client machine is required	Microsoft Excel	

Note: For Firefox v52 or higher version, some of old models require installing Firefox Extend Support Release (ESR).

Associated Management System Standards

Standards

ITU-T M.3100—Generic Network Information Model.
ITU-T M.3200—TMN Management Service: Overview.
ITU-T M.3400—Management Functions



Loop-LCT Graphical Configuration Tool

Features

- Windows style user desktop environment
- Supported browsers: Firefox (32-bit), Internet Explorer (IE)
- Database server: PostgreSQL RDBMS
- SNMP based management system that supports SNMP functions including commands, alarms, and statistics gathering.
- Management of a Loop NE/ 3rd-party NE
- Built-in MIB compiler for SNMP based NE
- Configuration upload/download
- Firmware download
- Graphical Cross-connect Tool (GXC)
- Diagnostics (BERT/Loopback Test) by port
- Trend Grapher (TG) for performance monitoring
- NE panel view with LED, alarm indication & GUI menu
- NE firmware/hardware version detection
- Working TSI map selection, status & management
- Cross-connect information export/import
- Cross-connect of data/voice type, frame/unframed, CAS ON/OFF
- Support Normal/SNCP/ULSR TSI mapping
- Support SNMP v1/v2c/v3

Description

Loop-LCT is based on Loop-iNET platform and provides a GUI user interface for equipment configuration and management.

It supports NE panel view and allows MIB table setting. Moreover, the Graphical Cross Connections (GXC) tool is quite helpful in managing the cross connections on equipments. It is designed to manage equipments by using web browser. It allows you to access and perform operations and maintenance tasks with user friendly tools.



Loop-LCT Main Functions

Equipment Panel View

- Offers real-time LED status, alarm indication, visualized plug-in card information and GUI menu for configuration

Graphical Cross-Connect Mapping Tool

- NE-Level Cross Connect Configuration
- Provides equipment cross-connect creation/deletion/display views.
- Supports Normal/SNCP/ULSR cross-connect types

File Transfer

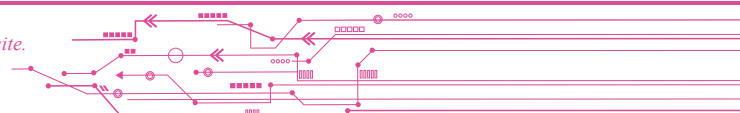
- Configuration upload/download
- Firmware download

Trend Grapher

- Real-time data traffic monitoring
- Trend report in simple and clear graphics

TDM Diagnostics Management

- Graphical Loopback/BERT tool
- Port level diagnostics





Third-party System Specification

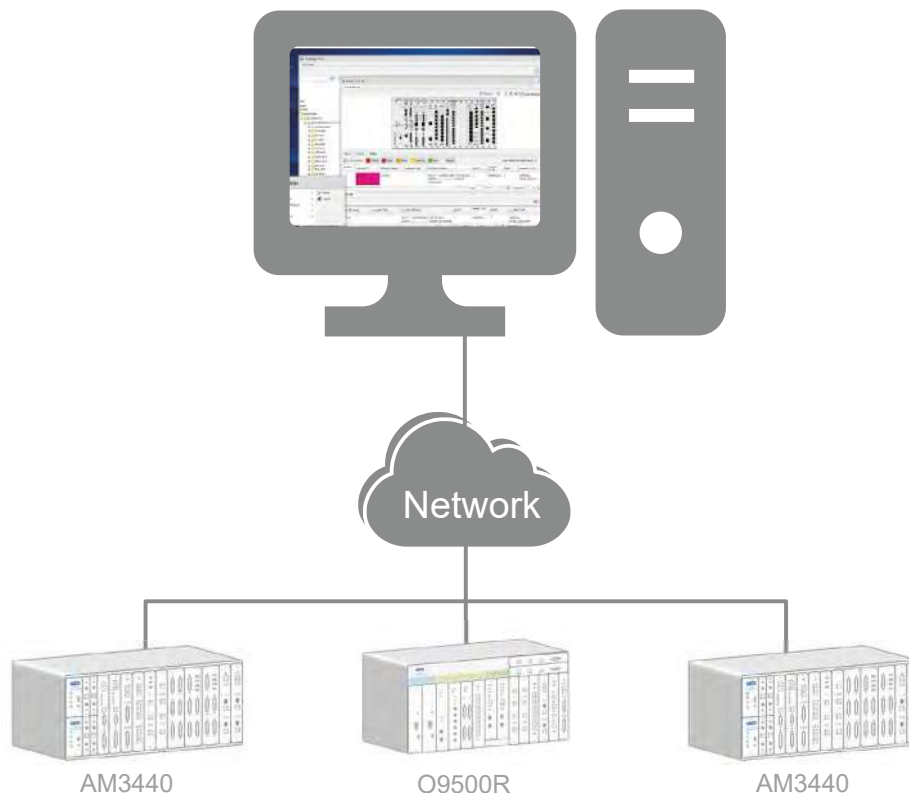
Note 1: Hardware system shall be provided by local SI or end-customer.

Note 2: This recommendation list below is the minimum system hardware requirement and it is for reference only. Please consult with a Loop representative for precise hardware spec and quantities.

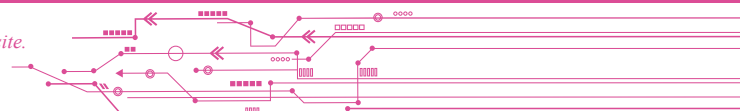
Minimum Hardware Specifications

Item	Descriptions
Processor	Intel i3 Core (2.4 GHz or above)
Memory	4GB or above
Hard disk	60GB/5400rpm or above
NIC	10/100/1000M
Resolution	1024*768 or above
Operating System	Windows Server 2008 R2 Enterprise Windows Server 2008 R2 Foundation/Standard Windows Server 2012 R2 Foundation/Essentials/Standard Windows 7 Professional, Enterprise, Ultimate (32 or 64 bit) Windows 10 Professional
Web Browser	Firefox (32-bit): V52 Extend Support Release (ESR), V77~81 IE: Version 11

Application Illustration



iNET-LCT for Equipment Management





SDH/SONET-MSTP

Loop-O9150Sa SDH STM-1 TM/ADM	36
Loop-O9170S SDH STM-1 MUX	38
Loop-O9400R SDH/SONET ADM/TM	40
Loop-O9500R SDH/SONET IMAP	53
Loop-O9550 SDH/SONET IMAP	66
Loop-O9550-D SDH/SONET IMAP	72



Loop-O9150Sa SDH STM-1 TM/ADM



Features

- Mechanical and Electrical
 - 1U height ETSI/ANSI shelf unit (front/rear access)
 - Standalone, and rack mount
 - SDH STM-1 TM /ADM Mux
- Aggregate Port
 - 2 STM-1 with SFP optical housing
- On-board tributaries on TG1/TG2 slot
 - TG1: up to 2/4 FE
 - TG2: up to 8 E1
- Optional modules on TG3/TG4*/TG5* slot
 - TG3: 8 E1
 - TG4/TG5(Manufacture option)*
 - 16-port E1
 - 4-port GE SW
- Ethernet
 - Supports GFP, VCAT, LCAS, Non-LCAS
- Network Protection
 - SNCP and MSP (1+1) protection
- Timing
 - Support External/Internal/Line/E1 clock
- Power Supply
 - Two hot swappable DC plug-in modules (-48 Vdc) for redundancy
 - Two hot swappable AC plug-in modules (100 to 240 Vac) for redundancy
- Performance Monitoring
 - 1 hour, 24 hours, and 7 days
 - Alarm suppression, masking, and reporting
- Management
 - Console port
 - SNMP v1
 - Centralized management with Loop's EMS over DCC channel
 - Through E1
 - Loop-iNET Intelligent Network Management System
 - Telnet support

Description

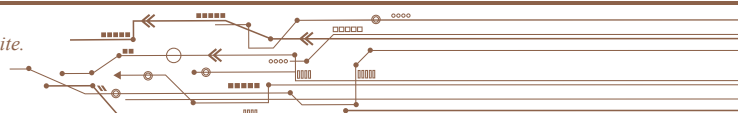
Loop-O9150Sa is an economical, cost-effective SDH STM-1 TM/ADM designed to combine digital access interfaces including TDM and interfaces into STM-1 optical lines for convenient transport and switching. Through STM-1 uplink, O9150Sa provides VC-12 standard E1s and Ethernet supporting GFP, VCAT, LCAS and Non-LCAS protocol.

The O9150Sa is a comprehensive SDH STM-1 multiplexer platform for traditional telecom businesses and broadband information business applications, and a blending trend which adapts Metropolitan Area Network as well as audio and information business in all Private Networks.

The O9150Sa provides two aggregate STM-1 interfaces which offer the service provider a versatile protection scheme including SNCP and MSP (1+1) protection for both ring and linear network topology.

All interfaces are fully compliant with the relevant ANSI standards and ITU recommendations. The O9150Sa provides fault management, performance monitoring, configuration management, and network security management. Through the console port, LAN port, E1 port, and DCC channel, the OAM&P can be achieved both locally and remotely via SNMP or menu-driven interfaces. The O9150Sa supports the LOOP-iNET Intelligent Network Management System.

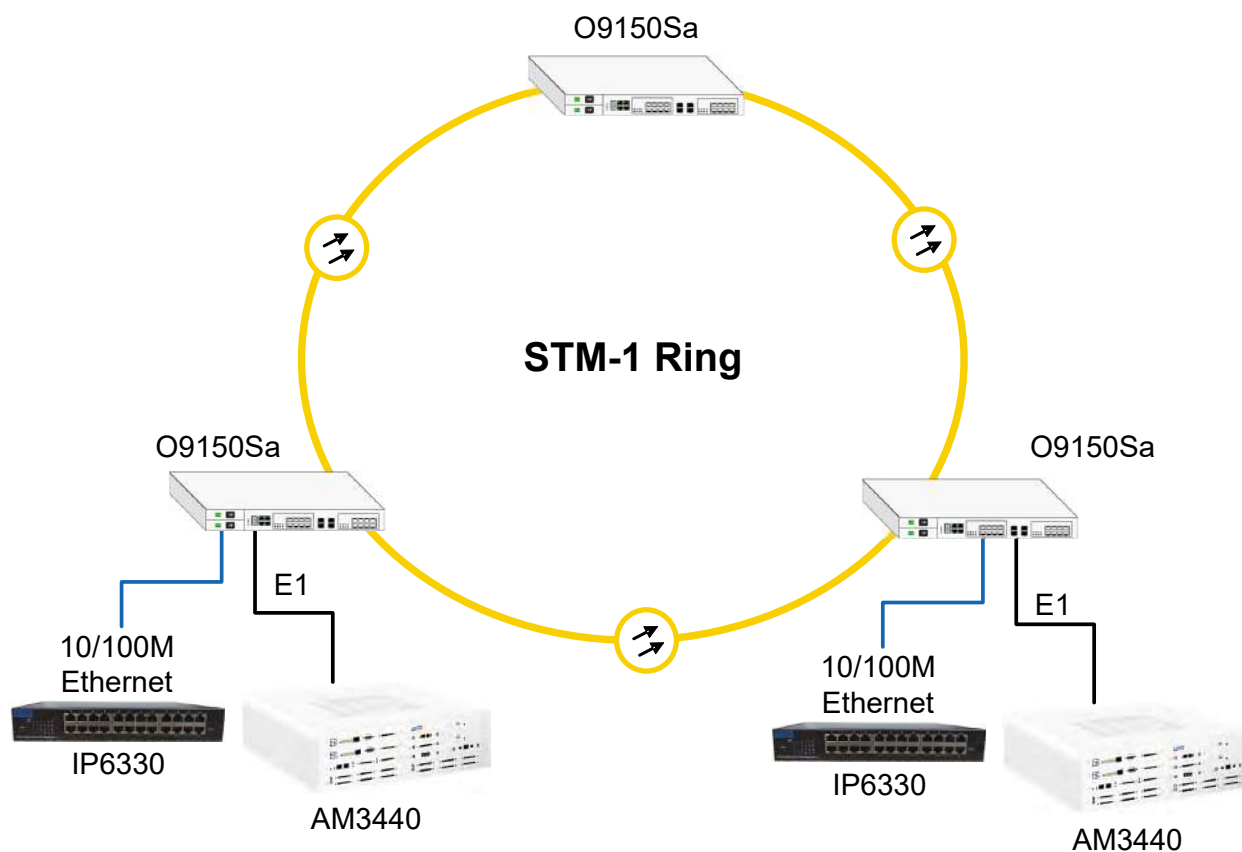
*Future option





Application Illustration

STM-1 Ring Protection





Loop-O9170S SDH STM-1 MUX

Features

- 1U height ETSI/ANSI shelf unit (front/rear access)
- Standalone, wall mount, and rack mount
- SDH STM-1 TM and ADM
- Aggregate port
 - 2 SFP optical housing
 - MSP 1+1 protection and SNCP
- On-board tributaries on fixed slot
 - 8-port E1 ports with 1 DB37 or 6 E1 ports with RJ48 connectors unframed clock independent
 - Four 10/100 (FE) Ethernet ports
- On-board DS0 tributary on TG3 slot (manufacture option)
 - 4-port RS232 and 4-port FXS
 - 4-port RS485 and 4-port FXS
 - 4-port RS232 and 4-port RS485
 - 8-port FXS
 - 8-port FXO
 - 8-port RS232
 - 8-port RS485.
- Optional DS0 modules on TG4 slots (manufacture option)
 - 4-port E&M
 - 4-port RS232 and 4-port RS485
 - 8-port FXS
 - 8-port FXO
 - 8-port RS232
 - 8-port RS485
- Optional DS0 modules on TG5 slots (manufacture option)
 - 4-port E&M
 - 4-port RS232 and 4-port RS485
 - 8-port FXS
 - 8-port FXO
 - 8-port RS232
 - 8-port RS485
 - 4-port E1/FE1
- Power Modules
 - Hot swappable DC power (-48 Vdc)
 - AC power (100 to 240 Vac)
 - Dual power modules for redundancy
- DS0 cross-connect fabric with TG3, TG4, TG5 modules and SNMP
- Networking protection
 - MSP (1+1) and SNCP protection
 - Support External/Internal/Line/E1 clock
- Supports VCAT, GFP, and LCAS
- Performance monitoring
- Alarm suppression, masking, and reporting
- Management:
 - Console port
 - SNMP port
 - Centralized management with Loop's EMS over DCC channel
 - Loop-iNET Intelligent Network Management System
 - Telnet support



Description

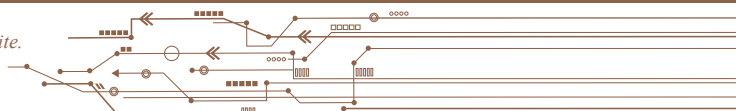
Loop-O9170S is an economical, cost-effective SDH STM-1 Mux designed to combine digital access interfaces including TDM, IP, and voice interfaces into STM-1 optical lines for convenient transport and switching. Through STM-1 uplink, O9170S provides VC-12 standard E1s and Ethernet supporting VCAT, GFP, and LCAS protocol.

The O9170S is a comprehensive SDH STM-1 multiplexer platform for traditional telecom businesses and broadband information business applications, and a blending trend which adapts Metropolitan Area Network as well as audio and information business in all Private Networks.

The O9170S provides two optical line signals at STM-1 with protection schemes including MSP(1+1) and SNCP protection in both ring and linear network topologies.

On the aggregate side, the O9170S has two STM-1 ports supporting 1+1 protection. On the tributary side, the O9170S has four Ethernets and 8-port E1, and optional DS0 interfaces of Voice (FXS/FXO/E&M), DTE (RS232/RS485) and FE1 interfaces.

All interfaces are fully compliant with the relevant ANSI standards and ITU recommendations. The O9170S provides fault management, performance monitoring, configuration management, and network security management. Through the console port, LAN port and DCC channel, the OAM&P can be achieved both locally and remotely via SNMP or menu-driven interfaces. The O9170S supports the LOOP-iNET Intelligent Network Management System.



ADM mode typical application (SNCP Protection)





Loop-O9400R SDH/SONET ADM/TM

Supporting SDH & PDH



Features

- 6U height, full front access (ETSI) shelf support up to 2.5G Mbps backplane
- Hot-swappable cross-connect modules, tributary modules and power modules
- Temperature-controlled fan tray
- Aggregate cross-connect modules (controller modules)
 - Up to STM-1/4/16 (OC-3/12/48) aggregate lines with software configuration (CC16)
 - Up to STM-1/4 (OC-3/12) aggregate lines with software configuration (CC4)
- Tributary modules: 8 tributary slots
 - Two ports STM-1/4 (OC-3/12) module
 - Three ports E3/T3 module
 - 16/32/63 ports E1/T1 tributary module
 - 8GbE tributary module with L2 switch
- Power Modules
 - DC module (-40 to -72 Vdc), 300w; AC/DC hybrid module (90 to 240 Vac; -40 to -72 Vdc), 300w
 - Dual power (1+1) protection
- Protection
 - Controller cross-connect unit (CC4/CC16) protection, MSP (1+1), SNCP/UPSR Ring
 - Tributary protection
 - E1/T1: Card, Port, Line
 - E3/T3: Line
 - B155/622: MSP, SNCP/UPSR
 - Ethernet
 - 8GE4SW Card
- TM, ADM, and cross-connect
- Full cross-connect at VC11/VC12/VC3/VC4 levels
- External/Internal/Line timing source with SSM
- Ethernet supports GFP, LAPS, VCAT, BCP, LCAS and non-LCAS
- Management
 - Console port, VT100 menu-driven
 - SNMP port: Both v1 and v3 supported
 - Telnet and SSH
 - Centralized management with Loop's EMS/iNMS over DCC channel
 - Loop-iNET GUI Element Management System
 - TMN management (Loop-iNMS) with full FCAPS and end-to-end circuit management
- RoHS compliant

Description

The Loop-O9400R STM-1/4/16 (OC-3/12/48) is a standards-compliant high density SDH/SONET ADM/TM with a full T1/E1 cross-connect rack system.

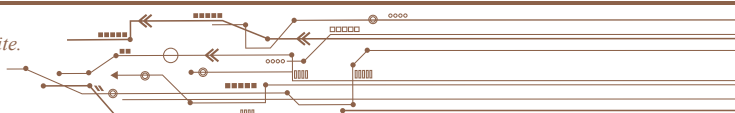
The O9400R has full add and drop capability according to the figures below:

- For the controller STM-1/4 (OC-3/12) aggregate cross connect module, up to
 - 1 STM-4 tributary
 - 8 STM-1 tributaries
 - 18 E3/T3 tributaries
 - 378 E1/T1 tributaries
 - 48 10/100M EoS tributaries
- For the controller STM-1/4/16 (OC-3/12/48) aggregate cross connect module, up to:
 - 1 STM-16 tributaries
 - 4 STM-4 tributaries
 - 16 STM-1 tributaries
 - 24 E3/T3 tributaries
 - 504 E1/T1 tributaries
 - 64 10/100/1000M EoS tributaries

With up to 4 STM-1/4/16 (OC-3/12/48) aggregate interfaces on cross-connect modules and 16 STM-1 (OC-3) interfaces on tributaries, the Loop-O9400R offers the service provider a versatile protection scheme including SNCP (UPSR), and MSP (1+1) protection for network topology.

All interfaces are fully compliant with the relevant ETSI standards and ITU recommendations. The Loop-O9400R provides powerful Operation, Administration, Maintenance and Provisioning (OAM&P) functionality, including fault management, performance monitoring, configuration management, and network security management. Through a console port, LAN port, In-band E1, and DCC channel, OAM&P can be achieved both locally and remotely via SNMP or menu-driven interfaces.

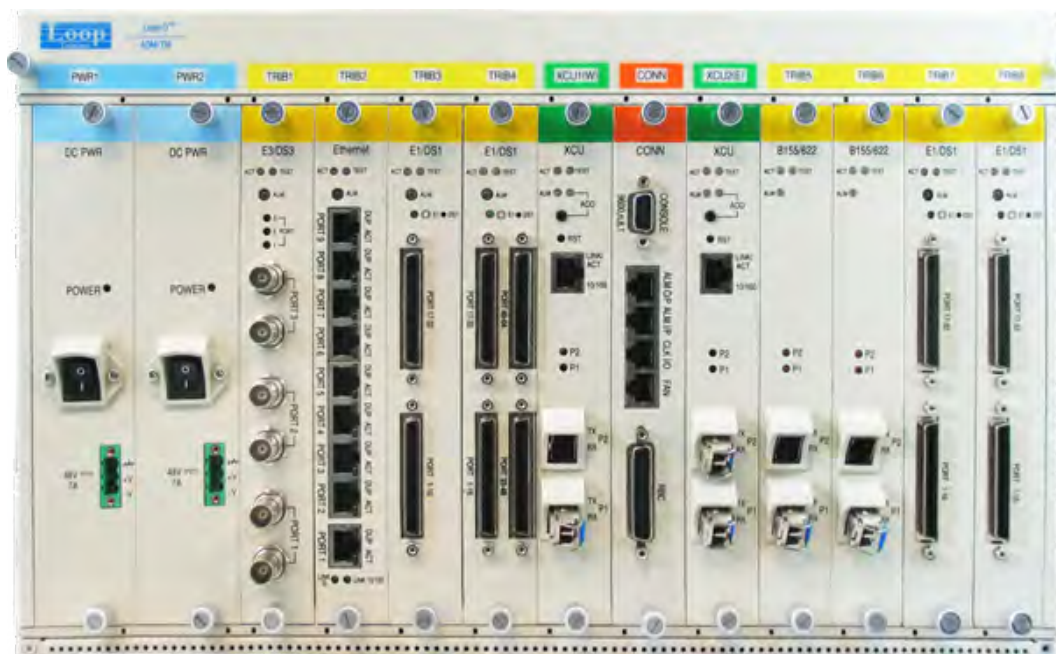
The Loop-O9400R provides a complete set of operation interfaces that are consistent with the Telecommunication Management Network (TMN) concept (ITU Recommendation M.30, G.784) for SDH/SONET Network Element/Operations System (NE/OS), NE/NE, and NE/Craft communications. Users can easily operate the Loop-O9400R locally or remotely for centralized management.



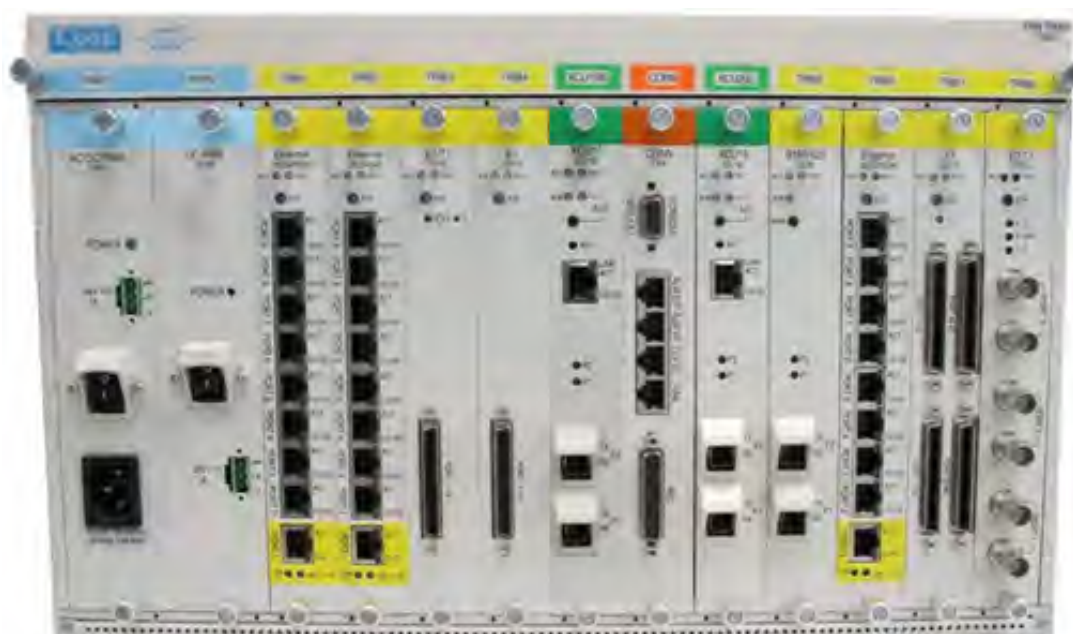


Loop-O9400R Front Panel

Controller STM-1/4 (OC-3/12) with CHA Chassis



Controller STM-1/4/16 (OC-3/12/48) with CHA Chassis







Loop-O9400R Card Type and Capacity Reference Table

Table 1 STM-1/4 (OC3/12) Aggregate Line

In this table, STM-4 equals OC-12; STM-1 equals OC-3; E1 equals T1; and E3 equals T3. Backup/protection is represented by (B).

SLOTS	TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU1(W)	CONNECTOR	XCU2(E)	TRIB 5	TRIB 6	TRIB7	TRIB 8
GLOBAL PAYLOAD SDH	155M		155M		8 x 155M		8 x 155M	2 x 155M 1 x 155M	N/A 1 x 155M	4 X 155M 2 x 155M	N/A 2 x 155M
Tributary (Plug-in Modules)							Tributary (Plug-in Modules)				
Link without MSP	STM-1	N/A	STM-1	N/A	STM-1/4 (2 ports)		STM-1/4 (2 ports)	STM-1	STM-1	STM-1 (2 ports)	STM-1 (2 ports)
	STM-1	N/A	STM-1	N/A	STM-1/4 (2 ports)		STM-1/4 (2 ports)	STM-1	STM-1	STM-4	N/A
	STM-1	N/A	STM-1	N/A	STM-1/4 (2 ports)		STM-1/4 (2 ports)	STM-1 (2 ports)	N/A	STM-1 (2 ports)	STM-1 (2 ports)
Link with MSP (1+1)	STM-1	STM-1(B)	STM-1	STM-1(B)	STM-1/4 (2 ports)		STM-1/4 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports) (B)	STM-1 (2 ports)	STM-1 (2 ports) (B)
	STM-1	STM-1(B)	STM-1	STM-1 (B)	STM-1/4 (2 ports)		STM-1/4 (2 ports)	STM1 (2 ports)	STM-1 (2 ports) (B)	STM-4	STM-4 (B)
Link with SNCP Ring ^{Note 1}	N/A	N/A	N/A	N/A	STM-1/4 (2 ports)		STM-1/4 (2 ports)	STM-1	STM-1	STM-1 (2 ports)	STM-1 (2 ports)
Link with Link with SNCP Ring & MSP (1+1) ^{Note 2}	N/A	N/A	N/A	N/A	STM-1/4 (2 ports)		STM-1/4 (2 ports)	N/A	N/A	N/A	N/A
Max 378 E1 (Single)	63 E1	N/A	63 E1	N/A				63 E1	63 E1	63 E1	63 E1
Max 252 E1 (Protection)	63 E1	63 E1 (B)	63E1	63 E1 (B)				63 E1	63 E1 (B)	63 E1	63 E1 (B)
Max. 18 E3 (Single)	3 E3	N/A	3 E3	N/A				3 E3	3 E3	3 E3	3 E3
Max 12 E3 (Protection)	3 E3	3 E3 (B)	3 E3	3 E3 (B)				3 E3	3 E3 (B)	3 E3	3 E3 (B)
Max 48 10/100 BT 6x 1000BT (Single)	8x10/100BT 1 x 1000BT	N/A	8x10/100BT 1 x 1000BT	N/A				8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT
Max 32 10/100 BT 4 x 1000 BT (Protection)	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT (B)	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT(B)				8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT (B)	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT (B)
8GES4W	STM-1	STM-1(B)	STM-1	STM-1(B)				2 x STM-1	2 x STM-1 (B)	STM-4	STM-4(B)
	STM-1	STM-1 ^{Note 3}	STM-1	STM-1 ^{Note 4}				STM-1	STM-1	2 x STM-1	2 x STM-1

Note 1: XCU1(W) port 1 and XCU2(E) port 1 form Ring #1
XCU1(W) port 2 and XCU2(E) port 2 form Ring #2
Trib5 port 1 and Trib6 port 1 form Ring #3
Trib7 port 1 and Trib8 port 1 form Ring #4
Trib7 port 2 and Trib8 port 2 form Ring #5

Total Capacity = 5 Rings

Note 2: XCU1(W) port 1 and XCU2(E) port 1 with MSP (1+1) protection
XCU1(W) port 2 and XCU2(E) port 2 with MSP (1+1) protection
XCU1(W) port 1 and XCU2(E) port 2 form a ring
These four ports form one STM-1/4 Main Ring with MSP (1+1) protection

Note 3: Disabled if 8GESW is used in TRIB1

Note 4: Disabled if 8GESW is used in TRIB3



Loop-O9400R Card Type and Capacity Reference Table

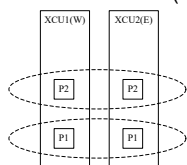
Table 2 STM-1/4/16 (OC3/12/48) Aggregate Line

In this table, STM-16 equals OC-48, STM-4 equals OC-12; STM-1 equals OC-3; E1 equals T1; and E3 equals T3.

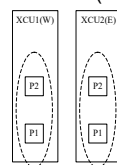
Backup/protection is represented by (B).

SLOTS	TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU1(W)	CONNECTOR	XCU2(E)	TRIB 5	TRIB 6	TRIB7	TRIB 8	
GLOBAL PAYLOAD SDH	4 X 155M	N/A	4 X 155M	N/A	2 x 2.5G		2 x 2.5G	4 X 155M	N/A	4 X 155M	N/A	
	2 x 155M	2 x 155M	2 x 155M	2 x 155M				2 x 155M	2 x 155M	2 x 155M		
	4 X 155M	N/A	16 x 155M	N/A				4 X 155M	N/A	4 X 155M	N/A	
	2 x 155M	2 x 155M	16 x 155M	N/A				2 x 155M	2 x 155M	2 x 155M	2 x 155M	
Tributary (Plug-in Modules)							Tributary (Plug-in Modules)					
Link without MSP	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	
	STM-4	N/A	STM-4	N/A	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-4	N/A	STM-4	N/A	
Link with MSP (1+1) ^{Note 1}	STM-1 (2 ports)	STM-1 (2 ports) (B)	STM-1 (2 ports)	STM-1 (2 ports) (B)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports) (B)	STM-1 (2 ports)	STM-1 (2 ports) (B)	
	STM-4	STM-4 (B)	STM-4	STM-4 (B)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-4	STM-4 (B)	STM-4	STM-4 (B)	
Max 504 E1 (Single)	63 E1	63 E1	63 E1	63 E1				63 E1	63 E1	63 E1	63 E1	
Max 252 E1 (Protection)	63 E1	63 E1 (B)	63 E1	63 E1 (B)				63 E1	63 E1 (B)	63 E1	63 E1 (B)	
Max. 24 E3 (Single)	3 E3	3 E3	3 E3	3 E3				3 E3	3 E3	3 E3	3 E3	
Max 12 E3 (Protection)	3 E3	3 E3 (B)	3 E3	3 E3 (B)				3 E3	3 E3 (B)	3 E3	3 E3 (B)	
Max 64 10/100 BT 8x 1000BT (Single)	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT				8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT	
Max 32 10/100 BT 4 x 1000 BT (Protection)	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT (B)	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT (B)				8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT (B)	8x10/100BT 1 x 1000BT	8x10/100BT 1 x 1000BT (B)	
8GES4W	STM-4	STM-4(B)	STM-4	STM-4(B)				STM-4	STM-4(B)	STM-4	STM-4(B)	
	STM-4 or 2 x STM-1	2 x STM-1	STM-4 or 2 x STM-1 ^{Note 2}	STM-4 or 2 x STM-1 ^{Note 2}				STM-4 or 2 x STM-1	2 x STM-1	STM-4 or 2 x STM-1	2 x STM-1	

Note 1: With MSP (1+1) protection, the protection pair on XCU (W) and XCU (E) are as follows:

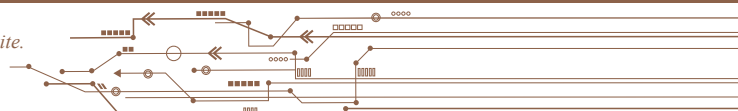


XCU (W) port 1 and XCU (E) port 1
XCU (W) port 2 and XCU (E) port 2



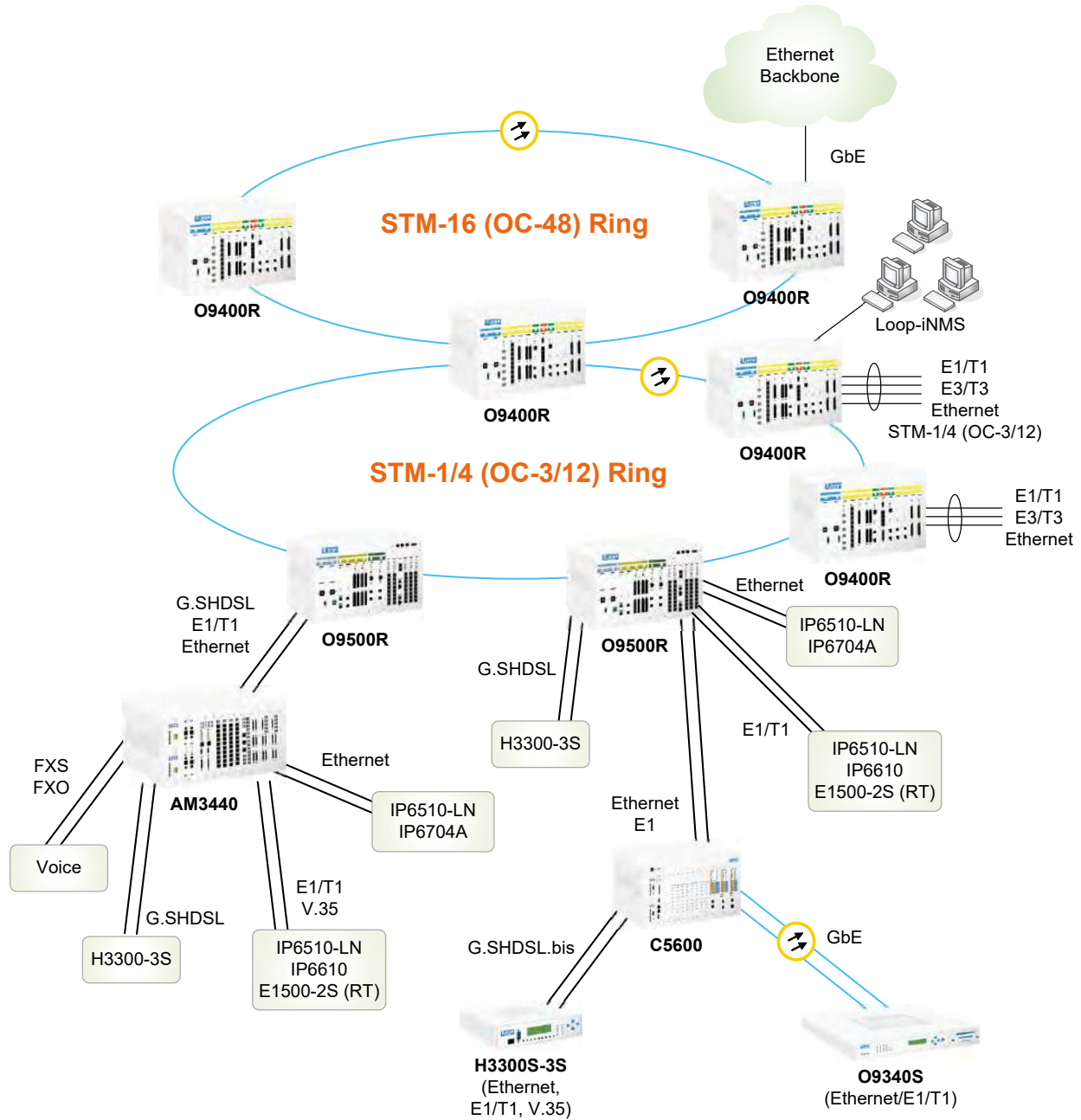
XCU (W) port 1 and XCU (W) port 2
XCU (E) port 1 and XCU (E) port 2

Note 2: If Slots 3 and 4 hold an 8GWSW, STM-4/OC-12 can only be registered for either card.



Application Illustrations

1. Total Solution for IP/Voice Data Application





2. Rings with STM-1/4/16 (CC16) Capability

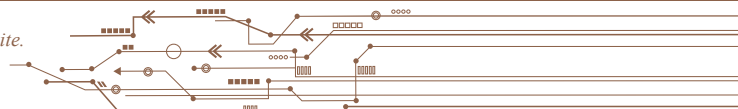
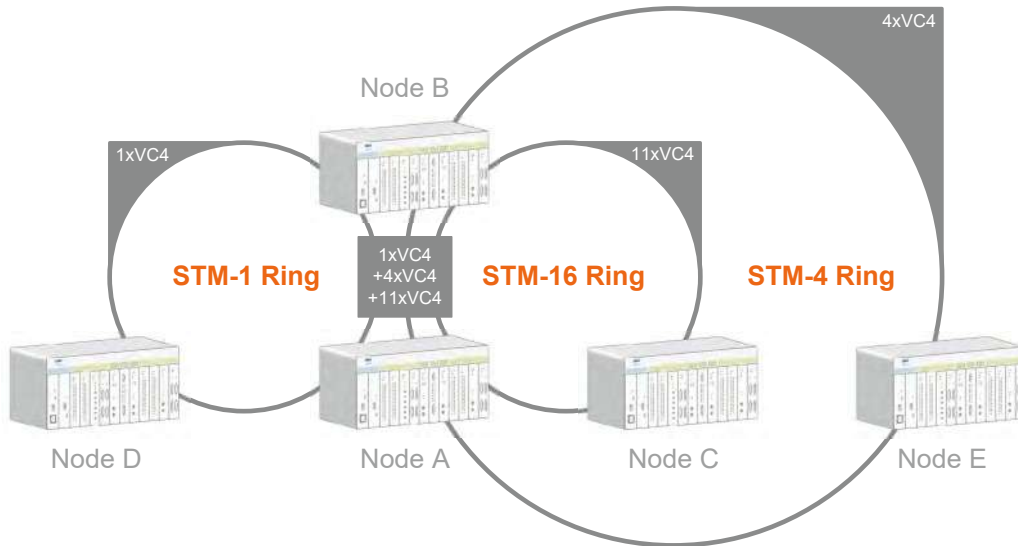
With STM-16 (CC16) capability, multi-rings can share the bandwidth in one optical line.

Nodes A, B, and C form a STM-16 Ring

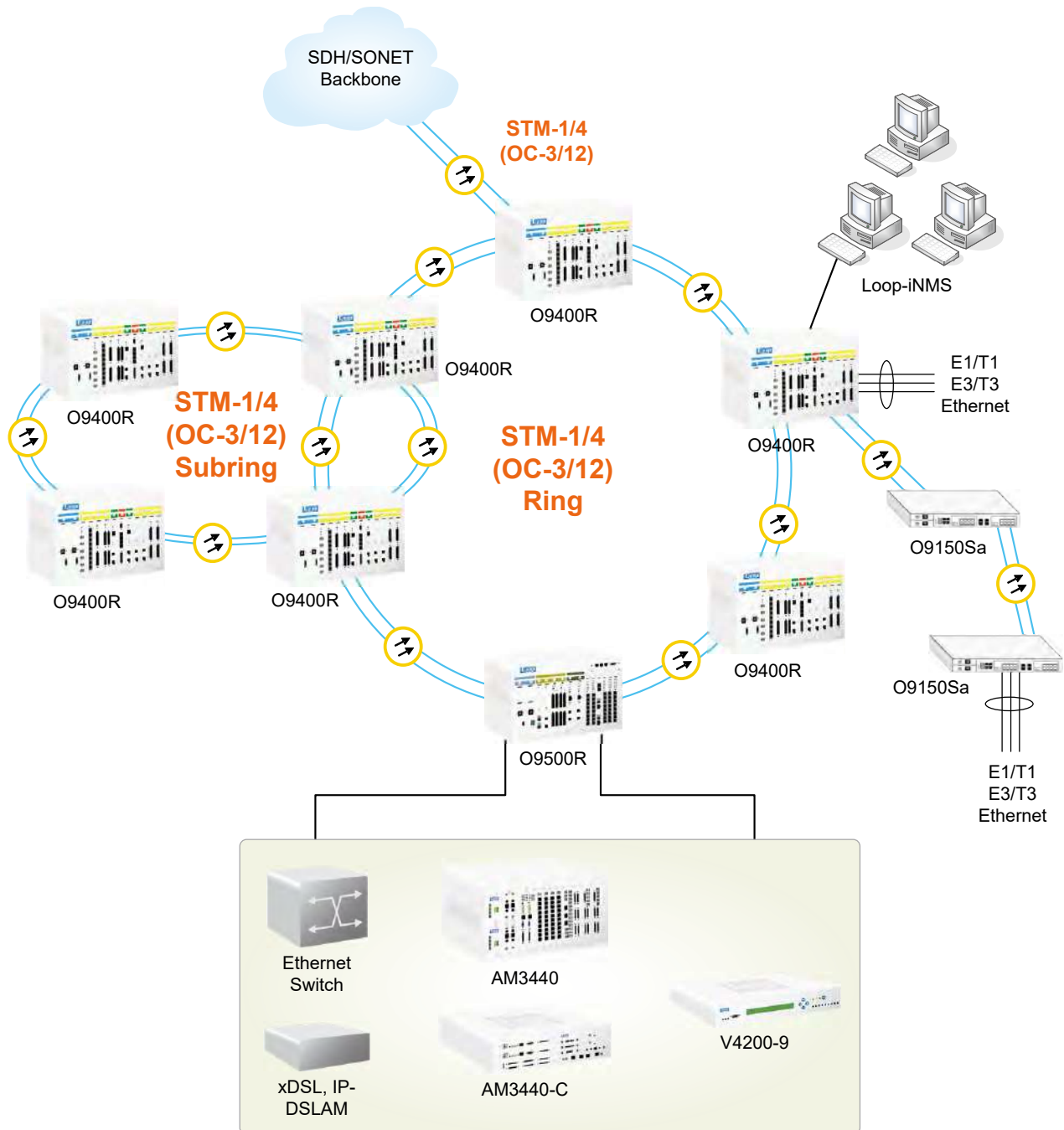
Nodes A, B, and E form a STM-4 Ring

Nodes A, B, and D form a STM-1 Ring

Nodes A and B only need one optical line to connect these three rings.



3.Rings with STM-1/4 Applications

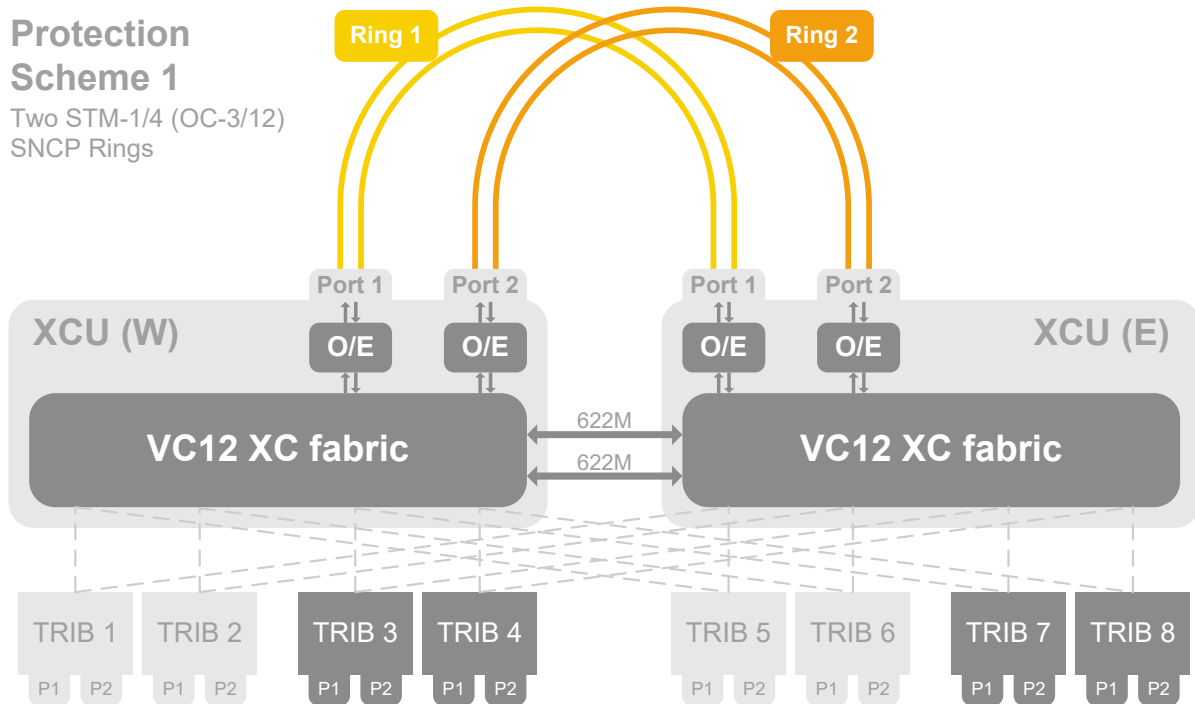




4. Two Ring Protection (CC4)

Protection Scheme 1

Two STM-1/4 (OC-3/12)
SNCP Rings



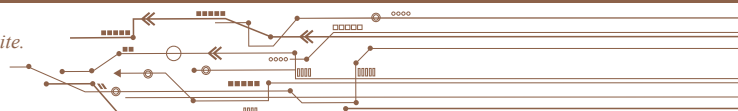
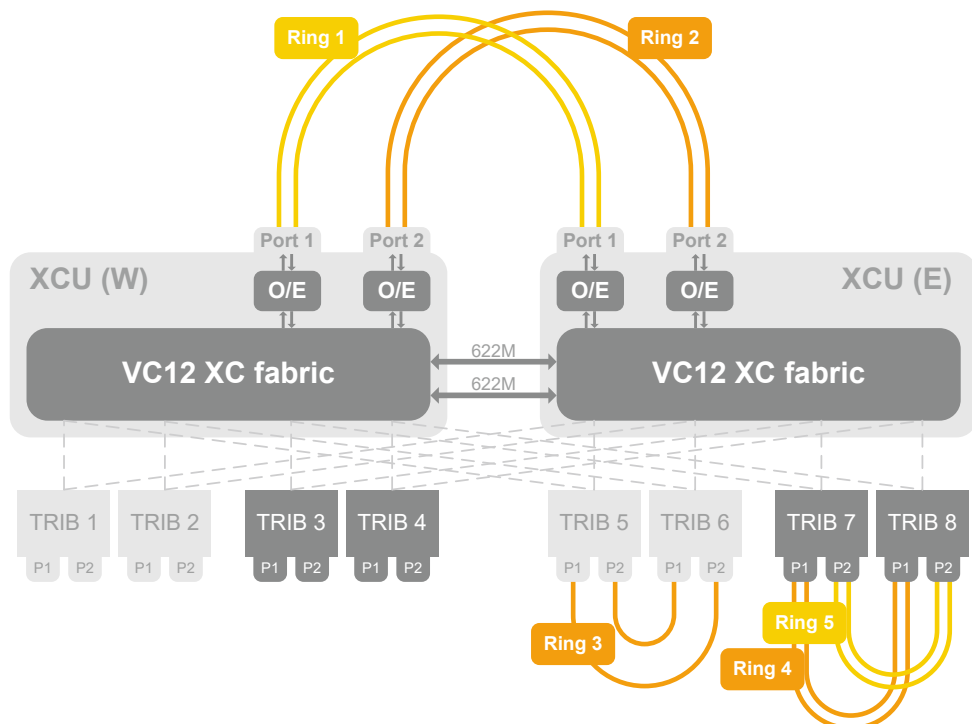
5. Five Rings (CC4)

Protection Scheme 5

Five STM-1/4 (OC-3/12)
SNCP Rings

Two from XCU channels

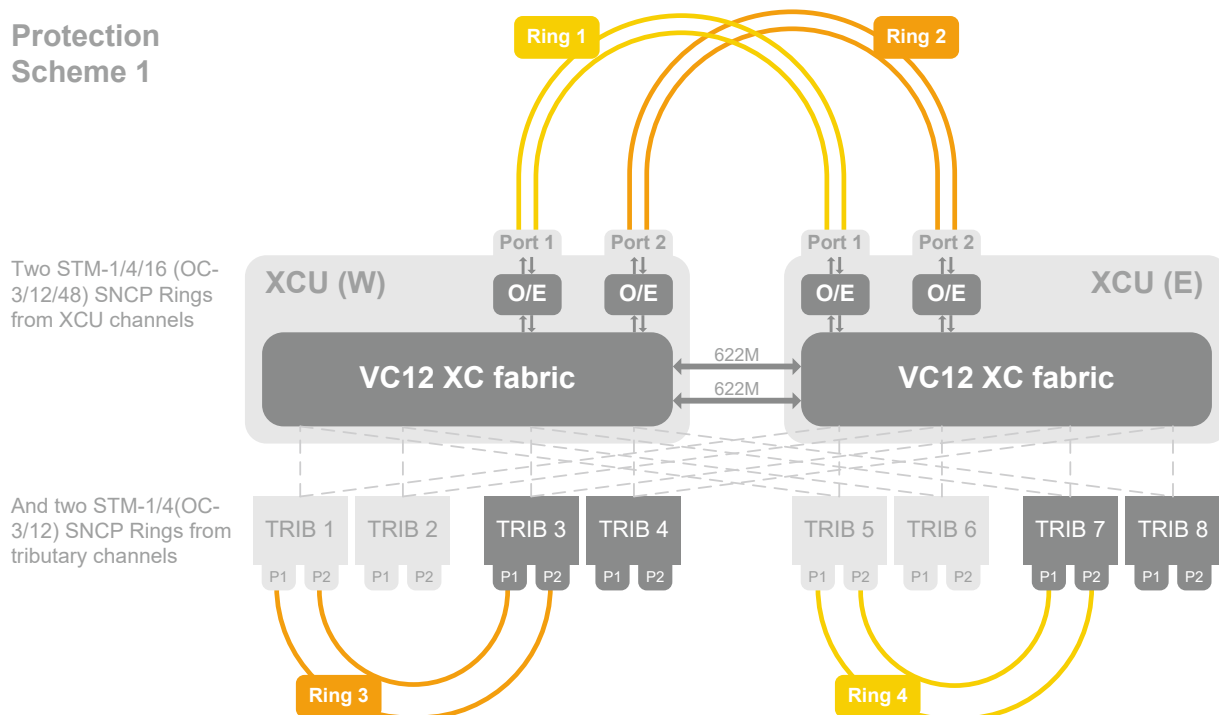
Three from tributary channels





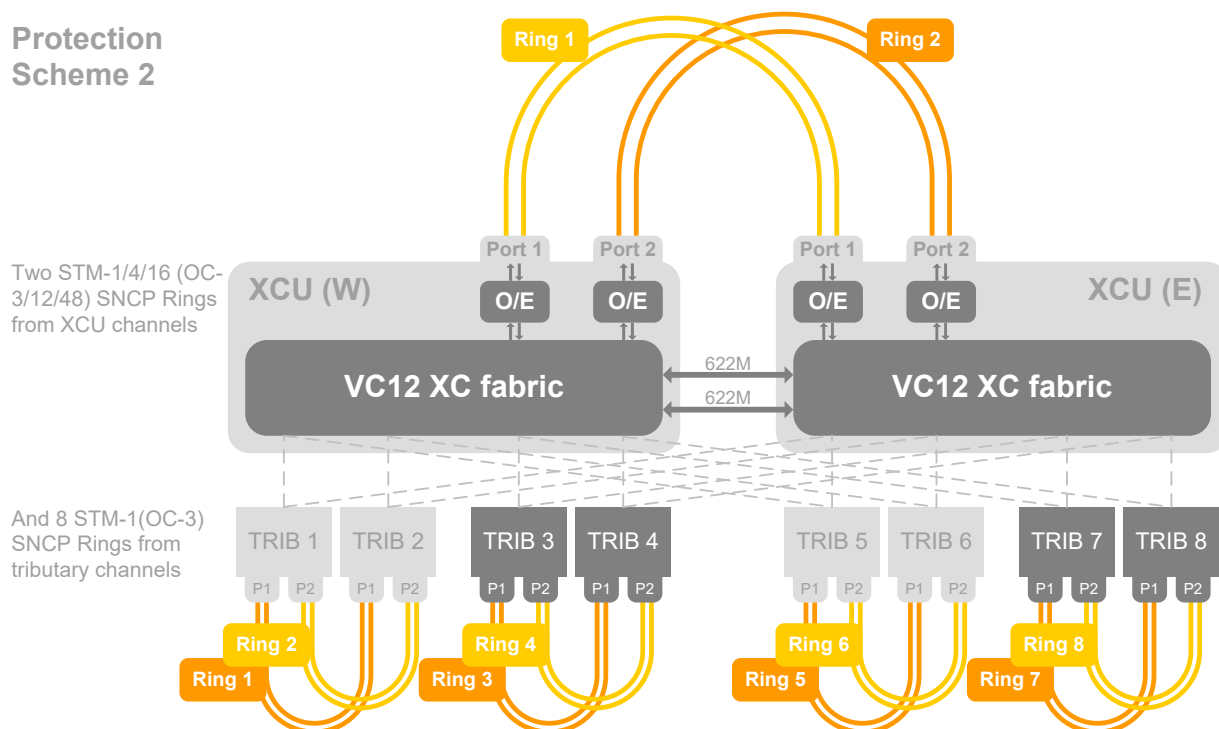
6. 2*STM-16 Ring + 2*STM-4 Ring (CC16)

Protection Scheme 1



7. 2*STM-16 Ring + 8*STM-1 Ring (CC16)

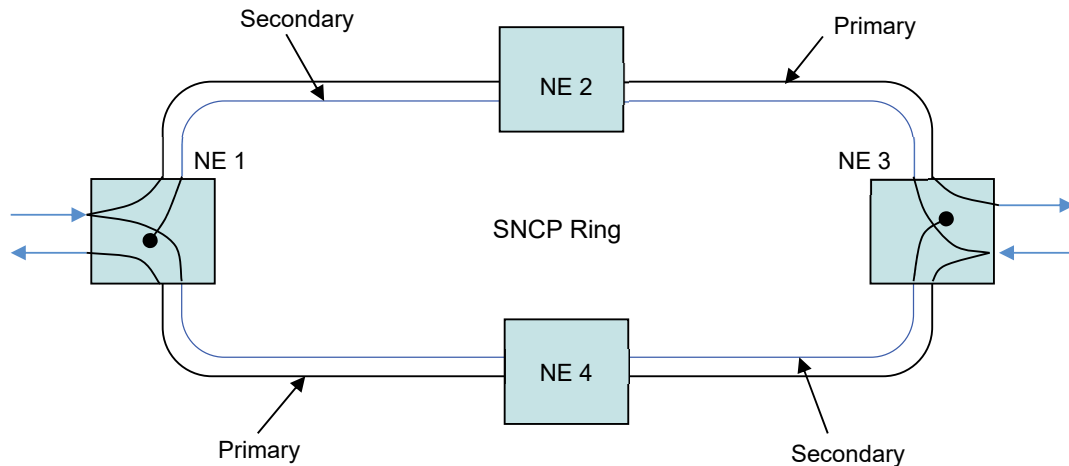
Protection Scheme 2





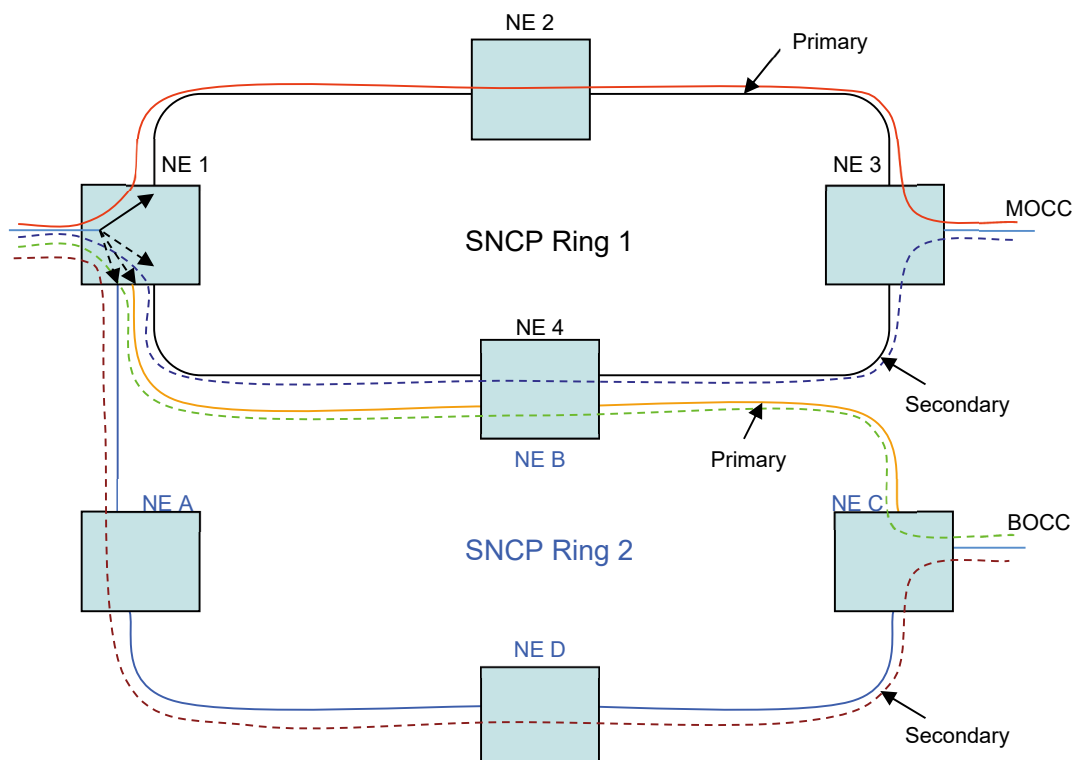
Subnetwork connection protection (SNCP)

The SNCP ring provides duplicate fiber paths in the network. Working traffic flows in one direction whereas protection traffic flows in the opposite direction. If a problem occurs in the working traffic path, the receiving node switches to the protection traffic path.



Dual homing protection

The O9400R SNCP ring uses the “dual homing” mechanism, whose protection switch sends an LOS, LOF, or AIS alarm when it detects a fiber break. The figure below shows how the dual homing mechanism works:

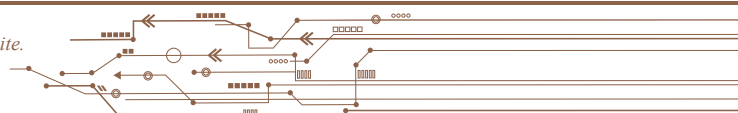


SNCP Ring 1 :

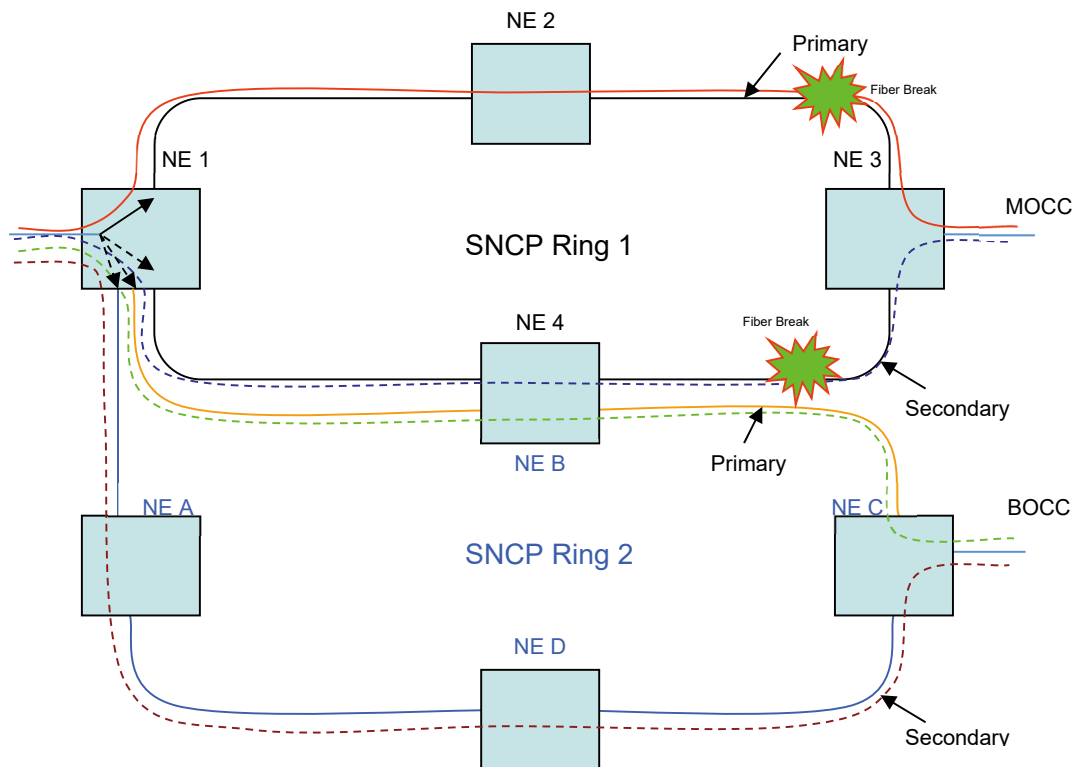
- NE 1 working traffic is transferred to NE 3 MOCC via NE 2
- NE 1 protection traffic is transferred to NE3 MOCC via NE 4

SNCP Ring 2

- NE 1 protection traffic is transferred to NE C BOCC via NE B
- NE 1 protection traffic is transferred to NE C BOCC via NE D



The figure below shows how the dual homing mechanism works when the fiber breaks on SNCP Ring 1 primary and secondary paths:



SNCP Ring 1

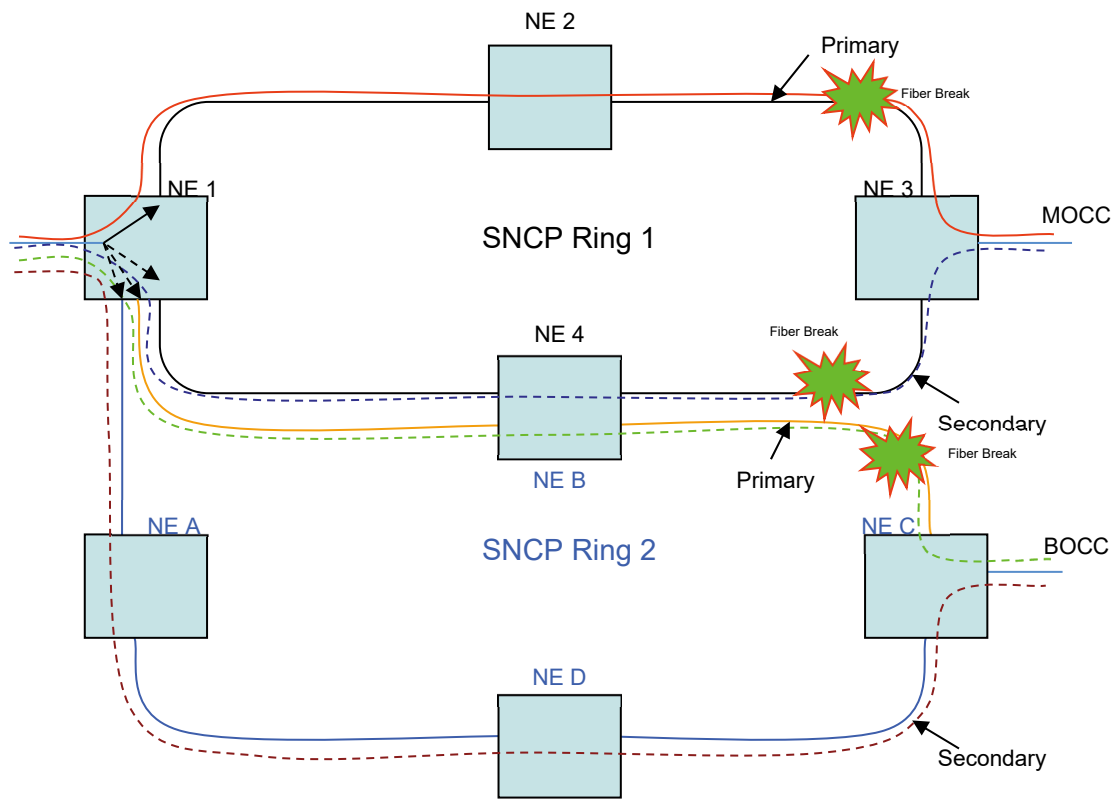
- The fiber breaks on the primary path
- The fiber breaks on the secondary path

SNCP Ring 2

- NE 1 working traffic is transferred to NE C BOCC via NE B
- NE 1 protection traffic is transferred to NE C BOCC via NE D



The figure shows how the dual homing mechanism works when the fiber breaks on SNCP Ring 1 primary and secondary paths and the SNCP Ring 2 primary path:

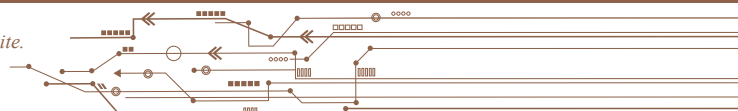


SNCP Ring 1

The fiber breaks on the primary path
The fiber breaks on the secondary path

SNCP Ring 2

The fiber breaks on the primary path
NE 1 working traffic is transferred to NE C BOCC via NE D





Loop-O9500R SDH/SONET IMAP

(CHA/CHAA chassis & CC4/CC16 Controller)



Features

- 6U height, full front access (ETSI) shelf
- TM, ADM and DCS (full cross-connect) at DS0, VC11, VC12, VC3, VC4
- All modules hot-swappable
 - Controller (for aggregation and cross-connect)
 - Two STM-1/4/16 (OC-3/12/48) aggregate lines (CC16)
 - Two STM-1/4 (OC-3/12) aggregate lines (CC4)
 - Dual controllers for Cross-connect Unit Protection
 - Tributary Modules for access
 - Four High-speed modules (HS)
 - Six Low-Speed modules (LS)
 - Power Modules
 - DC Module (-48/-125/-250 Vdc)
 - Dual Power (1+1) Protection
- Tributary protection
 - E1/T1: Card/Port (1:1) using Y-box, Line (1+1)
 - E3/T3: Line (1+1)
 - B155/622, B2G5: MSP, SNCP/UPSR
 - 8GE: Card protection
- Ethernet Functions
 - Ethernet over SDH/SONET supports GFP, LAPS, VCAT, LCAS and non-LCAS
 - Port- and VLAN-associated E-Line and E-LAN
 - Alarm suppression, masking and reports
- Management
 - Console port: VT100 menu-driven
 - Ethernet port: VT100 menu-driven via Telnet/SSH
 - SDH/SONET DCC and DS0 in-band
 - SNMP-based NMS/EMS
 - Centralized management with Loop's EMS/NMS
 - Loop-iNET GUI EMS
 - Loop-iNMS with full FCAPS and end-to-end circuit management and diagnosis
- RoHS compliant

Description

The Loop-O9500R SDH/SONET IMAP (Integrated Multi-Services Access Platform) is an economical, all-in-one solution for integrating various types of signals and transportation over various types of networks within one enclosure. Its universal roles and modular design make it effortless to perform traffic grooming for both peripheral and core networks by providing access interfaces, multiplexing, cross-connection, gateways, and transportation channels.

For **access interfaces**, 10+ low-speed modules are designed to encapsulate industry specific signals into DS0 timeslots. These interfaces include Voice (e.g. FXS, FXO, E&M, and etc.), Digital (e.g. RS232, RS449, X.21, and etc.), Teleprotection (e.g. G.703, C37.94) and so on.

For **multiplexing and cross-connection**, O9500R provides non-blocking cross-connection of up to 672 DS0 timeslots, which equal to 21 E1 channels, to serve as a **MUX/DACS**, and VC-n/VT-n fabric for SDH/SONET non-blocking cross-connection to serve as an **ADM**.

For **transportation**, high-speed modules provide transportation channels such as STM-1/4/16(OC-3/12/48) channels from Controller, B155/622, and B2G5 cards, E1/T1 channels from 63-port E1/T1 cards, and E3/T3 channels from 3-port E3/T3 cards.

For **gateways**, the signals from different interfaces can be freely encapsulated, cross-connected, and transported over a variety of transportation networks. For instance, E1/T1 and E3/T3 channels can be encapsulated into VT/VC paths and transported over SDH/SONET.

Multiple **protection schemes** are designed at different levels, including path-level SNCP/UPSR and section-level MSP (1+1) for SDH/SONET.

Performance and fault are also monitored to ensure service integrity. Operation, Administration, Maintenance and Provisioning (OAM&P). These functionalities are fully incorporated into the operation system. O9500R is fully compatible with Loop-iNET (EMS) and Loop-iNMS (Integrated NMS) to achieve centralized management for large scale networks.



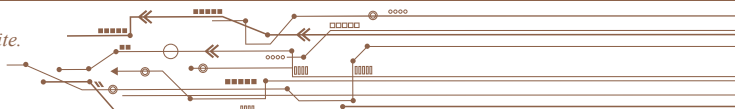
O9500R (CC4/CC16) Tributary Modules

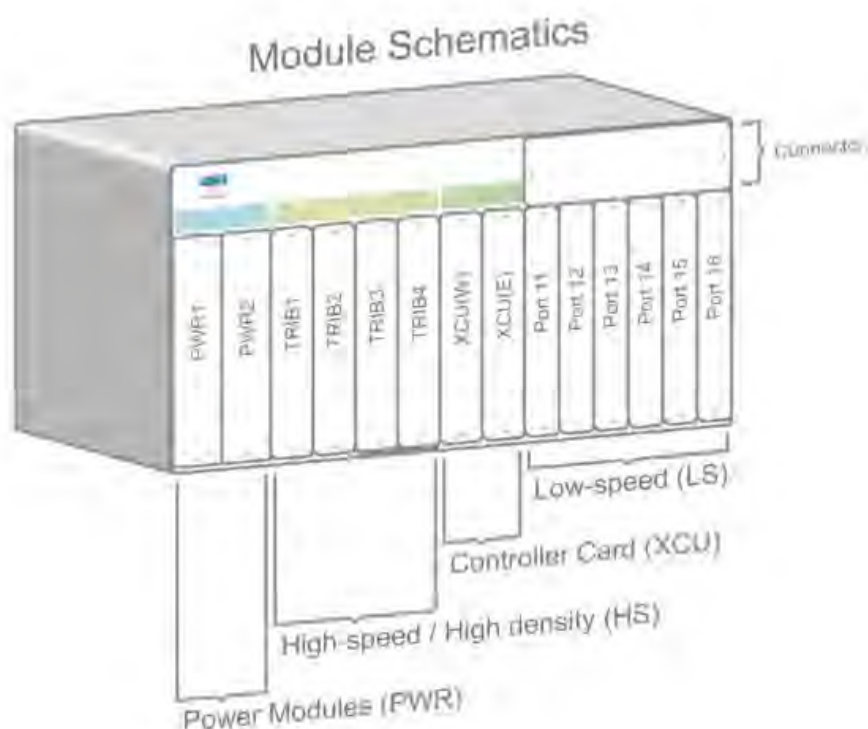
Plug-in cards with yellow background are high-speed cards using **622M backplane**, and those with magenta background are high-speed cards using **2.5G backplane**. Plug-in cards without background color are low-speed cards.

Type	Module	Description
High-speed/ High Density (HS)	B155/622	2-channel STM-1 (OC-3) tributaries with or without MSP 1+1 1-channel STM-4 (OC-12) tributaries with or without MSP 1+1
	B2G5	1-channel STM-16 (OC-48) tributaries with or without MSP 1+1
	E1/T1	63 port E1/T1 tributaries
		32 port E1/T1 tributaries
		16 port E1/T1 tributaries
	E1(75 ohm)	63 E1(75 ohm) plug-in card
		32 E1(75 ohm) plug-in card
		16 E1(75 ohm) plug-in card
	E3/T3	3 T3 or 3 E3 software programmable interface with M13/Mx3 function for T3 interface only
	8GESW	8 GbE Ethernet over SDH card with L2 switch (8GES4SWA/8GES16SWA*)
Low-speed (LS) Single slot	RTB	8-port Bridge/Router
	4E1/4T1	4-channel E1/T1
	3E1/3T1	3-channel E1/T1
	2GH	2-channel G.SHDSL (2 pairs) without line power
	4GH	4-channel G.SHDSL (1 pairs) without line power
	8CD	8-channel G.703 card at 64 Kbps data rate
	4C37	4 channel C37.94 (low-speed optical)
	8RS232	8-channel RS232/V.24
	8DC	8-channel Dry Contact I/O
	8DCB	8-channel Dry Contact I/O type B
	8E&M	8-channel 2W/4W E&M
	12FXSA	12-channel FXS
	12FXOA	12-channel FXO
	12MAGA*	12-channel Magneto
	TDMoEA	4 GbE for TDM signal over Ethernet
	8DBRA	8-channel Data Bridge
	8UDTEA	8-channel DTE
	1FOMB	1 port FOM (1FOMB)
	OCUDPA	8-channel OCU/DP
	6UDTEA	6-channel DTE
	TTA	our ports for DTT input and output.
Low-speed (LS) Dual slot		

*Future Option

Note A Dual-Slot module takes up two adjacent single slots.





Connectivity

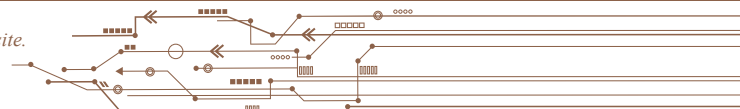
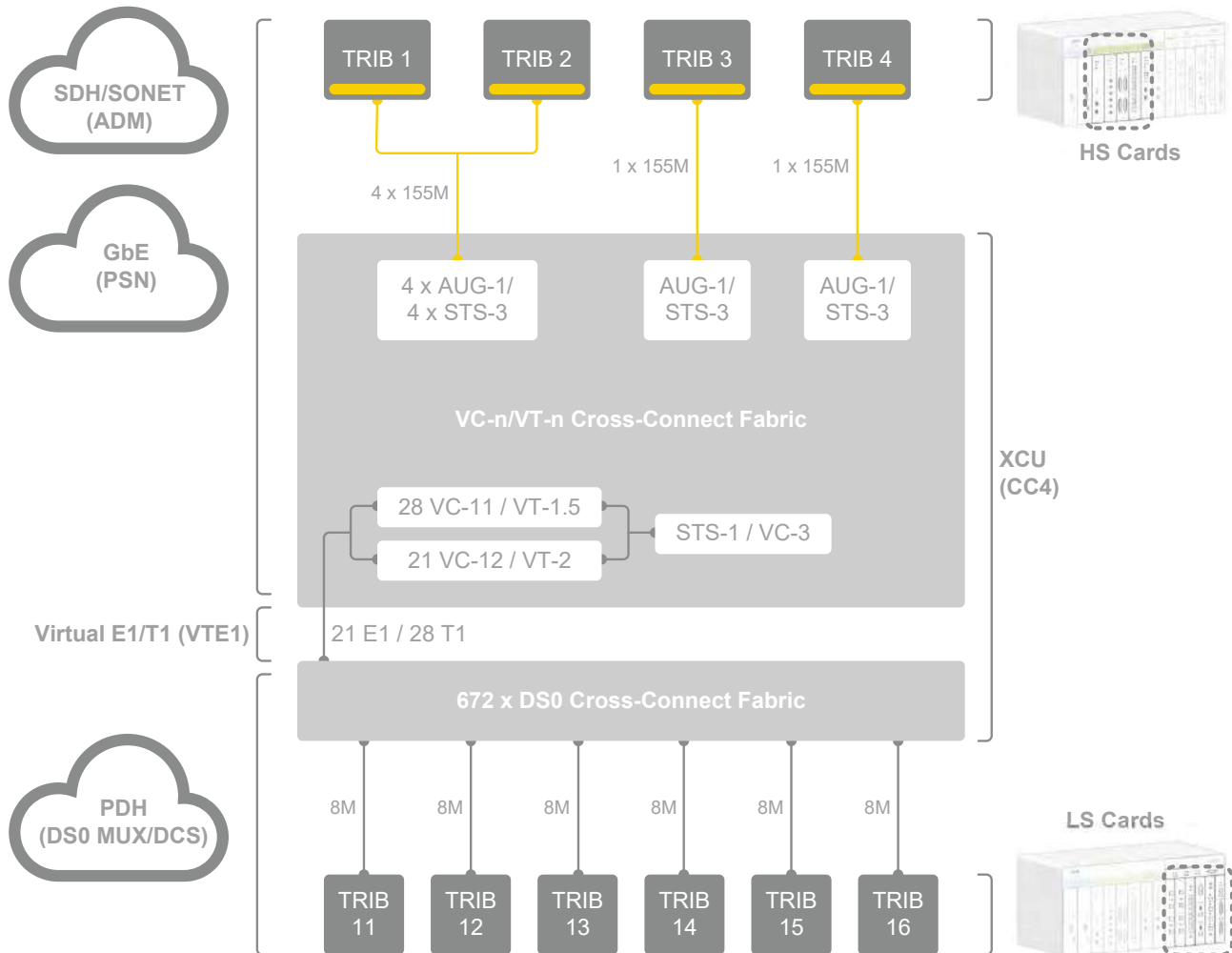
Tributary Module: Backplane Payload

Traffic of each tributary card is connected to the XCU via backplane channels. Each **LS slot (TRIB 11~16)** is provided with **4 E1/T1 (8M)** worth of bandwidth, and each **HS card (TRIB 1~4)** with **different amount of STM-n/OC-n channels as summarized below**. Especially, an **additional STM-16/OC-48 (2.5G)** channel is shared by **TRIB 3 and 4** for extra high-speed connection on **CHAA only**. These 2.5G HS cards are marked with a magenta patch at the bottom of the panel to indicate the existence of the 2.5G channel. Traffic from **HS cards** are directed to the **VC-n/VT-n cross-connect fabric**, while traffic from **LS cards** are directed to the **DS0 cross-connect fabric**. Traffic from LS cards can be merged onto SDH/SONET via the internal **virtual E1/T1 channels**.

Chassis Type	TRIB 1	TRIB 2	TRIB 3	TRIB 4	TRIB 11~16
CC4	4 x 155M (shared) or 2 x 155M (each)		2 x 155M (shared) or 1 x 155M (each)		8M (each)
CC16	2 x 155M	2 x 155M	2 x 155M	2 x 155M	8M (each)
			1 x 2.5G (shared)		

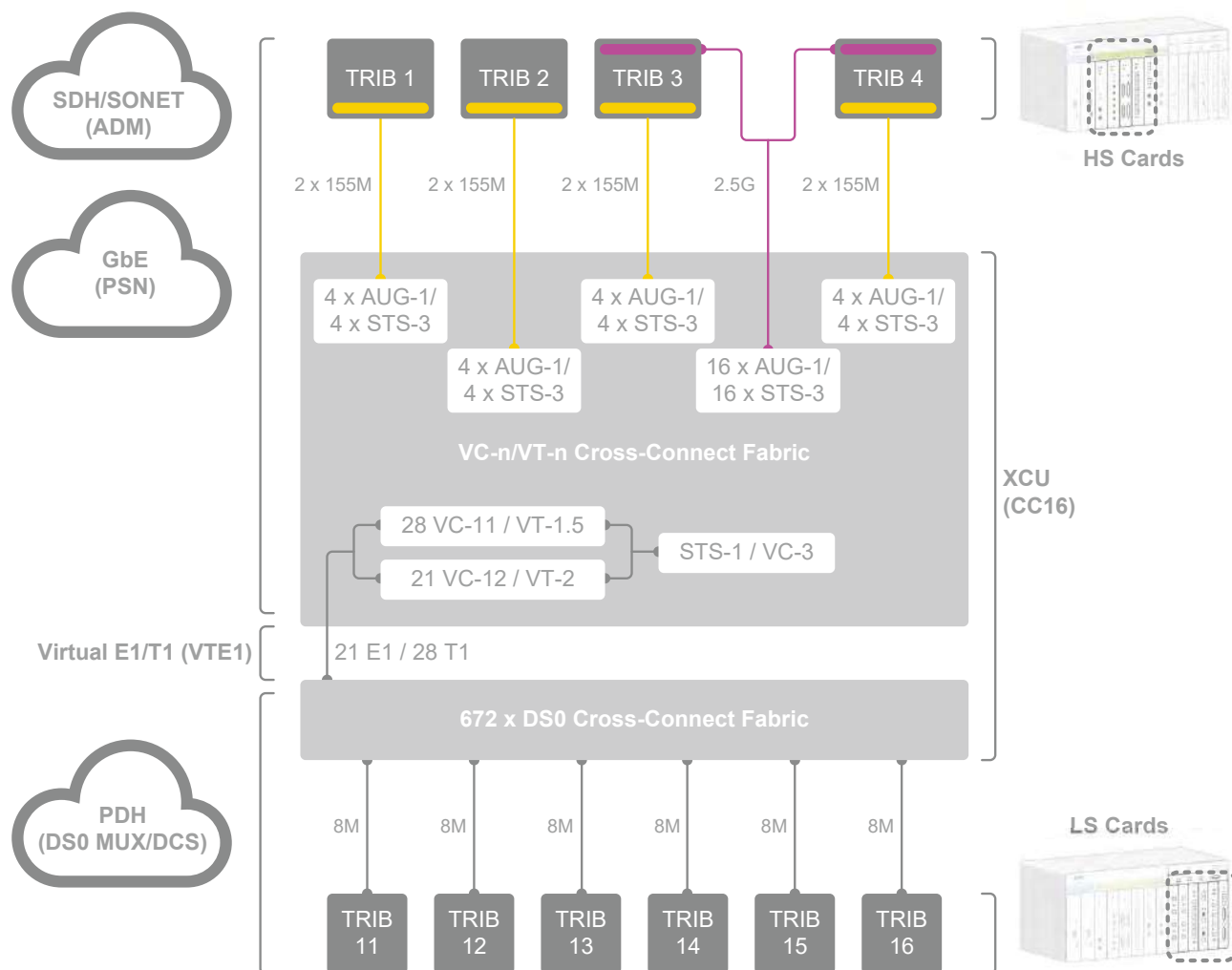


O9500R CHA Chassis Backplane & Internal Channels





O9500R CHAA Chassis Backplane & Internal Channels

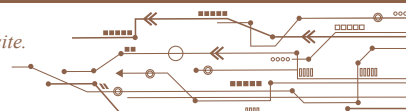




Cross-model Comparison for Plug-in Card Compatibility

Plug-in Card	O9500R			O9400R			AM3440-A/C
	CC4	CC16	CCPA	CC4	CC16	CCPA	
16/32/63TE	v	v	v	v	v	v	x
16/32/63E75	v	v	v	v	v	v	x
3TE3	v	v	v	v	v	v	x
3TE3M13	v	v	v	v	v	v	x
8GES4SWA	v	v	v	*	*	*	x
8GES16SWA	x	*	*	x	*	v	x
B16	v	v	v	v	v	v	x
B2G5	x	v	v	x	v	v	x
PTN10G	x	x	v	x	x	v	x
4E1	v	v	v	x	x	x	v
4T1	v	v	v	x	x	x	v
3E1	v	v	v	x	x	x	v
3T1	v	v	v	x	x	x	v
2GH	v	v	v	x	x	x	v
4GH	v	v	v	x	x	x	v
8DC	v	v	v	x	x	x	v
8DCB	v	v	v	x	x	x	v
8CD	v	v	v	x	x	x	v
4C37	v	v	v	x	x	x	v
8RS232	v	v	v	x	x	x	v
8DBRA	v	v	v	x	x	x	v
RTB	v	v	v	x	x	x	v
TDMoEA	v	v	x	x	x	x	v
6UDTEA	v	v	v	x	x	x	v
8UDTEA	v	v	v	x	x	x	v
8EMA	v	v	v	x	x	x	v
12MAGA	*	*	*	x	x	x	v
12FXSA	v	v	v	x	x	x	v
12FXOA	v	v	v	x	x	x	v
1FOMB	v	v	*	x	x	x	v
OCUDPA	v	v	v	x	x	x	x
TTA	v	v	v	x	x	x	v

*Future Option





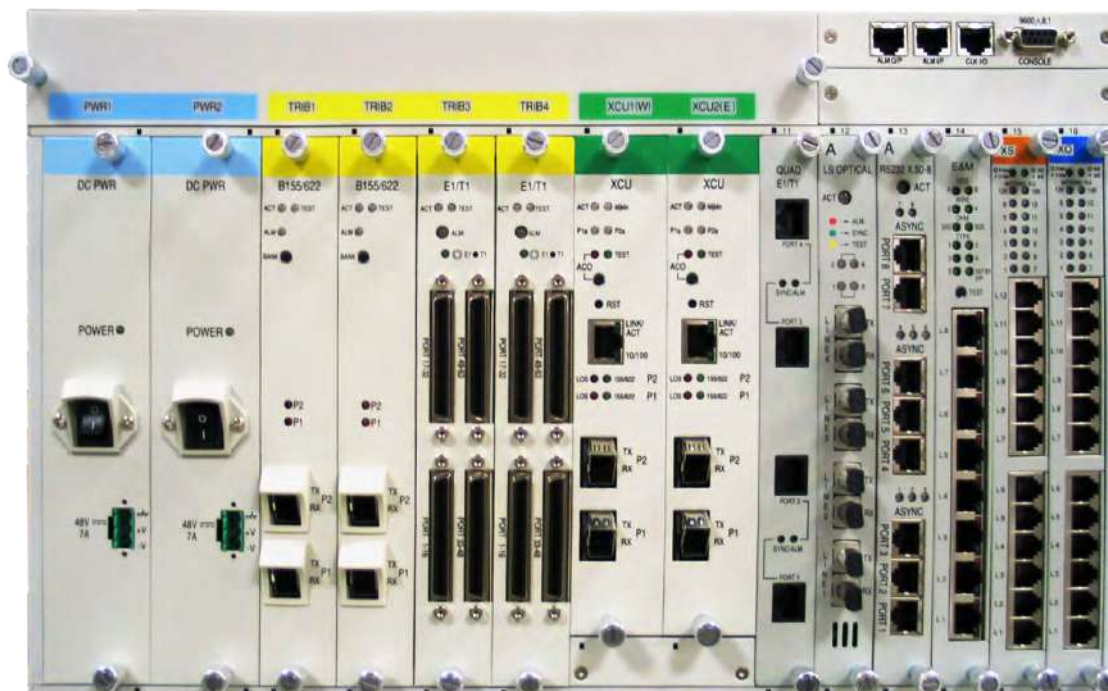
Low-speed Tributary Modules Maximum Capacity

Low-speed Module	Channel	Maximum Channels/Ports	
		TRIB 11~16 each	System
1FOMB	FOM	1	6
RTB	FE	8	48
2/4 channel G.SHDSL	G.SHDSL	2/4	12/24
4E1/T1	E1/T1	4E1/4T1	21E1/24T1
3E1/T1	E1/T1	3	18
8CD	G.703	8	48
6CDA	G.703	6	36
4C37	C37.94	4	24
8DC	Dry Contact	8	48
8DCB	Dry Contact	8	48
8RS232	RS232	8	48
12FXSA	FXS	12	72
12FXOA	FXO	12	72
12MAGA*	Magneto	12	72
8E&M	E&M	8	48
TDMoEA	TDMoE	4	24
8DBRA	RS232	8	48
8UDTEA	RS232/RS422/RS449	8	48
OCUDPA	OCU/DP	8	48
6UDTEA	RS232/X.21/V.35/V.36/EIA530	6	36

*Future Option



High-speed Tributary Modules with XCU-CC4 on CHA Chassis



In the tables below, STM-16 is equivalent to OC-48, STM-4 to OC-12, STM-1 to OC-3, E1 to T1, and E3 to T3.

High-speed Channel without Protection

High-seed Module	Channel	Maximum Channels						Sum
		Tributary (Plug-in Modules)				Controller Cards		
		TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU 1	XCU 2	
E1/T1	E1/T1	63/32/16	63/32/16	63/32/16	63/32/16	N/A	N/A	252
E3/T3	E3/T3	3	3	3	3	N/A	N/A	12
8GES4SWA	GbE	8	8	8	8	N/A	N/A	32
CC4, B155/622	STM-1	2	2	1	1	2	2	10
	STM-4	1 <small>Note 1</small>		N/A	N/A	2	2	5

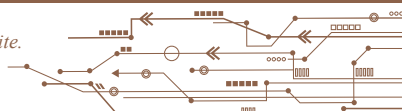
High-speed Channel with Protection

High-seed Module	Channel	Maximum Channels						
		Tributary (Plug-in Modules) <small>Note 2</small>				Controller Cards		Sum
		TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU 1	XCU 2	
E1/T1	E1/T1	63/32/16	(B) 63/32/16	63/32/16	(B) 63/32/16	N/A	N/A	126
E3/T3	E3/T3	3	(B) 3	3	(B) 3	N/A	N/A	6
8GES4SWA	GbE	8	(B) 8	8	(B) 8	N/A	N/A	16
CC4, B155/622	STM-1	2 MSP(1+1)		2 MSP(1+1)		2 MSP(1+1)		6
	STM-4	1 MSP(1+1)		N/A	N/A	2 MSP(1+1)		3

(B) signifies backup/protection

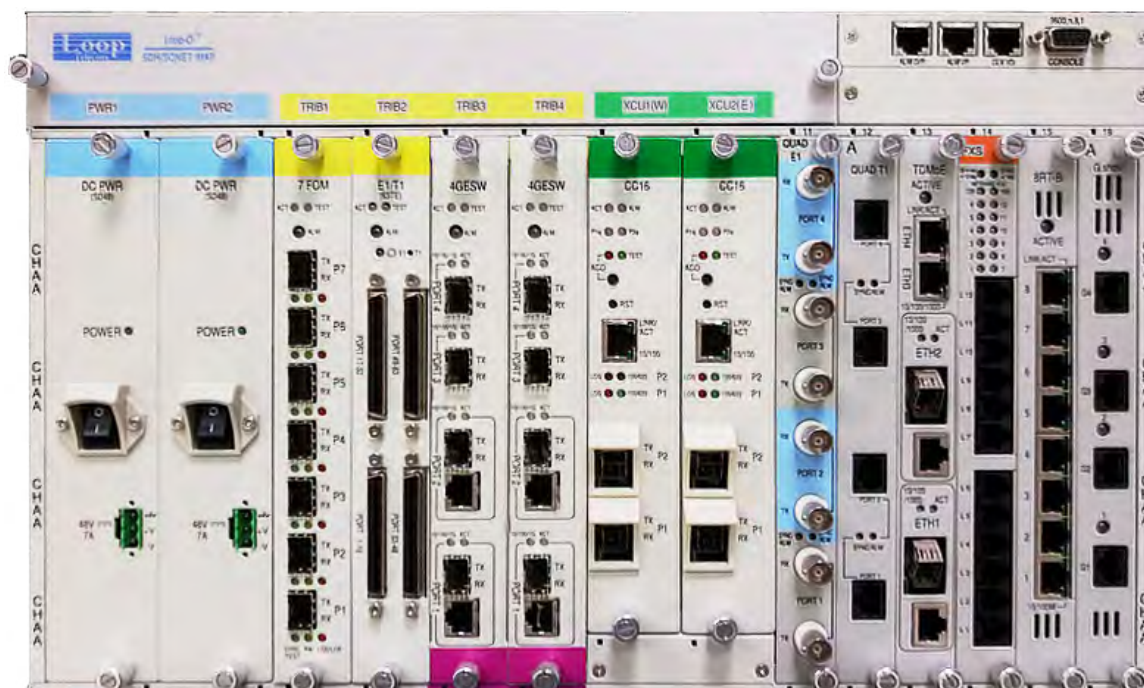
Note 1 Only one tributary STM-4/OC12 channel is compatible with XCU-CC4 without protection in either TRIB 1 or TRIB 2 slot.

Note 2 TRIB 1 and TRIB 2 form a protection group, and TRIB 3 and TRIB 4 form a protection group.





High-speed Tributary Modules with XCU-CC16 on CHAA Chassis



In the tables below, STM-16 is equivalent to OC-48, STM-4 to OC-12, STM-1 to OC-3, E1 to T1; and E3 to T3.

High-speed Channel without Protection

High-seed Module	Channel	Maximum Channels						Sum
		Tributary (Plug-in Modules)				Controller Cards		
		TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU 1	XCU 2	
E1/T1	E1/T1	63/32/16	63/32/16	63/32/16	63/32/16	N/A	N/A	252
E3/T3	E3/T3	3	3	3	3	N/A	N/A	12
8GES4SWA	GbE	8	8	8	8	N/A	N/A	32
CC16, B155/622	STM-1	2	2	2	2	2	2	12
	STM-4	1	N/A	1	N/A	2	2	6
CC16, B2G5	STM-16	N/A	N/A	1	N/A	2	2	5

High-speed Channel with Protection

High-seed Module	Channel	Maximum Channels						Sum
		Tributary (Plug-in Modules)				Controller Cards		
		TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU 1	XCU 2	
E1/T1	E1/T1	63/32/16	(B) 63/32/16	63/32/16	(B) 63/32/16	N/A	N/A	126
E3/T3	E3/T3	3	(B) 3	3	(B) 3	N/A	N/A	6
8GES4SWA	GbE	8	(B) 8	8	(B) 8	N/A	N/A	16
CC16, B155/622	STM-1	2 MSP(1+1)		2 MSP(1+1)		2 MSP(1+1)		6
	STM-4	1 MSP(1+1)		1 MSP(1+1)		2 MSP(1+1)		4
CC16, B2G5	STM-16	N/A	N/A	1 MSP(1+1)		2 MSP(1+1)		3

(B) signifies backup/protection

Note TRIB 1 and TRIB 2 form a protection group, and TRIB 3 and TRIB 4 form a protection group.

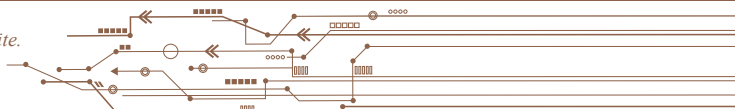
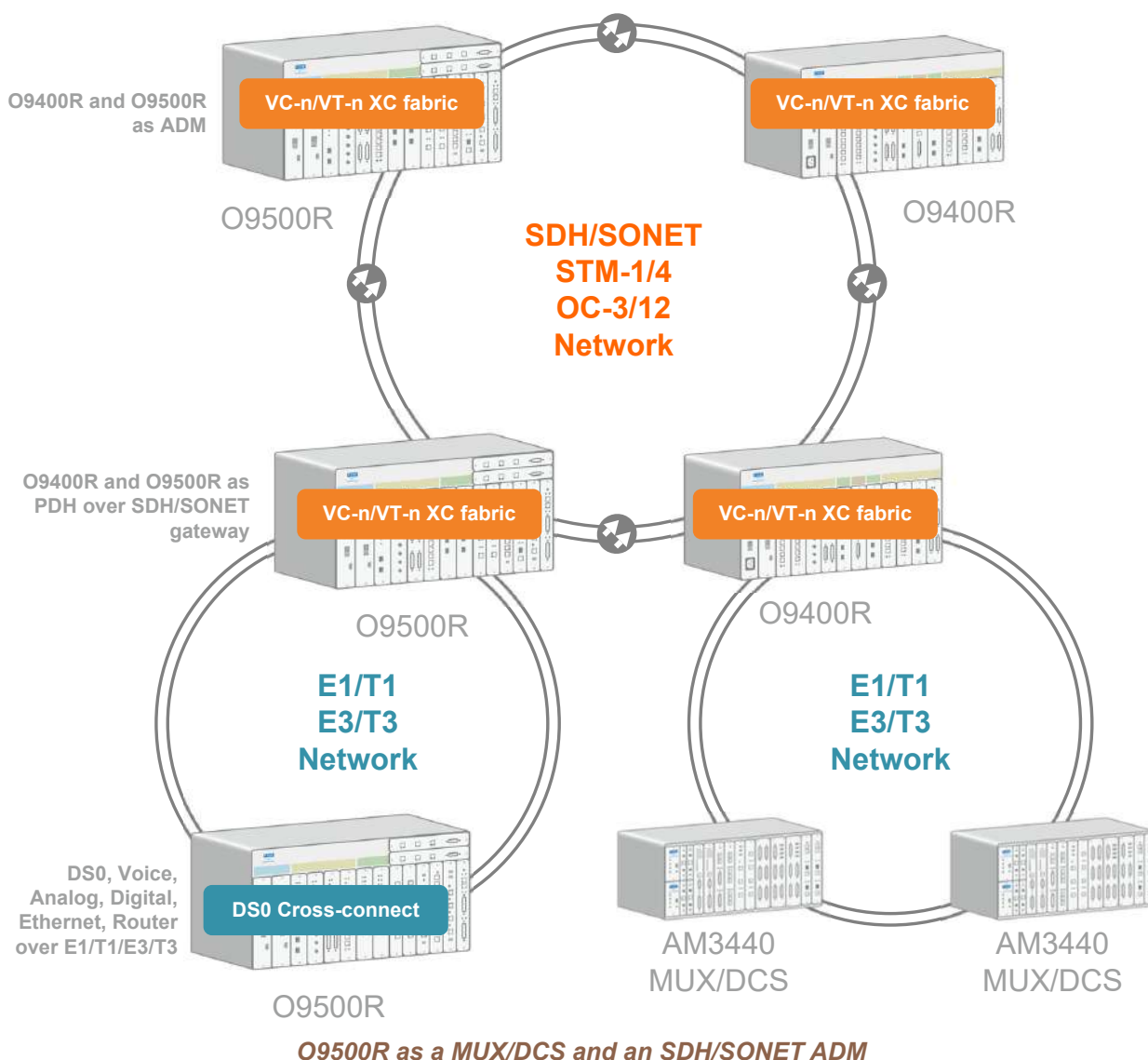


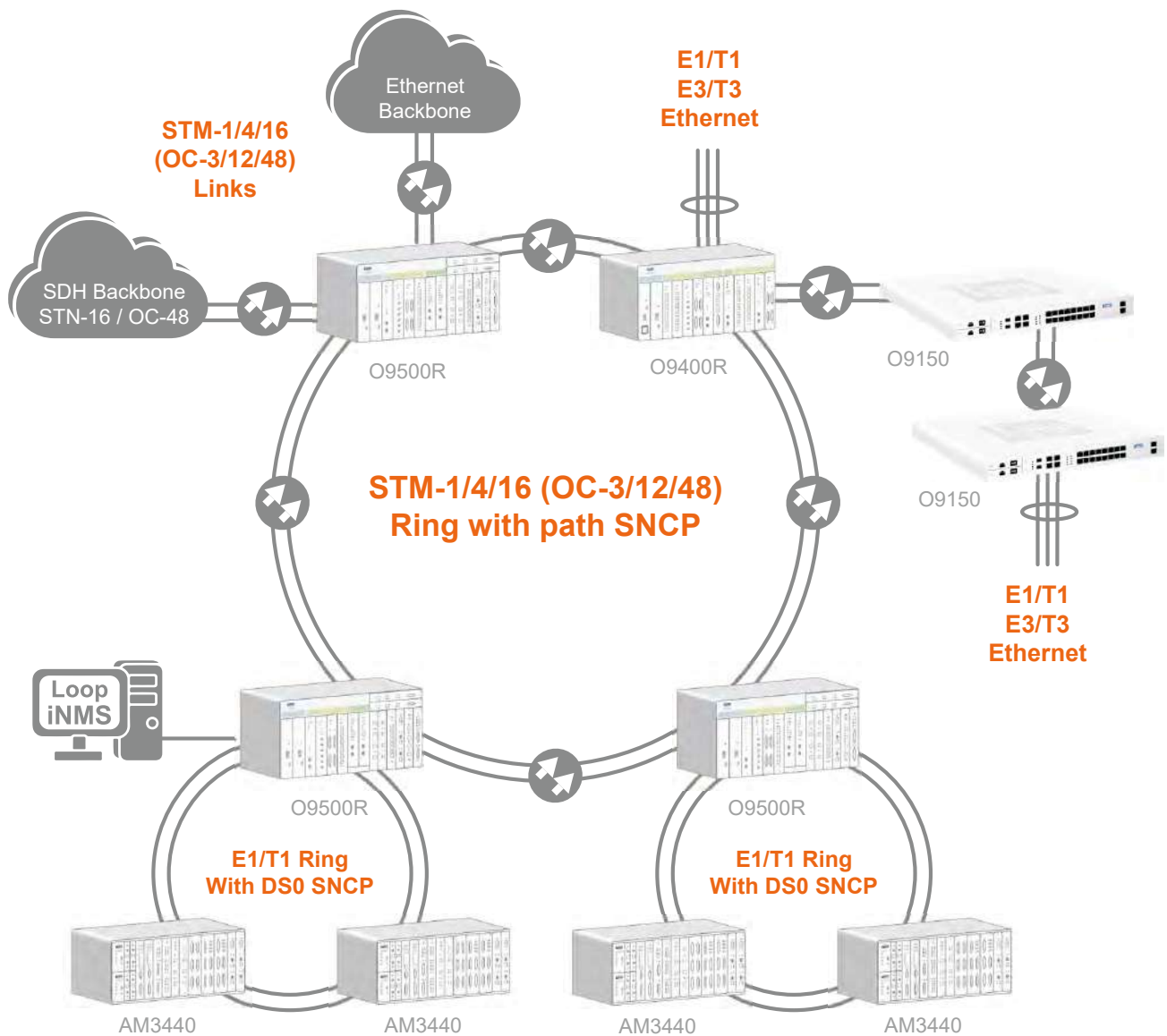
Transport/Access interface and module functional block

O9500R can serve as the gateways between different network types and encapsulates traffic of a certain type into another type for transportation. Interfaces for the access side and interfaces for the transport side are required. Traffic from the access side will be directed to the transport side and go through cross-connection and encapsulation processes.

Application Illustrations

The O9500R can be configured as either a PDH terminal Multiplexer (MUX), a cross-connect system (DACS), or as a SDH/SONET Linear Add/Drop Multiplexer (ADM). With UPSR/SNCP and MSP (1+1) protection, the O9500R can easily provide a well-protected transmission path and integrated access in many different applications, as shown below.



SNCP/UPSR Ring Protection for SDH/SONET paths and DS0 (3E1/T1 card only)

SNCP/UPSR is a SDH/SONET path-level protection mechanism by copying traffic onto two paths of any STM-n/OC-n channels. Two types of SNCP/UPSR rings are possible. Traffic is unidirectional for both primary and secondary paths. Traffic is counterclockwise on the primary path and clockwise on the secondary path. For each path, A-to-C traffic and C-to-A traffic traverse different intermediate nodes (Node B and D respectively).

DS0 SNCP/UPSR mechanism is similar to SDH/SONET SNCP/UPSR for path-level protection. Instead of mapping traffic onto two SDH/SONET paths, DS0 traffic is mapped and copied onto two different E1/T1 timeslots for protection. The two timeslots can be of the same line or different lines, entirely dependent on the network topology. DS0 SNCP/UPSR is now only supported by **3E1/T1** card (LS card).



SNCP/UPSR:

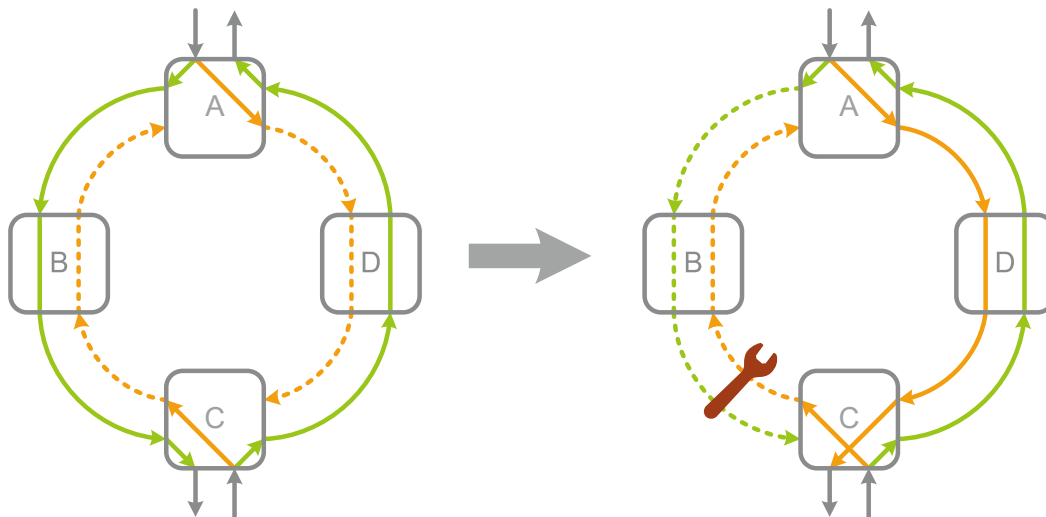
Traffic copied onto both paths
Selector at Rx selects traffic from either path



Primary Path



Secondary Path



Normal Condition:

A to C traffic selected from primary path
C to A traffic selected from primary path

Line between B&C failure:

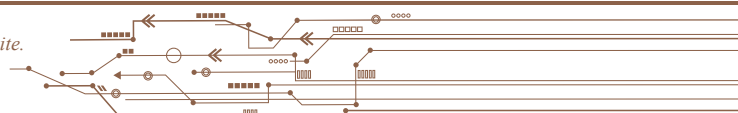
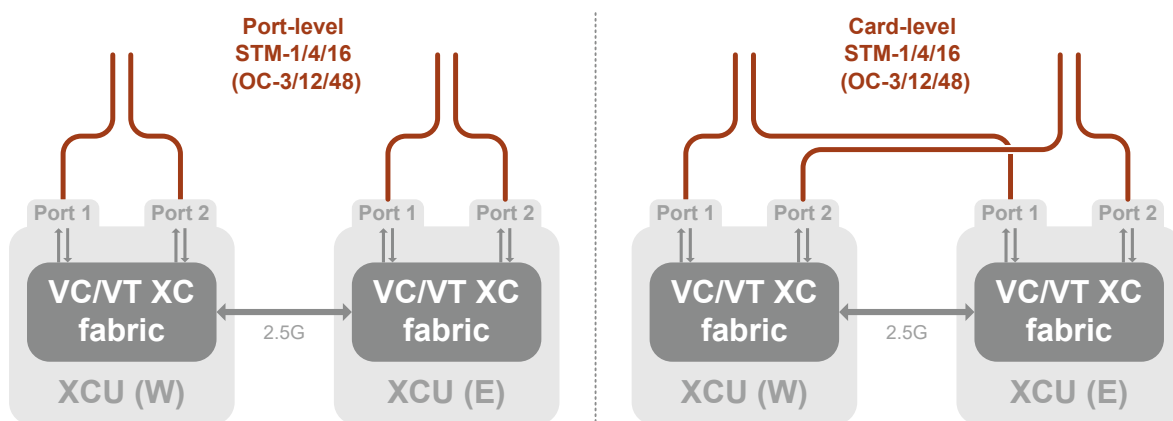
A to C traffic switched to secondary path
C to A traffic still selected from primary path

SNCP/ULSR Ring Protection at Circuit Level (DS0 or SDH/SONET path)

SDH/SONET MSP (1+1) Protection

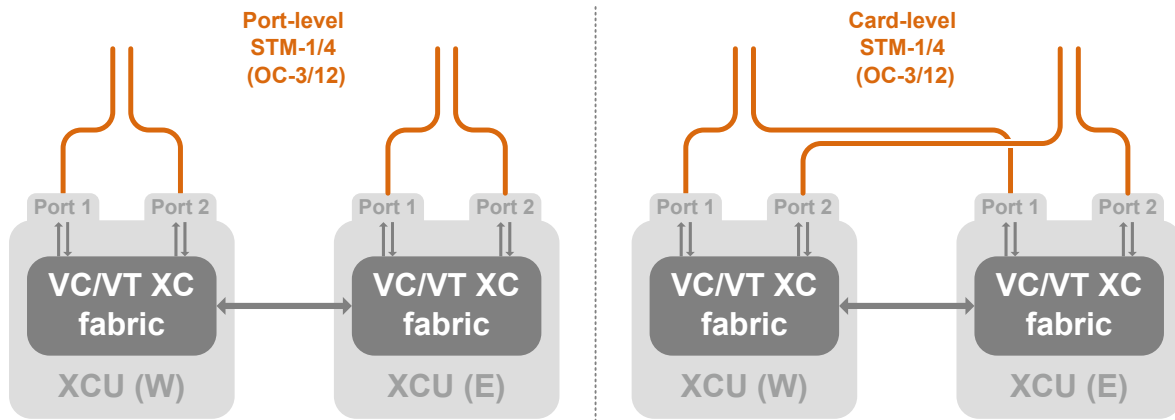
Multiplex section protection (MSP) is a linear protection scheme by pairing two physical ports together for line protection of a SDH/SONET line section between two nodes. Protection can be configured as port-level or card-level. In port-level protection, two ports on the same card are paired to protection against port failure but not card failure. In card-level protection, two ports on two different cards are paired to protection against port failure and card failure.

MSP (1+1) with CC16 XCU

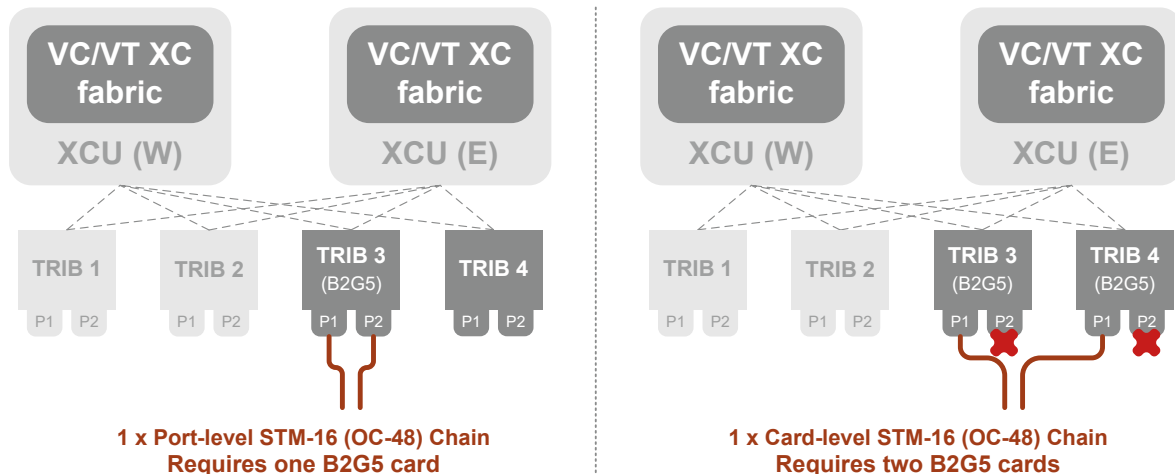




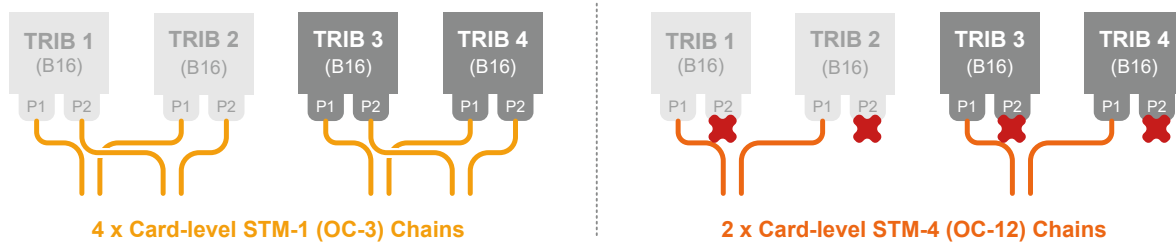
MSP (1+1) with CC4 XCU



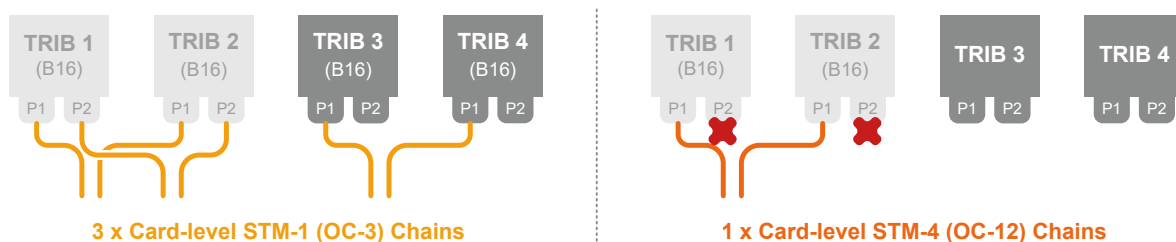
MSP (1+1) chains with B2G5 on CHAA



MSP (1+1) chains with B16 on O9500R-CHAA



MSP (1+1) chains with B16 on O9500R-CHA





Loop-O9550 SDH/SONET IMAP

O9550-A



Features

- Full front access (ETSI) shelf
- ADM, TM, and cross-connect
- Per chassis single STM-1/4 (OC-3/12) optical ring uplinks
 - Up to four STM-1/4 (OC-3/12) aggregate lines that are software configurable
 - Non-blocking N x 64 Kbps for 252 E1 or 336 T1 for data and voice channel transmission for uplink site
- Tributary modules (see next page)
- Power Modules:
 - DC Module: (-48Vdc, -24Vdc, -125Vdc)
 - Dual Power: (1+1) Protection for DC only
- SSM and CLK hold over function (SDH/SONET and E1/T1)
- Controller protection:
 - MSP (1+1) or SNCP for single controllers
 - MSP (1+1) and SNCP for dual controllers
- E1/T1/FOM support 1+1 and 1:1 Line protection
- A-law to μ -law conversion

- Alarm in/out, clock in/out
- Support E1/T1/FOM ring structure
- Support E1 DS0 SNCP ring
- Compatible to a SNMP based GUI network management system and supported by LoopView and Loop iNMS
- SSH V2
- SNMP V1 and V3
- RoHS compliant

Item	O9550-A
Chassis	5U
# of Mini-slots	4
# of Single slots	12
Maximum E1 Channels (Uplink)	504
Maximum E1 Channels (Tributary)	64
Maximum T1 Channels (Uplink)	672
Maximum T1 Channels (Tributary)	52

Description

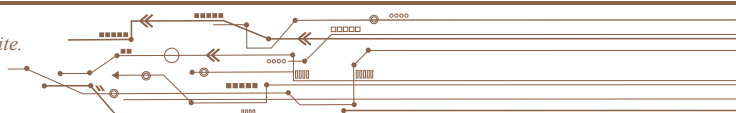
The Loop-O9550 SDH/SONET IMAP (Integrated Multi-Service Access Platform) is an economical STM-1/4 (OC-3/12) access multiplexer. It is designed to combine digital access interfaces, including TDM, IP, and voice interfaces into STM-1/4 (OC-3/12) optical lines for convenient transport and switching.

This unit is a full cross-connect; one or more of the WAN ports can be used as a Drop & Insert function with fractional E1/T1 lines, which can be muxed into a full E1/T1 line.

The O9550 provides two optical line signals at STM-1 (OC-3) or STM-4 (OC-12) with protection schemes including MSP (1+1) and SNCP protection in both ring and linear network topologies.

Redundancy is available in dual CPU controllers and power supply options, making the O9550 an excellent fit for critical applications. The chassis does not need or contain fan cooling, though an external fan tray is available.

The O9550 supports local control and diagnostics by using a VT-100 terminal connected to the console port. The O9550 also supports Ethernet, Telnet, SSH and SNMP so that it can also be controlled and diagnosed from remote locations. An in-band management channel with GUI is available. LED indicators for all plug-in cards are also available.





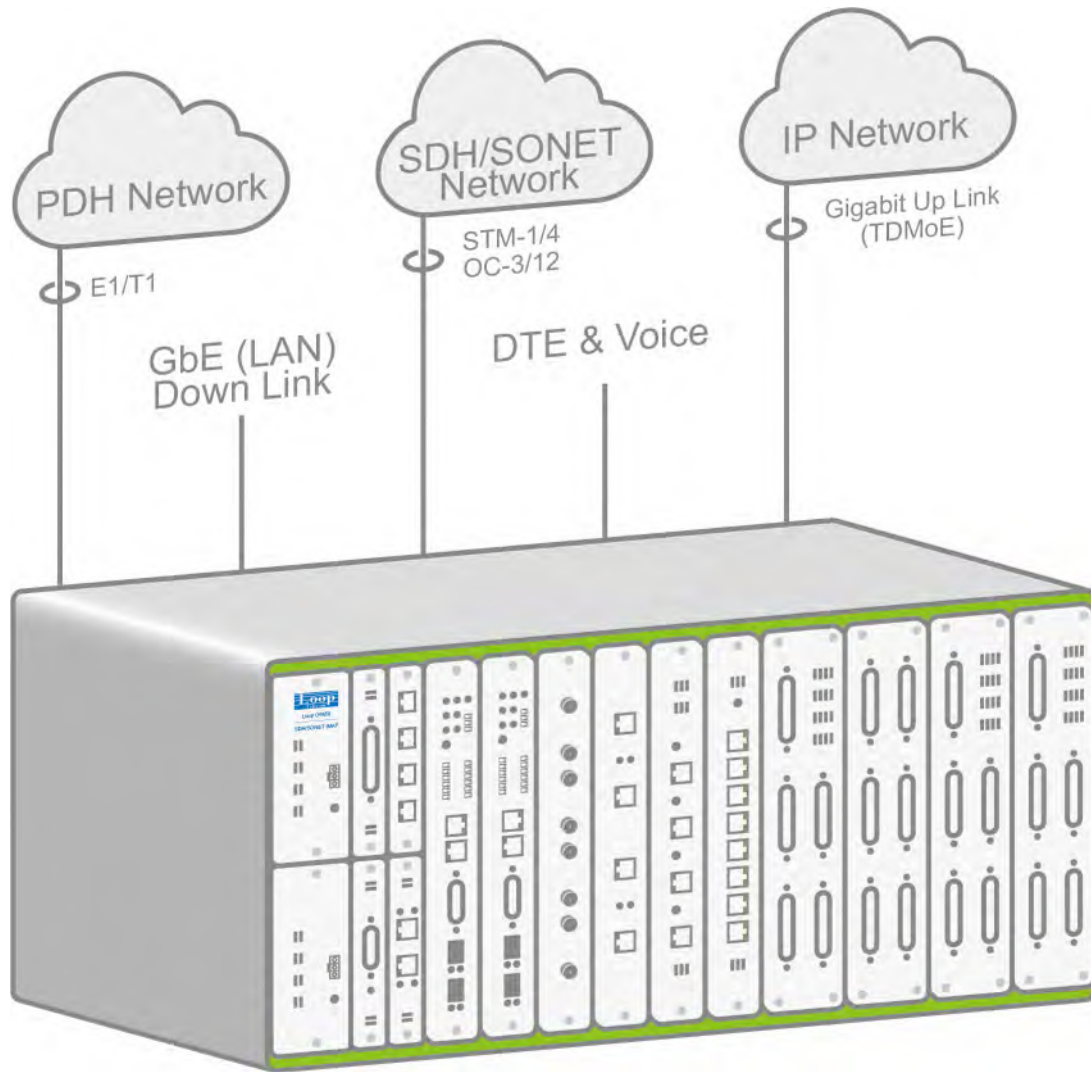
Plug-in card compatibility

	Plug-in cards	O9550	AM3440-A		O9500R		
		CC4A	CCB	CCPA	CC4	CC16	CCPA
Single Slot	3-channel E1	v	#	v	v	v	v
	4-channel E1	v	#	v	v	v	v
	4-channel T1	v	v	v	v	v	v
	2-channel G.SHDSL (2 pairs) w/o line power	v	v	x	v	v	v
	4-channel G.SHDSL (1 pair) w/o line power	v	v	x	v	v	v
	8-channel G.703 card at 64 Kbps data rate	v	v	v*	v	v	v
	8-channel Dry Contact I/O type A/B	v	v	v	v	v	v
	8-channel 2W/4W E&M (8EMA)	v	v	v	x	x	x
	8-channel OCU-DP card (ODP)	v	v	v	v	v	v
	12-channel FXS (12FXSA)	v	v	v	v	v	v
	12-channel FXO (12FXOA)	v	v	v	v	v	v
	12-channel Magneto (12MAGA)	v	v	v*	v*	v*	v*
	4-channel low speed optical (C37.94)	v	v	v	v	v	v
	6-channel RS232 with V.110 encoding (6RS232A)	v	v	v*	x	x	x
	8-channel RS232 with X.50 substrate	v	v	v	v	v	v
	8-LAN-port/ 64-WAN-port Router-B	v	v	v	v	v	v
	4-channel TDMoEA	v	v	v	v	v	v
	8-channel Data Bridge	v	v	x	v	v	v
	1FOMA	v	v	x	x	x	x
	8UDTEA	v	v	v	v	v	v
	6UDTEA	v	v	v	v	v	v
	VoIP Gateway card	v	v	v*	x	x	x
	6CDA	v	v	x	x	x	x
Dual Slot	Transfer trip card (TTA)	v	v	x	v	v	v
Mini Slot	1-channel E1 (Single E1 interface)	v	v	v			
	1-channel T1 (Single T1 interface)	v	v	v			
	Four-channel E1 card (M4E75, M4E120)	v	v	v			
	Four-channel T1 card (M4T1)	v	v	v			
	Echo Canceller Card (ECA)	v	v	v			
	Analog/Digital Bridge Card (ABRA)	v	v	v			
	Fiber optical interface	v	v	v			
	2-LAN port, 64 WAN port Router-A	v	v	v			
	Quad 2W/4W E&M (Four E&M voice interfaces)	v	x	x			
	Quad E&MA (Four E&M voice interfaces)	v	##	##			
	Quad FXSA (Four FXS voice interfaces)	v	##	##			
	Mini C37.94	v	v	v			
	1X.21	v	v	v			

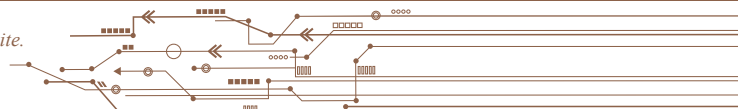
Notes: v = Supported
x = Not supported
= Supported by AM3440 Chassis CHAJ, CHAK and CHCJ only
= Supported by AM3440 Chassis CHAK only
*Future Option

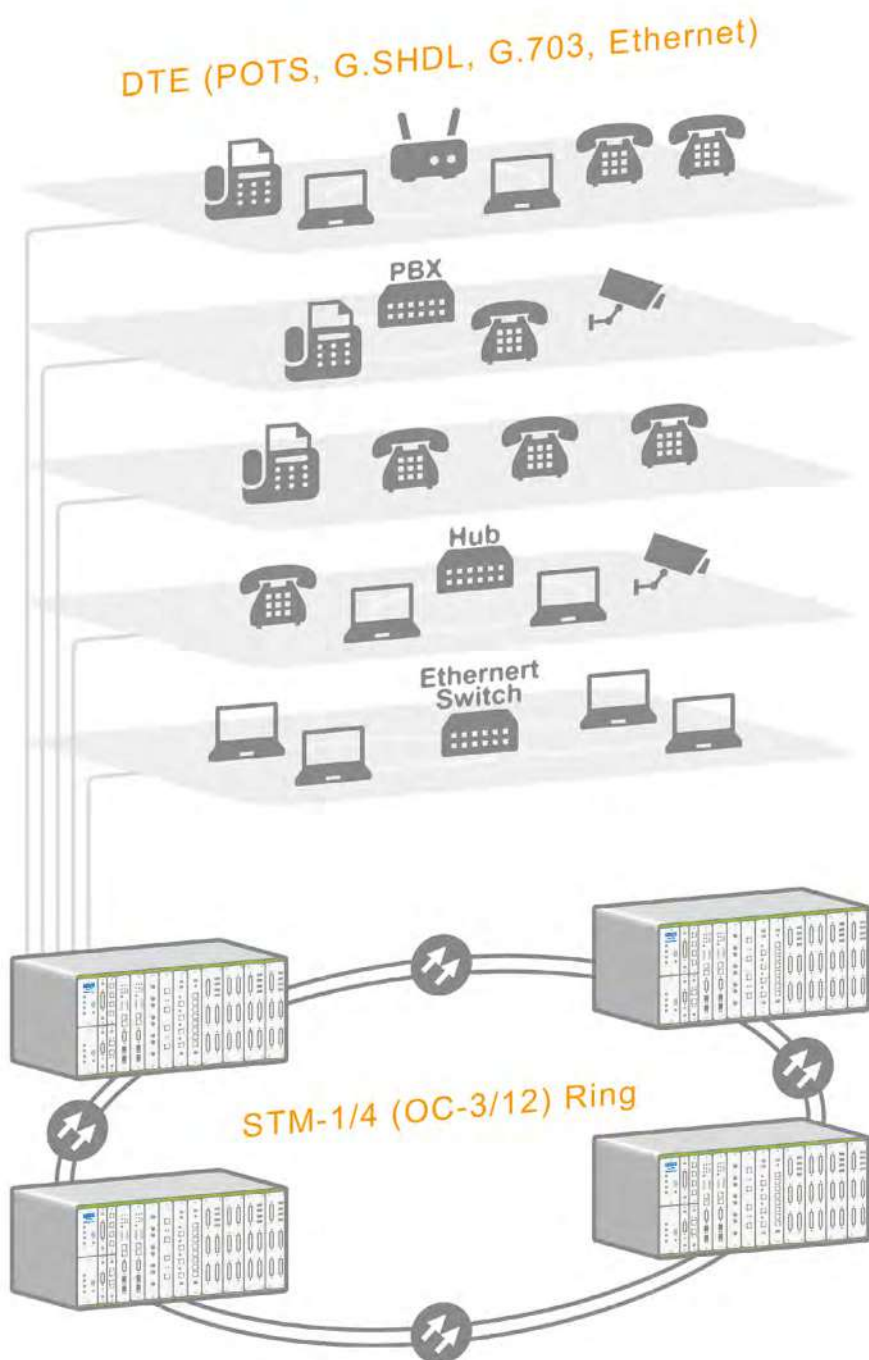


Application Illustrations

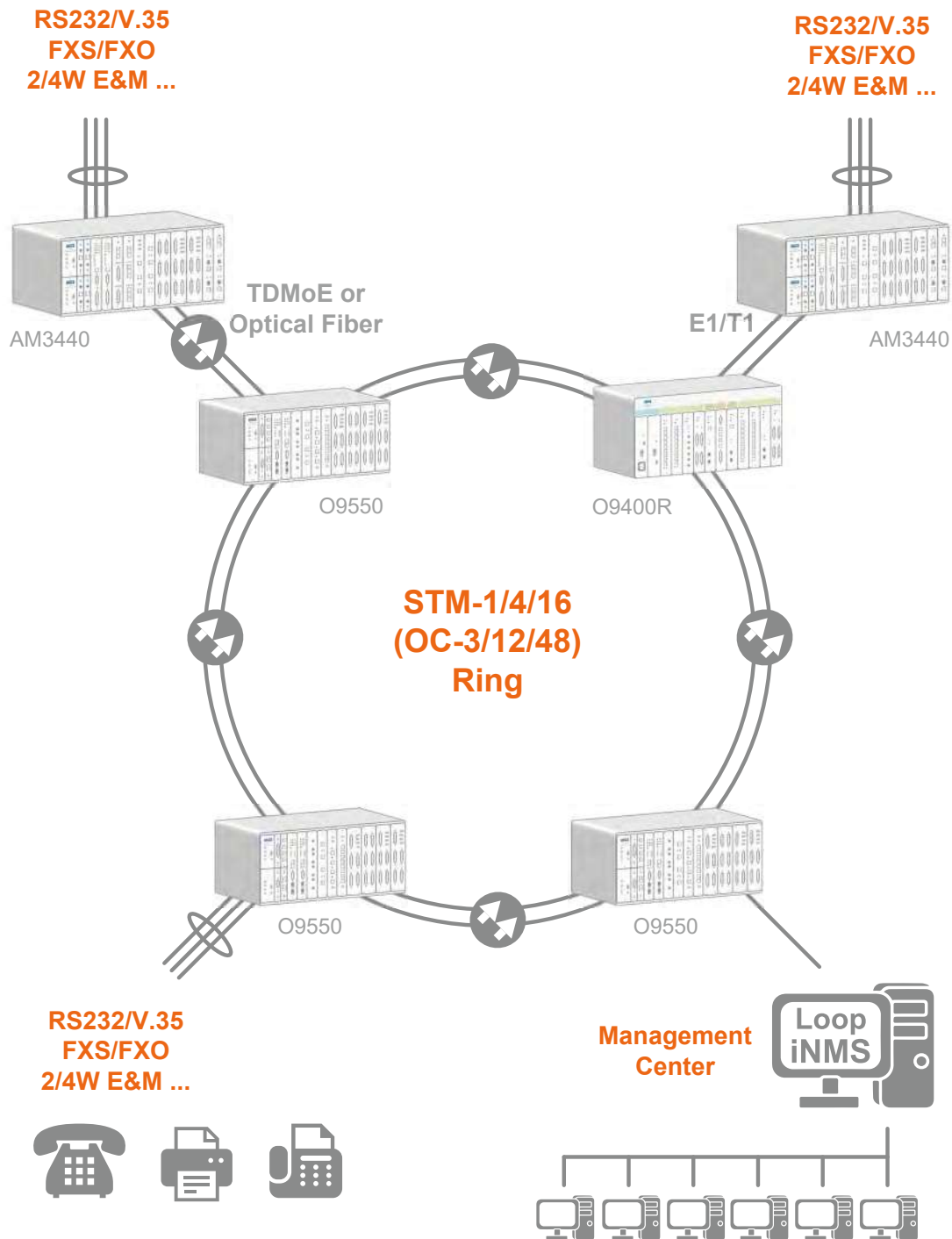


Uplink and Downlink Application

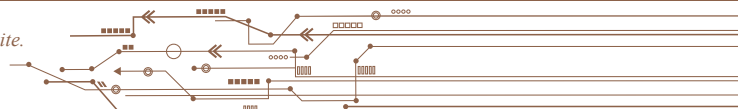


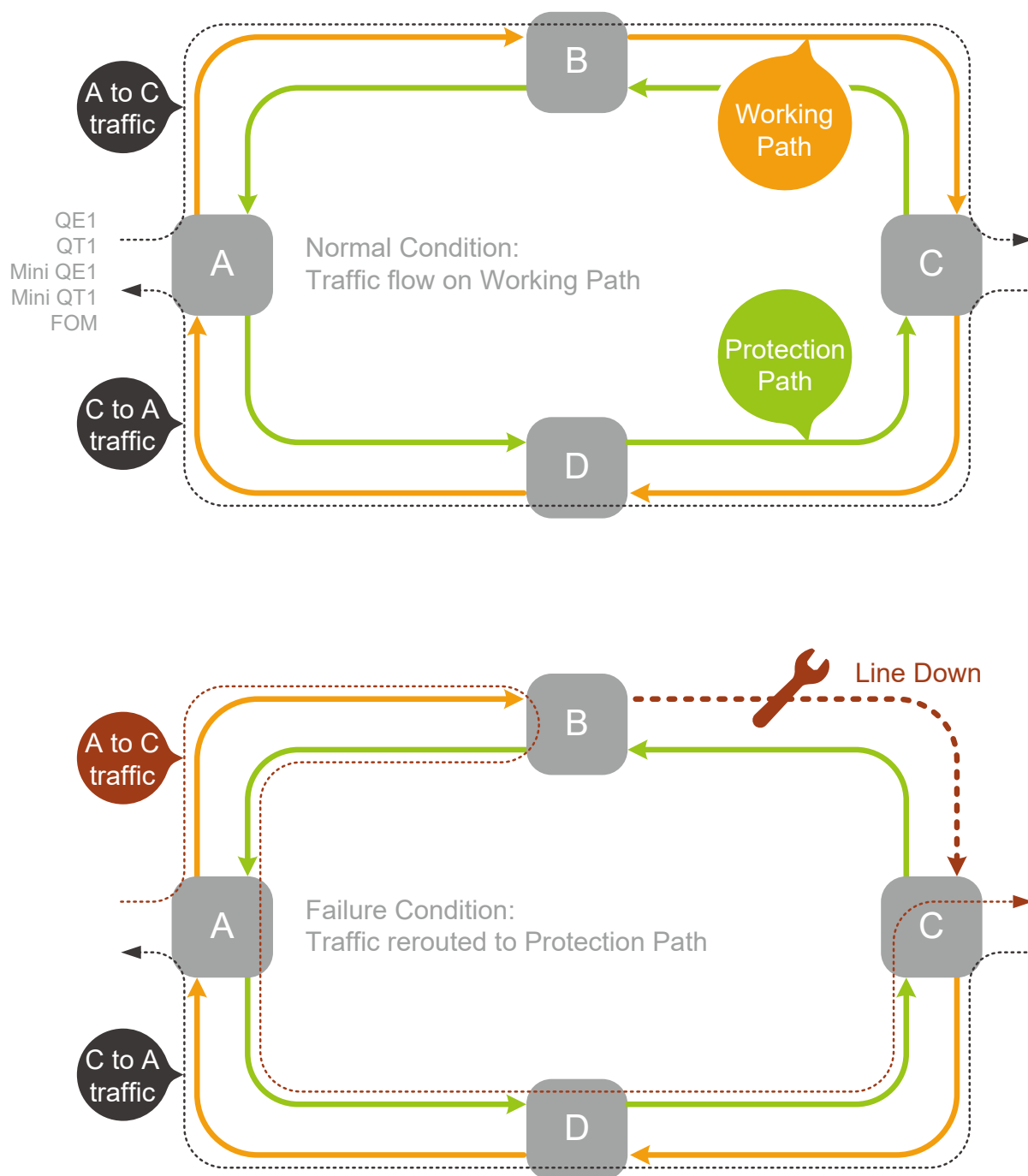


Smart Building Application



SDH/SONET Ring Application





Note ULSR ring does not support E1 unframed mode. Users must switch to E1 frame mode to set up a ULSR ring.

ULSR Ring Application



Loop-O9550-D SDH/SONET IMAP



Features

- 2U height, full front access (ETSI) shelf
- ADM, TM, and cross-connect
- Support of DS0 DACS (Digital Access Cross-Connect System) with full cross-connect
- Dual controller, dual DC power with load sharing or single AC power card support
- 1 for 1 protection, Y-BOX, E1, T1, FOM
- PDH ring protection, FOM, Mini QE1
- Console, Telnet, SNMP, and Inband management support
- Compatible to a SNMP-based GUI network management system and supported by iNET and Loop iNMS
- All the plug-in cards are hot-pluggable

Item	O9550-D
Chassis	2U
# of Mini-slots	9
Max. E1 Ports	36
Max. T1 Ports	9
Cross-Connect Capacity	1080Mbps

Description

The Loop-O9550-D SDH/SONET IMAP (Integrated Multi-Service Access Platform) is an economical STM-1/4 (OC-3/12) access multiplexer. It is designed to combine digital access interfaces, including TDM, IP, and voice interfaces into STM-1/4 (OC-3/12) optical lines for convenient transport and switching.

This unit is a full cross-connect; one or more of the WAN ports can be used as a Drop & Insert function with fractional E1/T1 lines, which can be muxed into a full E1/T1 line.

The O9550-D provides two optical line signals at STM-1 (OC-3) or STM-4 (OC-12) with protection schemes including MSP 1+1 and SNCP protection in both ring and linear network topologies.

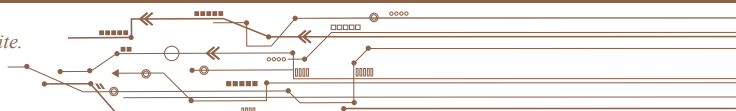
Redundancy is available in dual CPU controllers and power supply options, making the O9550-D an excellent fit for critical applications.

The O9550-D supports local control and diagnostics by using a VT-100 terminal connected to the console port. The O9550-D also supports Ethernet, Telnet, SSH and SNMP so that it can also be controlled and diagnosed from remote locations. An in-band management channel with GUI is available. LED indicators for all plug-in cards are also available.

O9550-D Plug-in Cards

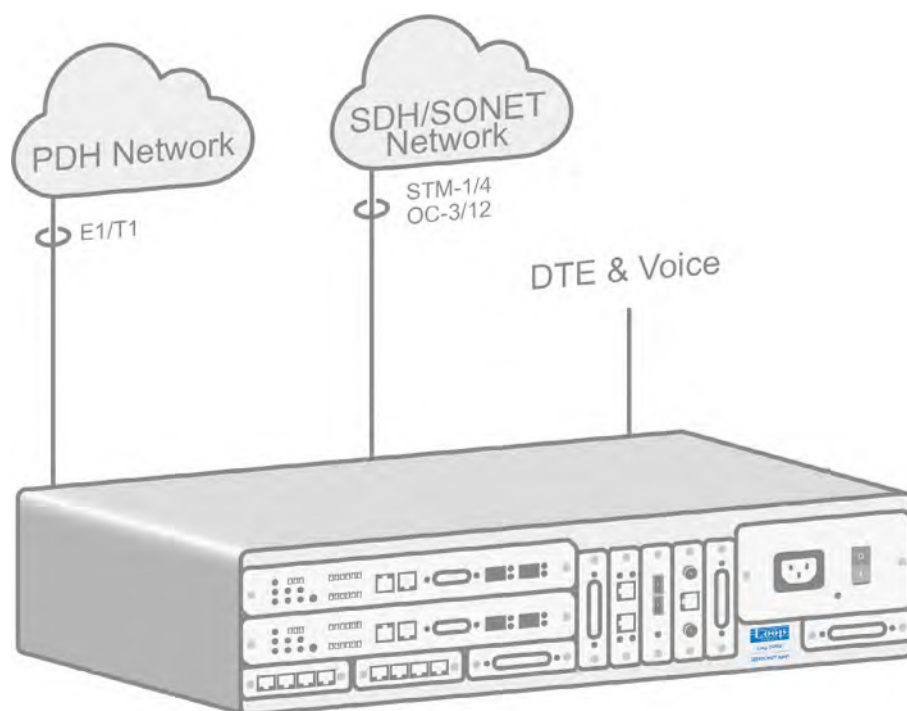
	O9550-D
1T1	✓
1E1(E75)	✓
1E1(E120)	✓
4E1(M4E75)	✓
4E1(M4E120)	✓
Router-A(RTA)	✓
1FOM-E1(FOM)	✓
QEMA	✓
4FXSA(QFXSA)	✓
4FXO(QFXO)	✓
QFXSA	✓
Mini C37.94	✓
1DTE(X.21/V.35/RS232)	✓
Analog Voice Bridge (ABRA)	✓
Echo Canceller (ECA)	✓

✓ : Supported

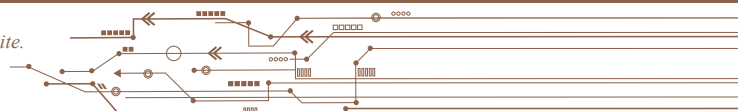
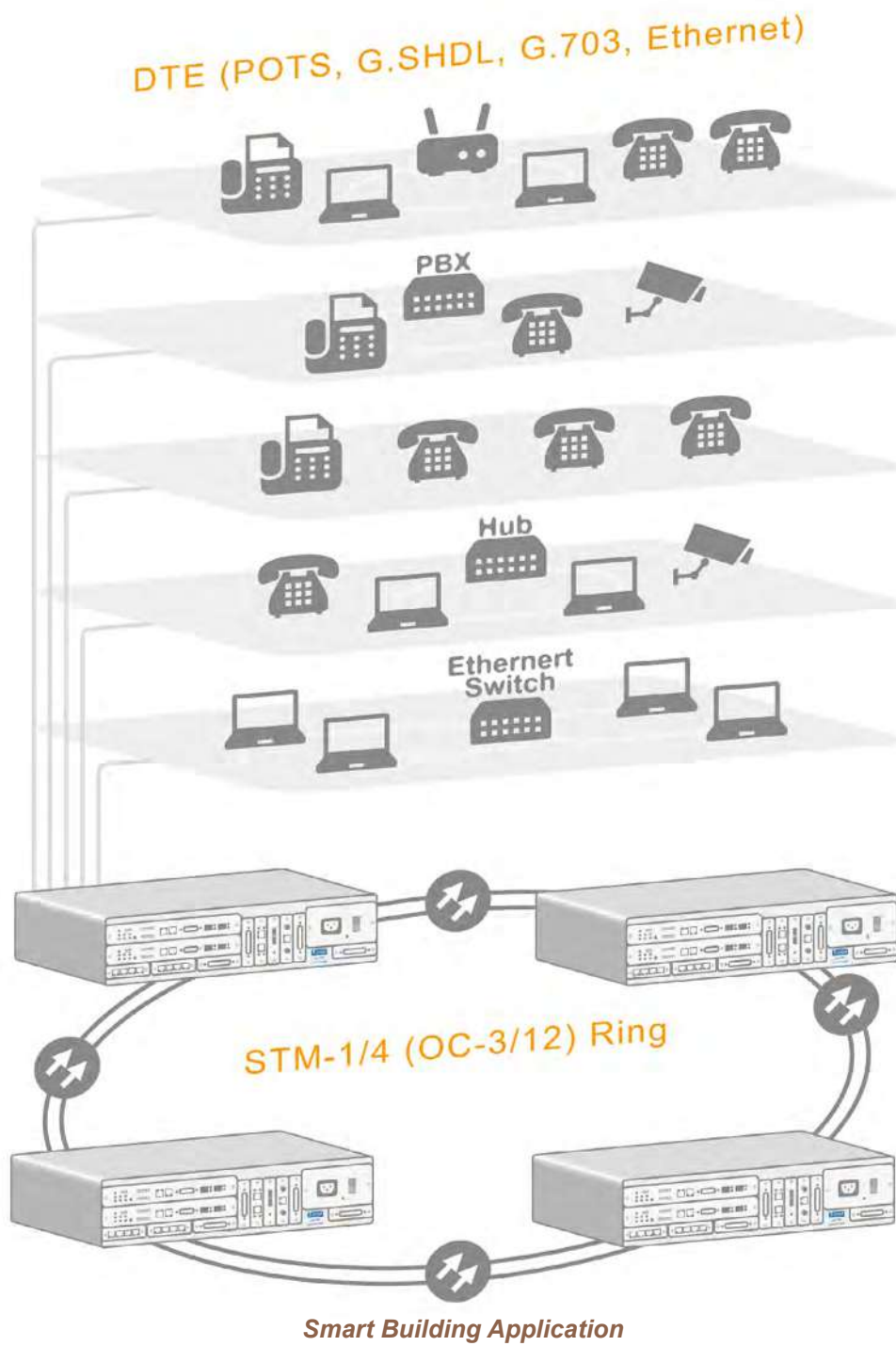


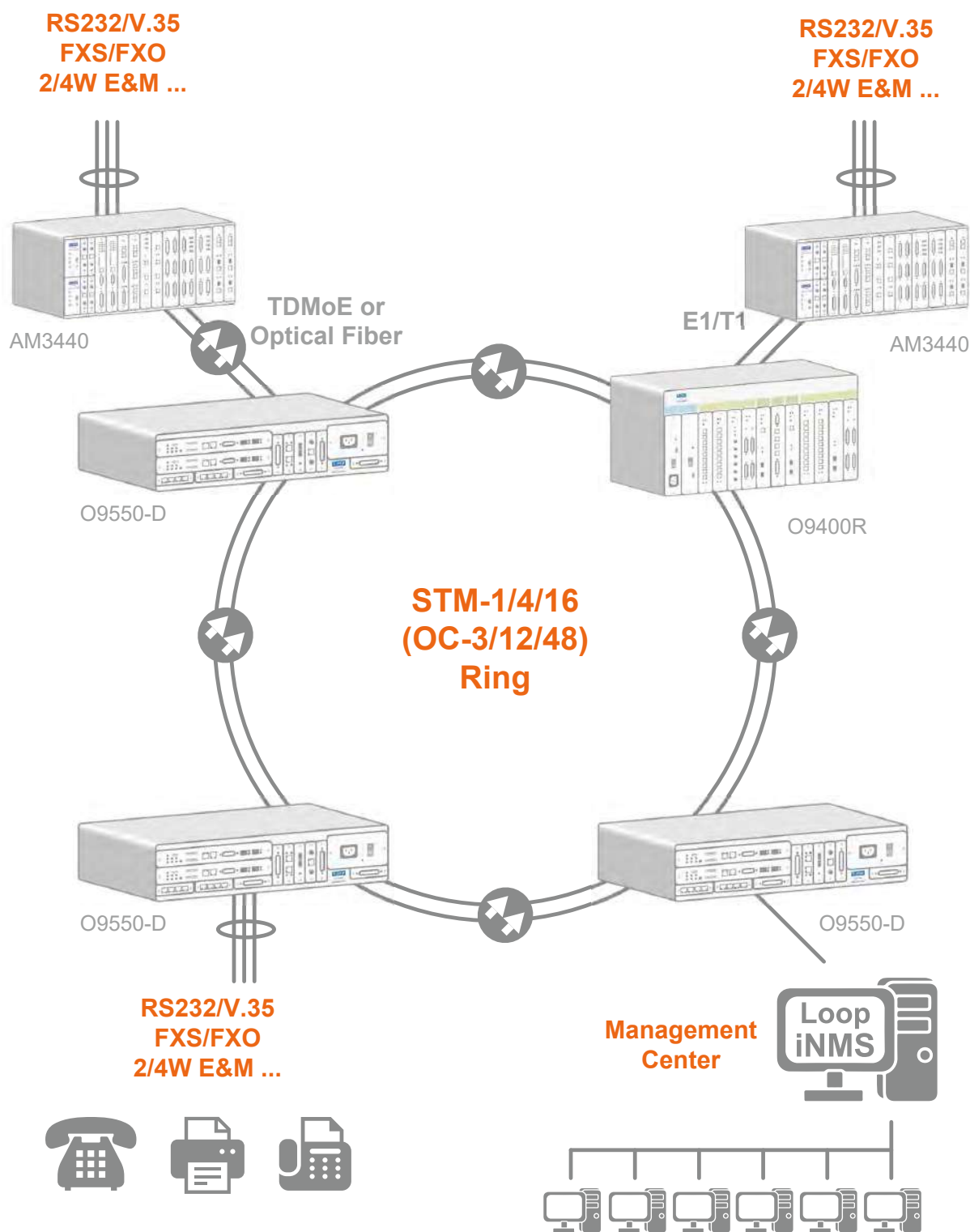


Application Illustration

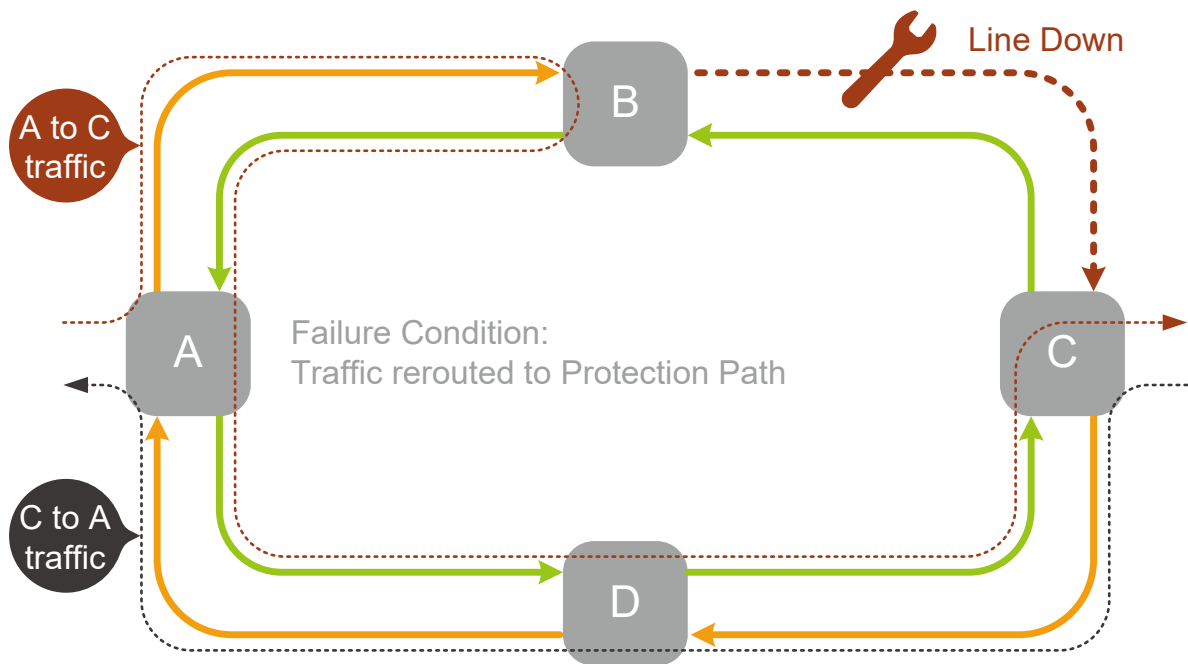
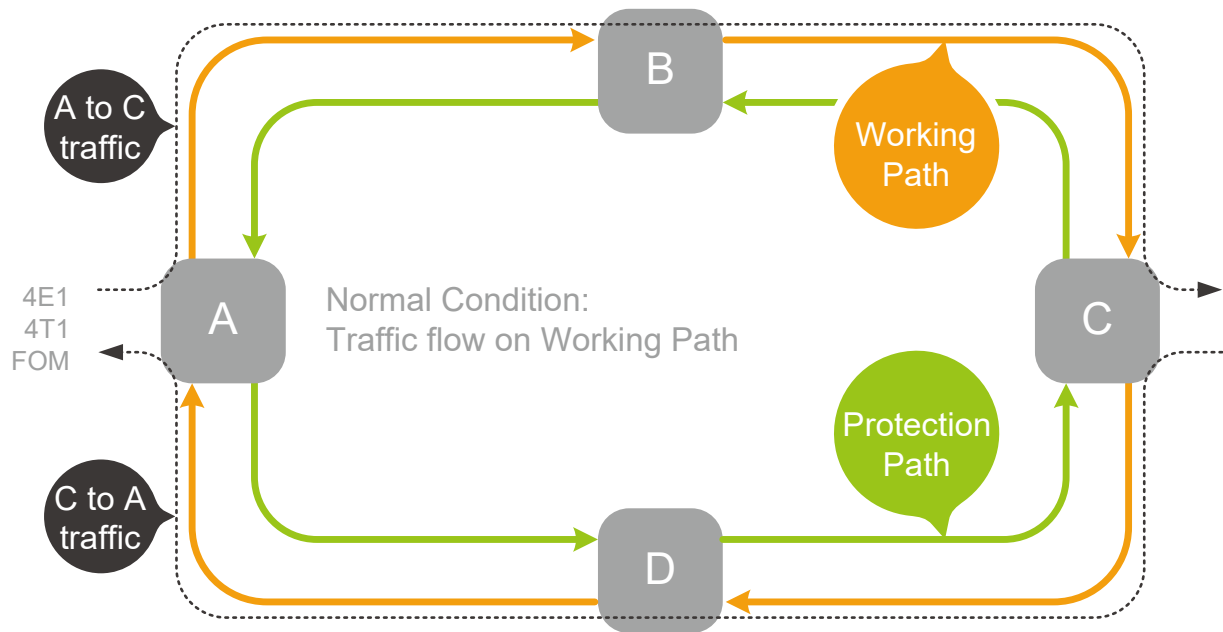


Uplink and Downlink Application



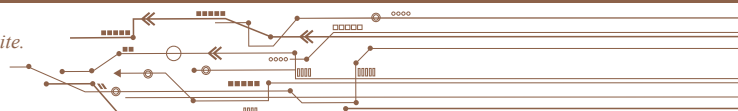


SDH/SONET Ring Application



Note ULSR ring does not support E1 unframed mode. Users must switch to E1 frame mode to set up a ULSR ring.

ULSR Ring Application





4

Multi-Service Cross Connect

Loop-AM3430 Access DCS-MUX	78
Loop-AM3440 Access DCS-MUX	79
Loop-AM3440-CHPAa/CHPCa Access DCS-MUX	87
Loop-AM3440-D Access DCS-MUX	96
Loop-AM3440-E IP/TDM DCS-MUX	99
Loop-AM3440-CHE8GEHSWa IP/TDM DCS-MUX	101
Loop-V4150 DS0 Cross Connect System	104
Loop-V4200-9 MuxMaster/Wideband IAD CSU/DSU, E1/T1 Converter, DACS	107



Loop-AM3430 Access DCS-MUX



Features

- 1 U height Shelf
- DS0 DACS (Digital Access Cross-Connect System) with full cross-connection
- Supports 4 x T1*/E1 or 2 x FOM E1 and 4 x E1* on board
- Supports 4 x hot-pluggable tributary slots
- Hot pluggable tributary interface modules including
 - 4 port E&M
 - 2 port Ethernet Bridge
 - 4 port RS485
 - 8 port RS232 Async
 - 4 port RS232 Sync
 - 8 port FXS
 - 8 port FXO
 - 2 port C37
 - 1 port V35
 - 1 port X21
 - 4 port CD (G.703 64K Co-dir)
 - 8 port DTE (4 port RS232 Async + 4 port RS485)
- Hot swappable power Modules, dual power modules for redundancy
 - DC power -48 Vdc (-36 to -75Vdc)
 - AC power (100 to 240 Vac)
- Protection
 - T1* or E1 1+1 protection
 - FOM 1+1 protection*
- Management
 - Console port with VT-100 menu-driven user interface
 - Telnet
 - SNMP v1
 - Inband management through DS0 (64K)

Description

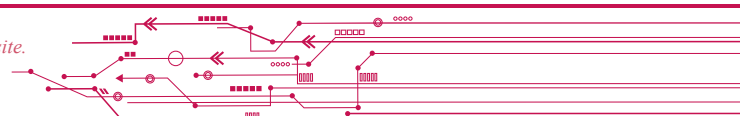
The Loop-AM3430 is an economical, cost effective Access DCS-MUXs that combine various digital access interfaces into T1*/E1 or FOM* lines for convenient transport and switching. Through T1*/E1 or FOM* uplinks, the AM3430 provides access for voice and data communication over the network.

This unit is a full cross-connect and can act as a mini DACS: one or more of the WAN ports can be used as a Drop & Insert function with fractional T1*/E1 line, which can be muxed into a full E1/T1 line.

On the network side, the AM3430 has T1*/ E1 or FOM* ports supporting 1+1 protection.

The AM3430 supports local control and diagnostics by using a VT-100 terminal connected to the console port. There are LED indications for all tributary interface modules. The AM3430 also supports Ethernet, Telnet, and SNMP, so that it can be controlled and diagnosed from remote locations. An in-band management channel is also available.

*Future Option





Loop-AM3440 Access DCS-MUX

AM3440-A



AM3440-C



Features

- Full frontal access (ETSI) Shelf
- DACS (Digital Access Cross-Connect System) with full non-blocking nx64K (DS0) cross-connect support Dual controller, dual power with load sharing
- E1/T1/TDMoEA 1+1 protection, switching time <50ms
- DS0 Level Nx64K circuit protection
- PDH ring protection, QE1/QT1, FOM, Mini QE1/QT1
- Console, Telnet, and Inband management support SNMP v.1 and v.3
- Craft interface port for connection to external Intelligent Front Panel
- Compatible to a SNMP based GUI network management system and supported by Loop iNET and Loop iNMS
- Two chassis types available: AM3440-A, AM3440-C
- Support SAToP(CCPA T1 SAToP*), CESoPSN, and MEF8 for emulation of TDM circuits
- Support GbE uplinks with CCPA controller installed

* Future Option

All the plug-in cards are hot-pluggable

Item	AM3440-A	AM3440-C
Chassis	5U	3U
# of Mini-slots	4	4
# of Single slots	12	5
Maximum E1/T1 Channels	64	36
Cross-Connect Backplane Capacity	128 Mbps	72 Mbps

Description

The Loop-AM3440-A/C series products are Access DCS-MUXs which support multiplexing of various digital access interfaces into E1 or T1 lines for convenient transport and switching.

The Loop-AM3440 Access DCS-MUX provides access for a variety of TDM, packet, and voice interfaces and transports over GbE or E1/T1 uplinks. These interfaces are compatible with other Loop products. The AM3440 can act as a mini DACS: one or more of the WAN ports can be used as a Drop & Insert function with fractional E1/T1 lines, which can be muxed into a full E1/T1 line. Furthermore, the AM3440 also supports TDM circuit emulation protocols. TDM data and voice services can be encapsulated as Pseudowires and transported over ETH/IP/MPLS packet switch networks.

The AM3440 controller module provides full non-blocking Nx64K cross-connect matrix up to 2048 DS0. System redundancy is available in dual controller and power modules, making it an excellent fit for critical applications.

While 1+1 link protection is available for E1, T1, and TDMoEA modules, path protection for end-to-end Nx64K circuit protection is available for 3E1/T1.

The AM3440 supports local control and diagnostics by using a VT-100 terminal connected to the console port. It supports Ethernet, Telnet, and SNMP, so that it can be controlled and diagnosed from remote ends. An in-band management channel with GUI is available as well.

Both the models of AM3440-A and C has a number of plug-in slots in regular size and mini size. (Card size to slot compatibility is detailed on the next page.) Most of the plug-in cards have LED indications.

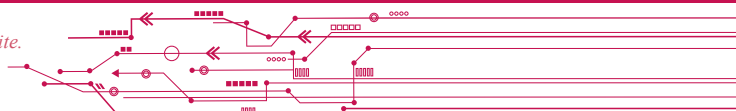
The AM3440 consists of a rugged reinforced aluminum chassis, giving this equipment a durable structure and a long-lasting physical life.



Loop-AM3440 plug-in cards:

The mini-slot cards plug into the mini-slots of the AM3440. The single-slot cards plug into single slots. The dual-slot cards plug into two adjacent single slots.

Tributary Modules	Controller	CCB		CCPA	
	Chassis	AM3440-A		AM3440-C	
Plug-in cards					
Single-Slot	3-channel E1	#	√	#	√
	3-channel T1	#	√	#	√
	4-channel E1	√	√	√	√
	4-channel T1	√	√	√	√
	2-channel G.SHDSL (2 pairs) w/o line power	√	×	√	×
	4-channel G.SHDSL (1 pair) w/o line power	√	×	√	×
	8-channel G.703 card at 64 Kbps data rate	√	√*	√	√*
	8-channel Dry Contact I/O Type	√	√	√	√
	8-channel Dry Contact I/O Type B	√	√	√	√
	8-channel 2W/4W E&M (8E&M)	D	√*	D	√*
	8-channel 2W/4W E&M (8E&MA)	√	√	√	√
	12-channel FXS	D	√*	D	√*
	12-channel FXSA	√	√	√	√
	12-channel FXOA	√	√	√	√
	12-channel Magneto	√	√*	√	√*
	1-channel low speed optical (C37.94)	D	D	D	D
	4-channel low speed optical (C37.94)	√	√	√	√
	8-channel RS232 with X.50 subrate	√	√	√	√
	6-port RS232 card (6RS232A) with V.110 encoding	√	√*	√	√*
	8-LAN-port/ 64-WAN-port Router-B	√	√	√	√
	4-channel TDMoEA	√	√	√	√
	8-channel Data Bridge	√	×	√	×
	1FOMA	√	×	√	×
	6-channel UDTEA	√	√	√	√
	8-channel UDTEA	√	√	√	√
	8-channel OCU-DP	√	×	×	×
	6-channel Co-Directional card (6CDA)	√	×	√	×
	VOIPGA interface card	!	√*	√	√*
Dual-Slot	Transfer Trip card (TTA)	√	×	√	×





Tributary Modules	Controller	CCB	CCPA	CCB	CCPA
	Chassis	AM3440-A		AM3440-C	
Mini-Slot	Plug-in cards				
	1-channel E1 (Single E1 interface) with 75ohm	√	√	√	√
	1-channel E1 (Single E1 interface) with 120ohm	√	√	√	√
	1-channel T1 (Single T1 interface)	√	√	√	√
	Mini Quad E1 (Four E1 interfaces) with 75ohm	√	√	√	√
	Mini Quad E1 (Four E1 interfaces) with 120ohm	√	√	√	√
	Mini Quad T1 (Four T1 interfaces)	√	√	√	√
	Fiber Optical Interface	√	√	√	√
	LS Optical M1C37 Card	!	!	√	√
	1-channel X.21	√	√	√	√
	1-channel V.35	√	√	√	√
	1-channel RS232	√	√	√	√
	1-channel OCU-DP	×	×	√	×
	Quad E&M (QEMA)	##	##	√	√
	QFXSA (Four FXS voice interface)	##	##	√	√
	QFXO (Four FXO voice interfaces)	##	##	√	√
	QMAGA (Four magneto voice interfaces)	##	##*	√	√*
	2-LAN port/64 WAN port Router-A	√	√	√	√
	Echo Canceller card	√	√	√	√
	Analog Bridge card	√	√	√	√

Note: √ = Supported # = Supported by Chassis CHAJ, CHAK and CHCJ only D =Discontinued
 × = Not Supported ## = Supported by Chassis CHAK only * = Future Option
 ! = Supported by Chassis CHAJ, CHAK, CHC and CHCJ only

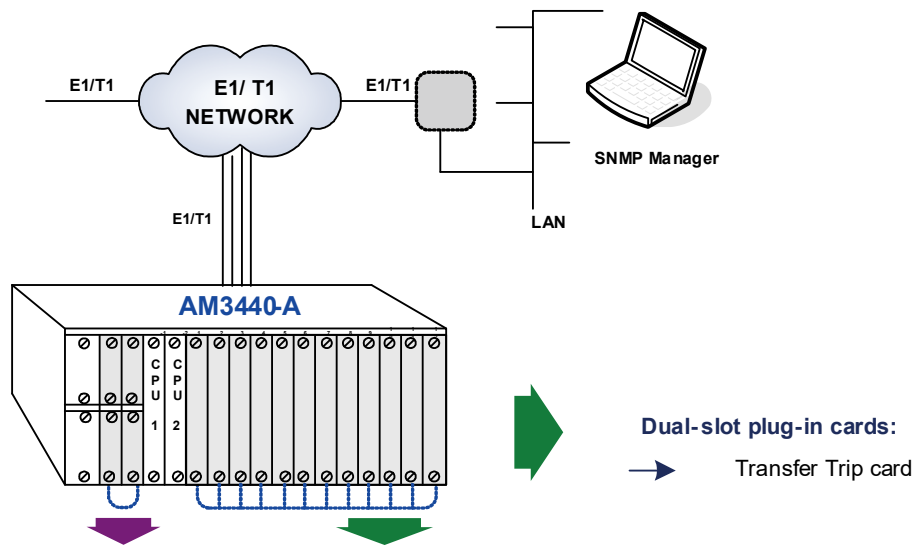
Controller and Function:

Controller	CCB	CCPA
Function		
LCD ^{Note}	√	×
DB9 console ^{Note}	√	×
Micro USB console	√	√
iXC tool	√	√*

Note: Loop-ACC-CAB-HDB15M-25-DB09F-G is included for Console/LCD Interface connection.



Application Illustrations



Dual-slot plug-in cards:

→ Transfer Trip card

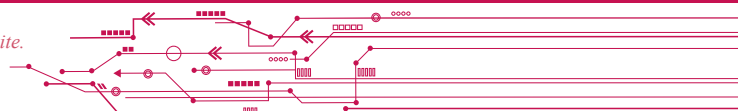
Mini-Slot plug-in Cards

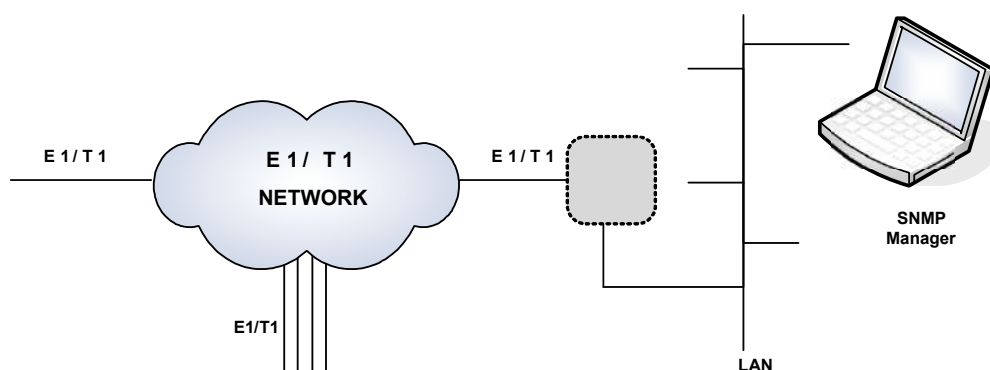
- 1 - channel E1
- 1 - channel T1
- Mini Quad E1
- Mini Quad T1
- 32 WAN port Router (D)
- 64 WAN port Router
- Fiber Optical Interface
- 3 - channel Terminal Server
- 1 - channel DTE (1X.21, 1V.35, 1RS232)
- ECA
- ABRA
- QMAGA*
- QFXO*
- QFXSA*
- QEMA*
- 1- channel OCU-DP*

Single-Slot plug-in Cards :

- 3 - channel E1
- 4 - channel E1
- 4 - channel T1
- 8 - channel OCU-DP
- 2 - channel G. SHDSL w/o line power
- 4 - channel G SHDSL w/o line power
- 8 - channel G.703 64 Kbps
- 8 - channel Dry Contact I/O
- 8 - channel Dry Contact I/O type B
- 8 - channel 2W/4W E&MA
- 12 - channel FXSA
- 12 - channel FXOA
- 12 - channel Magneto
- 4 - channel C37.94
- 8 - channel RS232 with X.50 substrate
- 6 - channel V.110
- 8 - LAN - port / 64 - WAN - port Router - B
- VOIPGA
- TDMoEA
- 8-Data Bridge
- 1FOM-A
- 8UDTEA
- 6UDTEA

Note : (D) = Discontinued
*For Chassis AK only





AM3440-C			
CTRL 2	Mini Plug-in (C)	Mini Plug-in (D)	
CTRL 1	Mini Plug-in (B)	Mini Plug-in (A)	
Plug-in (3)	Plug-in (5)	Plug-in (4)	
Plug-in (2)			
Plug-in (1)			

Mini-Slot plug-in Cards

- 1 - channel E1
- 1 - channel T1
- Mini Quad E1
- Mini Quad T1
- 32 WAN port Router (D)
- 64 WAN port Router
- Fiber Optical Interface
- QFXO
- QMAGA
- QFXSA
- 1 - channel DTE (1X.21, 1V.35, 1RS232)
- 1 - channel OCU-DP
- ECA
- ABRA
- QEMA

Dual-slot plug-in cards:

- Transfer Trip card

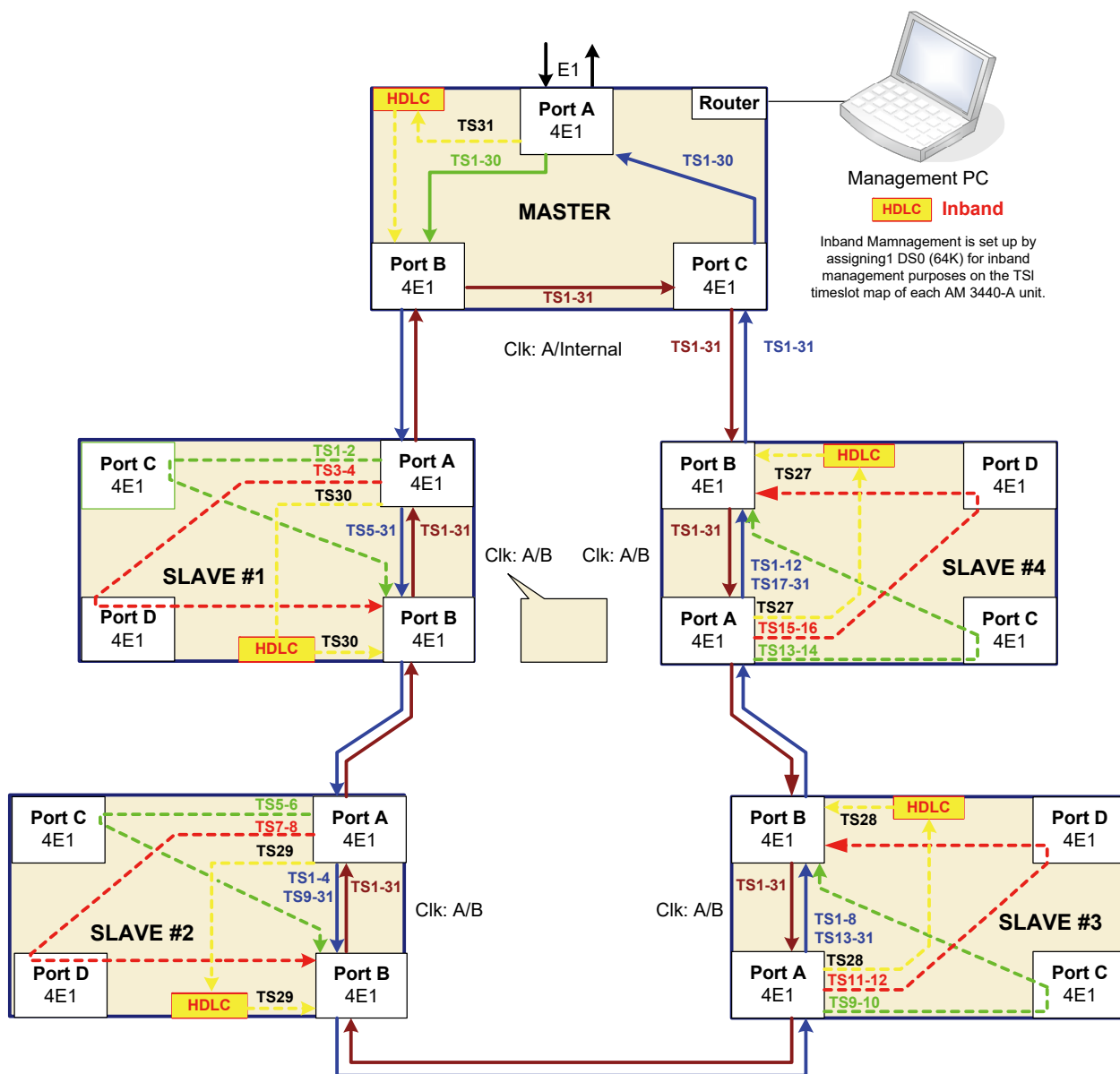
Single-Slot plug-in Cards:

- 3 - channel E1 ^{Note}
- 3 - channel T1
- 4 - channel E1
- 4 - channel T1
- 2 - channel G . SHDSL w / o line power
- 4 - channel G . SHDSL w / o line power
- 8 - channel G . 703 64 Kbps
- 8 - channel Dry Contact I/O type B
- 8 - channel Dry Contact I/O
- 8 - channel 2W/4W E&MA
- 12 - channel FXSA
- 12 - channel FXOA
- 12 - channel Magneto
- 4 - channel C37.94
- 8 - channel RS232 with X.50 subrate
- 6 - channel V.110
- 8 - LAN-port / 64- WAN - port Router -B
- VOIPGA
- TDMoEA
- 8- Data Bridge
- 1FOMA
- 8UDTEA
- 6UDTEA

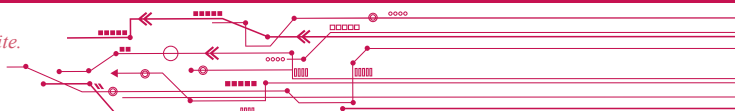
Note : (D) = Discontinued



ULSR Ring Application (E1)

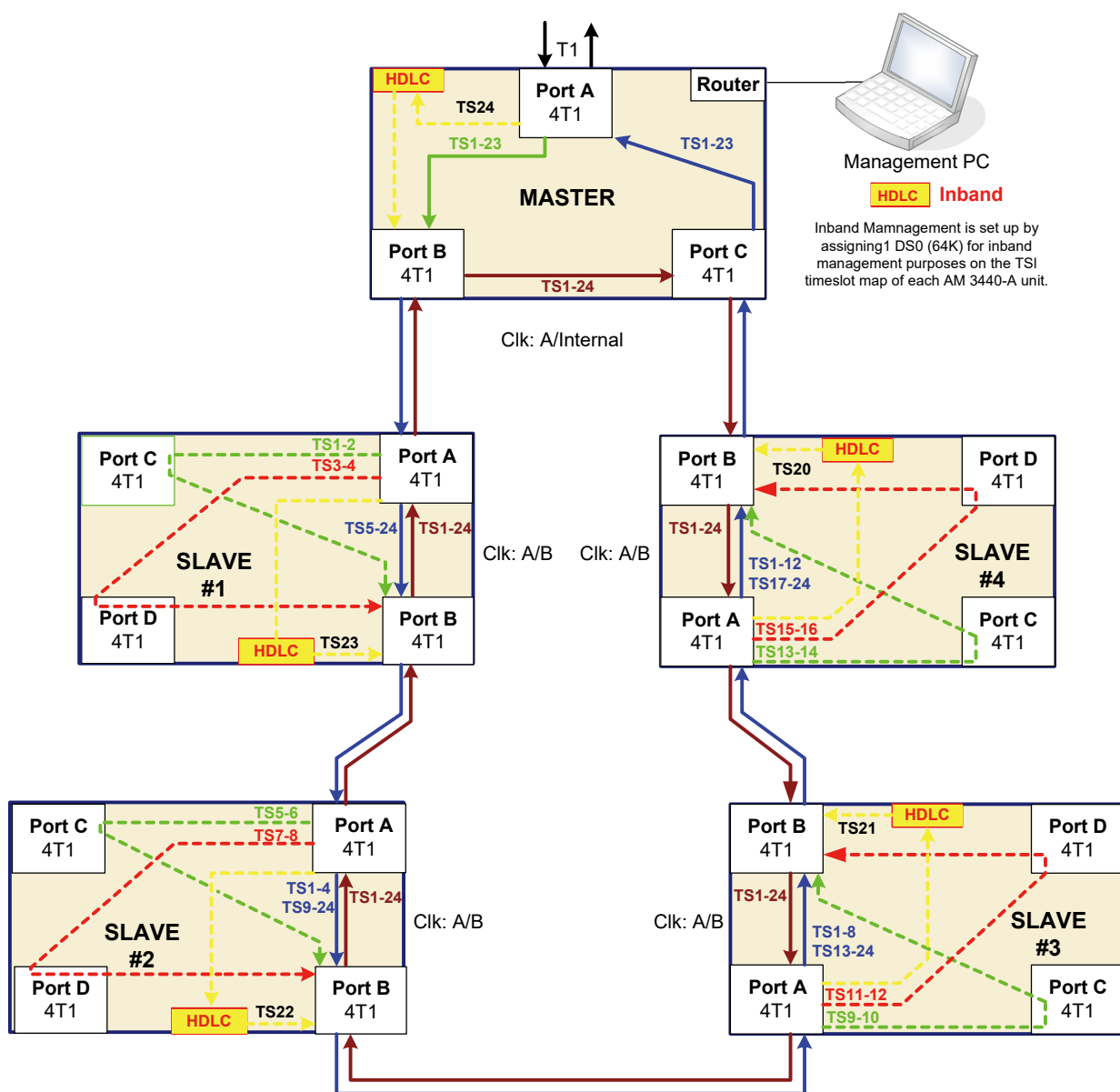


Note: ULSR ring does not support E1 unframed mode. Users must use E1 framed mode to set up a ULSR ring.



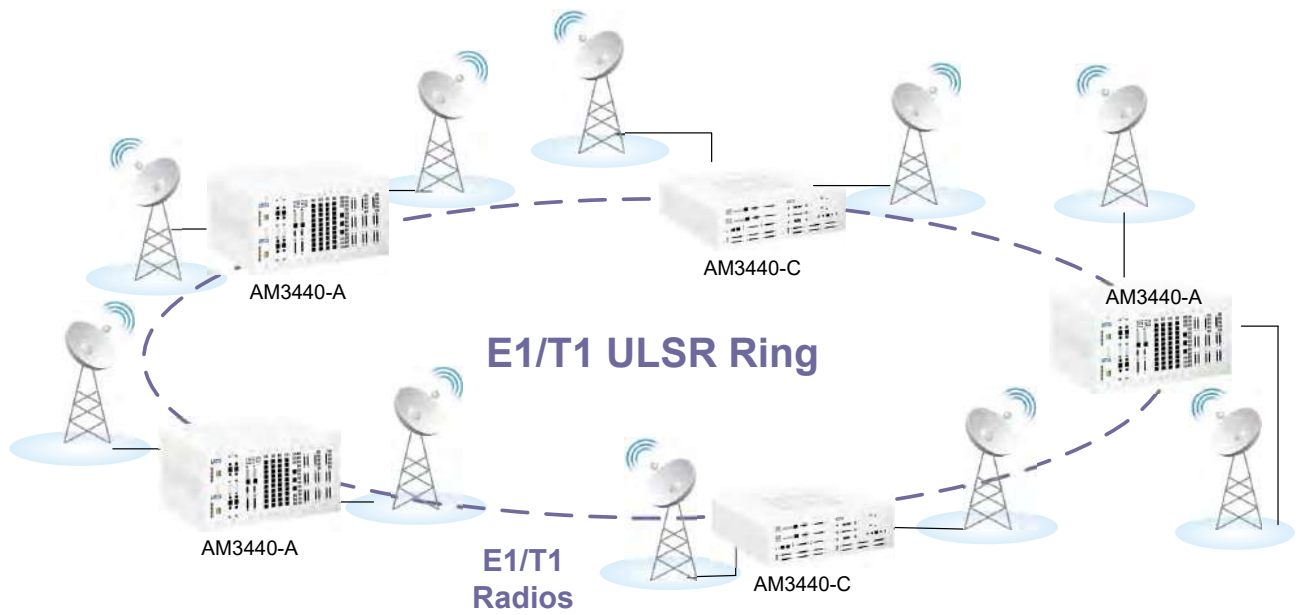


ULSR Ring Application (T1)

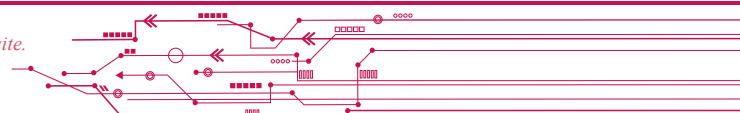
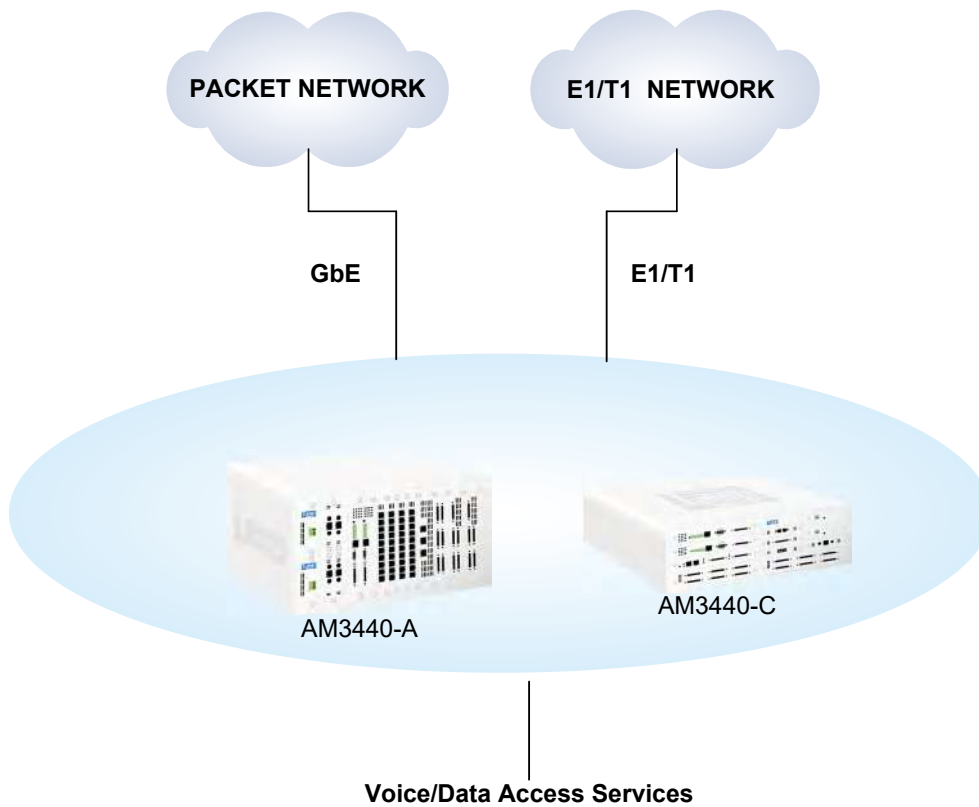




AM3440 ULSR Ring Application through E1/T1 Radio



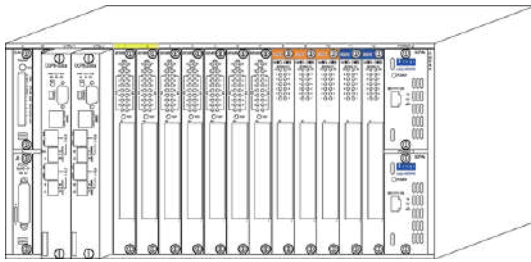
AM3440 GE Uplink (with CCPA controller installed)



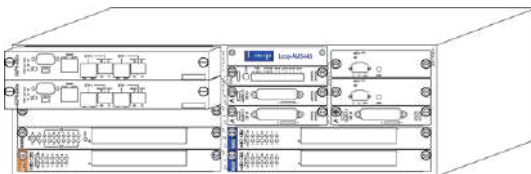


Loop-AM3440-CHPAa/CHPCa Access DCS-MUX

AM3440-CHPAa



AM3440-CHPCa



Features

- System Capacity
 - Full frontal access (ETSI) Shelf, with 4 x mini slots and 12 x single slots for TDM N x 64K plug-in modules.
 - DACS (Digital Access Cross-Connect System) with full non-blocking nx64K (2048 x 2048 DS0) cross-connect support Dual controller, dual power with load sharing
 - Up to 8 x GE SFP on AM3440-CCPB-8GEHSWa controller module, up to 16 x GE SFP with dual controllers.
 - Slot 1 and Slot 2 support TDM N x 64K plug-in modules and 8GEAa high speed tributary module.
- Management
 - Console, Telnet, and Inband management support SNMP v.1 and v.3
 - Compatible to a SNMP based GUI network management system and supported by Loop iNET and Loop iNMS
 - Supports RADIUS authentication
- MPLS-TP
 - MPLS Transport Profile per RFC-5921
 - Any Ethernet port can be configured asNNI (MPLS port) or UNI (Ethernet service port)
 - Static MPLS LSP label provisioning via NMS
 - Pseudo Wire (PW) to support
 - Ethernet Pseudo Wire(VPWS, VPLS, H-VPLS)
 - PDH Pseudo Wire End-2-End Emulation (SATO MPLS, CESoMPLS)
 - MPLS-TP OAM
 - Section/LSP/PW TP-OAM using BFD (Per IEEE 8113.2)
 - MPLS-TP QoS
 - 64K Granularity Rate Limit Per Flow
 - Ingress/Egress TC/EXP Class Mapping
 - TC/EXP Priority-based Queuing (8 Queues)
 - Tunnel Traffic Engineering CIR/PIR and CBS/ PBS Policing/Shaping
- PW Traffic Engineering CIR/PIR and CBS/PBS Policing/Shaping
- WRE
- Strictly Priority / WRR
- Carrier Ethernet (CE)
 - L2 Switching/Bridging
 - RSTP/MSTP (IEEE 802.1w/1s)
 - VLAN 1Q 802.1q/ Q in Q8 802.1ad
 - VLAN Operation: Stack/Switch/Strip
 - Link Aggregation (802.3ad): Static/LACP
- Ethernet Services
 - E-Line, E-LAN, E-Tree services as defined by MEF 9 and 14 and using VPWS/VPLS
 - Native Ethernet packets supported
 - Encapsulation: PW/LSP (MPLS-TP), VLAN tagging (1Q), VLAN double tagging (Q-in-Q)
- L3 Routing
 - Static Route
 - RIPv1 and RIPv2
 - OSPFv2 and OSPFv3
- VPLS
 - VPLS bridging
 - H-VPLS bridging
 - 32K MAC addresses
 - 2K VPLS instances per device
 - Split horizon to prevent forwarding loops
- Network Protections
 - MPLS-TP
 - MPLS LSP 1+1/1:1
 - Dual-homing PW Protection
 - LSP E2E protection switching within sub 50ms
 - CE
 - ERPS Ring (G.8032) Protection
 - ELPS (G.8031) Linear Protection
 - E1/T1/TDMoEA 1+1 protection,
 - DS0 Level Nx64K circuit protection
 - PDH ring protection, QE1/QT1, FOM, Mini QE1/ QT1
- PWE3 Services
 - Ethernet over CE
 - Port-based and VLAN-based services
 - EPL, EVPL, EPLAN, EVPLAN, E-Tree services as defined by the MEF 9&14
 - Encapsulation: VLAN 802.1Q/802.1ad Q in Q
 - Ethernet over MPLS
 - Port-based and VLAN-based services
 - VPWS, VPLS, H-VPLS services as defined by the MEF 9 and 14
 - Encapsulation: PW over MPLS-TP
 - PDH over MPLS/CE/IP
 - Framed E1/T1:CESoPSN, and MEF8 for emulation of TDM circuits
 - Unframed E1/T1: SAToP PW
 - PDH Clock Recovery: ACR/DCR/System Clock per PW configurable



All the plug-in cards are hot-pluggable

Item	AM3440-CHPAa	AM3440-CHPCa
Chassis	5U	3U
# of Mini-slots	4	4
# of Single slots	12	5
Maximum E1/T1 Channels	64	36
Maximum GE Ports	32**	4
Pseudowire bundles	64	64
DS0 Cross-Connect Backplane Capacity	128Mbps	72 Mbps
Packet Switching Capacity	33G**	-

Controller and Function:

Controller	CCPB-8GEHSWa	CCPB-2GEa	CCPB-DCSa
Function			
DB9 console ^{Note}	√	√	√
Micro USB console	√	√	√

Note: Both DB9 and micro USB console are available for AM3440-CCPB series controller, however only one of them will activate at a time.

* Future Option

** With Dual Controllers and two 8GEAa modules

Description

The Loop-AM3440-CHPAa/CHPCa product is Access DCS-MUX which supports multiplexing of various digital access interfaces into E1 or T1 lines for convenient transport and switching. The Loop-AM3440 Access DCS-MUX provides access for a variety of TDM, packet, and voice interfaces detailed on the next page. These interfaces are compatible with other Loop products. The AM3440 can act as a mini DACS: one or more of the WAN ports can be used as a Drop & Insert function with fractional E1/T1 lines, which can be muxed into a full E1/T1 line.

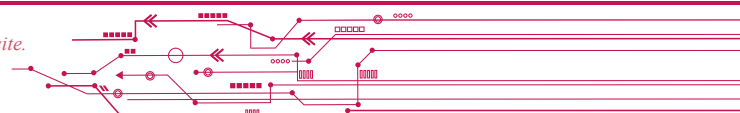
The AM3440 controller module provides full non-blocking Nx64K cross-connect matrix up to 2048 DS0. System redundancy is available in dual controller and power modules, making it an excellent fit for critical applications. With Loop-AM3440-CCPB-8GEHSWa controller module, it supports both MPLS-TP and Carrier Ethernet functions as Packet Transport Network. In addition to the native Ethernet transport, the AM3440 can be used as the gateway of PDH into the PSN network using circuit emulation technologies. The TDM encapsulation technologies supported are TDMoE, TDMoIP, and TDMoMPLS. In parallel, the Circuit Emulation supported are CESoPSN (Nx64K) and SAToP (Unframed E1/T1).

While 1+1 link protection is available for E1, T1, and TDMoEA modules, path protection for end-to-end Nx64K circuit protection is available for 3E1/T1.

The AM3440 supports local control and diagnostics by using a VT-100 terminal connected to the console port. It supports Ethernet, Telnet, and SNMP, so that it can be controlled and diagnosed from remote ends. An in-band management channel with GUI is available as well.

Loop-AM3440-CHPAa/CHPCa has a number of plug-in slots in regular size and mini size. (Card size to slot compatibility is detailed on the next page.) Most of the plug-in cards have LED indications.

The AM3440 consists of a rugged reinforced aluminum chassis, giving this equipment a durable structure and a long-lasting physical life.





Controller Variants

Controllers	AM3440-CCPB-DCSa	AM3440-CCPB-2GEa	AM3440-CCPB-8GEHSWa
Feature	Packet controller module, support cross-connect function. One USB console port, one DB9 console port and one RJ45 SNMP port.	Packet controller module, support cross-connect function, 2 x Combo GbE (SFP/RJ45) interfaces for TDMoE uplink, one USB console port, one DB9 console port and one RJ45 SNMP port. ● Supports SAToP (T1 SAToP*), CESoPSN, and MEF-8 ● Up to 64 Pseudowires ● Supports SyncE	Packet controller module, support cross-connect function, 4 x GbE and 4 x FE/GbE SFP interface with built-in L2 switch, one USB console port, one DB9 console port and one RJ45 SNMP ● Supports SAToP (T1 SAToP*), CESoPSN, and MEF-8 ● Up to 64 pseudowires. ● Supports SyncE
Switch	No	No	Yes
Ethernet Port	No	2	8

Chassis and Controller Compatibility

Note: √ = Supported × = Not Supported * = Future Option

	Controllers		
Chassis	AM3440-CCPB-DCSa	AM3440-CCPB-2GEa	AM3440-CCPB-8GEHSWa
AM3440-CHPAa	√	√	√
AM3440-CHPCa	√	√	×

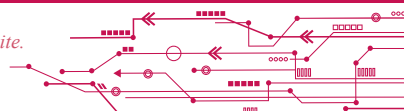
Loop-AM3440-CHPAa/CHPCa plug-in cards:

The mini-slot cards plug into the mini-slots of the AM3440-CHPAa/CHPCa. The single-slot cards plug into single slots.

	Controller	AM3440-CCPB-DCSa	AM3440-CCPB-2GEa	AM3440-CCPB-8GEHSWa
Low-Speed Tributary Modules	Chassis	AM3440-CHPAa/CHPCa	AM3440-CHPAa/CHPCa	AM3440-CHPAa
Single-Slot	Plug-in cards			
	Transportation			
	3-channel E1	√	√	√
	3-channel T1	√	√	√
	4-channel E1	√	√	√
	4-channel T1	√	√	√
	4-channel TDMoEA	√	√	√
	VOIPGA interface card*	√	√	√
	1FOMA	×	×	×
	2-channel G.SHDSL (2 pairs) w/o line power	×	×	×
	4-channel G.SHDSL (1 pair) w/o line power	×	×	×
	Serial and Digital Access			
	8-channel G.703 card at 64 Kbps data rate	√	√	√
	6-channel UDTEA	√	√	√
	8-channel UDTEA	√	√	√
	6-port RS232 card (6RS232A) with V.110	√	√	√
	8-channel RS232 with X.50 subrate	√	√	√
	6-channel Co-Directional card (6CDA)	×	×	×
	8-channel OCU-DP	×	×	×
	Voice and Analog Access			



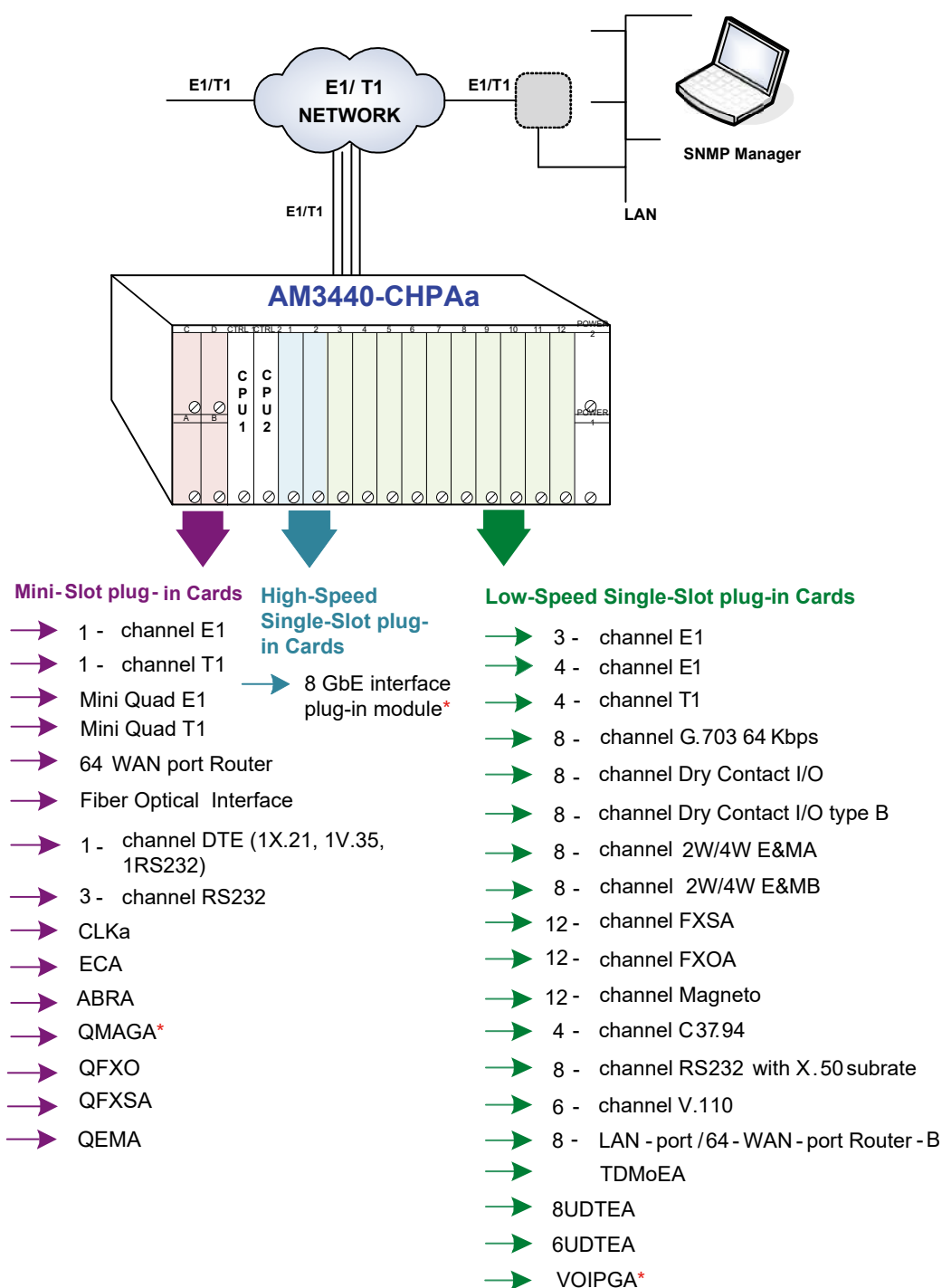
	Controller	AM3440-CCPB-DCSa	AM3440-CCPB-2GEa	AM3440-CCPB-8GEHSWa
Low-Speed Tributary Modules	Chassis	AM3440-CHPAa/CHPCa	AM3440-CHPAa/CHPCa	AM3440-CHPAa
Single-Slot	Plug-in cards			
	8-channel 2W/4W E&M (8E&MA)	√	√	√
	8-channel 2W/4W E&M (8E&MB)	√	√	√
	12-channel FXSA	√	√	√
	12-channel FXOA	√	√	√
	12-channel Magneto	√	√	√
	Data Processing			
	8-channel Dry Contact I/O Type	√	√	√
	8-channel Dry Contact I/O Type B	√	√	√
	8-channel Data Bridge	x	x	x
	Packet Access			
	8-LAN-port/ 64-WAN-port Router-B	√	√	√
	Teleprotection Access			
	4-channel low speed optical (C37.94)	√	√	√
Mini-Slot	Transportation			
	1-channel E1 (Single E1 interface) with 75ohm	√	√	√
	1-channel E1 (Single E1 interface) with 120ohm	√	√	√
	1-channel T1 (Single T1 interface)	√	√	√
	Mini Quad E1 (Four E1 interfaces) with 75ohm	√	√	√
	Mini Quad E1 (Four E1 interfaces) with 120ohm	√	√	√
	Mini Quad T1 (Four T1 interfaces)	√	√	√
	Fiber Optical Interface	√	√	√
	Serial and Digital Access			
	1-channel X.21	√	√	√
	1-channel V.35	√	√	√
	1-channel RS232	√	√	√
	3-port RS232 card	√	√*	√*
	1-channel OCU-DP	x	x	x
	Voice and Analog Access			
	Quad E&M (QEMA)	√	√	√
	QFXSA (Four FXS voice interface)	√	√	√
	QFXO (Four FXO voice interfaces)	√	√	√
	QMAGA (Four magneto voice interfaces) *	√	√	√
	Data Processing			
	Echo Canceller card	√	√	√
	Analog Bridge card	√	√	√
	2-LAN port/64 WAN port Router-A	√	√	√
	Teleprotection Access			
	LS Optical M1C37 Card	√	√	√
	Common Module			
	CLKa card	√	√	√
	CLKb card*	√	√	√
	CLKc card*	√	√	√



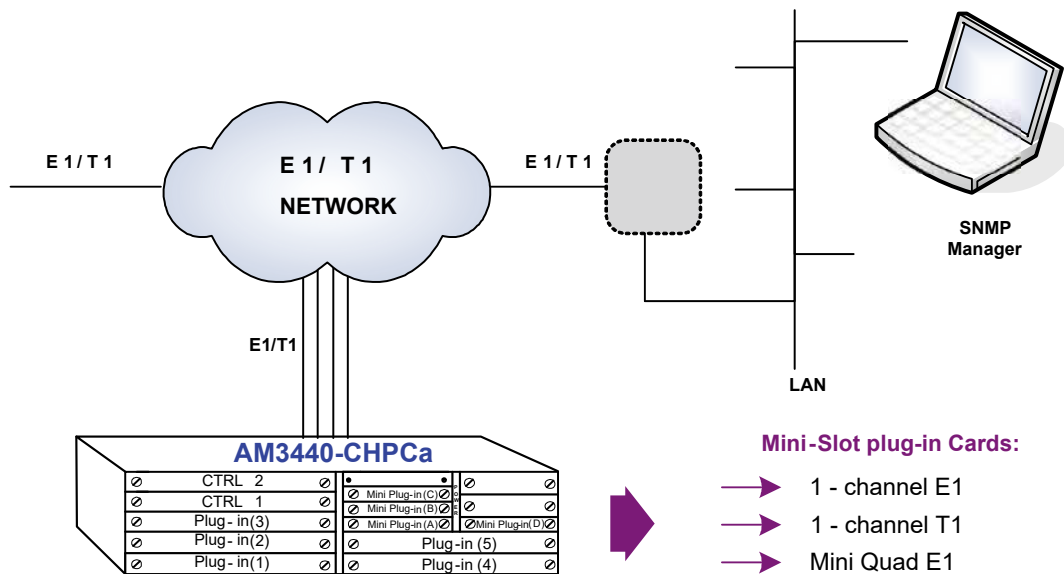


	Controller	AM3440-CCPB-DCSa	AM3440-CCPB-2GEa	AM3440-CCPB-8GEHSWa
High-Speed Tributary Modules	Chassis	AM3440-CHPAa/CHPCa	AM3440-CHPAa/CHPCa	AM3440-CHPAa (Slot 1~2)
Single-Slot	Packet Access			
	8 GbE Interface card*	x	x	√

Application Illustrations



*Future option



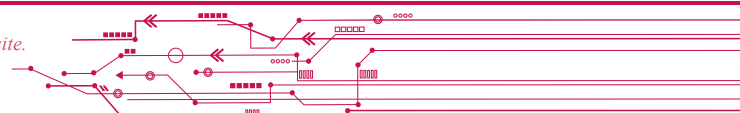
Single-Slot plug-in Cards:

- 3 - channel E1
- 3 - channel T1
- 4 - channel E1
- 4 - channel T1
- 2 - channel G . SHDSL w / o line power
- 4 - channel G . SHDSL w / o line power
- 8 - channel G .703 64 Kbps
- 8 - channel Dry Contact I/O type B
- 8 - channel Dry Contact I/O
- 8 - channel 2W/4W E&MA
- 8 - channel 2W/4W E&MB
- 12 - channel FXSA
- 12 - channel FXOA
- 12 - channel Magneto
- 4 - channel C37 . 94
- 8 - channel RS232 with X.50 subrate
- 6 - channel V.110
- 8 - LAN - port / 64 - WAN - port Router -B
- TDMoEA
- 8- Data Bridge
- 1FOMA
- 8UDTEA
- 6UDTEA
- VOIPGA*

Mini-Slot plug-in Cards:

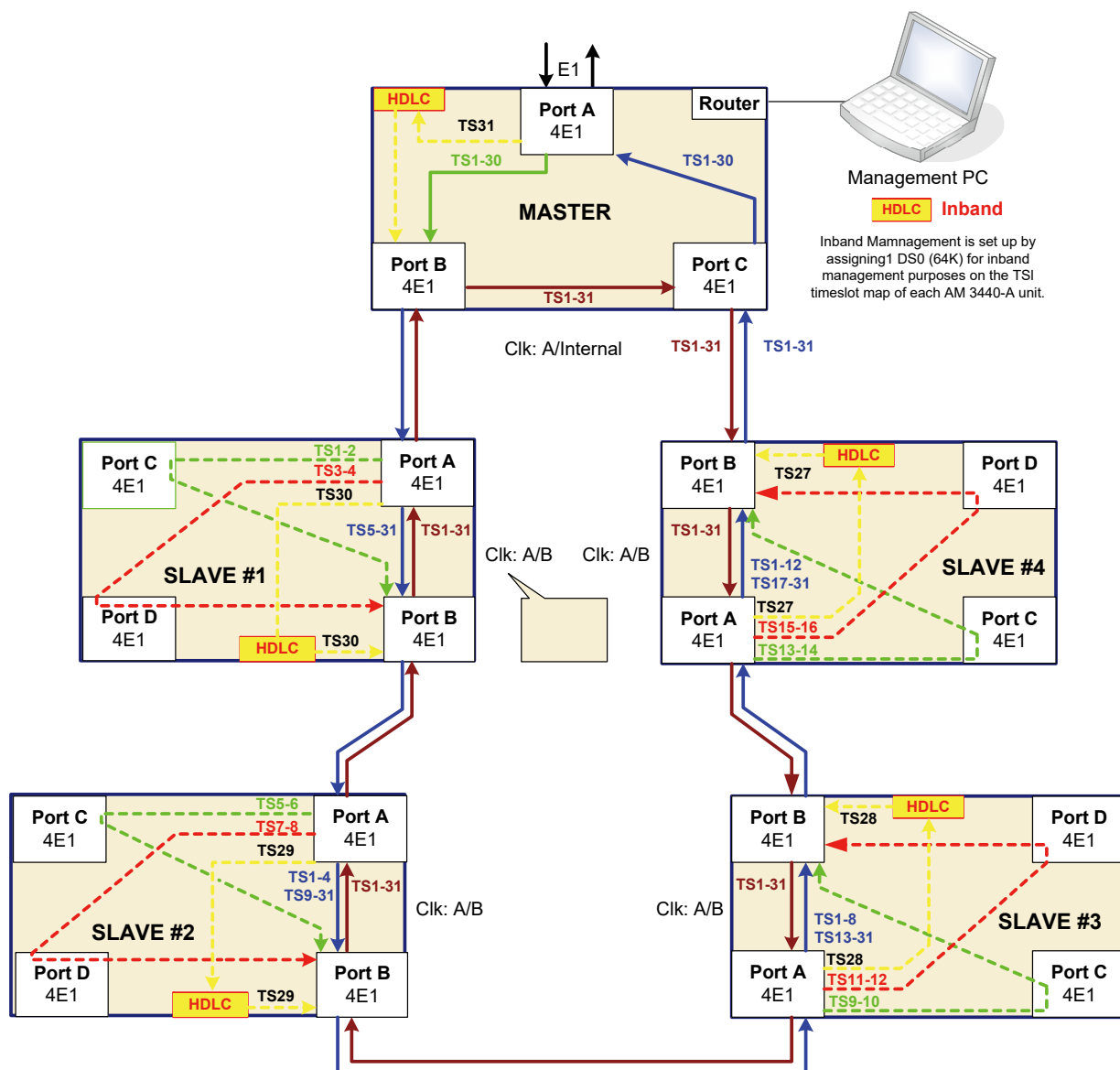
- 1 - channel E1
- 1 - channel T1
- Mini Quad E1
- Mini Quad T1
- 64 WAN port Router
- Fiber Optical Interface
- QFXO
- QMAGA
- QFXSA
- 1 - channel DTE (1X.21, 1V.35, 1RS232)
- 3 - channel RS232
- ECA
- ABRA
- QEMA
- CLKa

* Future Option





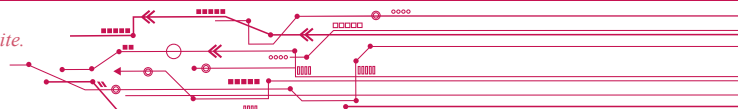
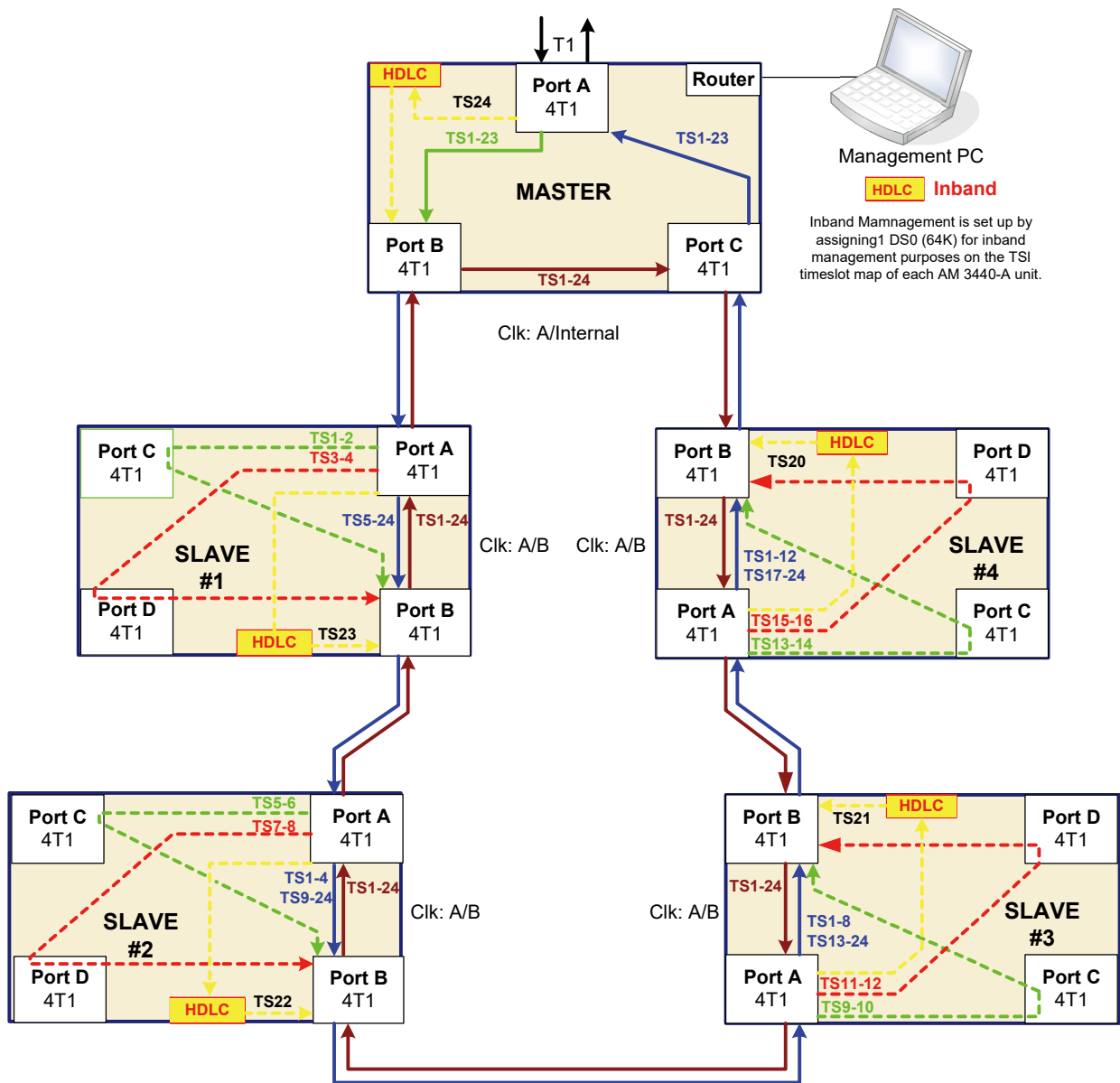
ULSR Ring Application (E1)



Note: ULSR ring does not support E1 unframed mode. Users must use E1 framed mode to set up a ULSR ring.

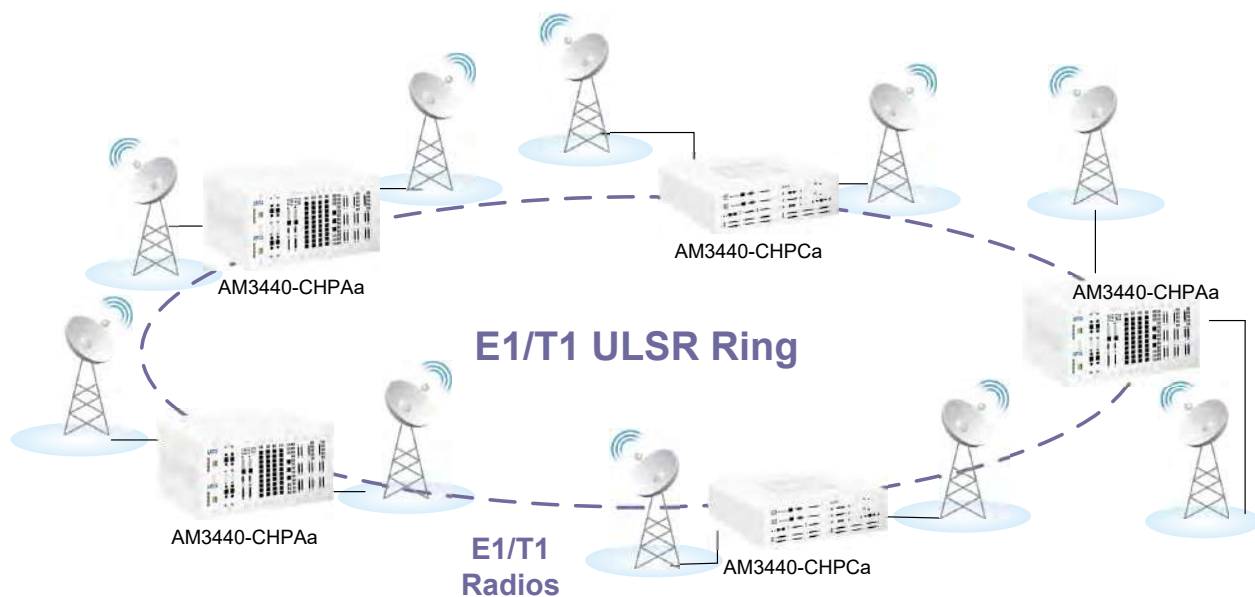


ULSR Ring Application (T1)

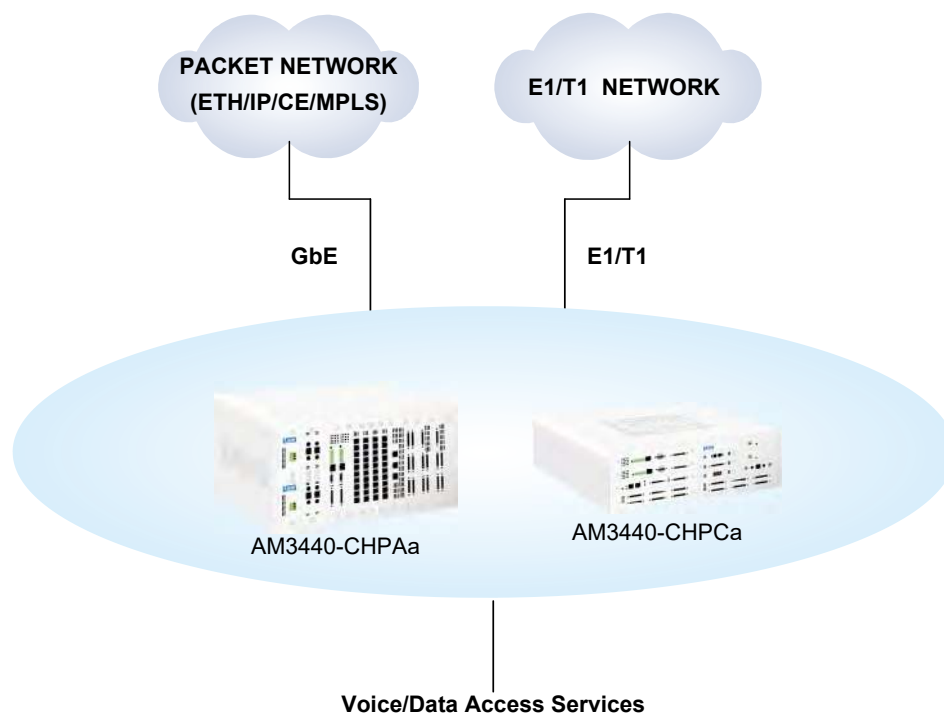




AM3440 ULSR Ring Application through E1/T1 Radio



AM3440 GE Uplink





Loop-AM3440-D Access DCS-MUX



Features

- 2U height, Full front access (ETSI) Shelf
- Support of DS0 DACS (Digital Access Cross-Connect System) with full cross-connect
- Dual controller, dual DC power with load sharing
- 1 for 1 protection, Y-BOX
- 1 for 1 protection, E1, T1, FOM
- PDH ring protection, FOM, Mini QE1/QT1
- Console, Telnet, SNMP, and Inband management support
- Craft interface port for connection to external LCD display
- Compatible to a SNMP-based GUI network management system and supported by iNET and Loop iNMS
- All the plug-in cards are hot-pluggable
- Support SAToP(CCPA T1 SAToP*), CESoPSN, and MEF8 for emulation of TDM circuits
- Support GbE uplinks with CCPA controller installed

*Future Option

Item	AM3440-D
Chassis	2U
# of Mini-slots	9
Max. E1/T1 Ports	36
Cross-Connect Backplane Capacity	72 Mbps

Description

The Loop-AM3440-D is in the Loop Access DCS-MUX series that combines various digital access interfaces into E1/T1 lines for convenient transport and switching. With 9 hot-pluggable mini size slots design, the Loop-AM3440-D provides access for a variety of TDM, IP, and voice interfaces and transports over GbE or E1/T1 uplinks. These interfaces are compatible with other Loop products. Furthermore, the AM3440 also supports TDM circuit emulation protocols. TDM data and voice services can be encapsulated as Pseudowires and transported over ETH/IP/MPLS packet switch networks.

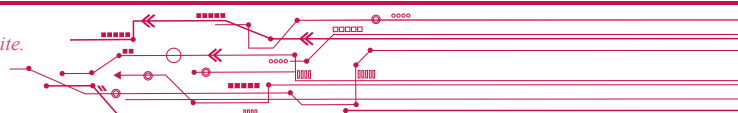
With Loop products such as the AM3440-D, a DTE interface can be extended over copper wire pairs or any E1/T1 transport facility. For each mini Quad E1/T1 plug-in card, each card can have as many as DS0 124 time slots from RS232, X.21, and V.35 interfaces, which can be multiplexed to fill 4 E1/T1 lines. The AM3440-D also supports fiber optical plug-in cards, which can be used to aggregate up to 4 E1 channels onto a single fiber optical interface to connect with other AM3440 devices or O9310 devices.

This unit is a full cross-connect and can act as a mini DACS: one or more of the WAN ports can be used as a Drop & Insert with fractional E1/T1 lines, which can then be multiplexed into a full E1/T1 line.

Redundancy is available in dual CPU controller and power supply options, making it an excellent fit for critical applications. The chassis does not contain a fan and has no need for fan cooling.

The Loop-AM3440-D supports local control and diagnostics by using an external 2-line, 40-character LCD display and keypads, or by using a VT-100 terminal connected to the console port and USB console port in CCB.(CCPA only have USB console port). The Loop-AM3440 also supports Ethernet, Telnet, and SNMP management so it can be controlled and diagnosed from remote locations. An in-band management channel with GUI is available.

The Loop-AM3440-D consists of a rugged reinforced aluminum chassis, giving this equipment a durable structure and a long-lasting physical life.





AM3440-D Plug-in Cards

	Controller	CCB	CCPA
Tributary Modules	Chassis	AM3440-D	
	Plug-in cards		
Mini-Slot	1-channel E1 (Single E1 interface) with 75ohm	√	√
	1-channel E1 (Single E1 interface) with 120ohm	√	√
	1-channel T1 (Single T1 interface)	√	√
	Mini Quad E1 (Four E1 interfaces) with 75ohm	√	√
	Mini Quad E1 (Four E1 interfaces) with 120ohm	√	√
	Mini Quad T1 (Four T1 interfaces)	√	√
	Fiber Optical Interface	√	√
	1-channel C37.94 mini plug-in card	√	√
	1-channel X.21 plug-in card	√	√
	1-channel V.35 plug-in card	√	√
	1-channel EIA530 plug-in card	D	D
	1-channel RS232 plug-in card	√	√
	1-channel OCU-DP	√	×
	4-channel E&M voice plug-in card	√	√
	4-channel FXS voice plug-in card	√	√
	4-channel FXO voice plug-in card	√	√
	4-channel Magneto voice plug-in card	√	√*
	2-LAN port/64 WAN port Router-A	√	√
	3-channel Terminal Server	D	×
	Echo Cancellation plug-in card	√	√
	Analog Bridging plug-in card	√	√

√ = Supported

× = Not Supported

* = Future Option

D = Discontinued

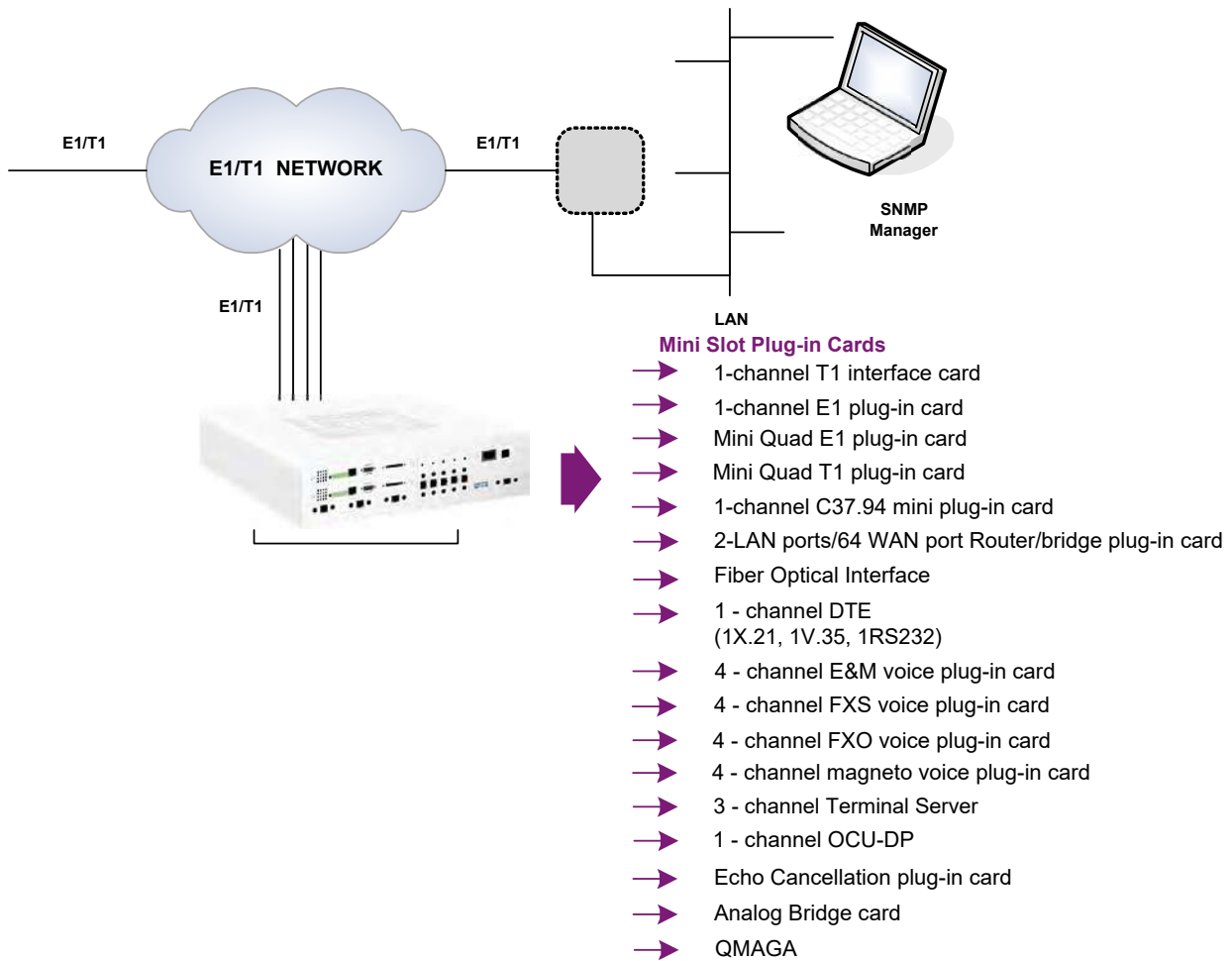
Controller and Function

Function \ Controller	CCB	CCPA
LCD ^{Note}	√	×
DB9 console ^{Note}	√	×
Micro USB console	√	√
iXC tool	√	√*

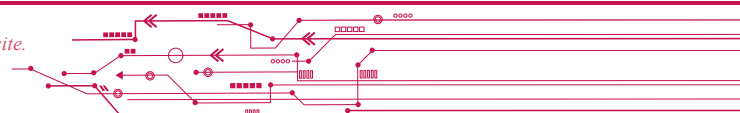
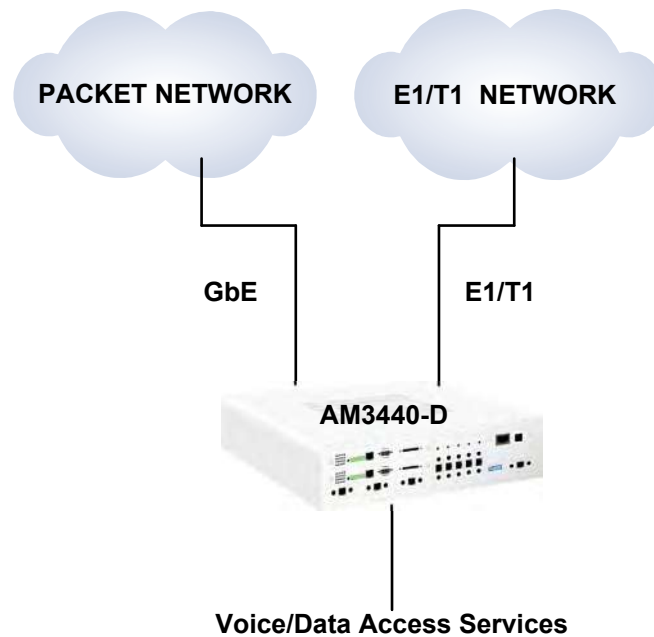
Note: Loop-ACC-CAB-HDB15M-25-DB09F-G is included for Console/LCD Interface connection.



Application Illustration



AM3440 GE Uplink (with CCPA controller installed)





Loop-AM3440-E IP/TDM DCS-MUX



Features

- Cross Connect Capability
 - Support full non-blocking DS0 cross connect matrix between TDM interfaces and TDMoE Pseudowires
 - Suitable for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications
 - Auto A-law/ μ -law conversion
- Ethernet Interface
 - 2 x Combo GbE (SFP 100/1000BaseFX and 10/100/1000BaseT)
 - IEEE 802.3ad Ethernet Link Aggregation*
- Pseudowires
 - Up to 64 concurrent pseudowires
 - Encapsulation format
 - SAToP(CCPA T1 SAToP*)
 - CESoPSN
 - MEF-8 (CESoETH)
 - Configurable CoS and VLAN
 - Packet Delay Variation Compensation Depth up to 256 ms
- Timing
 - System clock source can be chosen from Internal, External or E1/T1 Line with SSM
 - Automatic/Manual Clock Recovery modes
 - Adaptive Clock Recovery for Pseudowires
 - Jitter and Wander conforms to G.823/824 for Traffic Interface
 - SyncE

- Management
 - RJ45 Ethernet management interface
 - SNMPv1/v3, compatible to SNMP-based GUI network management systems and supported by Loop-iNET and Loop-iNMS
 - Telnet and SSH v2
 - Web GUI Configuration
 - USB console port with VT-100 menu driven interface
 - 64K timeslot inband management
 - Support Access Control List (ACL)
- Mechanical and Electrical
 - 1U height, 19" rack width. ANSI shelf.
 - Up to 7 mini-slots for AM3440 series interface modules.
 - All plug-in interface modules are hot swappable
 - Up to two ± 48 Vdc or 100 ~ 240 Vac hot swappable power modules
 - Dual DC or AC power with load sharing
 - Temperature range from -20° to 65°C
 - RoHS compliant

Model	AM3440-E
Chassis	1U
# of Mini-slots	5
# of HS-slots (Also apply to mini plug-in module via HS-Slot adapter)	2
Max. E1 Ports	28
Max. T1 Ports	28
Cross-Connect Backplane Capacity	184 Mbps

*Future Option

Description

The Loop-AM3440-E is the latest product in the Loop Access DCS-MUX series that combines various access interfaces and transport over GbE or E1 uplinks. The Loop-AM3440-E supports SAToP(CCPA T1 SAToP*)/ CESoPSN/ MEF8 Pseudowire Protocols to transport TDM data streams with timing information over packet switched network.

The Loop-AM3440-E provides full non-blocking DS0 cross-connect matrix for up to 28 x E1/T1 + 64 Bundles. Traffic grooming and segregation between the TDM interfaces and the Pseudowires provides flexibility and efficiency and makes the Loop-AM3440-E an ideal solution for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications.

With hot-pluggable mini size slots design, the Loop-AM3440-E provides access for E1, T1, FOM, FXS, FXO, E&M, Magneto*, C37.94, RS232, X.21, EIA530 and V.35 interfaces. These interfaces are compatible with other Loop

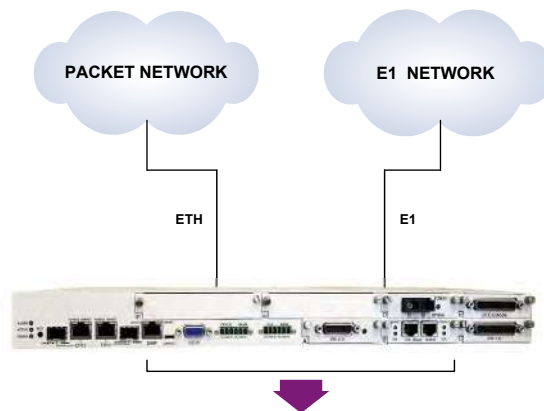


Table of Tributary Modules Applicable to AM3440-E

Mini-Slot Tributary Modules	Description	Supported by AM3440-E
1T1	1-channel T1 interface card	✓
1E1(E75)	1-channel E1 plug-in card with 75ohm	✓
1E1(E120)	1-channel E1 plug-in card with 120ohm	✓
4E1(M4E75)	Mini Quad E1 plug-in card with 75ohm	✓
4E1(M4E120)	Mini Quad E1 plug-in card with 120ohm	✓
4T1(M4T1)	Mini Quad T1 plug-in card	✓
M1C37	1-channel C37.94 mini plug-in card	✓
Router-A	2-LAN ports/64WAN port router/bridge plug-in card	✓
FOM	Fiber Optical Module	✓
1X.21 (1X21)	1-channel X.21 plug-in card	✓
1V.35 (1V35)	1-channel V.35 plug-in card	✓
1RS232 (1RS232)	1-channel RS232 plug-in card	✓
QEMA	4-channel E&M voice plug-in card	✓
QFXSA	4-channel FXS voice plug-in card	✓
QFXO	4-channel FXO voice plug-in card	✓
QMAGA	4-channel Magneto voice plug-in card	*
ECA	Echo Cancellation plug-in card	✓
ABRA	Analog Bridging plug-in card	✓
OCU-DP	1-channel OCU-DP plug-in card	*
GbE	GbE Module for HS slots	*
PoE+	GbE Module with PoE+ for HS slots	*

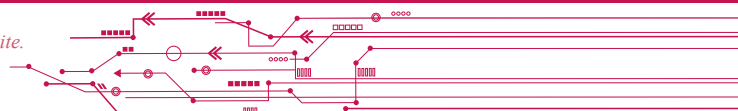
Note: ✓ = Supported * = Future Option

Application Illustration



Mini Slot Plug-in Cards

- ➔ 1-channel T1 interface card
- ➔ 1-channel E1 plug-in card with 75ohm
- ➔ 1-channel E1 plug-in card with 120ohm
- ➔ Mini Quad E1 plug-in card with 75ohm
- ➔ Mini Quad E1 plug-in card with 120ohm
- ➔ Mini Quad T1 plug-in card
- ➔ 1-channel C37.94 mini plug-in card
- ➔ 1-channel X.21 plug-in card
- ➔ 2-LAN ports/64WAN port router/bridge plug-in card
- ➔ Fiber Optical Module
- ➔ 1-channel V.35 plug-in card
- ➔ 1-channel EIA530 plug-in card
- ➔ 1-channel RS232 plug-in card
- ➔ 4-channel E&M voice plug-in card
- ➔ 4-channel FXS voice plug-in card
- ➔ 4-channel FXO voice plug-in card
- ➔ Echo Cancellation plug-in card
- ➔ Analog Bridging plug-in card





Loop-AM3440-CHE8GEHSWa IP/TDM DCS-MUX



Features

- Cross Connect Capability
 - Support full non-blocking DS0 cross connect matrix between TDM interfaces and TDMoE Pseudowires
 - Suitable for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications
 - Auto A-law/ μ -law conversion
- Ethernet Services
 - E-Line, E-LAN, E-Tree services as defined by MEF 9 and 14 and using VPWS/VPLS
 - Native Ethernet packets supported
 - Encapsulation: PW/LSP (MPLS-TP), VLAN tagging (1Q), VLAN double tagging (Q-in-Q)
- Pseudowires
 - Up to 64 concurrent pseudowires
 - Encapsulation format
 - SAToP(T1 SAToP*)
 - CESoPSN
 - MEF-8 (CESoETH)
 - Configurable CoS and VLAN
 - Packet Delay Variation Compensation Depth up to 256 ms
- Timing
 - System clock source can be chosen from Internal, External or E1/T1 Line with SSM
 - Automatic/Manual Clock Recovery modes
 - Adaptive Clock Recovery for Pseudowires
 - Jitter and Wander conforms to G.823/824 for Traffic Interface
 - SyncE
- Management
 - RJ45 Ethernet management interface
 - SNMPv1/v3, compatible to SNMP-based GUI network management systems and supported by Loop-iNET and Loop-iNMS
 - Telnet and SSH v2
 - Web GUI Configuration
 - USB console port with VT-100 menu driven
- MPLS-TP
 - MPLS Transport Profile per RFC-5921
 - Any Ethernet port can be configured as NNI (MPLS port) or UNI (Ethernet service port)
 - Static MPLS LSP label provisioning via NMS
 - Pseudo Wire (PW) to support
 - Ethernet Pseudo Wire (VPWS, VPLS, H-VPLS)
 - PDH Pseudo Wire End-2-End Emulation (SAToMPLS, CESoMPLS)
 - MPLS-TP OAM
 - Section/LSP/PW TP-OAM using BFD (Per IEEE 8113.2)
- MPLS-TP QoS
 - 64K Granularity Rate Limit Per Flow
 - Ingress/Egress TC/EXP Class Mapping
 - TC/EXP Priority-based Queuing (8 Queues)
 - Tunnel Traffic Engineering CIR/PIR and CBS/PBS Policing/Shaping
 - PW Traffic Engineering CIR/PIR and CBS/PBS Policing/Shaping
 - WRE
 - Strictly Priority / WRR
- Carrier Ethernet (CE)
 - L2 Switching/Bridging
 - RSTP/MSTP (IEEE 802.1w/1s)
 - VLAN 1Q 802.1q/ Q in Q8 802.1ad
 - VLAN Operation: Stack/Switch/Strip
 - Link Aggregation (802.3ad): Static/LACP
- L3 Routing
 - Static Route
 - RIPv1 and RIPv2
 - OSPFv2 and OSPFv3
- VPLS
 - VPLS bridging
 - H-VPLS bridging
 - 32K MAC addresses
 - 2K VPLS instances per device
 - Split horizon to prevent forwarding loops interface
 - 64K timeslot inband management
 - Supports RADIUS authentication
- Network Protections
 - MPLS-TP
 - MPLS LSP 1+1/1:1
 - Dual-homing PW Protection
 - LSP E2E protection switching within sub 50ms
 - CE
 - ERPS Ring (G.8032) Protection
 - ELPS (G.8031) Linear Protection
 - E1/T1/TDMoEA 1+1 protection,
 - DS0 Level Nx64K circuit protection
 - PDH ring protection, QE1/QT1, FOM, Mini QE1/QT1
- PWE3 Services
 - Ethernet over CE
 - Port-based and VLAN-based services
 - EPL, EVPL, EPLAN, EVPLAN, E-Tree services as defined by the MEF 9&14
 - Encapsulation: VLAN 802.1Q/802.1ad Q in Q
 - Ethernet over MPLS
 - Port-based and VLAN-based services
 - VPWS, VPLS, H-VPLS services as defined by



- the MEF 9 and 14
 - Encapsulation: PW over MPLS-TP
- PDH over MPLS/CE/IP
 - Framed E1/T1: CESoPSN, and MEF8 for emulation of TDM circuits
 - Unframed E1/T1: SAToP PW
 - PDH Clock Recovery: ACR/DCR/System Clock per PW configurable
- Mechanical and Electrical
 - 1U height, 19" rack width. ANSI shelf.
 - Up to 6 mini-slots for AM3440 series interface modules.
 - Up to 8 x GE SFP on-board.
 - All plug-in interface modules are hot swappable
 - Up to two $\pm 48\text{Vdc}$ or 100 ~ 240 Vac hot swappable

- power modules
 - Dual DC or AC power with load sharing
 - Temperature range from -20° to 65°C
 - RoHS compliant

Model	AM3440-CHE8GEHSWa
Chassis	1U
# of Mini-slots	6
Max. E1/T1 Ports	24
Maximum GE Ports	8
Cross-Connect Backplane Capacity	96 Mbps
Packet Switching Capacity	10G

Description

The Loop-AM3440-CHE8GEHSWa is the latest product in the Loop Access DCS-MUX series that combines various access interfaces and transport over GbE or E1 uplinks. The Loop-AM3440-CHE8GEHSWa supports SAToP(T1 SAToP*)/CESoPSN/ MEF8 Pseudowire Protocols to transport TDM data streams with timing information over packet switched network.

The Loop-AM3440-CHE8GEHSWa provides full non-blocking DS0 cross-connect matrix for up to 24 x E1/T1 + 64 Bundles. Traffic grooming and segregation between the TDM interfaces and the Pseudowires provides flexibility and efficiency, and makes the Loop-AM3440-CHE8GEHSWa an ideal solution for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications.

The Loop-AM3440-CHE8GEHSWa supports both MPLS-TP and Carrier Ethernet functions as Packet Transport Network. In addition to the native Ethernet transport, the Loop-AM3440-CHE8GEHSWa can be used as the gateway of PDH into the PSN network using circuit emulation technologies. The TDM encapsulation technologies supported are TDMoE, TDMoIP, and TDMoMPLS. In parallel, the Circuit Emulation supported are CESoPSN (Nx64K) and SAToP (Unframed E1/T1).

With hot-pluggable mini size slots design, the Loop-AM3440-CHE8GEHSWa provides access for E1, T1, FOM, FXS, FXO, E&M, Magneto*, C37.94, RS232, X.21 and V.35 interfaces. These interfaces are compatible with other Loop products.

*Future Option

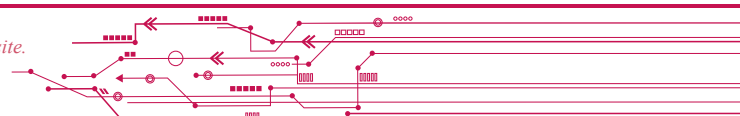




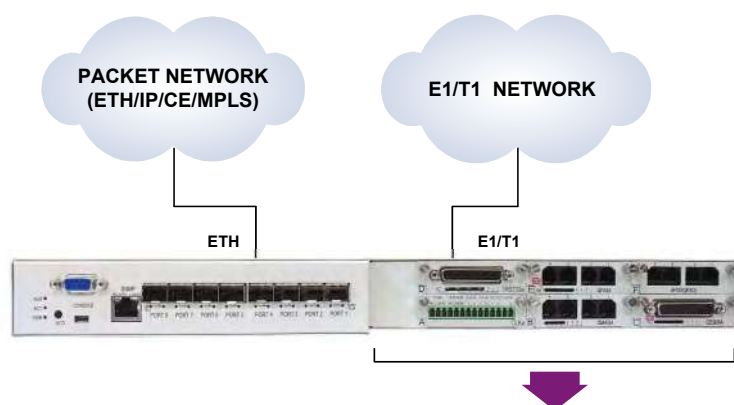
Table of Tributary Modules Applicable to AM3440-CHE8GEHSWa

Mini-Slot Tributary Modules	Description	Supported by AM3440-CHE8GEHSWa
1T1	1-channel T1 interface card	✓
1E1(E75)	1-channel E1 plug-in card with 75ohm	✓
1E1(E120)	1-channel E1 plug-in card with 120ohm	✓
4E1(M4E75)	Mini Quad E1 plug-in card with 75ohm	✓
4E1(M4E120)	Mini Quad E1 plug-in card with 120ohm	✓
4T1(M4T1)	Mini Quad T1 plug-in card	✓
M1C37	1-channel C37.94 mini plug-in card	✓
1X.21 (1X21)	1-channel X.21 plug-in card	✓
Router-A	2-LAN ports/64WAN port router/bridge plug-in card	✓
FOM	Fiber Optical Module	✓
1V.35 (1V35)	1-channel V.35 plug-in card	✓
1RS232 (1RS232)	1-channel RS232 plug-in card	✓
3RS232a	3-channel RS232 async/Sync, DCE/DTE plug-in card	✓
QEMA	4-channel E&M voice plug-in card	✓
QFXSA	4-channel FXS voice plug-in card	✓
QFXO	4-channel FXO voice plug-in card	✓
QMAGA	4-channel Magneto voice plug-in card	*
ECA	Echo Cancellation plug-in card	✓
ABRA	Analog Bridging plug-in card	✓
CLKa	Clock and Alarm plug-in card	✓

Note: ✓ = Supported

* = Future Option

Application Illustration

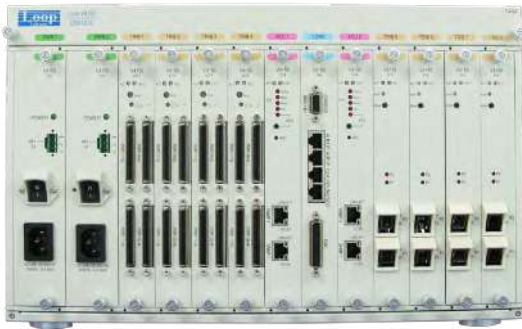


Mini Slot Plug-in Cards

- ➔ 1-channel T1 interface card
- ➔ 1-channel E1 plug-in card with 75ohm
- ➔ 1-channel E1 plug-in card with 120ohm
- ➔ Mini Quad E1 plug-in card with 75ohm
- ➔ Mini Quad E1 plug-in card with 120ohm
- ➔ Mini Quad T1 plug-in card
- ➔ 1-channel C37.94 mini plug-in card
- ➔ 1-channel X.21 plug-in card
- ➔ 2-LAN ports/64WAN port router/bridge plug-in card
- ➔ Fiber Optical Module
- ➔ 1-channel V.35 plug-in card
- ➔ 1-channel RS232 plug-in card
- ➔ 3-channel RS232 plug-in card
- ➔ 4-channel E&M voice plug-in card
- ➔ 4-channel FXS voice plug-in card
- ➔ 4-channel FXO voice plug-in card
- ➔ Echo Cancellation plug-in card
- ➔ Analog Bridging plug-in card
- ➔ Clock and Alarm plug-in card



Loop-V4150 DS0 Cross Connect System



Features

- 6U height, full front access (ETSI) shelf
- Hot-swappable cross-connect modules, tributary modules and power modules
- Temperature controlled fan tray
- Digital Cross-connect modules (controller modules)
 - System capacity support up to 504E1/672T1 DS0 non-blocking cross connect matrix
 - 1 + 1 protection
 - Type: Point to point and Broadcast
 - E1/T1 Signaling Conversion, A/μ Conversion
- Tributary modules
 - 8 tributary slots
 - Single port STM-1/OC3 module
 - Triple ports T3MX3 modules
 - 16/32/63 ports E1/T1 tributary module
- Power Modules
 - DC module (-36 to -72 Vdc)
 - AC/DC hybrid module (100 to 240 Vac; -36 to -72 Vdc)
 - Dual power (1+ 1) protection
- Protection
 - Protection switching time less than 50ms
 - Controller-DCS protection:1+1
 - Tributary protection
 - E1/T1: 1+1 and 1:1 per card and per port, 1:N (n=1 to 7) per card
 - B155: 1+1 MSP
 - T3/MX3: Port 1:1 and Line 1+1
- IPv4 and v6
- External/Internal/Line timing source with SSM
- Diagnostic: Test Access Path (TAP) with Monitor, Split and Release mode
- Management
 - Console port, VT100 menu-driven
 - Dual SNMP port: support v1 and v3
 - Telnet
 - Centralized management with Loop's EMS/NMS
 - LoopView GUI EMS Element Management System
 - TMN management (Loop-iNMS) with full FCAPS and end-to-end circuit management
 - SSH
- RoHS compliant

Description

Loop-V4150 DS0 Cross Connect System is a standard compliant high density DCS systems with full T1/E1, T3MX3 and STM-1/OC3 cross-connect rack system. The V4150 DS0 Cross Connect System designs to have full add and drop capability up to:

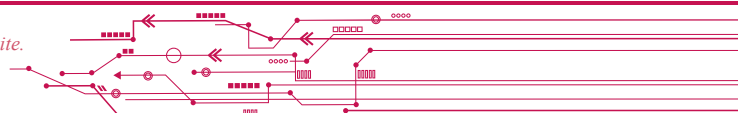
The CCA capability up to:

- 8 STM-1/OC3 tributaries
- 24 T3MX3 tributaries
- 504 E1/T1 tributaries
- DS0 non-blocking cross connect matrix : 504 E1/672T1

With system capacity support up to 504E1/672T1 DS0 non-blocking cross connect matrix, the V4150 DS0 Cross Connect System can offer high density capacity up to 504 E1/T1, 24 T3MX3, or 8 STM-1(OC-3).

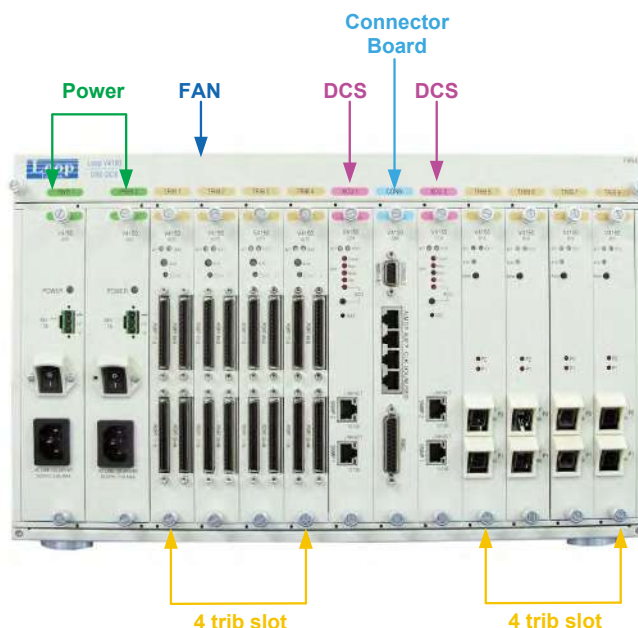
V4150-DCS offers the service provider protection schemes including 1+1, 1:1 and 1:N protection for tributary cards.

All interfaces are fully compliant with the relevant ETSI standards and ITU recommendations. The V4150-DCS provides powerful Operation, Administration, Maintenance and Provisioning (OAM&P) functionality, including fault management, performance monitoring, configuration management, and network security management. Through console port, LAN port, In-band E1, the OAM&P can be achieved both locally and remotely via SNMP or menu-driven interfaces.





Loop-V4150-DCS Front Panel



Loop-V4150 Card Type and Capacity Reference Table

Figure 1 Tributary cards without protection

Slot \ Plug-in Card		E1/T1	T3MX3	Optical (SFP)
				STM-1/OC-3
HS	TRIB 1	63/32/16	3	1
	TRIB 2	63/32/16	3	1
	TRIB 3	63/32/16	3	1
	TRIB 4	63/32/16	3	1
CCA				
HS	TRIB 6	63/32/16	3	1
	TRIB 7	63/32/16	3	1
	TRIB 8	63/32/16	3	1
	TRIB 9	63/32/16	3	1

Figure 2 Tributary cards with protection

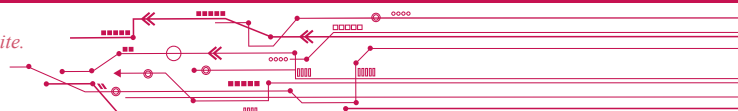
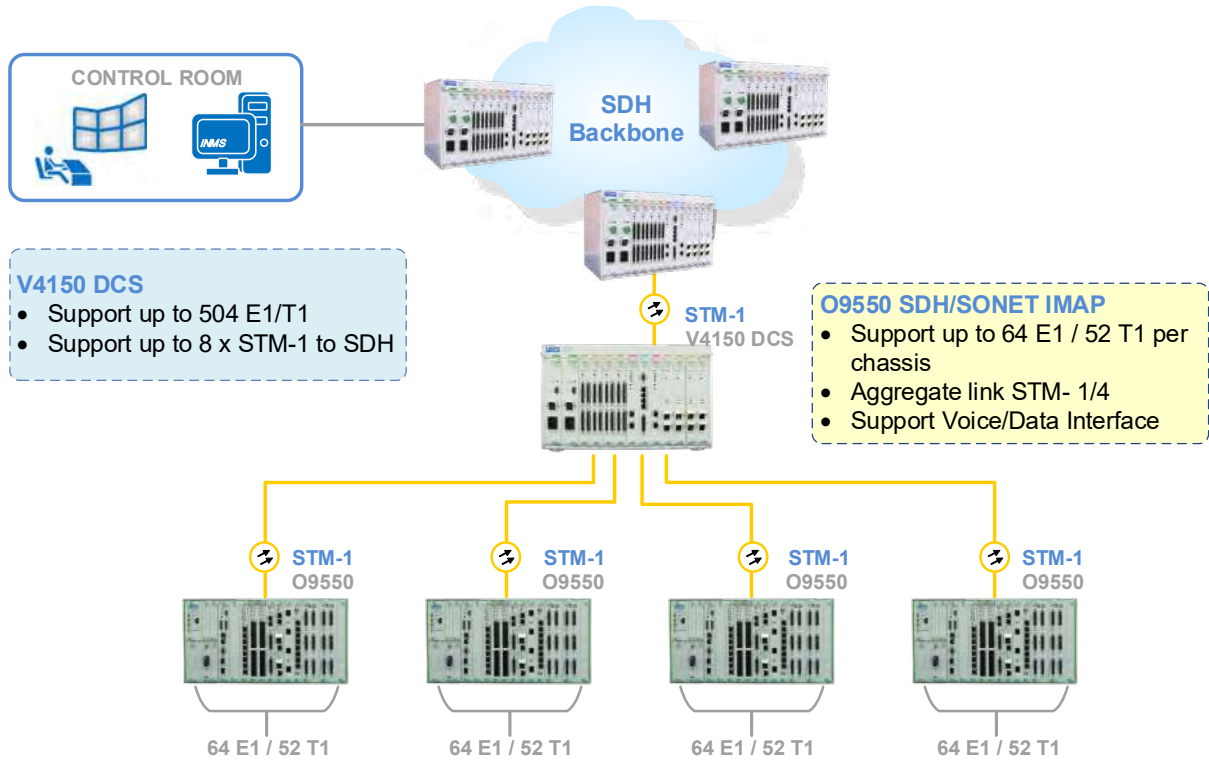
(B) backup/protection

Slot \ Plug-in Card		E1/T1	T3MX3	Optical (SFP)
				STM-1/OC-3
HS	TRIB 1	63/32/16	3	1
	TRIB 2	63/32/16 (B)	3 (B)	1 (B)
	TRIB 3	63/32/16	3	1
	TRIB 4	63/32/16 (B)	3 (B)	1 (B)
CCA 1				
CCA 2			(B)	
HS	TRIB 6	63/32/16	3	1
	TRIB 7	63/32/16 (B)	3 (B)	1 (B)
	TRIB 8	63/32/16	3	1
	TRIB 9	63/32/16 (B)	3 (B)	1 (B)



Applications:

Loop-V4150 DCS with O9550 SDH/SONET IMAP





Loop-V4200-9 MuxMaster/Wideband IAD CSU/DSU, E1/T1 Converter, DACS



Features

- 9 hot plug-in capable slots
- Available plug-in types:
 - T1, E1 interface cards
 - V.35, EIA530, RS232, and X.21 interface cards
 - QFXSA, QFXO, PLAR, and E&M interface cards
 - G.SHDSL interface card
 - T1/ E1 ATM Frame Relay interface cards
 - Router interface card with Subnet management (SNMC)
 - G.703 (co-directional) interface card
 - Terminal Server interface card
 - Fiber Optical interface card
 - OCU-DP interface card
- Usable as a CSU/DSU, E1 to T1 converter, multiple CSUs, or a DACS
- Full TSI capability among all slots in the main unit
- Remote diagnostic capabilities
- 2-line, 40-character LCD display for maintenance, performance monitoring, and administration
- Management through Console port, Ethernet port, and SNMP agents
- In-band Subnet Management facility for remote management through national networks
- LED indicators for power, tests, alarms, and each of 9 ports

Description

The Loop-V4200-9 is a versatile 9-port device. Depending on the plug-in cards selected, this unit can be configured

- as a CSU/DSU with drop and insert and voice capabilities
- as a 4 E1 to 5 T1 converter or fractions of them
- as a digital cross-connect system (DACS)
- as sets of ICSU combined in one box
- as a channel bank.

As a CSU/DSU, data from the V.35 or X.21 port can occupy any fraction of an E1 or T1 port. As an E1 to T1 converter, A to μ law coding and signaling conversions are correctly handled. For both E1 and T1 ports, continuous error checking, performance polling, and in-service diagnostics are provided. In any of the above combinations, full time slot interchange (TSI) among the ports are possible, making the Loop-V4200-9 a small DACS (digital access cross-connect system). The ports can further be used in pairs as ICSUs (intelligent CSU) at a lower cost and smaller space than individual ICSUs. The Loop-V4200 can also be configured as a channel bank.

The Loop-V4200-9 supports local control and diagnostics by using a 2-line, 40-character LCD display and keypads on the front panel, or by using a VT-100 terminal connected to the console port. The Loop-V4200-9 also supports Ethernet, Telnet, and SNMP so it can be controlled and diagnosed from remote locations. The Loop-V4200-9 supports in-band management, where management data is carried over the same channel as user data.

In addition to the LCD display, 12 multicolor LEDs provide status indications for power, test conditions, and alarms for each of the 9 ports. The internal firmware is stored in flash memory so that the future software upgrades can be downloaded.



Application Illustration

