



Migrating Legacy Networks to the Future



Multi-Service Cross Connect

SDH/SONET Transport-MSTP

Multi-Service Transport Platform

TDM over Ethernet Pseudowire

10G Packet-Transport-Network/MPLS/CE

Ethernet Access

Ethernet Switch

FOM and G.SHDSL Line Extension

Network Management Solutions

2020
Catalog

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
- 10G Packet-Transport-Network/MPLS/CE
- 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 9001.

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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Product Category

Core Network Transmission

WDM



WDM1800



O9400R



O9150



O9500R



O9170



V4150

Network
Management

TDMoE



G7860A

IP6820
(G.8032)

G7860A



IP6320A

IP/Ethernet

Last Mile Multi-



AM3440-A/B/C



AM3440-D



AM3430



O9340S



AM3440-E



IP6750 (CE)



IP6340

service Access



O9550-A



O9550-C



V4200-9



C5600



IP6750



IP6810



IP6820

Customer Premise Equipment



H3300-3S



H3310S



H3308S

G.SHDSL

Fiber Optical
Multiplexers



O9310



O9210S

CSU/DSU



T2500



E1510 E1oDTE



E1500S



E1590



IP6702A



IP6704A



P6510



IP6610



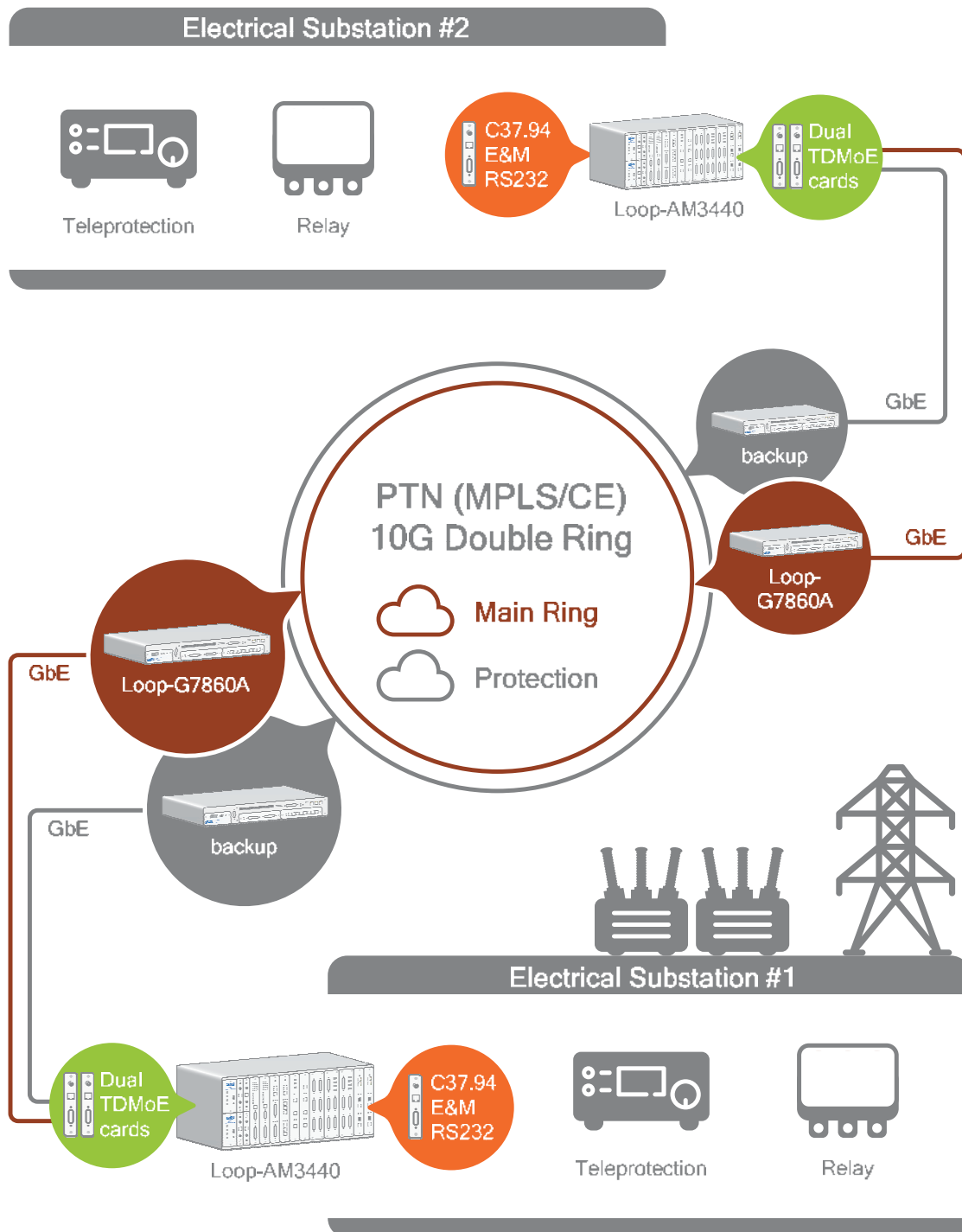
IP7930



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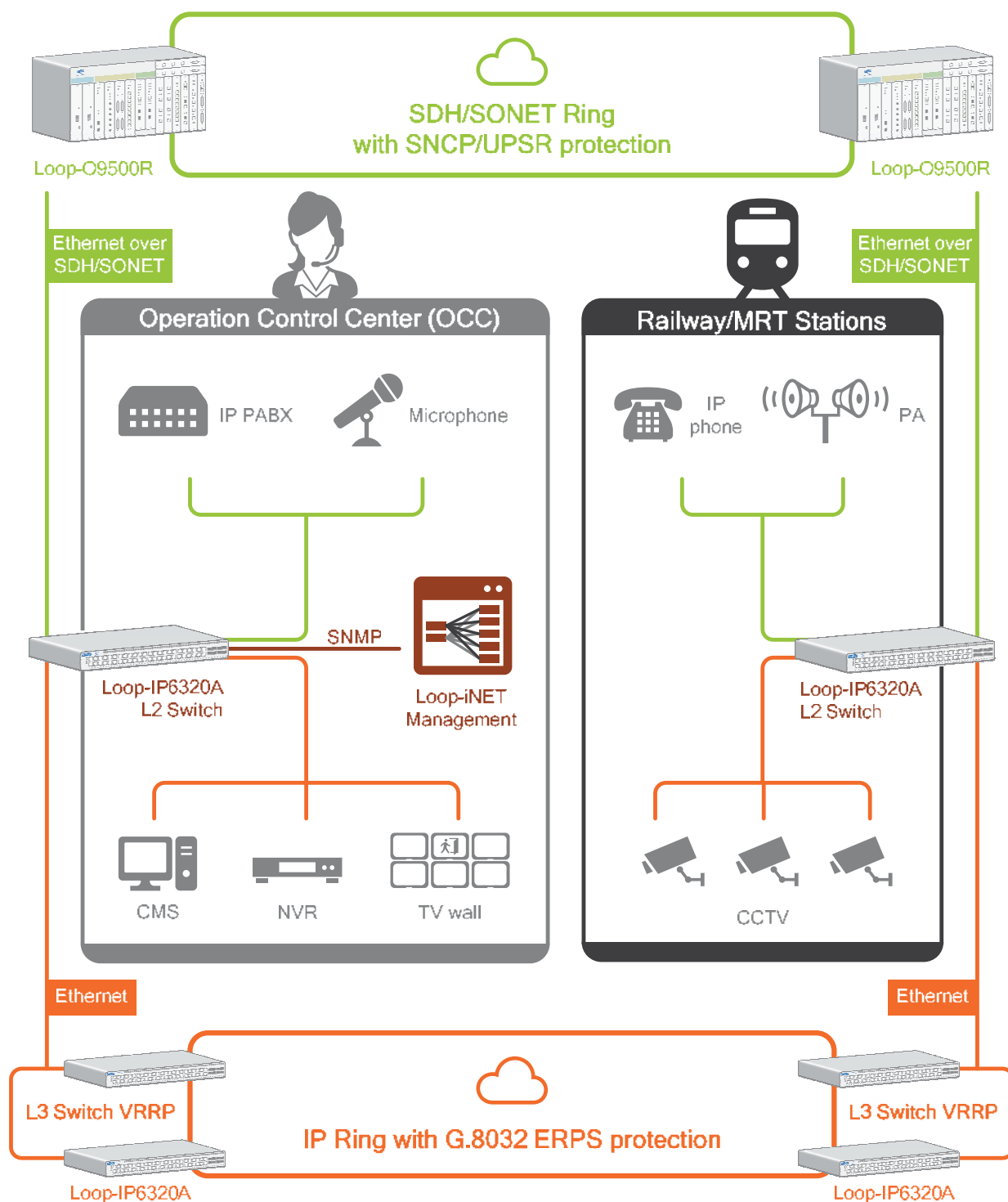
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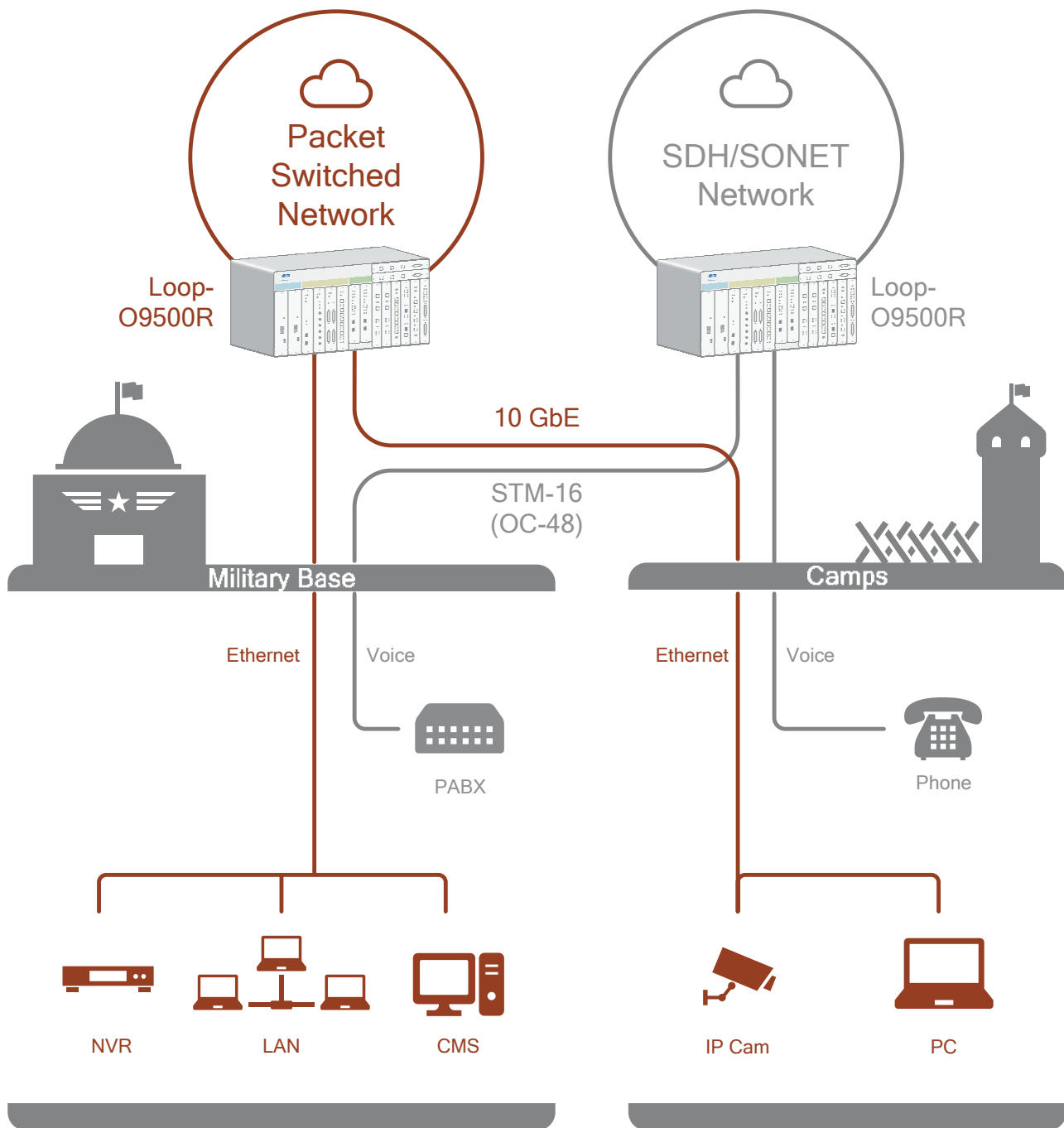
Power Electrical Substations: Communication with Protection

- 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



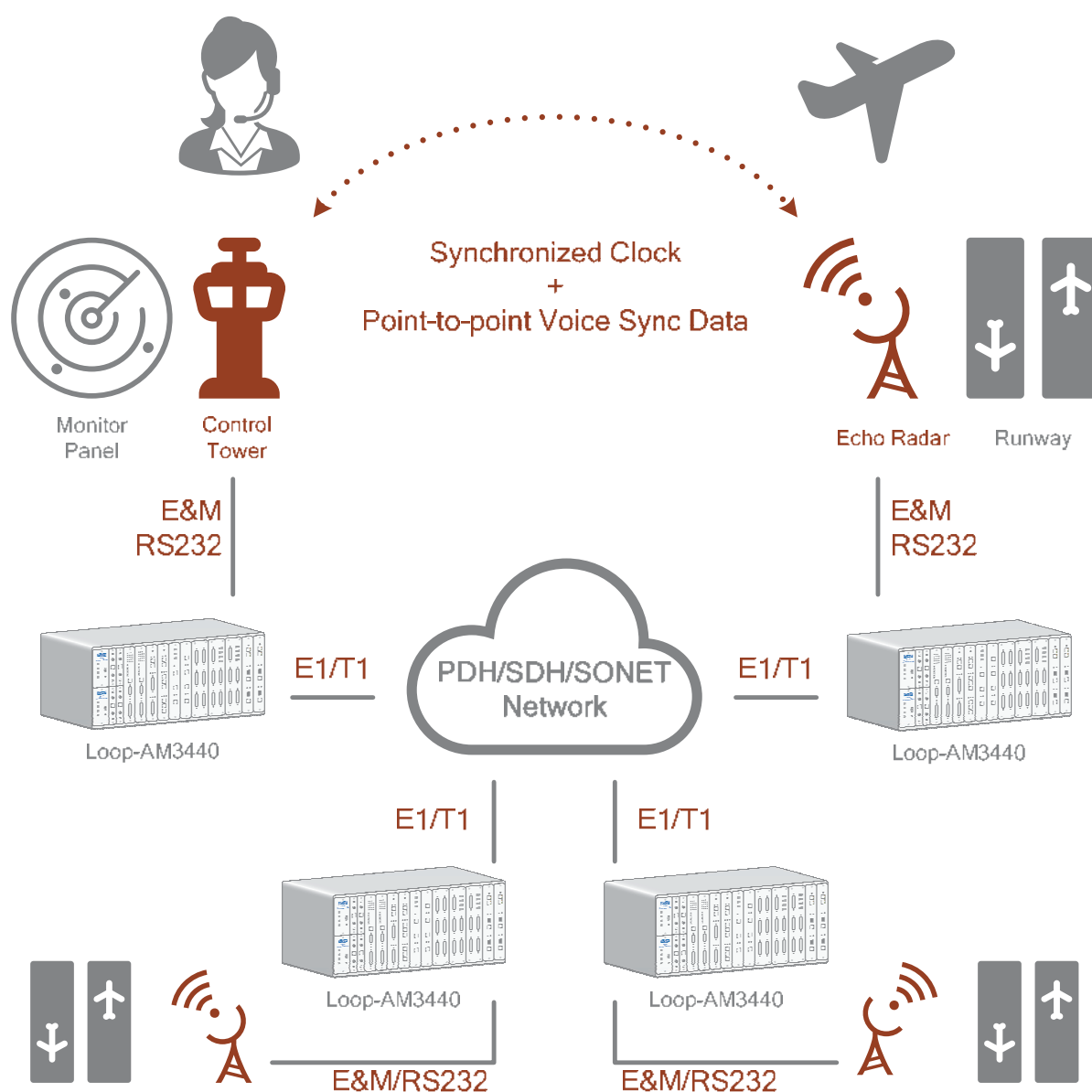
Transportation: Communication between Stations and OCC

- 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



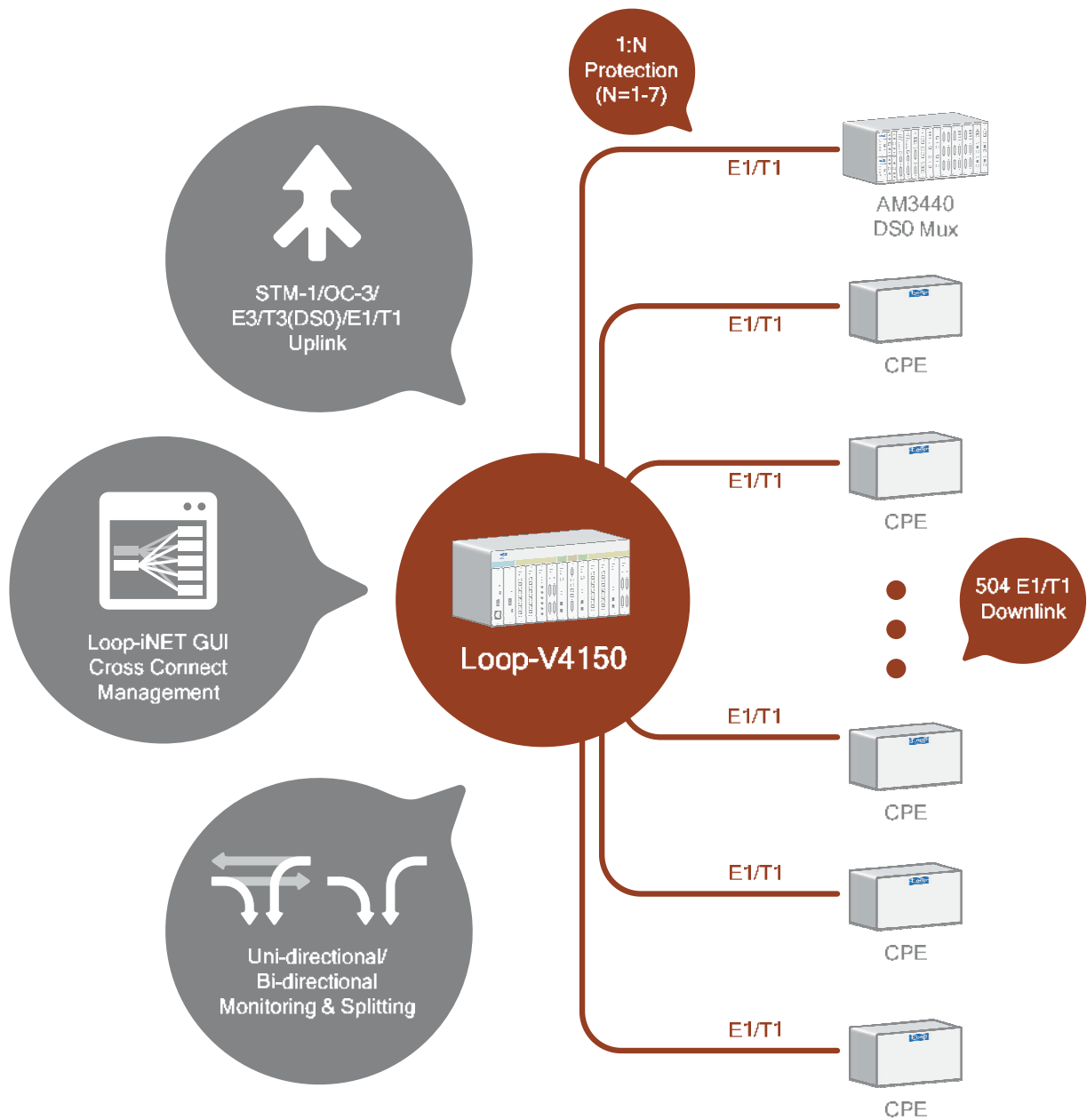
Military Communication

- 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



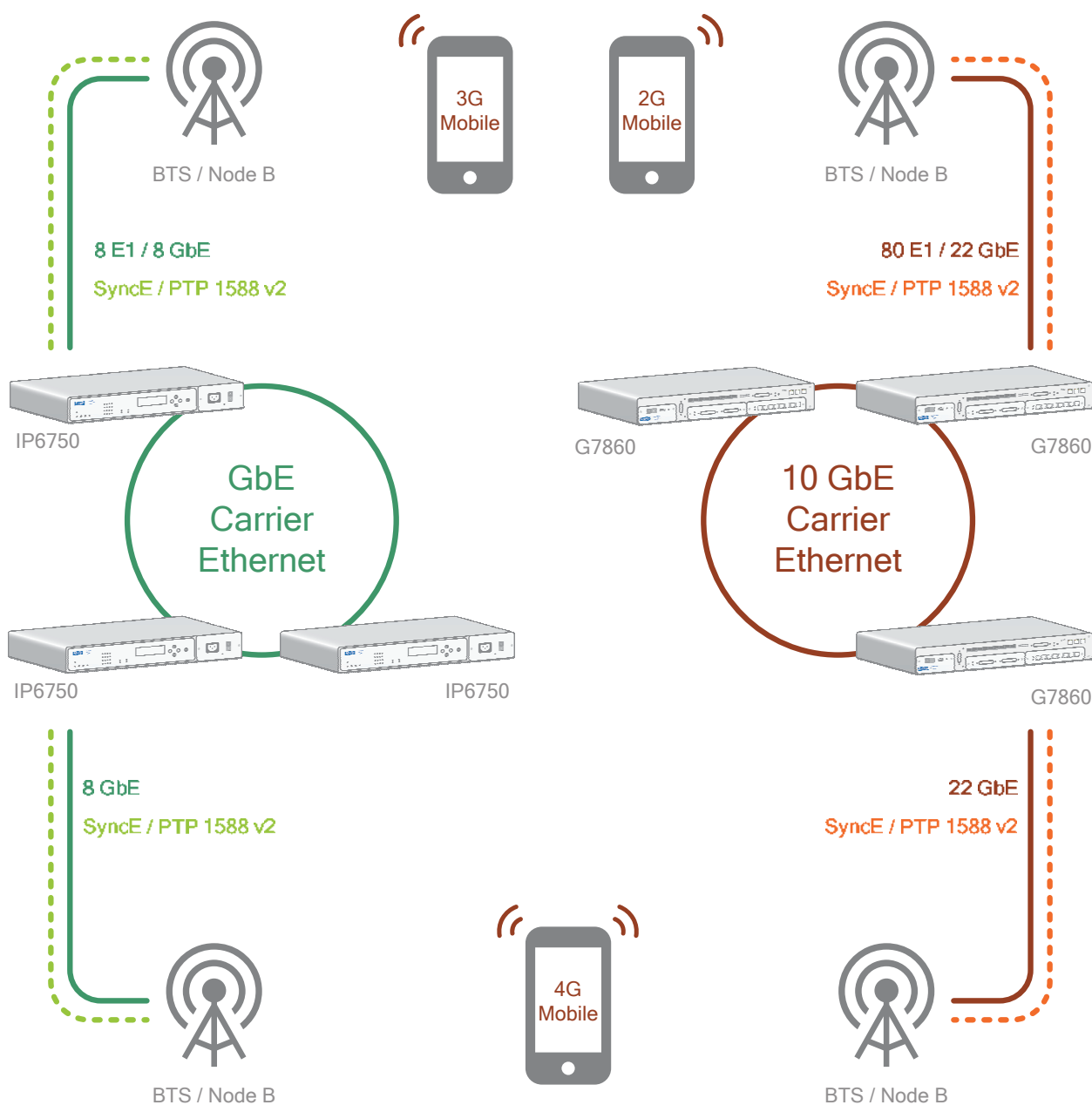
Aviation Radar Clock Stability for Air Traffic Control

- 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



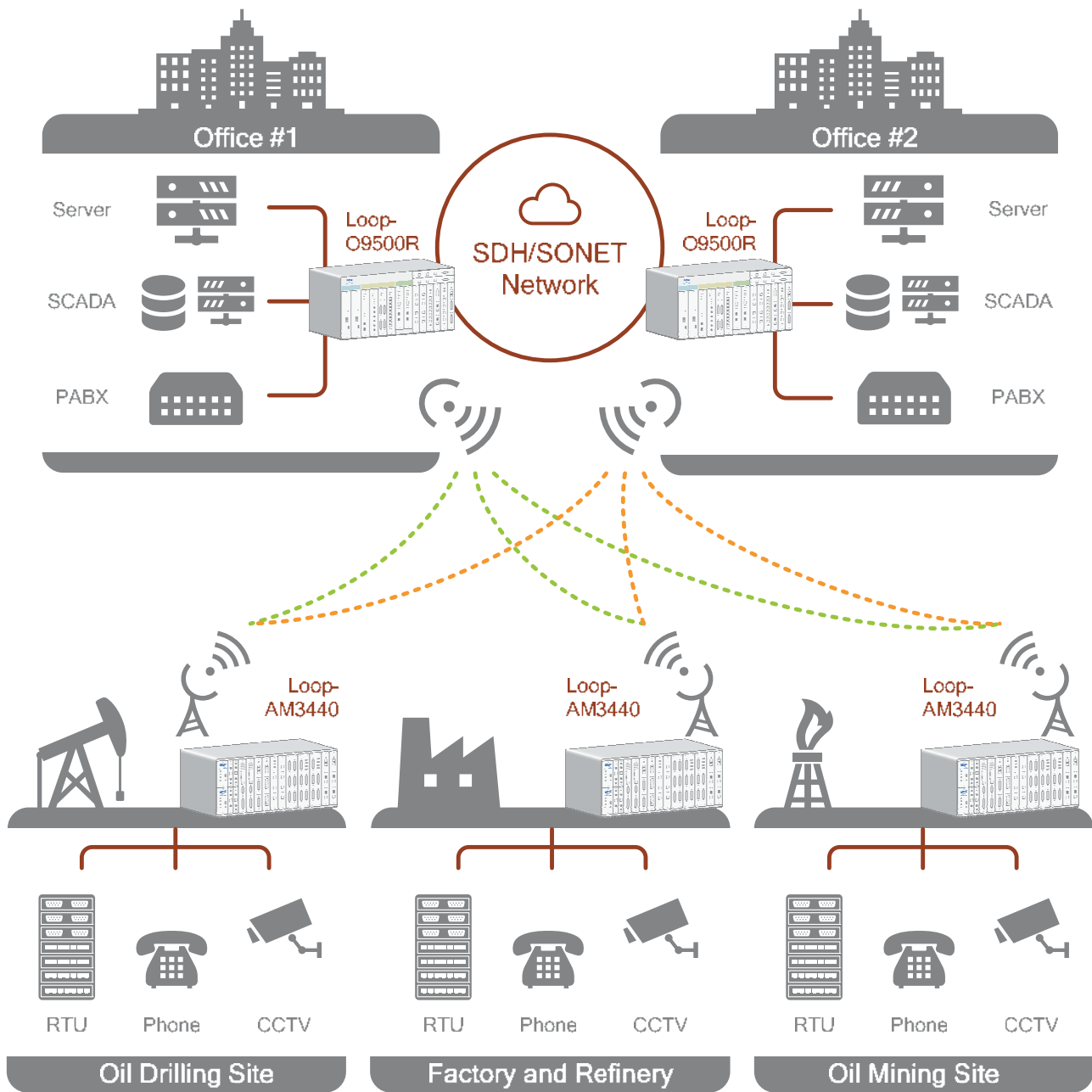
Telecommunication: New Generation DS0 Cross Connect System

- 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



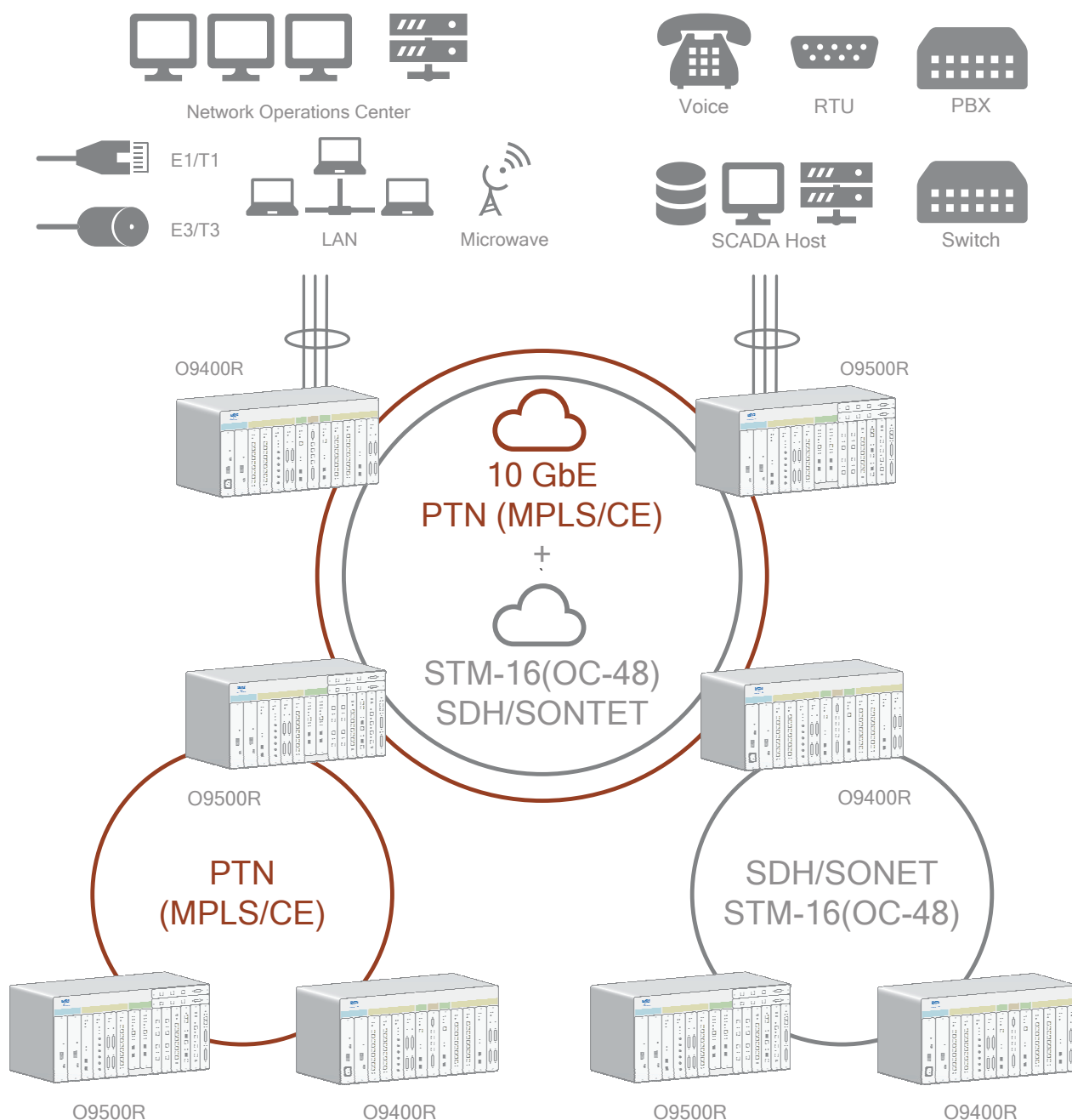
Telecommunication: Mobile Infrastructure

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



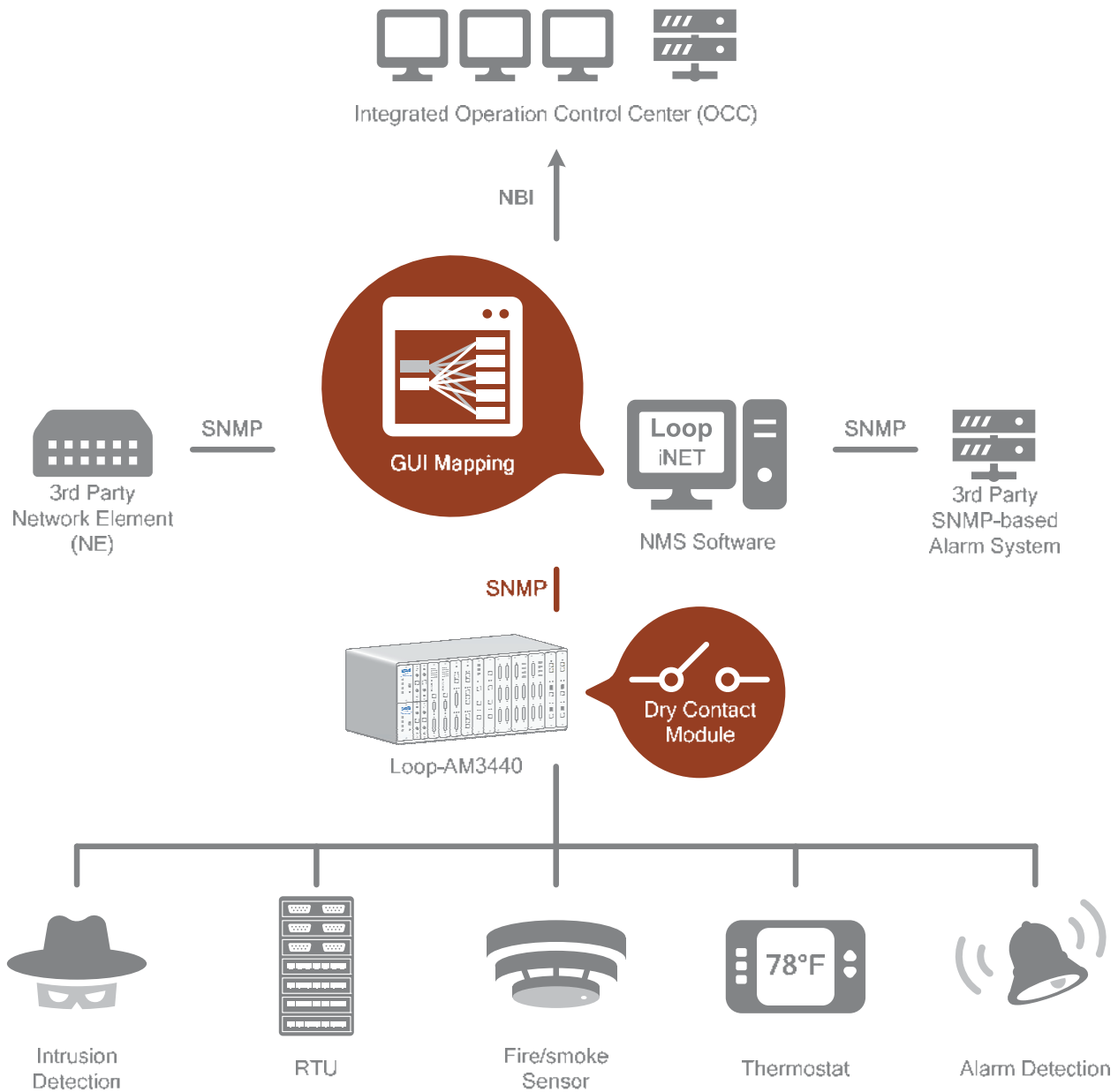
Oil and Gas: Communication between Remote Sites and Offices

- 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



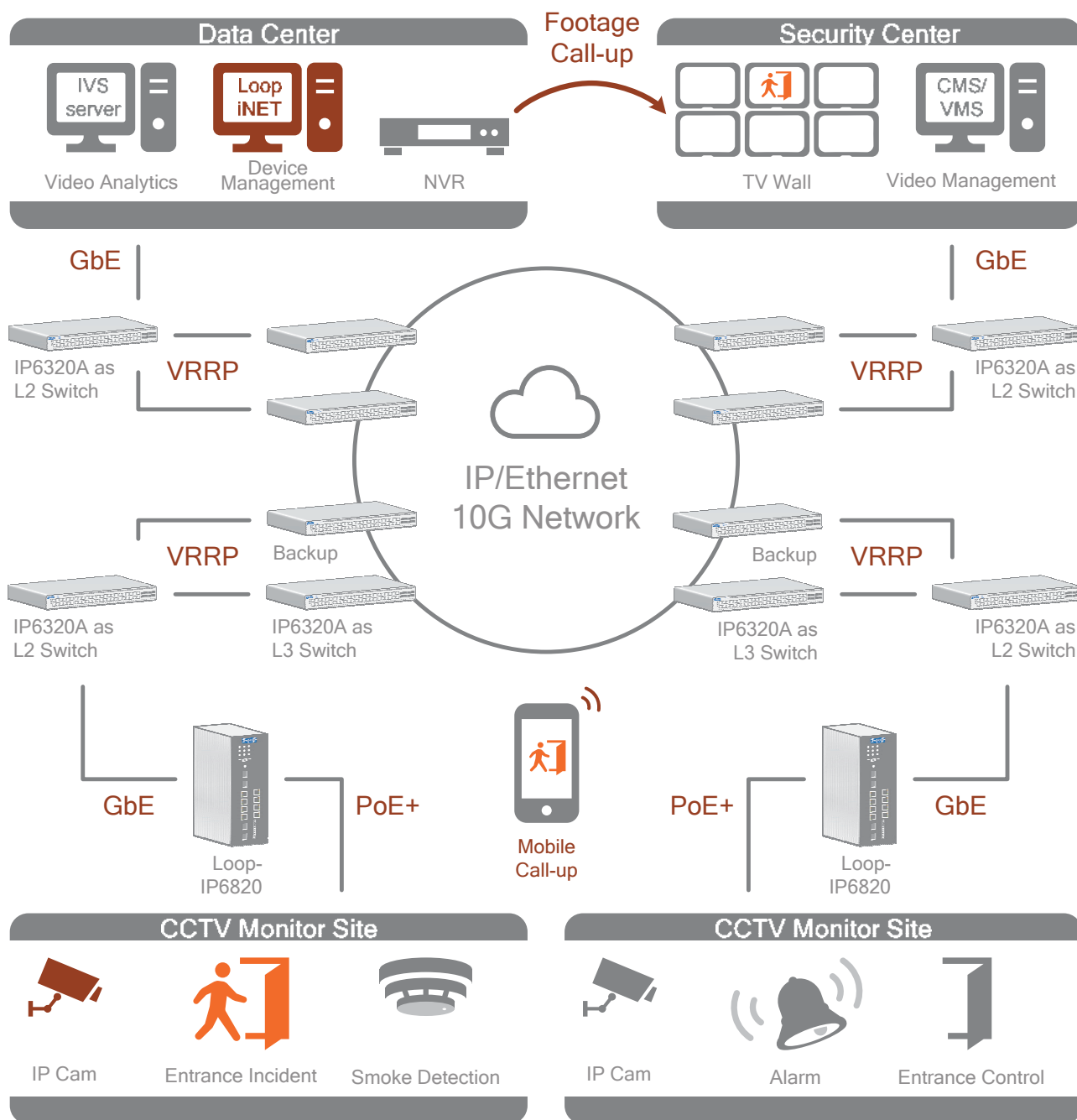
PTN Ring, SDH/SONET Ring, and Dual Ring Backbone Architecture

- 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



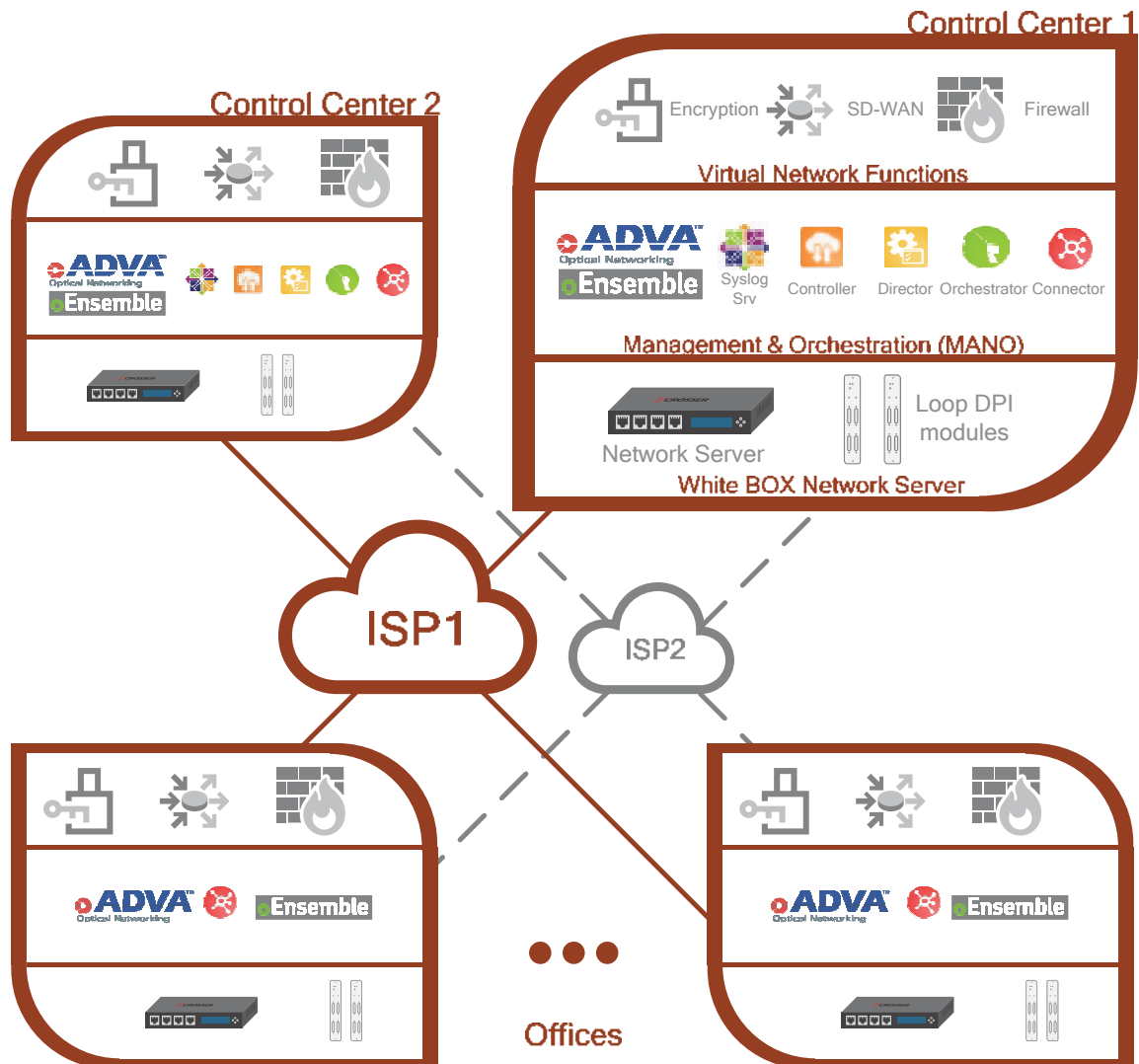
Intelligent Network Management System (NMS)

- 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



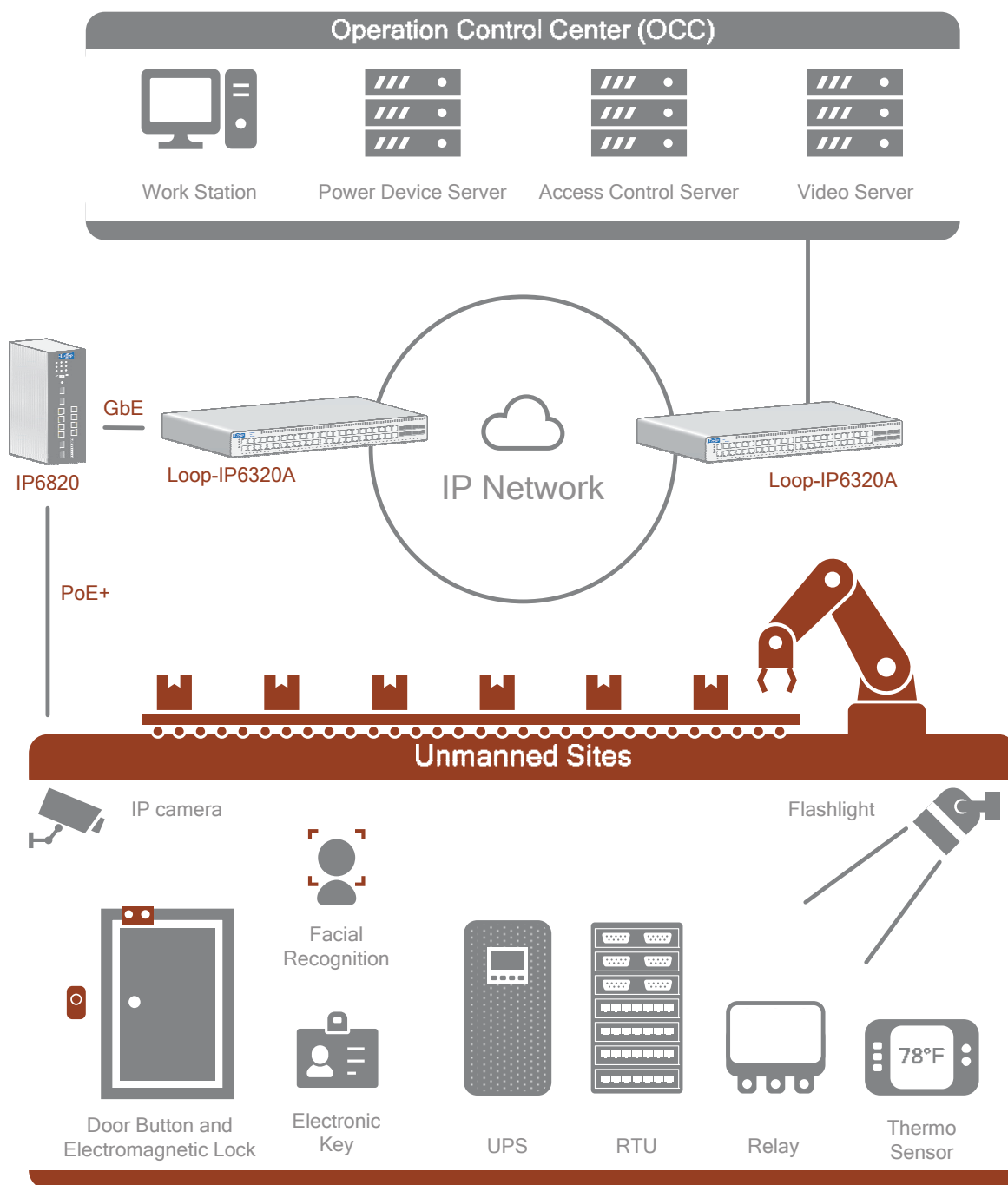
CCTV Surveillance for Access Control

- 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 IP6320A via IP/Ethernet back to Data Center and Security Center



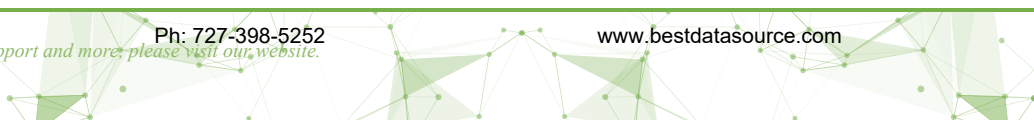
Network Function Virtualization (NFV) for Information Security

- 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/IP6320A hauling over IP Network



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Network Management

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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
- 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

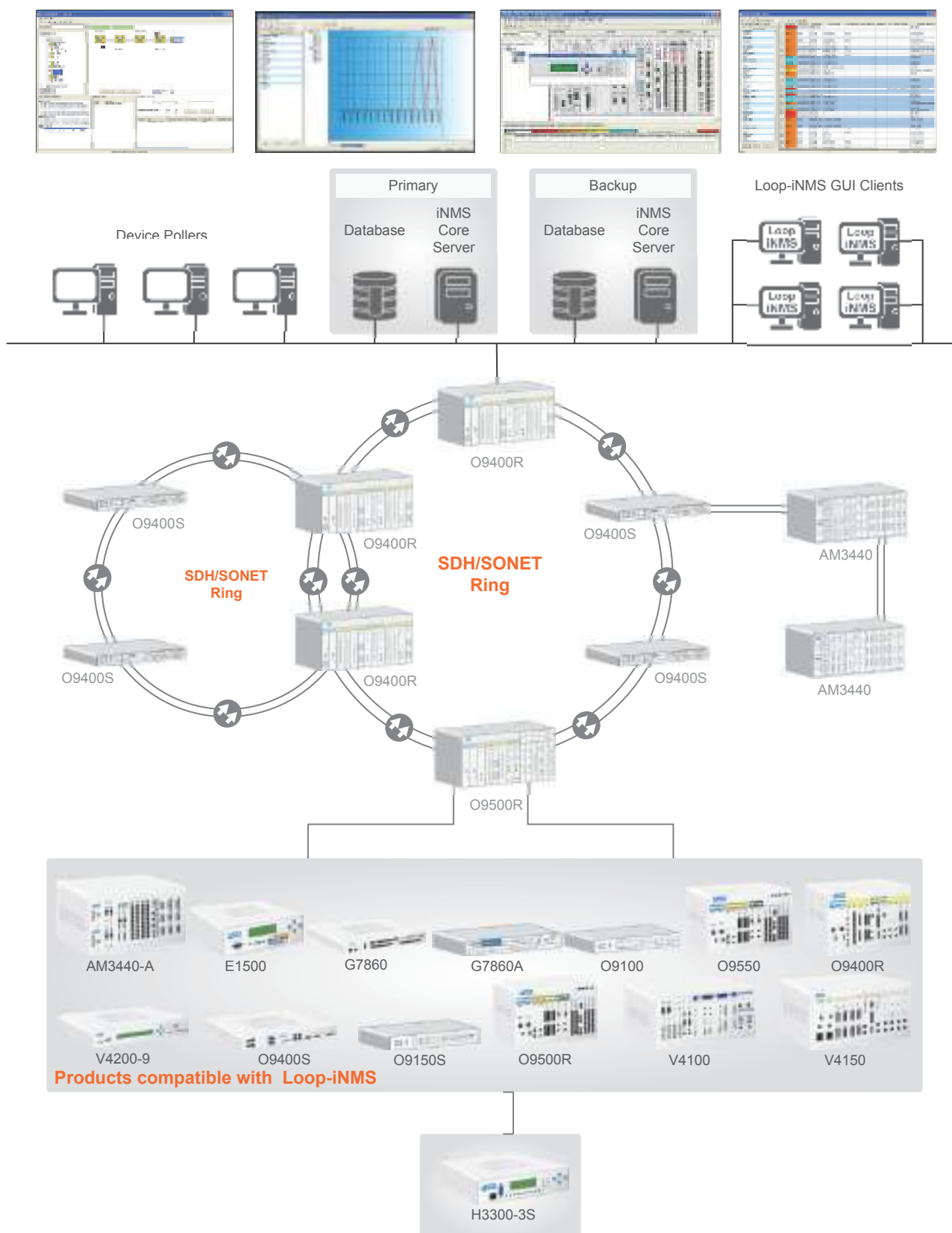
The GUI runs on a user-supplied computer running Microsoft Windows platform. Via LAN or WAN, up to 50 separate GUI clients can be concurrently logged into iNMS.

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 2000 Professional, or Windows 7 Professional
- Supports up to 50 concurrent GUI clients

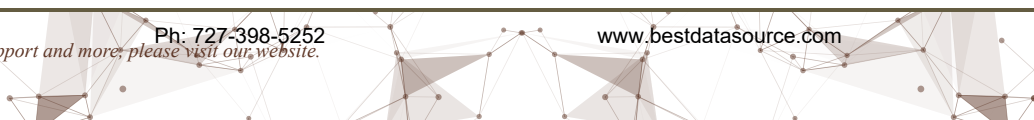
Loop-iNMS Basic Functions

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 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-6.8 (or RHEL-6.8) 64-bit	Linux / CentOS-6.8 (or RHEL-6.8) 64-bit	Linux / CentOS-6.8 (or RHEL-6.8) 64-bit	Linux / CentOS-6.8 (or RHEL-6.8) 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 HardDisk 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
- Node statistics data and alarm 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.

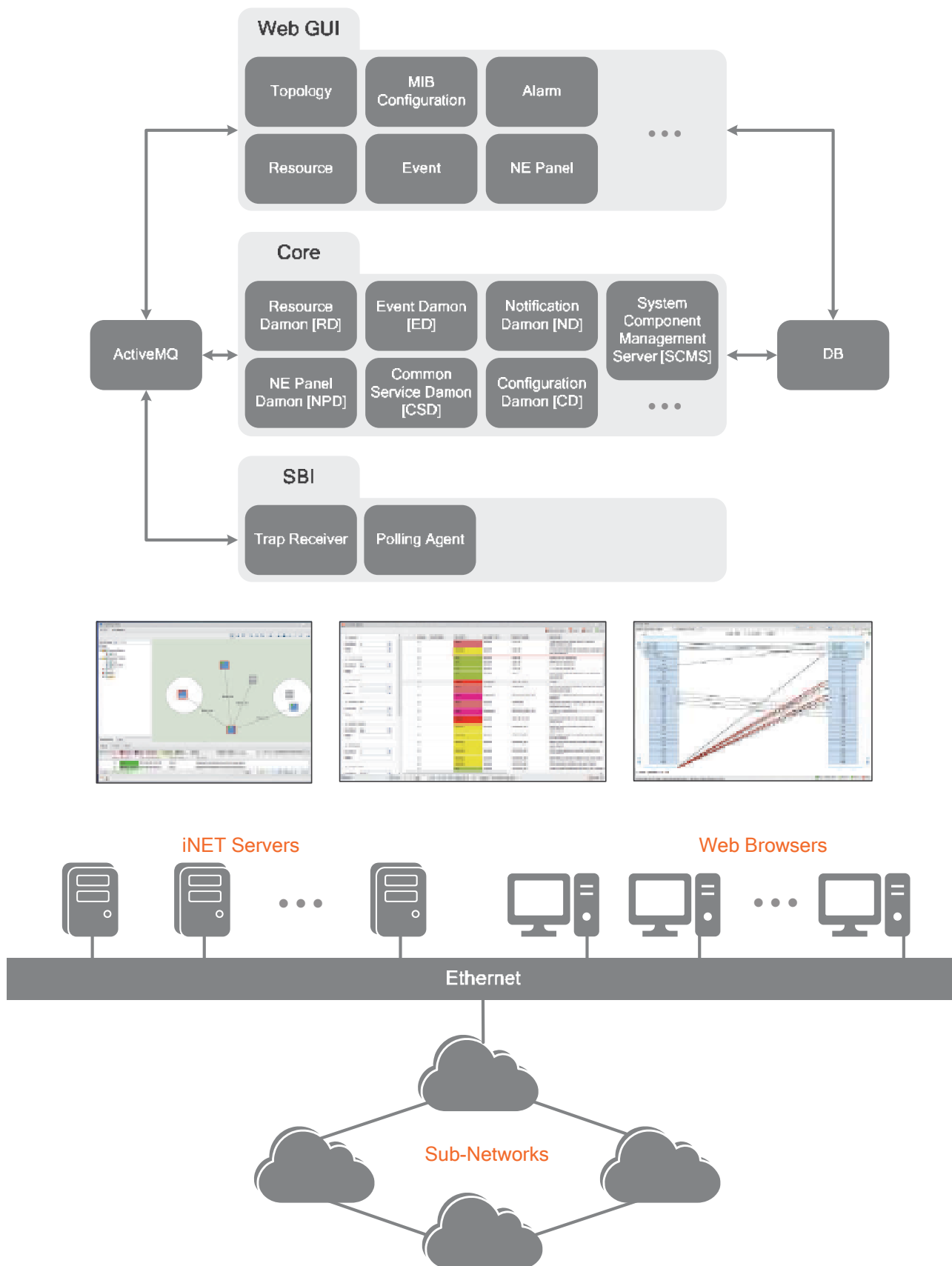
The workforce management is facilitated by the multiple levels of login security, which provides the network manager great flexibility of work assignment. The hierarchical grouping feature, cities, buildings, and rooms, allow rapid access to the desired network element.

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

- NE alarm/event collection
- Alarm filtering
- Alarm display
- Alarm history
- Alarm notification
- 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 in simple and clear 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).
- Supports Loop PTN solutions.

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.

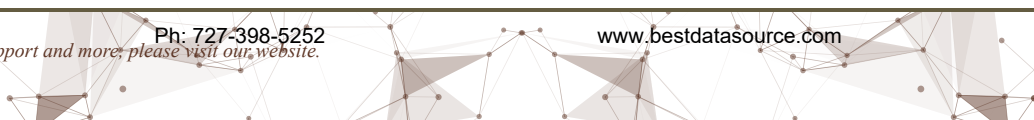
Note 2: This recommendation list below is the minimum system hardware requirement and it is for reference only. Please consult with a Loop representative for precise hardware spec and quantities.

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 2008 R2 Server Enterprise Windows 7 Professional, Enterprise, Ultimate (32 or 64 bit) Windows 2008 R2 Server Foundation/Standard Windows 2012 R2 Server Foundation/Essentials/Standard 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 2008 R2 Server Enterprise Windows 7 Professional, Enterprise, Ultimate (32 or 64 bit) Windows 10 Professional Windows 2016 Server
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 64~68
				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, Telnet function requires 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



LLoop-LCT Graphical Configuration Tool

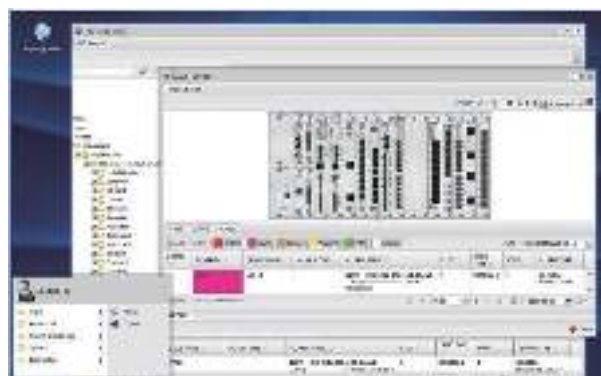
Features

- Windows style user desktop environment
- Supported browsers: Firefox (32-bit), Internet Explorer (IE)
- Database server: MySQL RDBMS
- SNMP based management system that supports SNMP functions including commands, alarms, and statistics gathering.
- Management of a Loop NE/ 3rd-party NE
- Support MIB compiled into the database
- 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

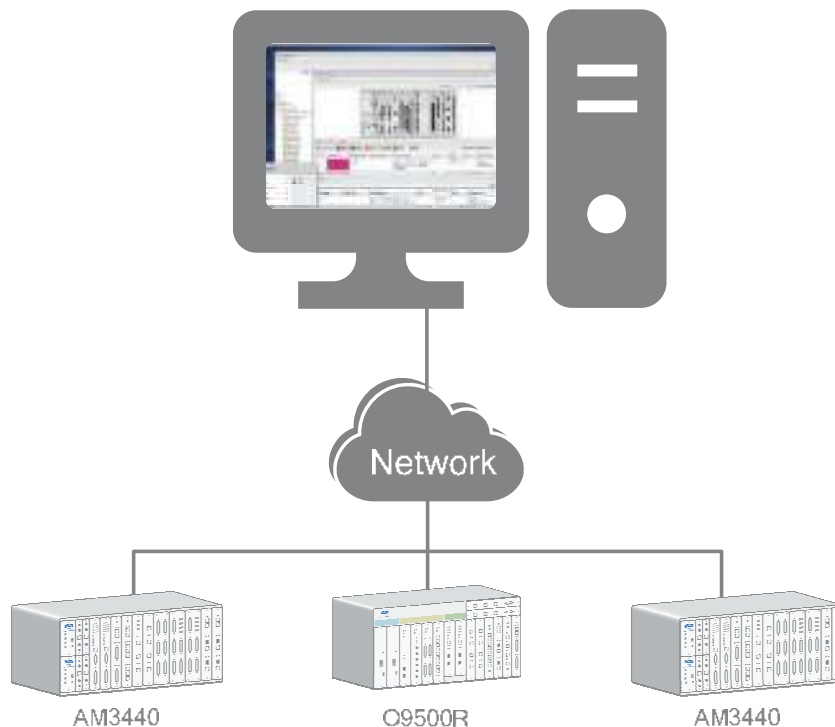
Note 1: Hardware system shall be provided by local SI or end-customer.

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.

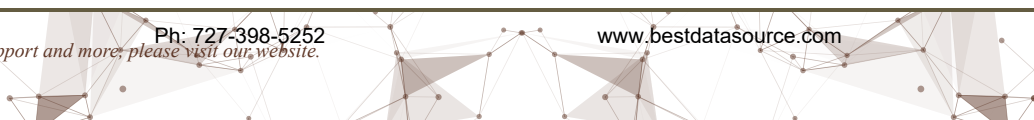
Minimum Hardware Specifications

Item	Descriptions
Processor	Intel i3 Core (2.4 GHz or above)
Memory	2GB or above
Hard disk	60GB/5400rpm or above
NIC	10/100/1000M
Resolution	2014*768 or above
Operating System	Windows 2008 R2 Server Enterprise Windows 7 Professional, Enterprise, Ultimate (32 or 64 bit) Windows 2008 R2 Server Foundation/Standard Windows 2012 R2 Server Foundation/Essentials/Standard Windows 10 Professional
Web Browser	Firefox (32-bit): V52 Extend Support Release (ESR), V55~66 IE: Version 11

Application Illustration



iNET-LCT for Equipment Management



3

SDH/SONET-MSTP

Loop-O9150S 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	61
Loop-O9550-D SDH/SONET IMAP	67

Loop-O9150S SDH STM-1 TM/ADM



Features

- 1U height, ETSI shelf (full front access) or ANSI shelf (front and rear access)
- SDH STM-1TM/ADM
- Aggregate port
 - 2 SFP optical housing
 - MSP 1+1 protection
 - SNCP protection
- Tributary port (manufacturing option)
 - Two 8-port E1 ports with DB37 connector or 16-port E1 ports with RJ48C and four 10/100 (FE) Ethernet ports
 - 8-port E1 with RJ48C connector and 8-port E1 with DB37 connector, with four 10/100 (FE) Ethernet ports
 - 8-port E1 ports with RJ48C /DB37and two 10/100 (FE) Ethernet ports
 - 4-port E1 ports with RJ48C/DB37and two 10/100 (FE) Ethernet ports
- Hot swappable power Modules, dual power modules for redundancy
 - DC power -48 Vdc (-36 to -72Vdc)
 - AC power (100 to 240 Vac)
 - Networking protection
 - MSP (1+1) protection for TM (Terminal Multiplexer)
 - SNCP protection for ADM (Add/Drop Mux)
- VC-12 cross-connect
- 4-Ethernet Port for total 63xVC12, with independent port configuration
- Supports Internal/Line clock
- Supports VCAT, GFP, and LCAS
- Supports E-Line
- Performance monitoring
- Alarm suppression, masking, and reporting
- Management:
 - Console port
 - SNMP port
 - Centralized management with Loop's EMS over DCC channel
 - LoopView GUI EMS
 - Telnet support
- RoHS compliant

Description

The Loop-O9150S SDH STM1 TM/ADM is a standard equipment device for SDH/MSTP networks with VC-12 directly reaching the network terminal. Through an STM-1 uplink, the O9150S provides VC-12 standard E1s and Ethernet supporting VCAT, GFP, and LCAS protocol.

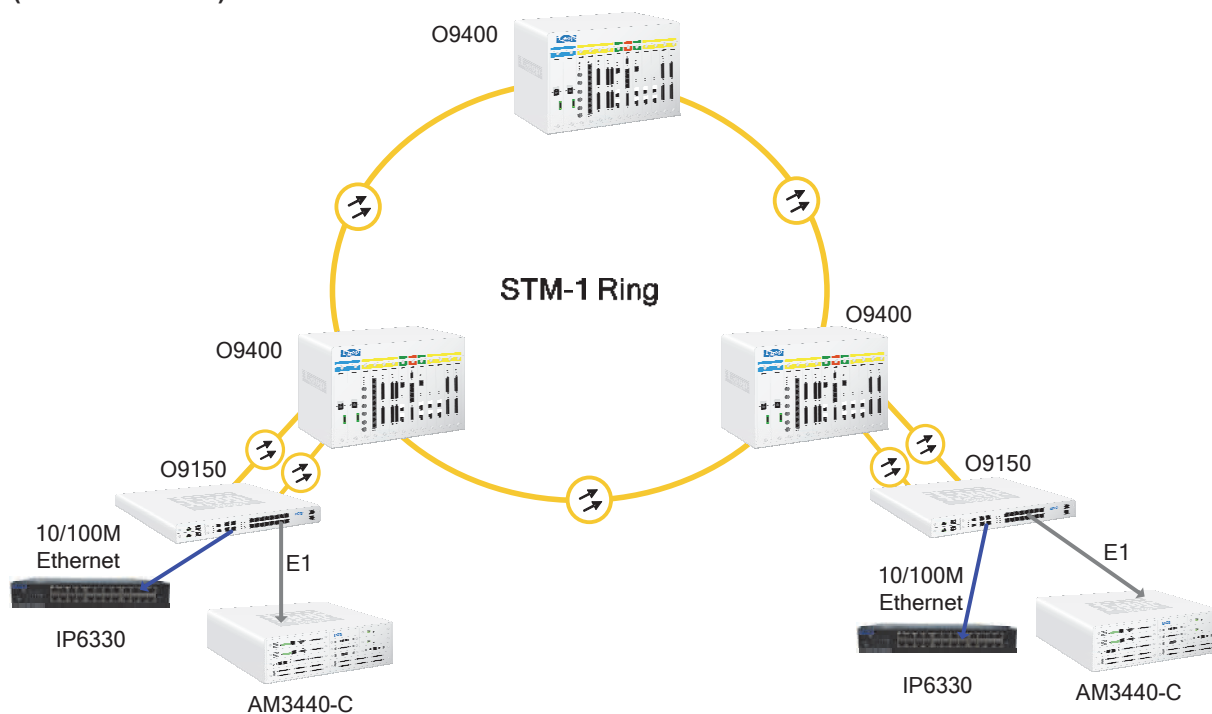
The O9150S is a comprehensive fiber transmission platform for traditional telecom business and broadband information business applications. As well, it is suited to adapt to general data in Metropolitan Area Networks and audio and information business data in Private Networks.

On the aggregate side, the O9150S has two STM-1 ports supporting MSP (1+1) TM and SNCP for ADM protection. On the tributary side, the O9150S has four Ethernets and up to two 8-port E1. As terminal equipment, the O9150S can be built in a range of complex topologies such as star, linear and ring. These can support a non-blocking cross-connect between different business interfaces.

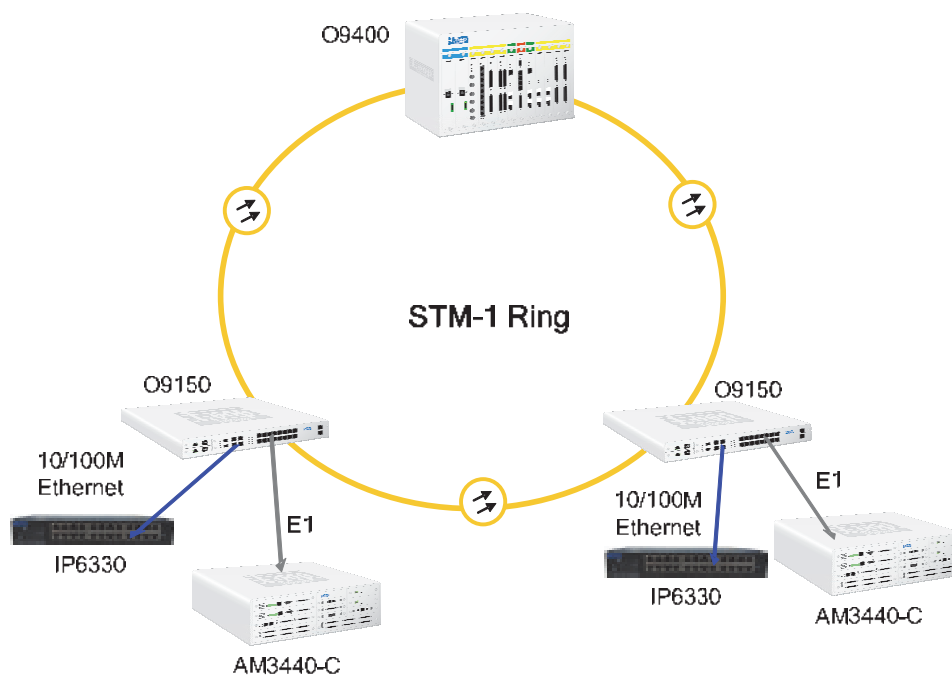
All interfaces are fully compliant with the relevant ANSI standards and ITU recommendations. The O9150S provides fault management, performance monitoring, configuration management, and network security management. Through the console port, LAN port and DCC channel, the OAM&P can be achieved both locally and remotely via SNMP or menu-driven interfaces. O9150S supports the LoopView GUI EMS (Element Management System).

Application Illustrations

TM (MSP Protection)



ADM



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.

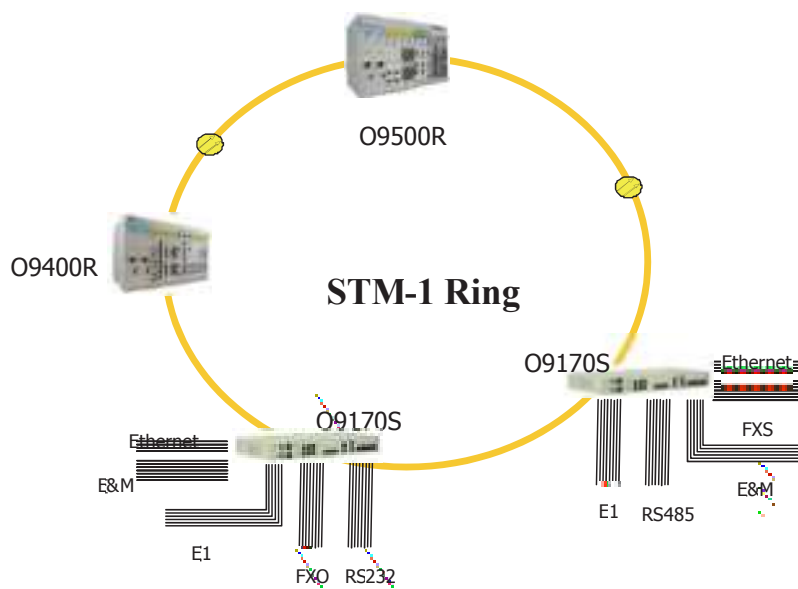
The O9170S provides two optical line signals at STM-1 with protection schemes including MSP(1+1) and SNCP protection in both ring and linear network topologies.

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.

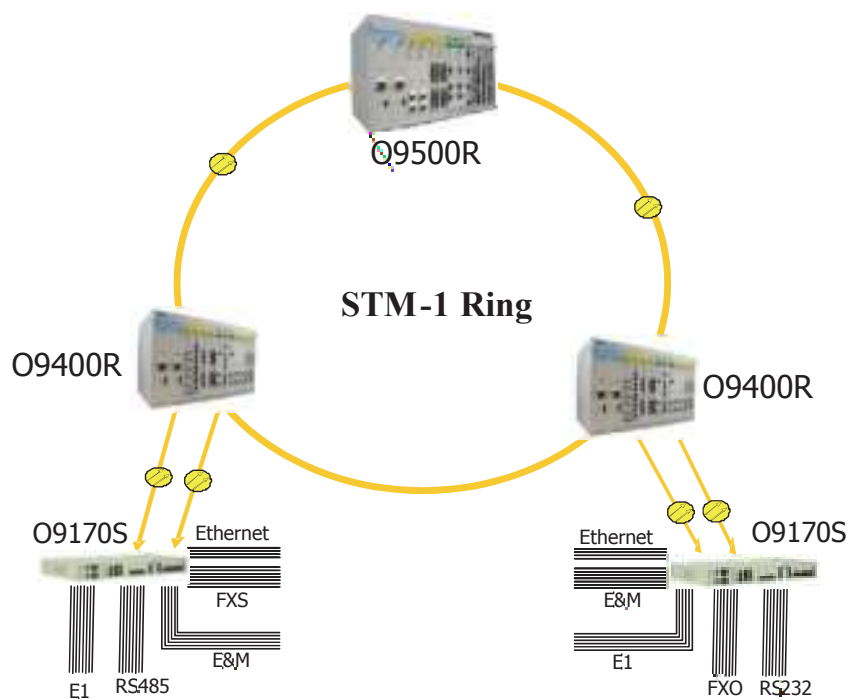
All interfaces are fully compliant with the relevant ANSI standards and ITU recommendations. The O9170S provides fault management, performance monitoring, configuration management, and network security management. Through the console port, LAN port and DCC channel, the OAM&P can be achieved both locally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

Application Illustration

ADM mode typical application (SNCP Protection)



TM mode typical application (MSP Protection)



Loop-O9400R SDH/SONET ADM/TM

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
 - 1 GbE and 8 FE tributary module with L2 switch
 - 1 GbE or 8 FE tributary module without L2 switch
 - 7 FOM tributary module
 - 4 GGeoSDH with L2 switch tributary module
 - TDMoG tributary module
- 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
 - FOM: Line
 - 4GGeoSDH: Card
 - TDMoG: Card
 - 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
- Ethernet Order Wire (EOW) using VoIP technology
- 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

Supporting SDH & PDH



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 Ethernet EoS tributaries
 - 6 GbE 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 10/100M Ethernet EoS tributaries
 - 8 GbE EoS tributaries
 - 56 FOM tributaries
 - 4 TDMoG 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

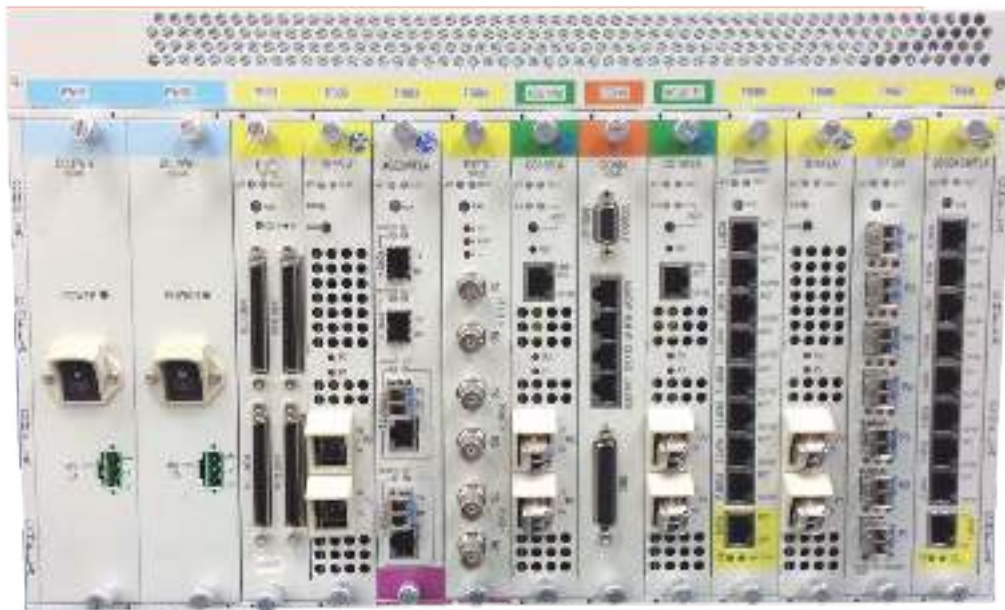


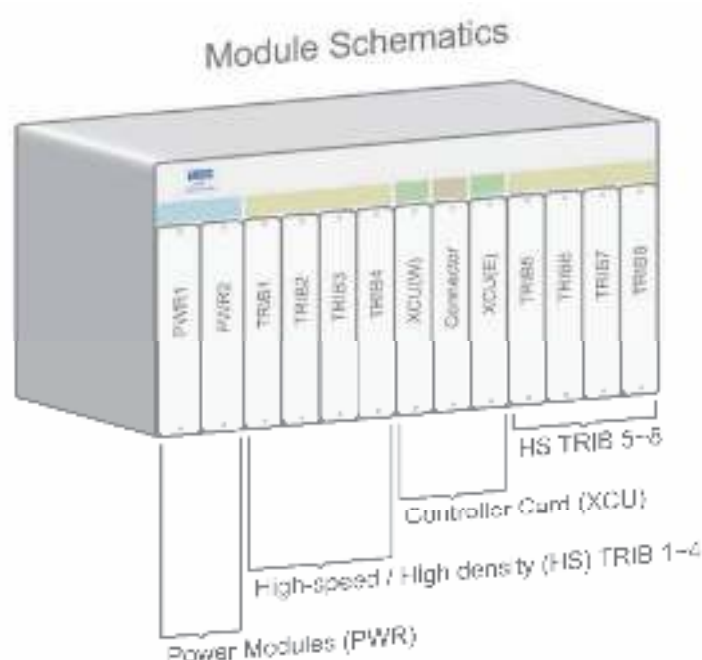


Controller STM-1/4/16 (OC-3/12/48) with CHAA Chassis



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





09400R Tributary Module Description

Module	Description		Controller Card Compatibility
B155/622	STM-4 (OC-12) tributaries	2 STM-4 MSP 1+1 or 1 STM-4 Sub-ring SNCP or 2 STM-4 without protection	XCU-CC4/CC16
	STM-1 (OC-3) tributaries	4 STM-1 MSP 1+1 or 4 STM-1 Sub-ring SNCP or 8 STM-1 without protection	
B2G5	STM-16 (OC-48) software configurable interface plug-in module without SFP (mini-GBIC) optical modules		XCU-CC16
E1/T1	63 port E1/T1 tributaries		XCU-CC4/CC16
	32 port E1/T1 tributaries		
	16 port E1/T1 tributaries		
E1(75 ohm)	63 E1(75 ohm) plug-in card		XCU-CC4/CC16
	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		XCU-CC4/CC16
Ethernet	8FE+1GbE Ethernet over SDH card with L2 switch (9EoS4SW) without L2 switch (9EoS4NSW)		XCU-CC4/CC16
4GEoSDH	4GbE Ethernet over SDH card with L2 switch		XCU-CC16
7FOM	7 port FOM tributaries		XCU-CC16
TDMoG	4 port 10/100/1000BT for TDM over Gigabit Ethernet		XCU-CC16
8GES4SW	STM-1 (OC-3) tributaries	STEM-1 or 2 STEM-1 or STM-4	XCU-CC4/CC16
	STM-4 (OC-12) tributaries	STM-4 or 2 x STEM-1	

O9400R Tributary Modules with XCU-CC4

In 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.

Table 1 High-speed Configuration without protection

Channel	Tributary (Plug-in Modules)								Controller Cards XCU-CC4	
	TRIB 1	TRIB 2	TRIB 3	TRIB 4	TRIB 5	TRIB 6	TRIB 7	TRIB 8	XCU 1	XCU 2
Global payload SDH	155M		155M		2 x 155M	N/A	4 x 155M	N/A	8 x 155M	8 x 155M
					155M	155M	2 x 155M	2 x 155M		
Link without protection	STM-1	N/A	STM-1	N/A	STM-1	STM-1	2xSTM-1	2xSTM-1	2xSTM-1/4	2xSTM-1/4
					STM-1	STM-1	STM-4	N/A		
					2xSTM-1	N/A	2xSTM-1	2xSTM-1		
					2xSTM-1	N/A	STM-4	N/A		
E1	63 E1	N/A	63 E1	N/A	63 E1	63 E1	63 E1	63 E1	N/A	N/A
E3	3 E3	N/A	3 E3	N/A	3 E3	3 E3	3 E3	3 E3	N/A	N/A
Ethernet 10/100/1000BT	8x10/100BT 1x1000BT	N/A	8x10/100BT 1x1000BT	N/A	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	N/A	N/A

Table 2 High-speed Configuration with protection

Channel	Tributary (Plug-in Modules)								Controller Cards XCU-CC4	
	TRIB 1	TRIB 2	TRIB 3	TRIB 4	TRIB 5	TRIB 6	TRIB 7	TRIB 8	XCU 1	XCU 2
Link with protection <i>Note 1</i>	STM-1	(B) STM-1	STM-1	(B) STM-1	2xSTM-1	(B) 2xSTM-1	2xSTM-1 Or STM-4 MSP	(B) 2xSTM-1 Or STM-4 MSP	2 x STM-1/4 SNCP Rings	
									2 x STM-1/4 MSP (1+1)	
									1 x STM-1/4 SNCP Ring with MSP (1+1)	
									1 x STM-1/4 SNCP Ring and 1 x STM-1/4 MSP (1+1)	
	N/A	N/A	N/A	N/A	STM-1/4 Sub-ring		2xSTM-1/4 Sub-ring		2 x STM-1/4 SNCP Rings	
E1	63 E1	(B) 63 E1	63 E1	(B) 63 E1	63 E1	(B) 63 E1	63 E1	(B) 63 E1	N/A	N/A
E3	3 E3	(B) 3 E3	3 E3	(B) 3 E3	3 E3	(B) 3 E3	3 E3	(B) 3 E3	N/A	N/A
Ethernet 10/100/ 1000BT	8x10/100BT 1x1000BT	(B) 8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	(B) 8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	(B) 8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	(B) 8x10/100BT 1x1000BT	N/A	N/A

(B) signifies backup/protection

Note 1 Protection schemes are illustrated with figures in the following sections.

O9400R Tributary Modules with XCU-CC16

Table 1 High-speed Configuration without protection

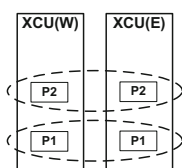
Channel	Tributary (Plug-in Modules)								Controller Cards XCU-CC16	
	TRIB 1	TRIB 2	TRIB 3	TRIB 4	TRIB 5	TRIB 6	TRIB 7	TRIB 8	XCU 1	XCU 2
Global payload SDH	4 x 155M	N/A	4 x 155M	N/A	4 x 155M	N/A	4 x 155M	N/A	2 x 2.5G	2 x 2.5G
	2 x 155M	2 x 155M	2 x 155M	2 x 155M	2 x 155M	2 x 155M	2 x 155M	2 x 155M		
	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		
Link without protection	2xSTM-1	2xSTM-1	2xSTM-1	2xSTM-1	2xSTM-1	2xSTM-1	2xSTM-1	2xSTM-1	2xSTM-1/4/16	2xSTM-1/4/16
	STM-4	N/A	STM-4	N/A	STM-4	N/A	STM-4	N/A	2xSTM-1/4/16	2xSTM-1/4/16
E1	63 E1	63 E1	63 E1	63 E1	63 E1	63 E1	63 E1	63 E1	N/A	N/A
E3	3 E3	3 E3	3 E3	3 E3	3 E3	3 E3	3 E3	3 E3	N/A	N/A
Ethernet 10/100/1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	N/A	N/A
FOM	7 FOM	7 FOM	7 FOM	7 FOM	7 FOM	7 FOM	7 FOM	7 FOM	N/A	N/A
4GEoSDH Note 2	N/A	N/A	2.5GbE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TDMoG Note 3	622M	N/A	622M	N/A	622M	N/A	622M	N/A	N/A	N/A
8GES4SW	STEM-1	STEM-1(B)	STEM-1	STEM-1(B)	STEM-4	STEM-4(B)	STEM-4	STEM-4(B)	N/A	N/A
	STEM-1	STEM-1 Note 4	STEM-1	STEM-1 Note 5	STM-4 or 2 x STEM-1	2 x STEM-1	STM-4 or 2 x STEM-1	2 x STEM-1	N/A	N/A

Table 2 High-speed Configuration with protection

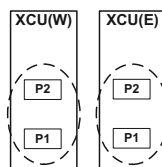
Channel	Tributary (Plug-in Modules)								Controller Cards XCU-CC16	
	TRIB 1	TRIB 2	TRIB 3	TRIB 4	TRIB 5	TRIB 6	TRIB 7	TRIB 8	XCU 1	XCU 2
Link with protection	2xSTM-1	(B) 2xSTM-1	2xSTM-1	(B) 2xSTM-1	2xSTM-1	(B) 2xSTM-1	2xSTM-1	(B) 2xSTM-1	2 x STM-1/4/16 Ring	
	STM-4	(B) STM-4	STM-4/16 Note 2	(B) STM-4/16	STM-4	(B) STM-4	STM-4	(B) STM-4		
E1	63 E1	(B) 63 E1	63 E1	(B) 63 E1	63 E1	(B) 63 E1	63 E1	(B) 63 E1	N/A	N/A
E3	3 E3	(B) 3 E3	3 E3	(B) 3 E3	3 E3	(B) 3 E3	3 E3	(B) 3 E3	N/A	N/A
Ethernet 10/100/1000BT	8x10/100BT 1x1000BT	(B) 8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	(B) 8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	(B) 8x10/100BT 1x1000BT	8x10/100BT 1x1000BT	(B) 8x10/100BT 1x1000BT	N/A	N/A
FOM	7 FOM	(B) 7 FOM	7 FOM	(B) 7 FOM	7 FOM	(B) 7 FOM	7 FOM	(B) 7 FOM	N/A	N/A
4GEoSDH Note 2	N/A	N/A	2.5GbE	(B) 2.5GbE	N/A	N/A	N/A	N/A	N/A	N/A
TDMoG Note 3	622M	(B) 622M	622M	(B) 622M	622M	(B) 622M	622M	(B) 622M	N/A	N/A
8GES4SW	STEM-4	STEM-4(B)	STEM-4	STEM-4(B)	STEM-4	STEM-4(B)	STEM-4	STEM-4(B)	N/A	N/A
	STM-4 or 2 x STEM-1	2 x STEM-1	STM-4 or 2 x STEM-1 Note 6	STM-4 or 2 x STEM-1 Note 6	STM-4 or 2 x STEM-1	2 x STEM-1	STM-4 or 2 x STEM-1	2 x STEM-1	N/A	N/A

(B) signifies backup/protection

Note 1: With MSP (1+1) protection, the protection pairs 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: 4GEoSDH and B2G5 modules can only be mounted in tributary slot 3 and 4 on CHAA Chassis with XCU-CC16, the backplane of which supports up to 2.5G Mbps mapping bandwidth.

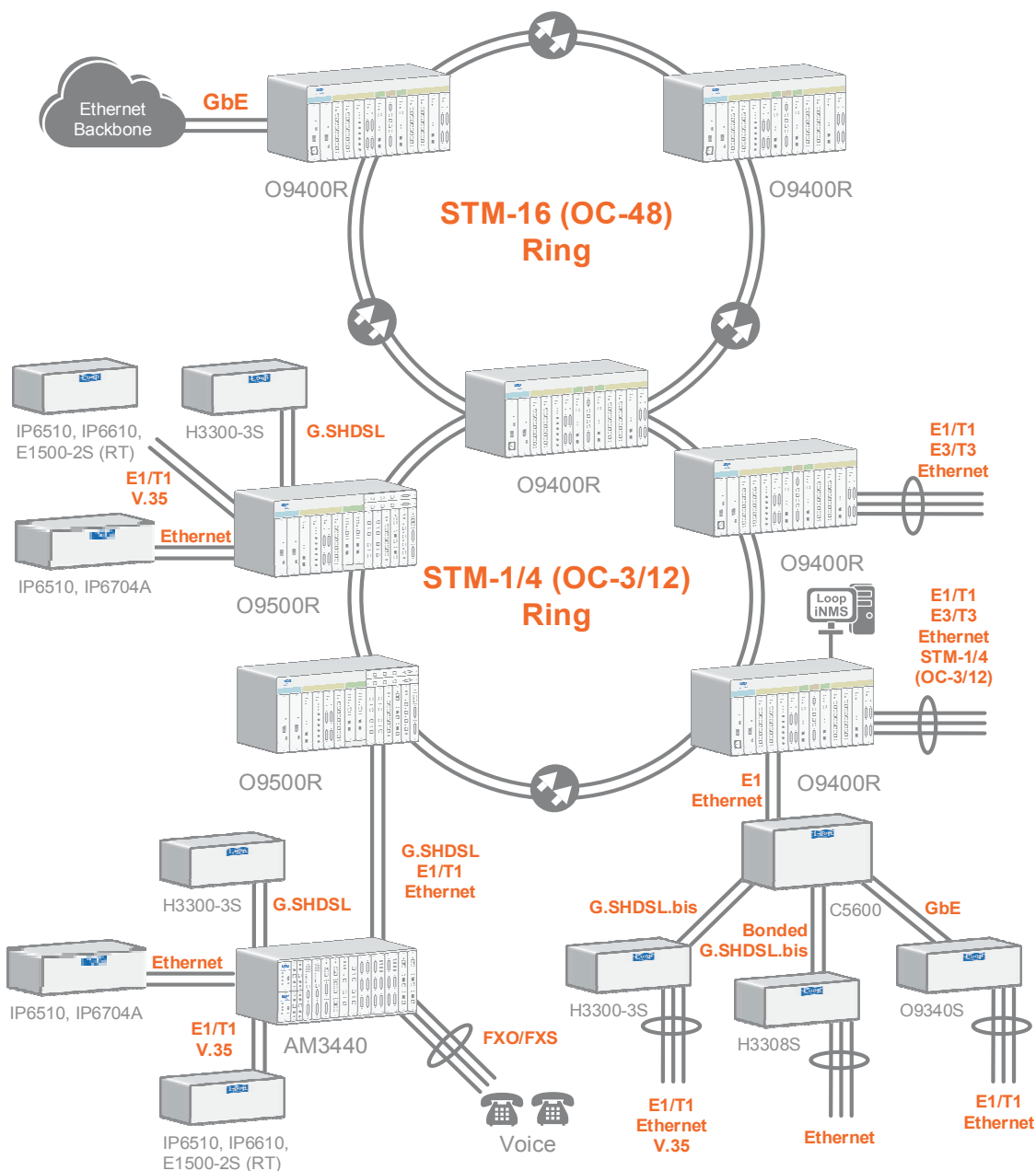
Note 3: The backplane bandwidth for the TDMoG card is 622M. When TDMoG module is mounted to on tributary slots 1, 3, 5, or 7 without protection, slot 2, 4, 6, or 8 will be blocked from use.

Note 4: Disabled if 8GESW is used in TRIB1

Note 5: Disabled if 8GESW is used in TRIB3

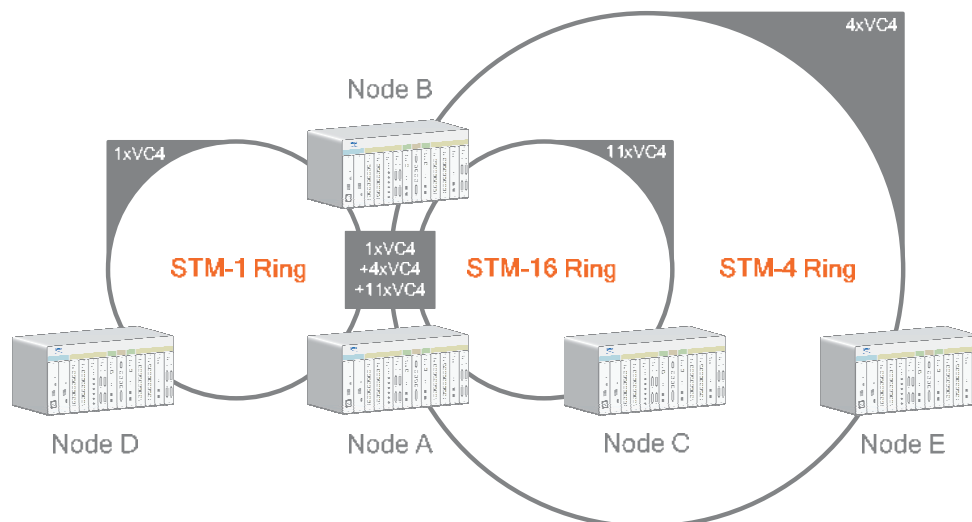
Note 6: If Slots 3 and 4 hold an 8GWSW, STM-4/OC-12 can only be registered for either card.

Application Illustrations

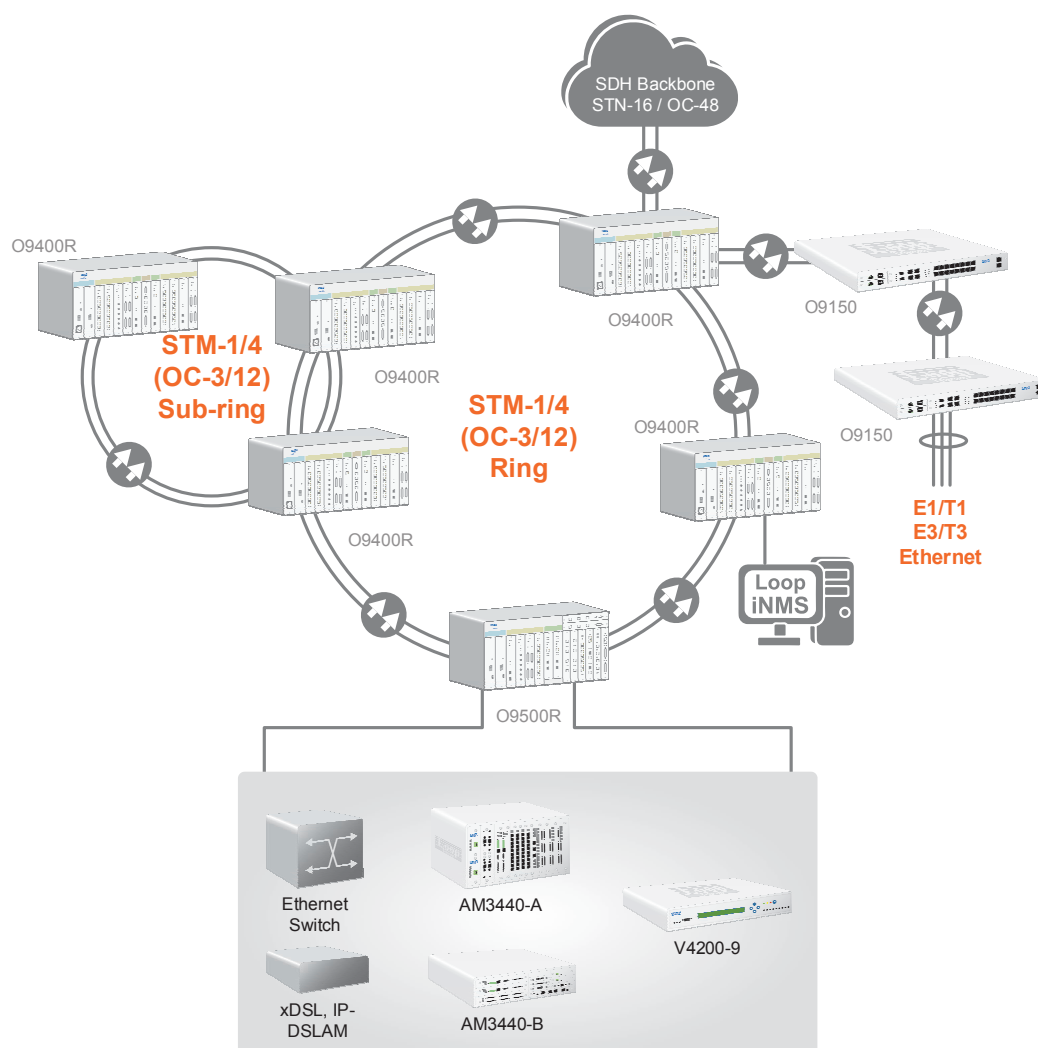


Total Solution for IP / SDH / Voice Data Transportation

With STM-16 (OC-48) capacity, multi-rings can share the bandwidth in one optical line. Node A, B, and C form a STM-16 Ring. Node A, B, and E form a STM-4 Ring. Node A, B, and D form a STM-1 Ring. Node A and B only need one optical line to connect these three rings. The cross-connect VC fabrics are able to cross-connect the three rings within the linear line between Node A and Node B.



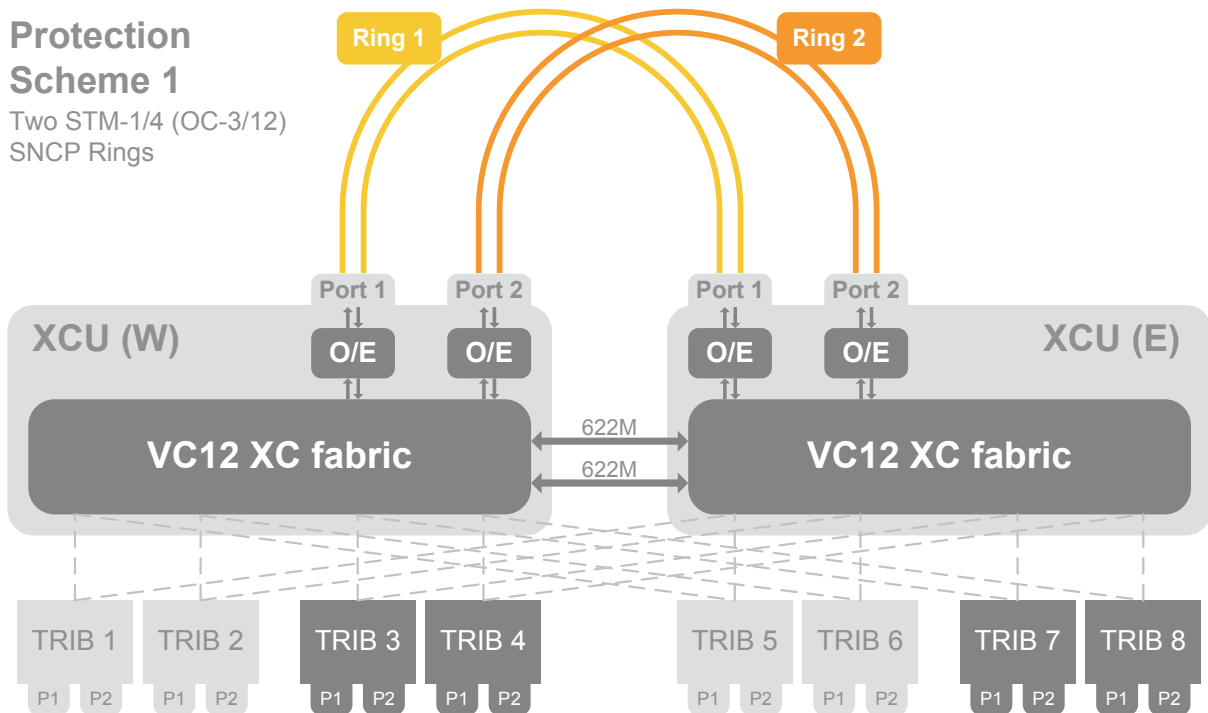
One Single Line for STM-1, STM-4, and STM-16 (XCU-CC16)



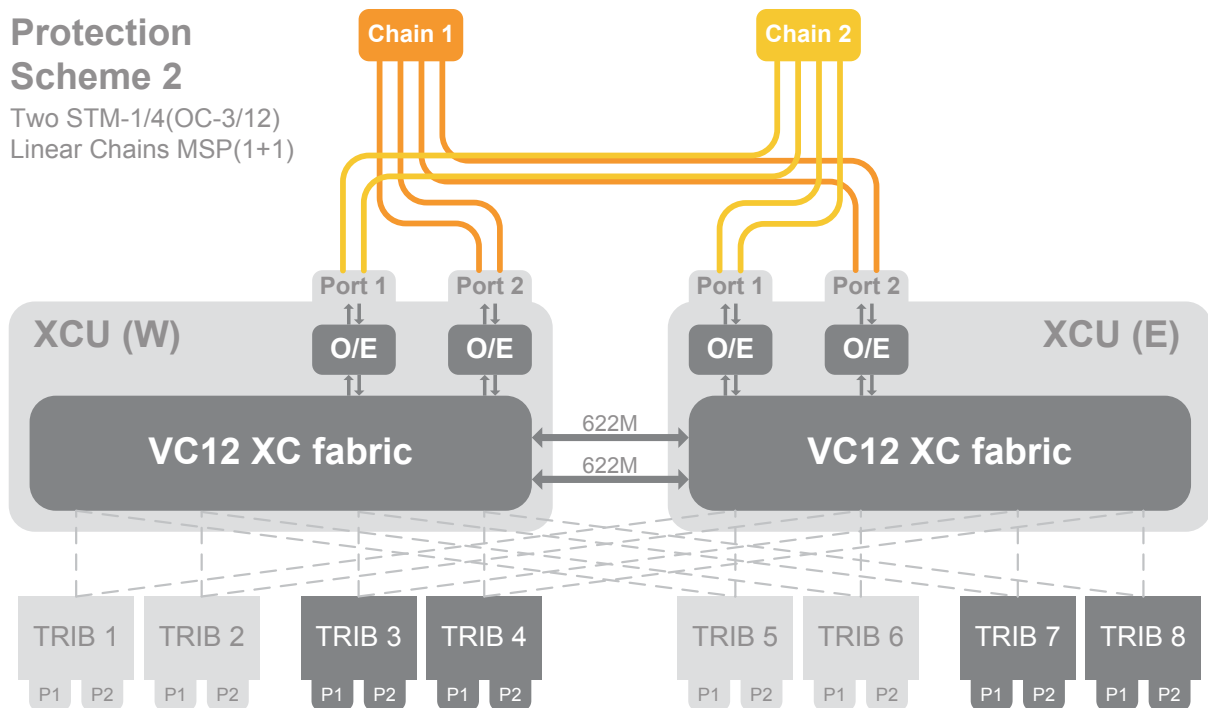
STM-1/4 Ring Application

Aggregation Line Protection Illustrations (XCU-CC4)**Protection Scheme 1**

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

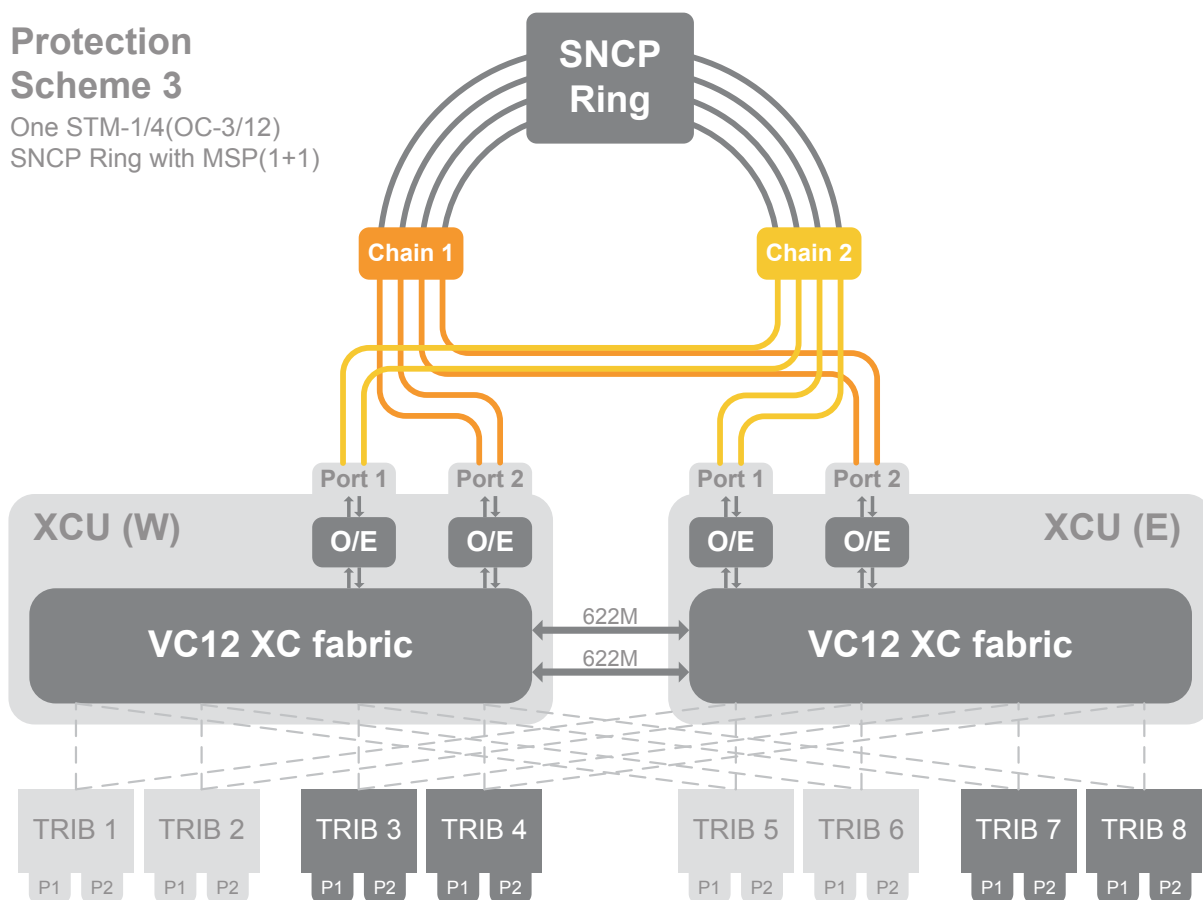
**Protection Scheme 2**

Two STM-1/4(OC-3/12)
Linear Chains MSP(1+1)



Protection Scheme 3

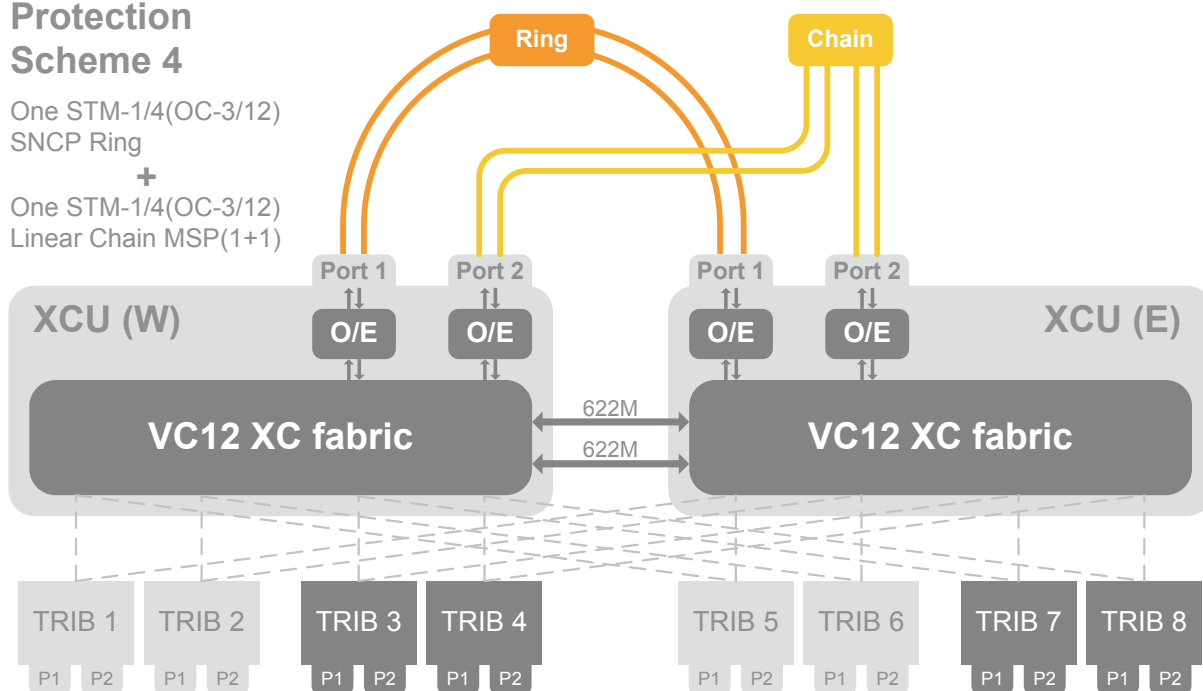
One STM-1/4(OC-3/12)
SNCP Ring with MSP(1+1)



Protection Scheme 4

One STM-1/4(OC-3/12)
SNCP Ring

+
One STM-1/4(OC-3/12)
Linear Chain MSP(1+1)

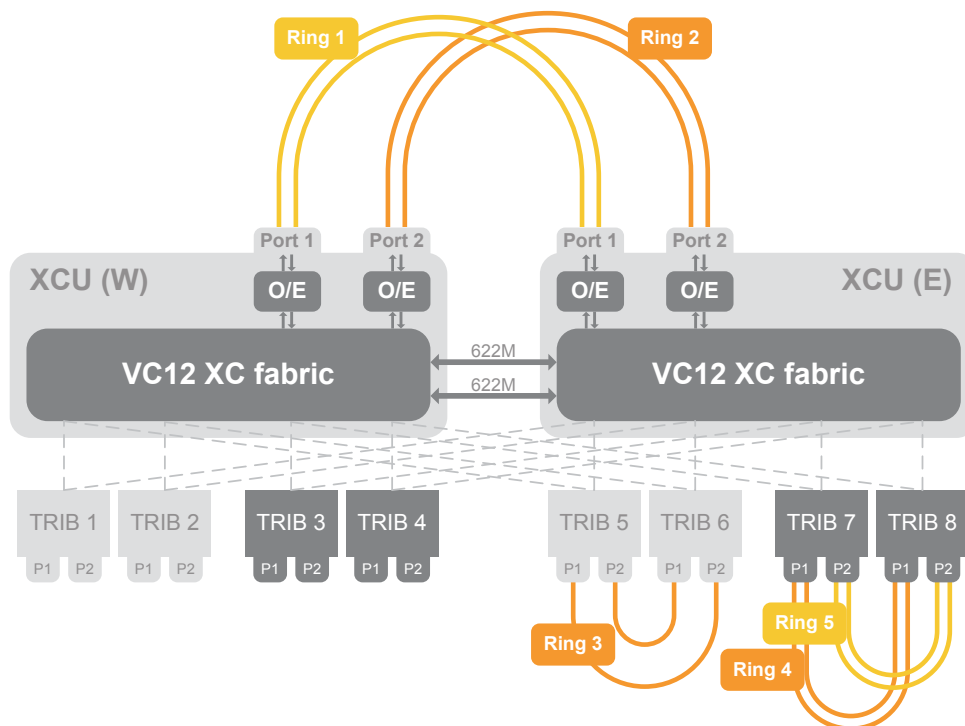


Protection Scheme 5

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

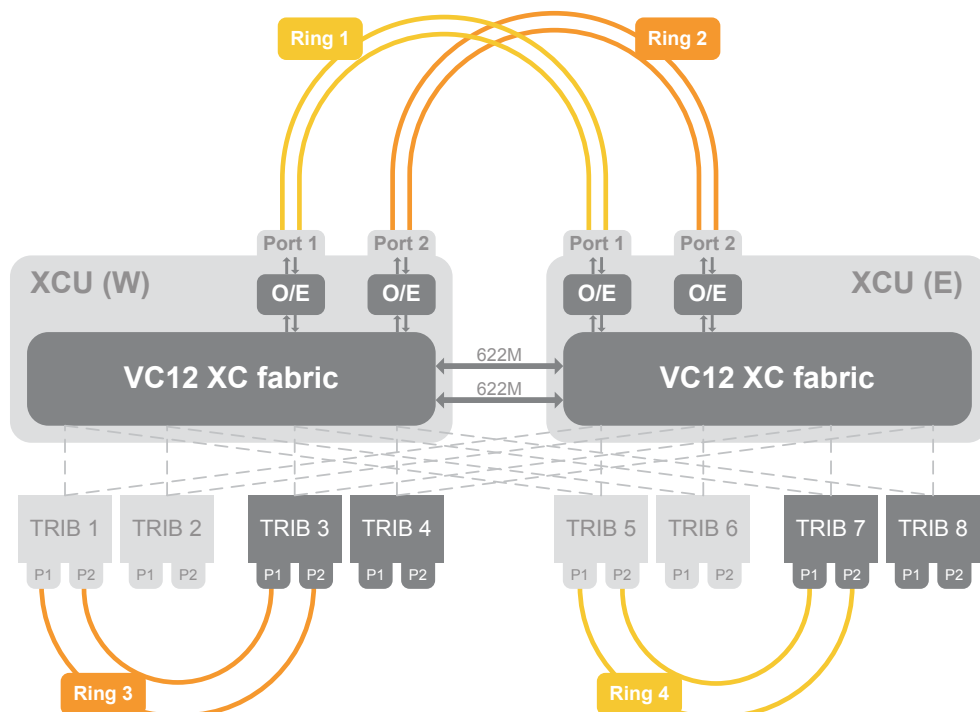
Two from XCU channels

Three from tributary channels

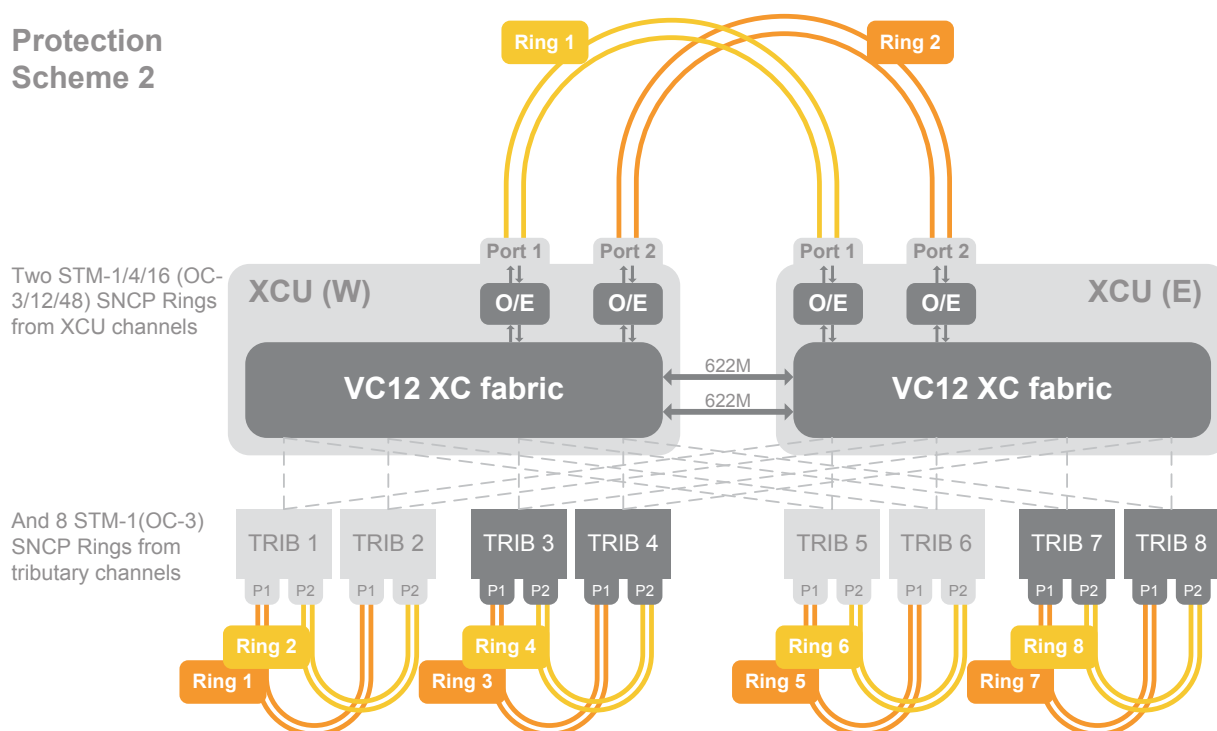
**Aggregation Line Protection Illustrations (XCU-CC16)****Protection Scheme 1**

Two STM-1/4/16 (OC-3/12/48) SNCP Rings from XCU channels

And two STM-1/4(OC-3/12) SNCP Rings from tributary channels

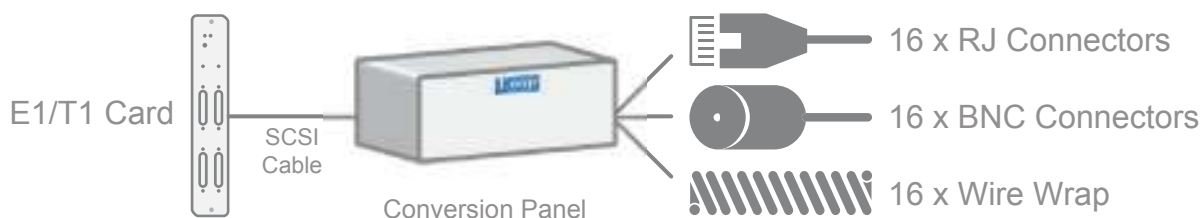


Protection Scheme 2



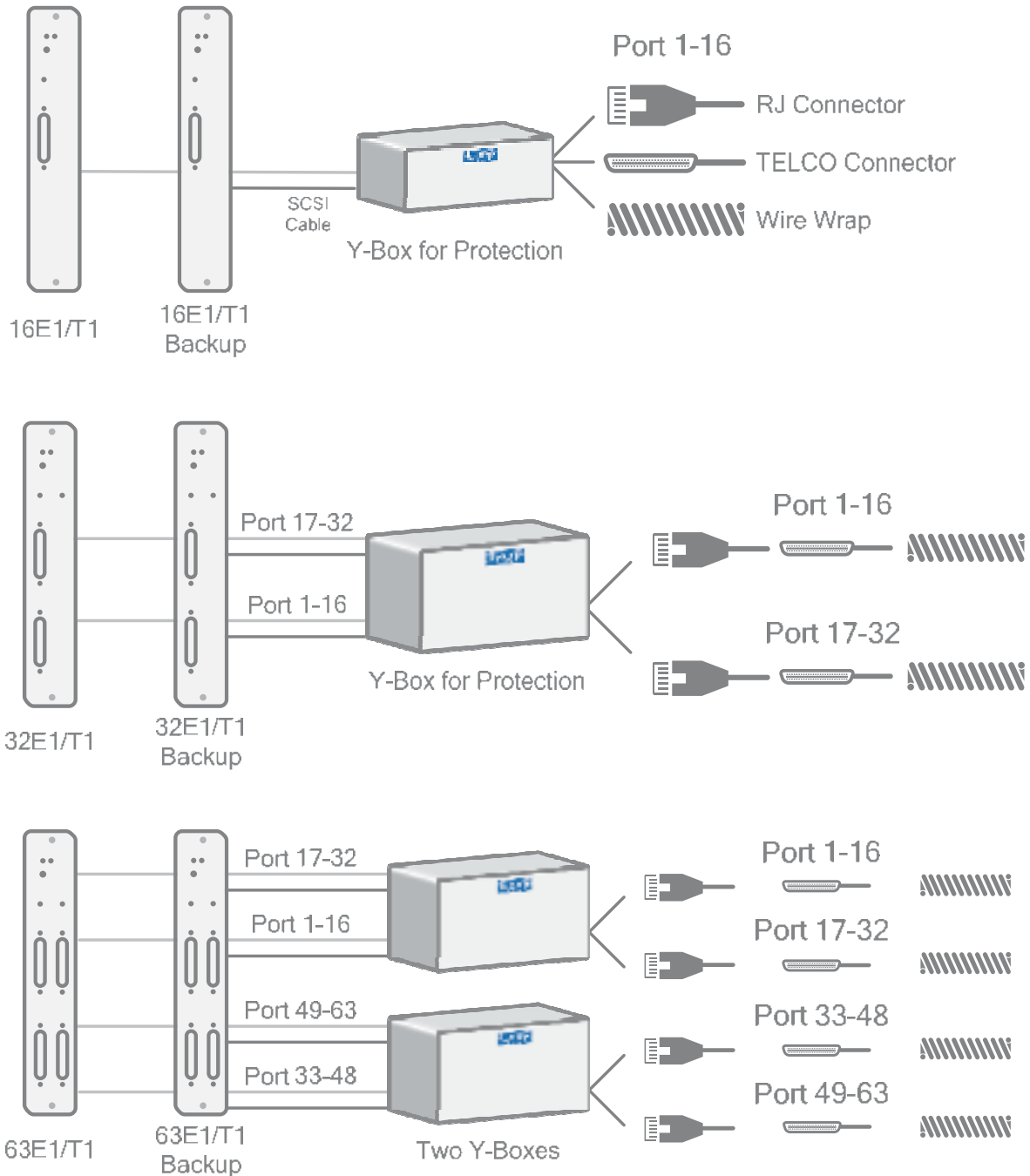
E1/T1 Connector Conversion Panel Illustration

One conversion panel supports up to sixteen ports. For 16E1/T1 cards, one conversion panel is required; for 32E1/T1 cards, two conversion panels are required; for 63E1/T1 cards, three conversion panels are required.



E1/T1 Y-box Protection Illustrations

Y-Boxes provide protection over terminal equipment. For O9500R, RJ, Wire Wrap, TELCO 50, and TELCO 64 connectors are available for E1 (120 ohm) or T1; TELCO 50 and TELCO 64 are available for E1 (75 ohm). For more detailed product specification, please refer to Accessories section. In below the wire connection from 16/32/63E1/T1 card, to Y-BOX, and to connector are illustrated.



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
 - Ethernet: ELPS, ERPS
 - FOM: Line (1+1)
 - 4GE/8GE: Card protection
 - 7 FOM: line
- 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
 - Ethernet Order Wire (EOW) using VoIP technology
- 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 768 DS0 timeslots, which equal to 24 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, Optical channels from 7-port FOM 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. Modules such as TDMoE and 8GESW make it possible for TDM traffic to be transported over Ethernet (DS0 over Ethernet) and the other way around (Ethernet over SDH/SONET) via circuit emulation and virtual concatenation technologies.

Multiple **protection schemes** are designed at different levels, including path-level SNCP/UPSR and section-level MSP (1+1) for SDH/SONET, circuit and line protection for access interfaces, DS0 SNCP/UPSR and UPSR for low-speed modules, and 1+1 module redundancy for power, controller, and plug-in cards.

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.

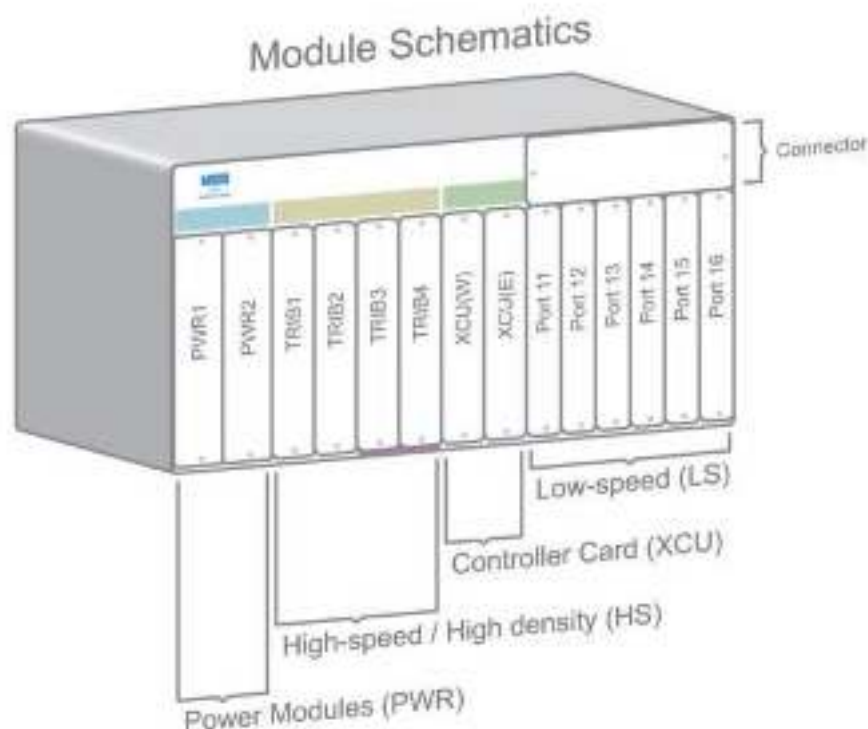
O9500R (CC4/CC16) Tributary Module Description

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
Low-speed (LS) Single slot	8GESW	8 GbE Ethernet over SDH card with L2 switch (8GES4SWA/8GES16SWA*)
	4GEoSDH	4GbE Ethernet over SDH card with L2 switch
	7FOM	7 port FOM tributaries
	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
	1C37/4C37	1 or 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
	Conference	2 RS232, 2 FXS, and 2 E&M ports
	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
Low-speed (LS) Dual slot	TTA	our ports for DTT input and output.

*Future Option

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



Low-speed Tributary Modules

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
1C37/4C37	C37.94	1/4	6/24
8DC	Dry Contact	8	48
8DCB	Dry Contact	8	48
8RS232	RS232	8	48
Conference Card	FXS/E&M/RS232	6	36
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						
		Tributary (Plug-in Modules)				Controller Cards		Sum
		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
XCU, 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
7FOM	FOM	7	7	7	7	N/A	N/A	28

High-speed Channel with Protection

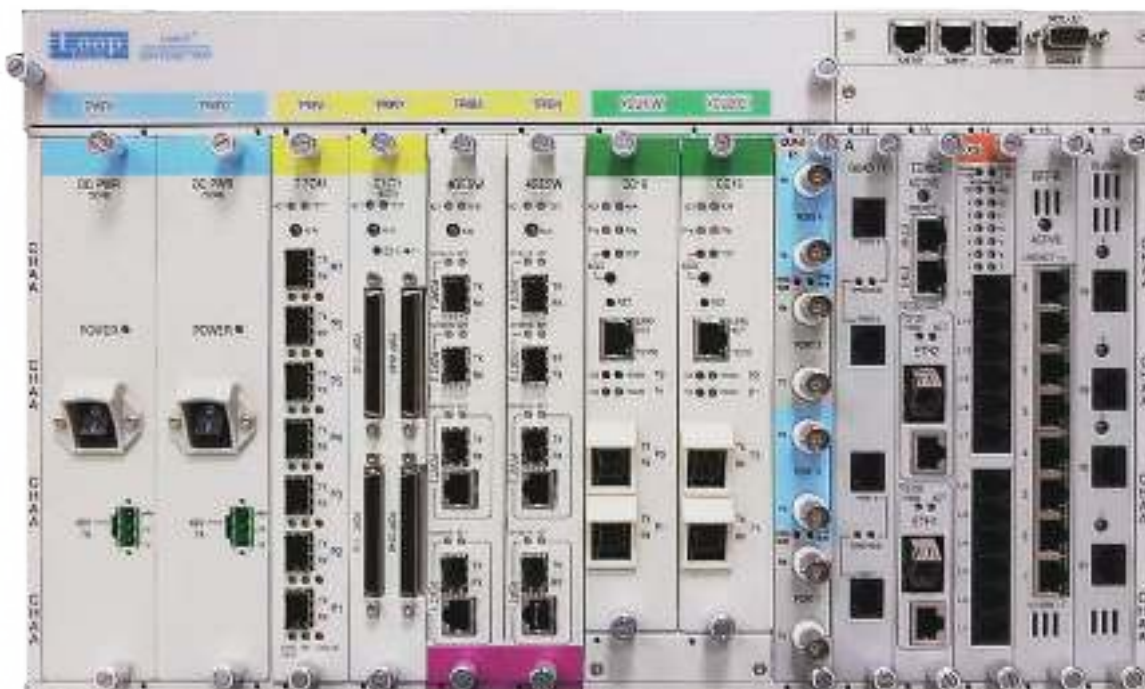
High-seed Module	Channel	Maximum Channels						
		Tributary (Plug-in Modules) <small>Note 2</small>				Controller Cards		Sum
		TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU 1	XCU 2	
E1/T1	E1/T1	63/32/16	(B) 63/32/16	63/32/16	(B) 63/32/16	N/A	N/A	126
E3/T3	E3/T3	3	(B) 3	3	(B) 3	N/A	N/A	6
8GES4SWA	GbE	8	(B) 8	8	(B) 8	N/A	N/A	16
XCU, 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
7FOM	FOM	7	(B) 7	7	(B) 7	N/A	N/A	14

(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
4GEoSDH	GbE	N/A	N/A	4	4	N/A	N/A	8
XCU, 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
7FOM	FOM	7	7	7	7	N/A	N/A	28

High-speed Channel with Protection

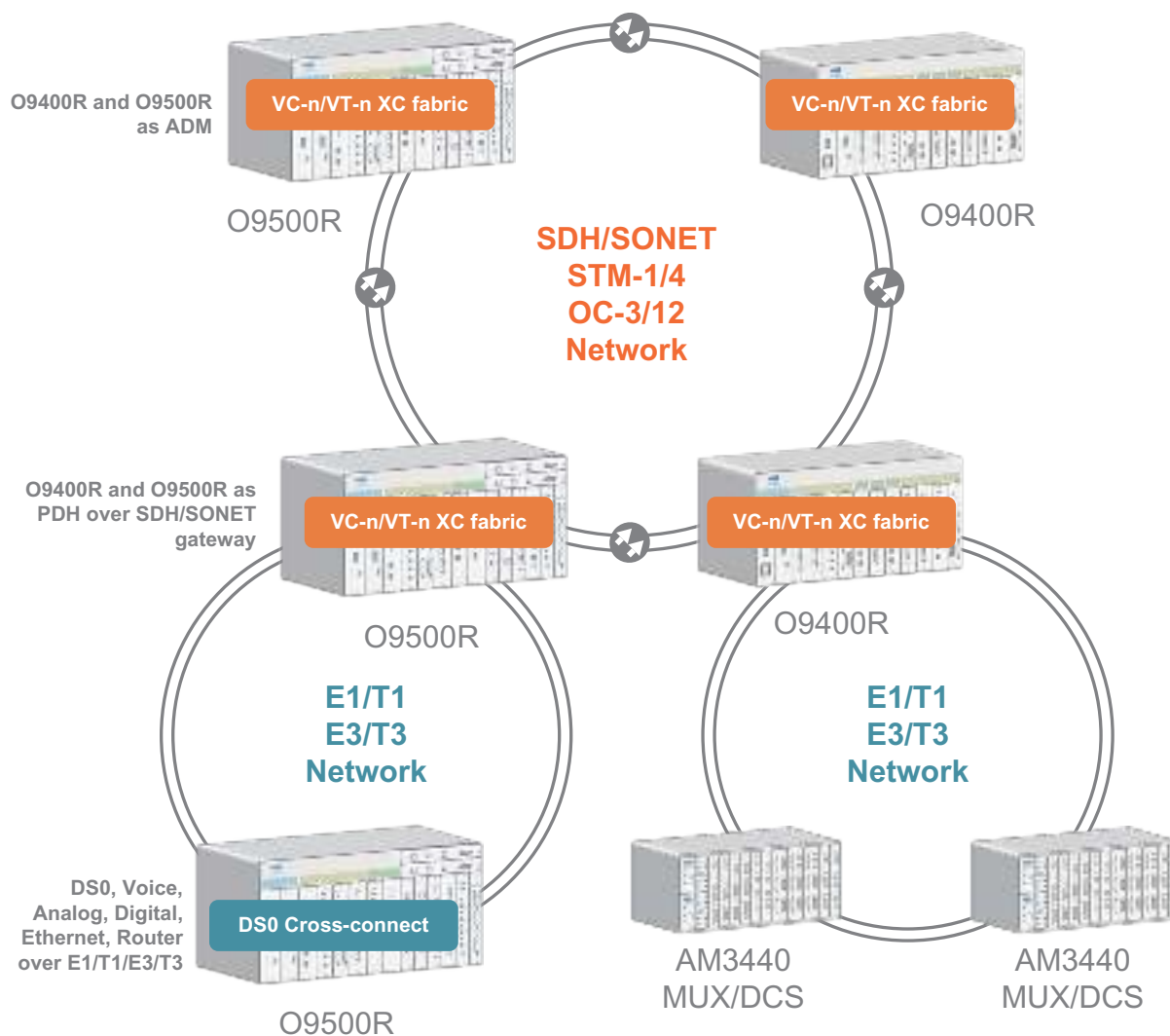
High-seed Module	Channel	Maximum Channels						Sum
		Tributary (Plug-in Modules)				Controller Cards		
		TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU 1	XCU 2	
E1/T1	E1/T1	63/32/16	(B) 63/32/16	63/32/16	(B) 63/32/16	N/A	N/A	126
E3/T3	E3/T3	3	(B) 3	3	(B) 3	N/A	N/A	6
8GES4SWA	GbE	8	(B) 8	8	(B) 8	N/A	N/A	16
4GEoSDH	GbE	N/A	N/A	4	(B) 4	N/A	N/A	4
XCU, 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
7FOM	FOM	7	(B) 7	7	(B) 7	N/A	N/A	14

(B) signifies backup/protection

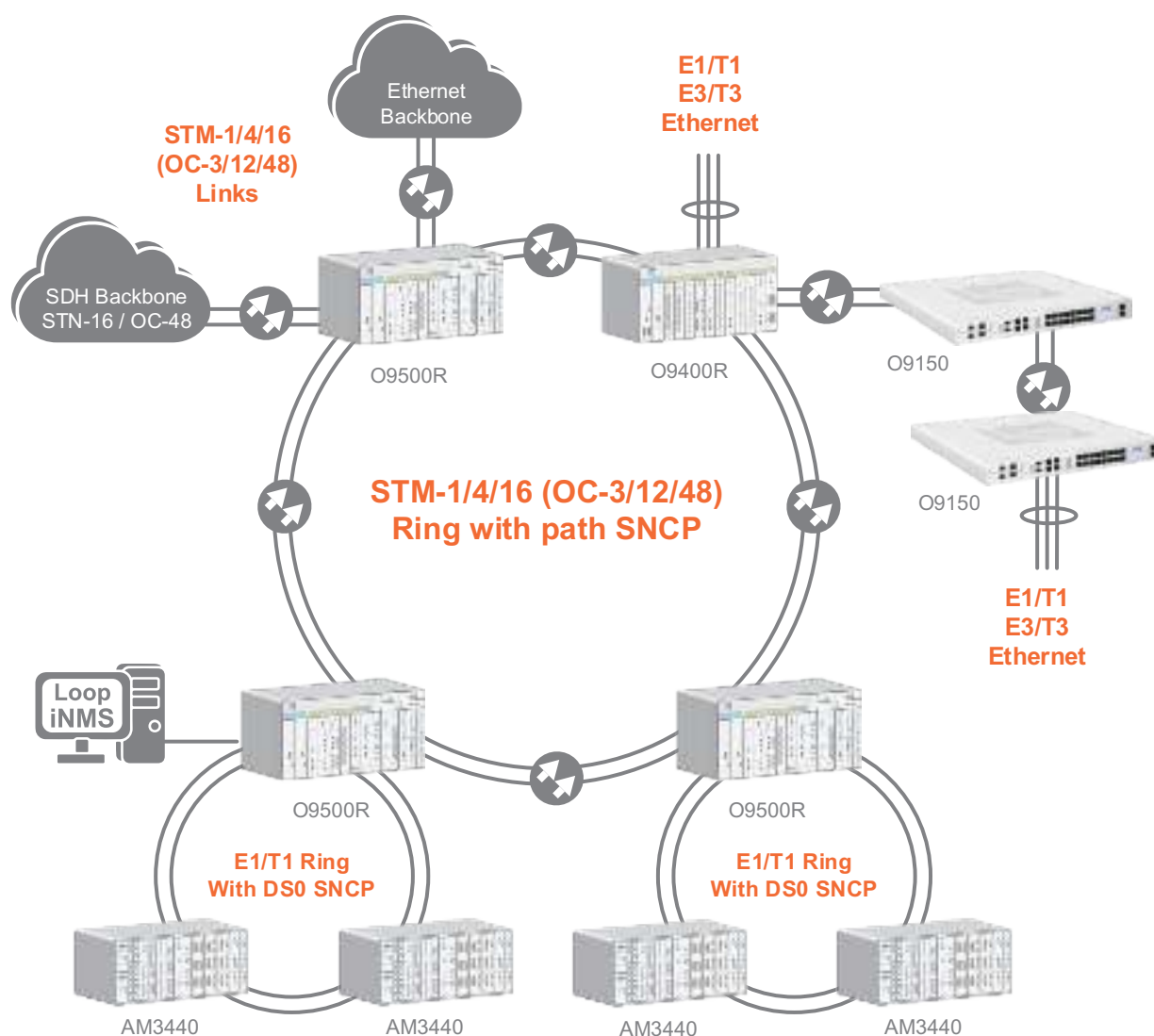
Note TRIB 1 and TRIB 2 form a protection group, and TRIB 3 and TRIB 4 form a protection group.

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.



O9500R as a MUX/DCS and an SDH/SONET ADM

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

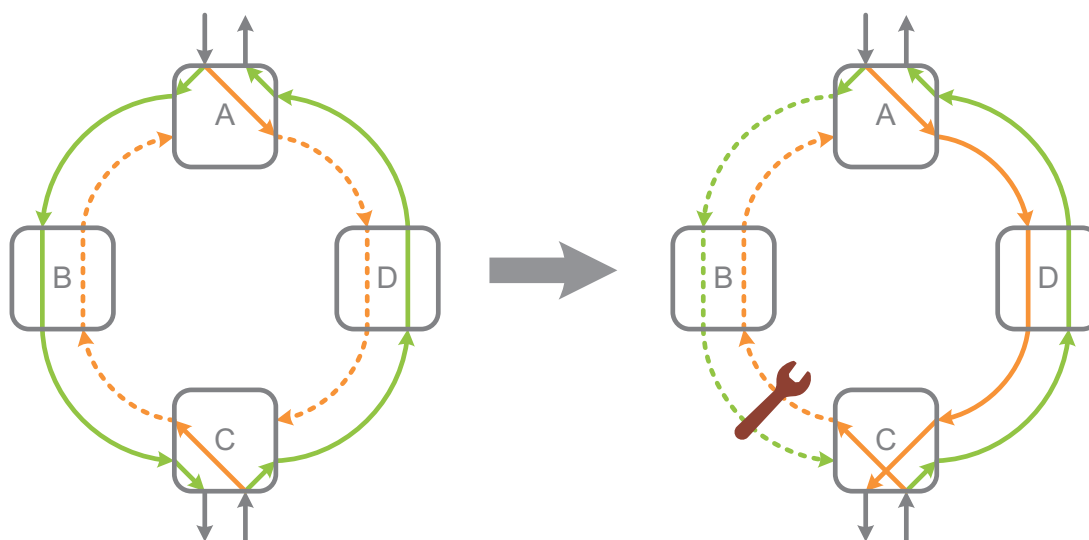
Selector at Rx selects traffic from either path



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)

Loop-O9550 SDH/SONET IMAP

O9550-A



O9550-C



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)
 - AC Module: AC(100V~240V) for CGC only
 - 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	O9550-C
Chassis	5U	3U
# of Mini-slots	4	4
# of Single slots	12	5
Maximum E1 Channels (Uplink)	504	504
Maximum E1 Channels (Tributary)	64	36
Maximum T1 Channels (Uplink)	672	672
Maximum T1 Channels (Tributary)	69	36

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 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.



Loop-O9550 cards

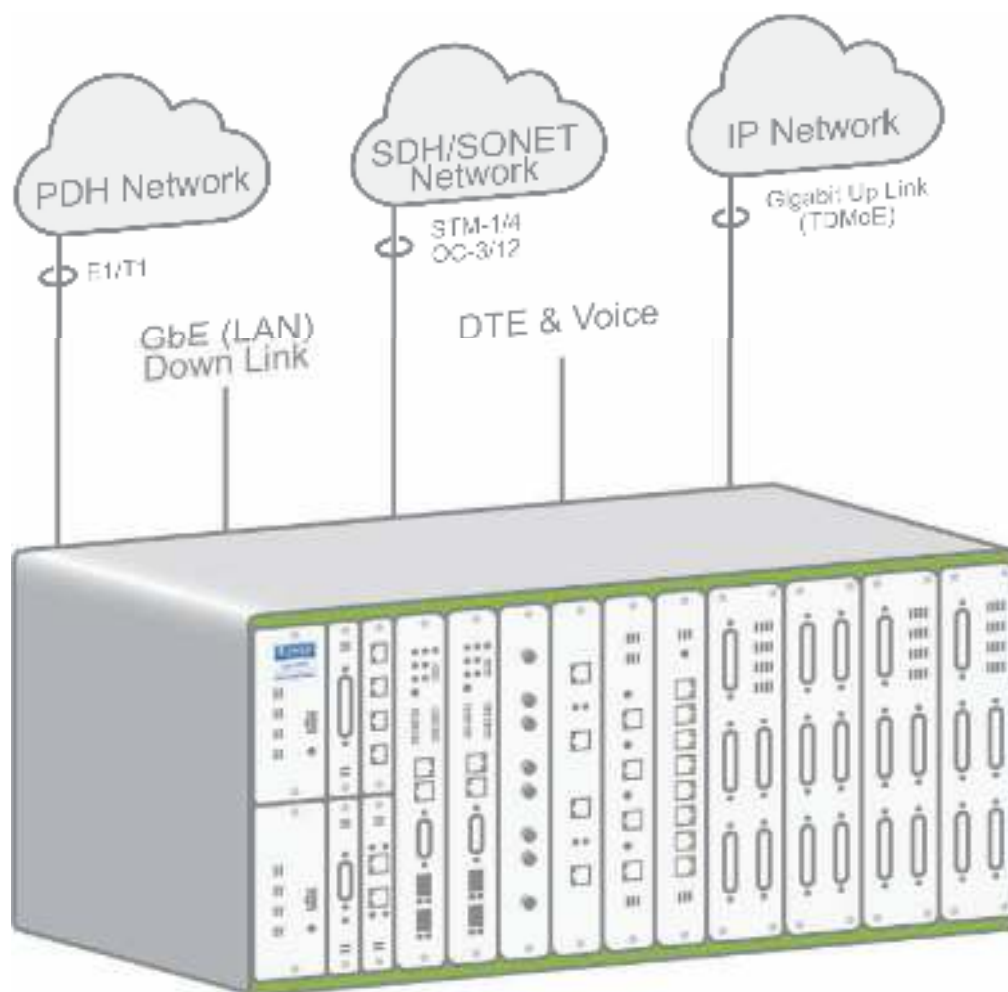
Mini-slot cards plug into the mini-slots of the O9550; single-slot cards plug into single slots; dual-slot cards plug into two adjacent single slots.

	Plug-in cards	O9550-A	O9550-C
DC Power	Dual DC power slots	√	√
AC power	Single AC power	×	√
CPU slots	Dual CC4A cards	√	√
Mini-Slot	1-channel E1 (Single E1 interface)	√	√
	1-channel T1 (Single T1 interface)	√	√
	Four-channel E1 card (M4E75, M4E120)	√	√
	Four-channel T1 card (M4T1)	√	√
	Echo Canceller Card (ECA)	√	√
	Analog/Digital Bridge Card (ABRA)	√	√
	Fiber optical interface	√	√
	2-LAN port, 64 WAN port Router-A	√	√
	Quad 2W/4W E&M (Four E&M voice interfaces)	√	√
	Quad E&MA (Four E&M voice interfaces)	√	√
	QFXS/QFXO (Four FXS/FXO voice interfaces)	√	√
	Quad FXSA (Four FXS voice interfaces)	√	√
	Mini C37.94	√	√
	1X.21	√	√
Single-Slot	3-channel E1	√	√
	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 A/B	√	√
	8-channel 2W/4W E&M (8EM, 8EMA)	√	√
	8-channel OCU-DP card (ODP)	√	√
	12-channel FXS (12FXS, 12FXSA)	√	√
	12-channel FXO (12FXO, 12FXOA)	√	√
	12-channel Magneto (12MAG, 12MAGA)	√	√
	Conference card	√	√
	1-channel low speed optical (C37.94)	√	√
	4-channel low speed optical (C37.94)	√	√
	6-channel RS232 with V.110 encoding (6RS232A)	√	√
	8-channel RS232 with X.50 subrate	√	√
	8-LAN-port/ 64-WAN-port Router-B	√	√
	4-channel TDMoEA	√	√
	8-channel Data Bridge	√	√
	1FOMA	√	√
	8UDTEA	√	√
	6UDTEA	√	√
	VoIP Gateway card	√	√
	6CDA	√	√
Dual-Slot	24-channel FXS	√	√
	24-channel FXO	√	√
	6-channel X.21/V.11	√	√
	6-channel V.35	√	√
	6-channel V.36	√	√
	6-channel EIA530/RS449 card	√	√
	Transfer trip card (TTA)	√	√

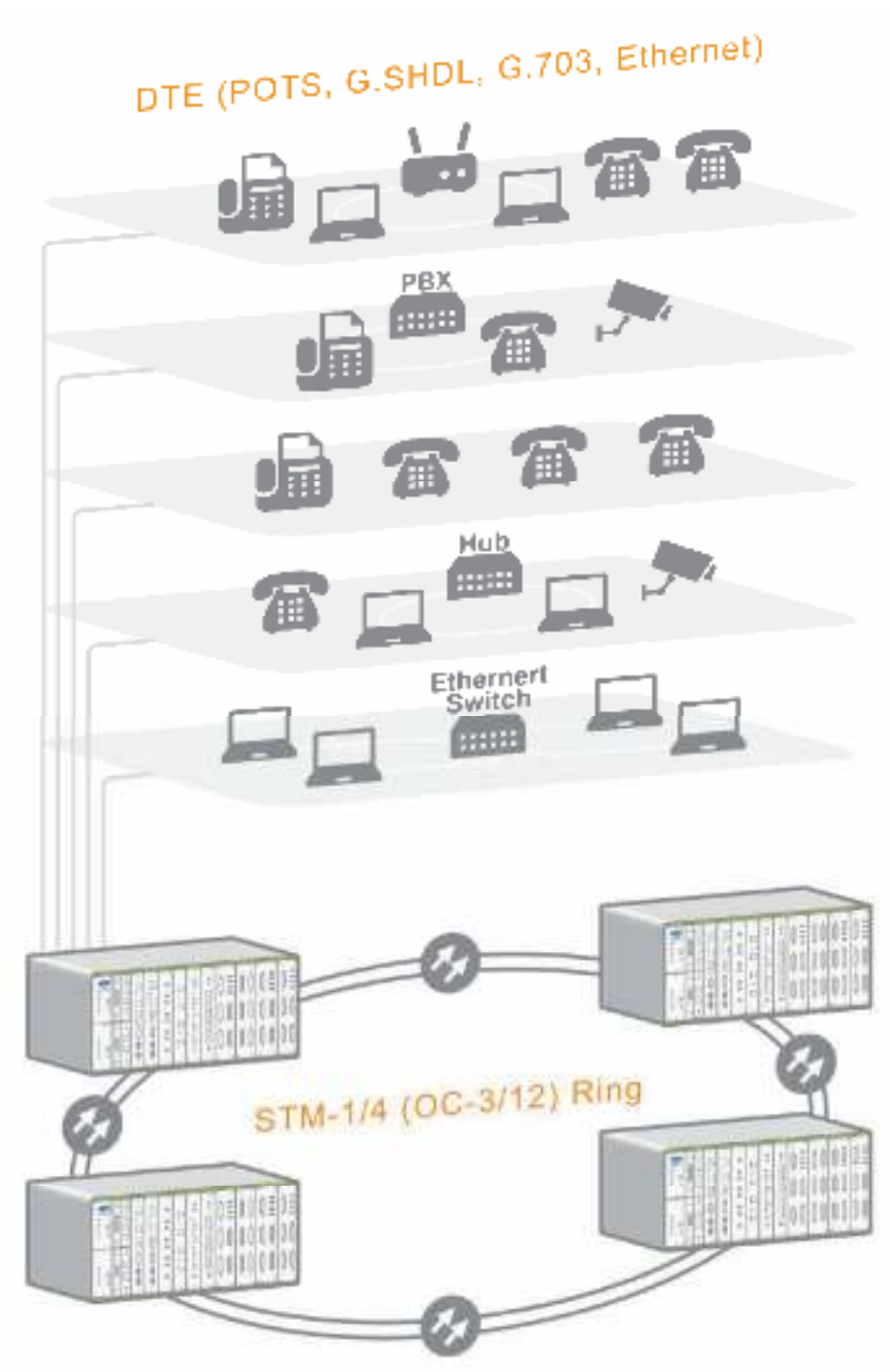
Notes: √ = Supported

× = Not supported

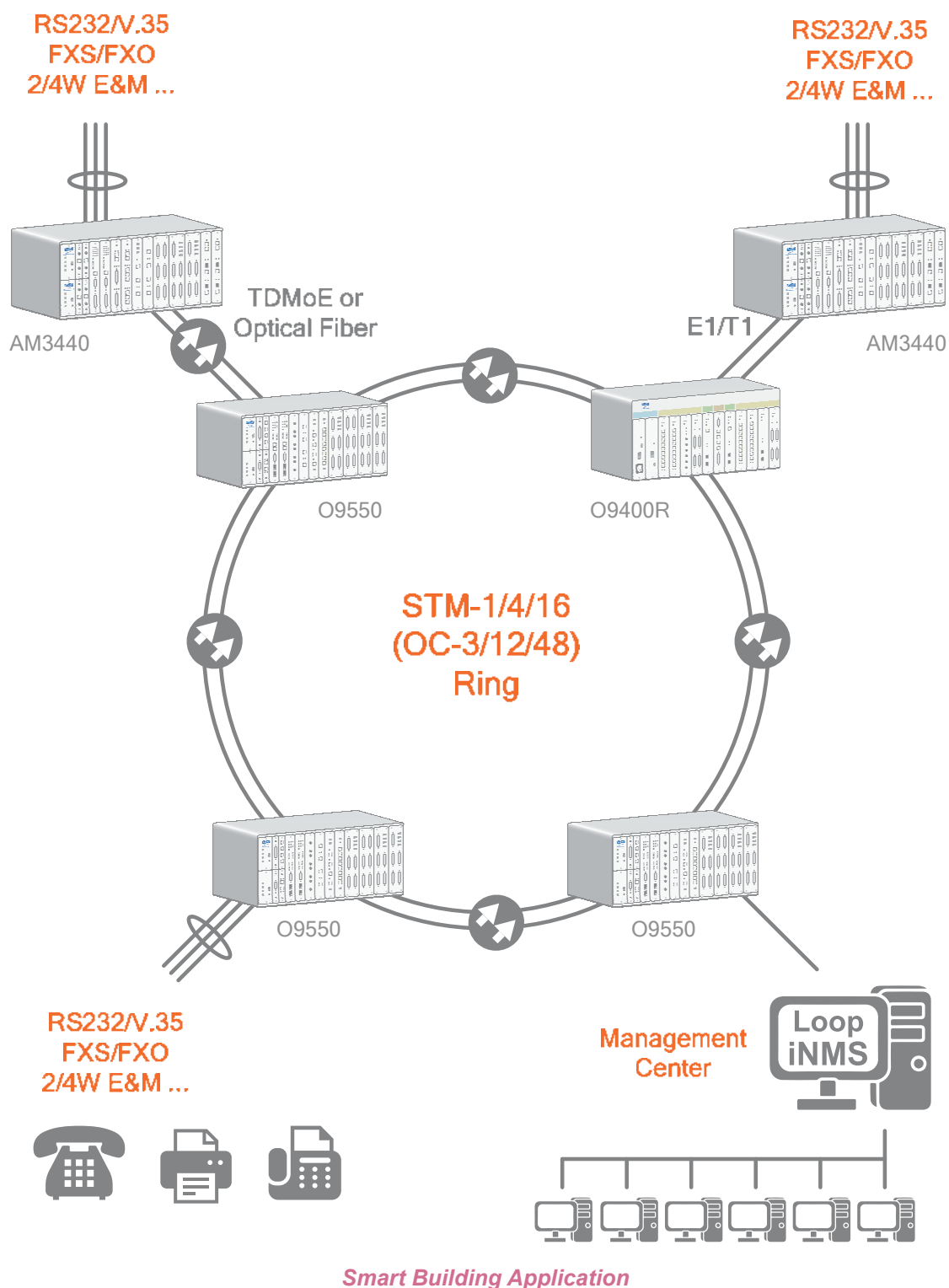
Application Illustrations

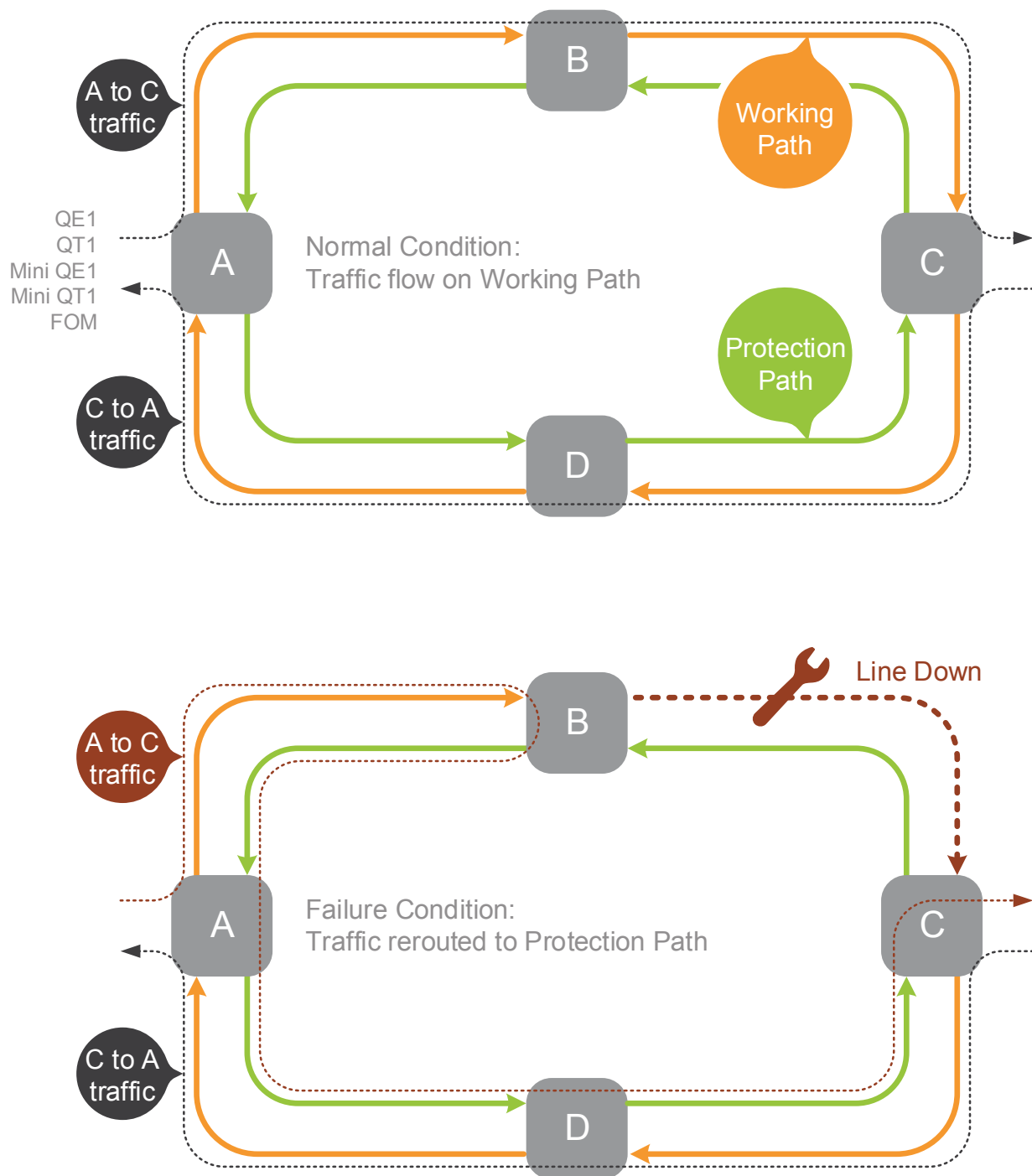


Uplink and Downlink Application



Smart Building 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

* Future option

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.

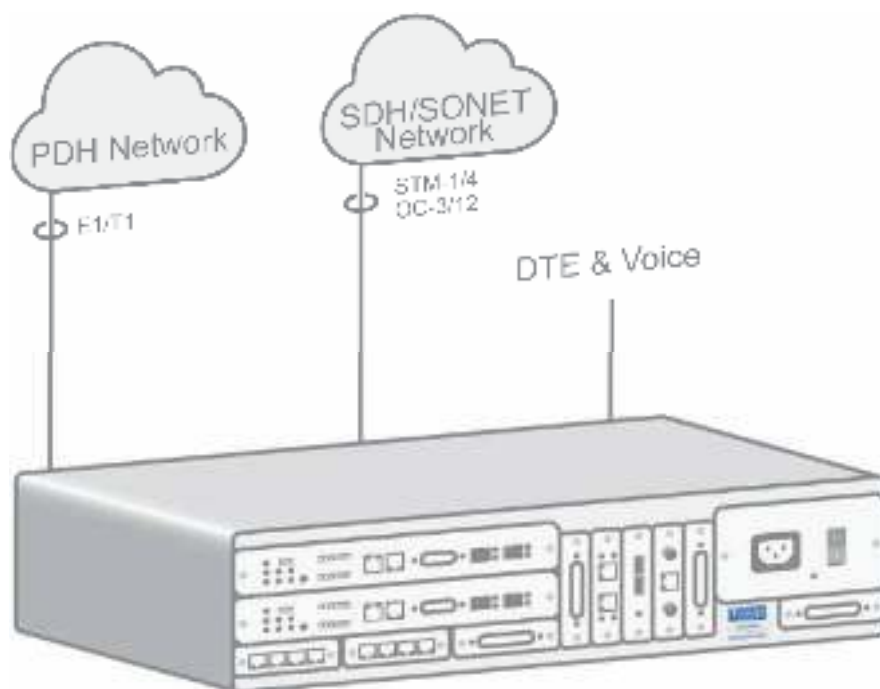
The O9550-D supports local control and diagnostics by using a VT-100 terminal connected to the console port. The O9550-D also supports Ethernet, Telnet, SSH and SNMP so that it can also be controlled and diagnosed from remote locations. An in-band management channel with GUI is available. LED indicators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

O9550-D Plug-in Cards

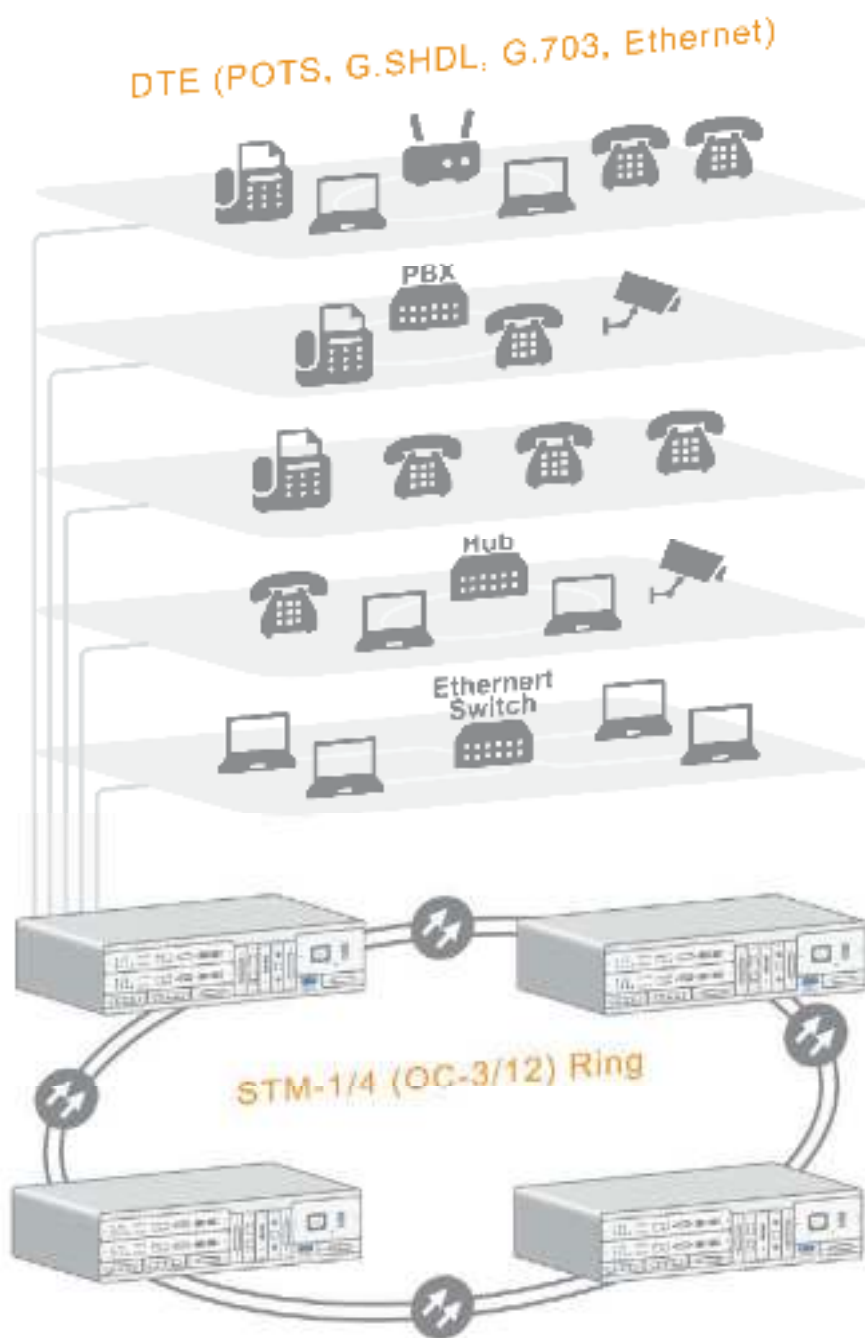
Plug-in Cards	O9550-D
1T1	✓
1E1(E75)	✓
1E1(E120)	✓
4E1(M4E75)	✓
4E1(M4E120)	✓
Router-A(RTA)	✓
1FOM-E1(FOM)	✓
Q2WE&M(Q2EM)	✓
Q4WE&M(Q4EM)	✓
QEMA	✓
4FXS(QFXS)	✓
4FXO(QFXO)	✓
QFXSA	✓
Mini C37.94	✓
1DTE(X.21/V.35/EIA350/RS232)	✓

✓ : Supported

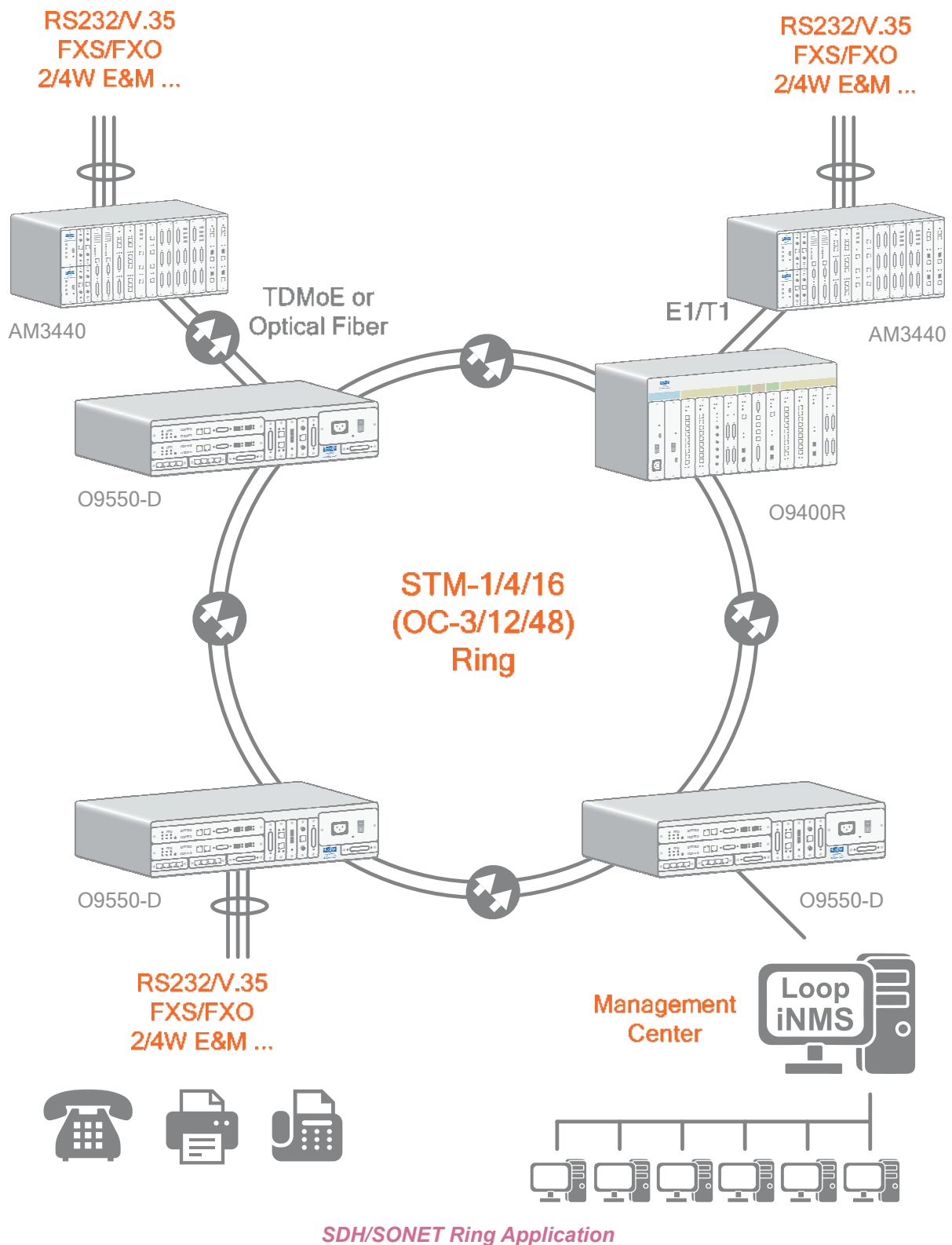
Application Illustration

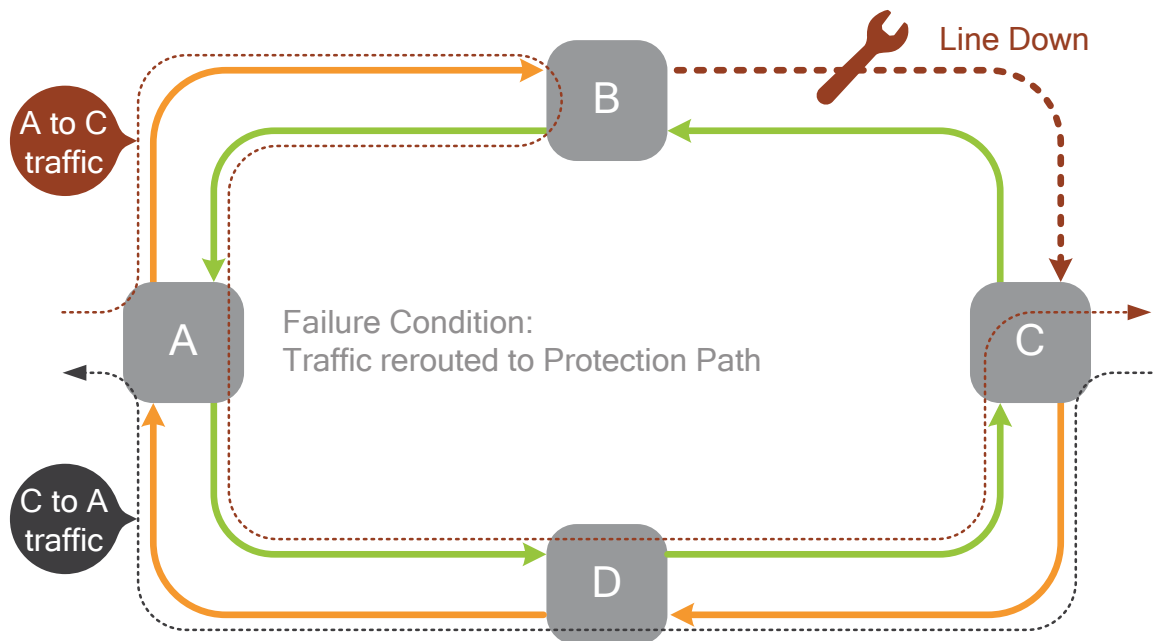
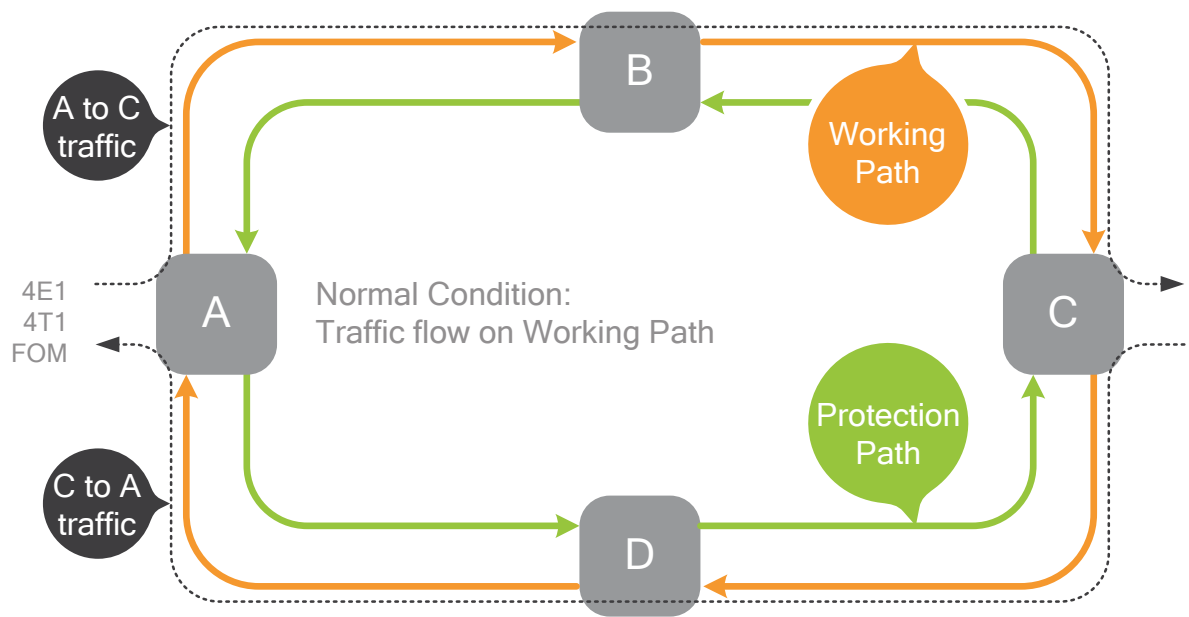


Uplink and Downlink Application



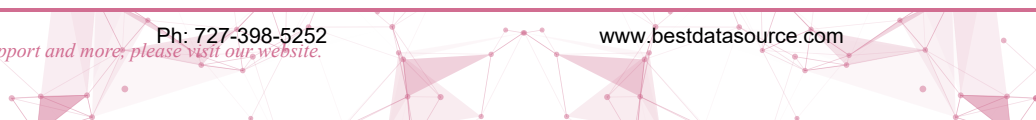
Smart Building Application





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	74
Loop-AM3440 Access DCS-MUX	75
Loop-AM3440-D Access DCS-MUX	82
Loop-AM3440-E IP/TDM DCS-MUX	85
Loop-V4150 DS0 Cross Connect System	87
Loop-V4200-9 MuxMaster/Wideband IAD CSU/DSU, E1/T1 Converter, DACS	90



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* or 2 x FOM 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-B



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
- Three chassis types available: AM3440-A, AM3440-B, AM3440-C
- Support SAToP(CCPA T1 SAToP*), CESoPSN, and MEF8 for emulation of TDM circuits

Item	AM3440-A	AM3440-B	AM3440-C
Chassis	5U	2.5U	3U
# of Mini-slots	4	4	4
# of Single slots	12	3	5
Maximum E1 Channels	64	28	36
Maximum T1 Channels	64	28	36
Cross-Connect Backplane Capacity	128 Mbps	56 Mbps	72 Mbps

* Future Option

Description

The Loop-AM3440-A/B/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 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. 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.

Each of the 3 models of AM3440-A, B, 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		CCB		CCPA	
	Chassis	AM3440-A		AM3440-B		AM3440-C		AM3440-C	
Single-Slot	Plug-in cards								
	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	√*	D	√*		
	8-channel 2W/4W E&M (8E&MA)	√	√	√	√	√	√		
	12-channel FXS	D	√*	D	√*	D	√*		
	12-channel FXSA	√	√	√	√	√	√		
	12-channel FXOA	√	√	√	√	√	√		
	12-channel Magneto	√	√*	√	√*	√	√*		
	1-channel low speed optical (C37.94)	√	√	√	√	√	√		
	4-channel low speed optical (C37.94)	√	√	√	√	√	√		
	8-channel RS232 with X.50 substrate	√	√	√	√	√	√		
	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)	√	×	√	×	√	×		
	1-channel E1 (Single E1 interface) with 75ohm	√	√	√	√	√	√		
Mini-Slot	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 EIA530	√	√	√	√	√	√		
	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	√	√	√	√	√	√		
	3-channel Terminal Server	√	×	√	×	√	×		
	Echo Canceller card	√	√	√	√	√	√		
	Analog Bridge card	√	√	√	√	√	√		

Note: √ = Supported # = Supported by Chassis CHAJ, CHAK and CHCJ only
 × = Not Supported ## = Supported by Chassis CHAK only

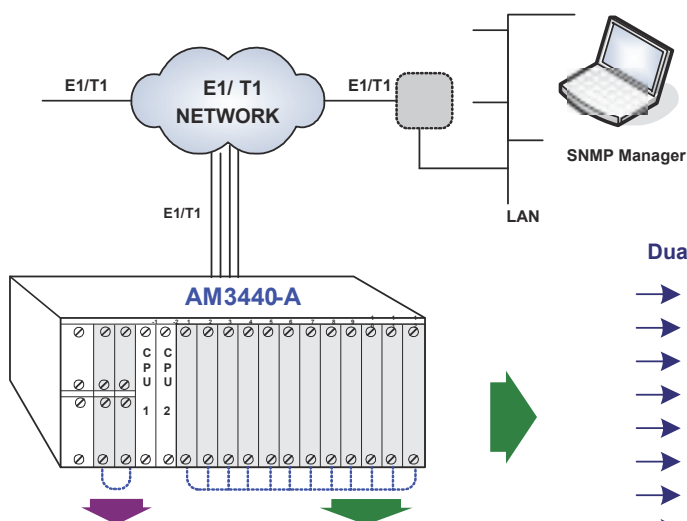
D = Discontinued
 * = Future Option

Controller and Function:

Controller	CCB	CCPA
Function		
LCD ^{Note}	√	×
DB9 console ^{Note}	√	×
USB console	√	√

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

Application Illustrations



Mini-Slot plug-in Cards

- ➔ 1 - channel E1
- ➔ 1 - channel T1
- ➔ Mini Quad E1
- ➔ Mini Quad T1
- ➔ 32 WAN port Router
- ➔ 64 WAN port Router
- ➔ Fiber Optical Interface
- ➔ 3 - channel Terminal Server
- ➔ 1 - channel DTE (1X.21, 1V.35, 1RS232, or 1EIA530)
- ➔ ECA
- ➔ ABRA
- ➔ QMAGA*
- ➔ QFXO*
- ➔ QFXSA*
- ➔ QEMA*
- ➔ 1 - channel OCU-DP*

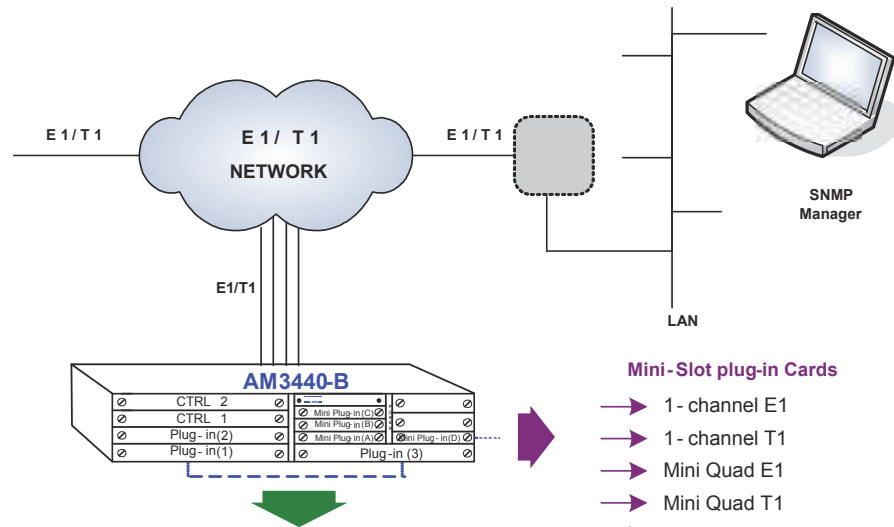
Single-Slot plug-in Cards :

- ➔ 3 - channel E1 ^{Note}
- ➔ 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&M (D)
- ➔ 8 - channel 2W/4W E&MA
- ➔ 12 - channel FXS (D) / FXSA
- ➔ 12 - channel FXO (D) / FXOA
- ➔ 12 - channel Magneto
- ➔ 1 - channel C37.94
- ➔ 4 - channel C37.94
- ➔ 8 - channel RS232 with X.50 substrate
- ➔ 6 - channel V.110
- ➔ 8 - LAN - port / 64 - WAN - port Router - B
- ➔ VOIPGA
- ➔ Conference card
- ➔ TDMoE (D) / TDMoEA
- ➔ 8- Data Bridge
- ➔ 1FOM-A
- ➔ 8UDTEA
- ➔ 6UDTEA

Dual-slot plug-in cards:

- ➔ 6 - channel X.21/V.11(D)
- ➔ 6 - channel V.35 (D)
- ➔ 6 - channel V.36 (D)
- ➔ 6 - channel EIA530 / RS449(D)
- ➔ 24 - channel FXS (D)
- ➔ 24 - channel FXO (D)
- ➔ 24 - channel FXOA (D)
- ➔ 2 - channel G.SHDSL w / line power (D)
- ➔ 4 - channel G.SHDSL w / line power (D)
- ➔ Transfer Trip card

Note : Only CHAJ Unit applicable to DS0 SNCP function
(D) = Discontinued
*For Chassis AK only



Dual-slot plug-in cards:

- 6- channel X.21/V.11(D)
- 6- channel V.35 (D)
- 6- channel V.36 (D)
- 6- channel EIA530/RS449 (D)
- 24- channel FXS (D)
- 24- channel FXO (D)
- 2- channel G.SHDSL w/o line power (D)
- 4- channel G.SHDSL w/o line power (D)
- Transfer Trip card

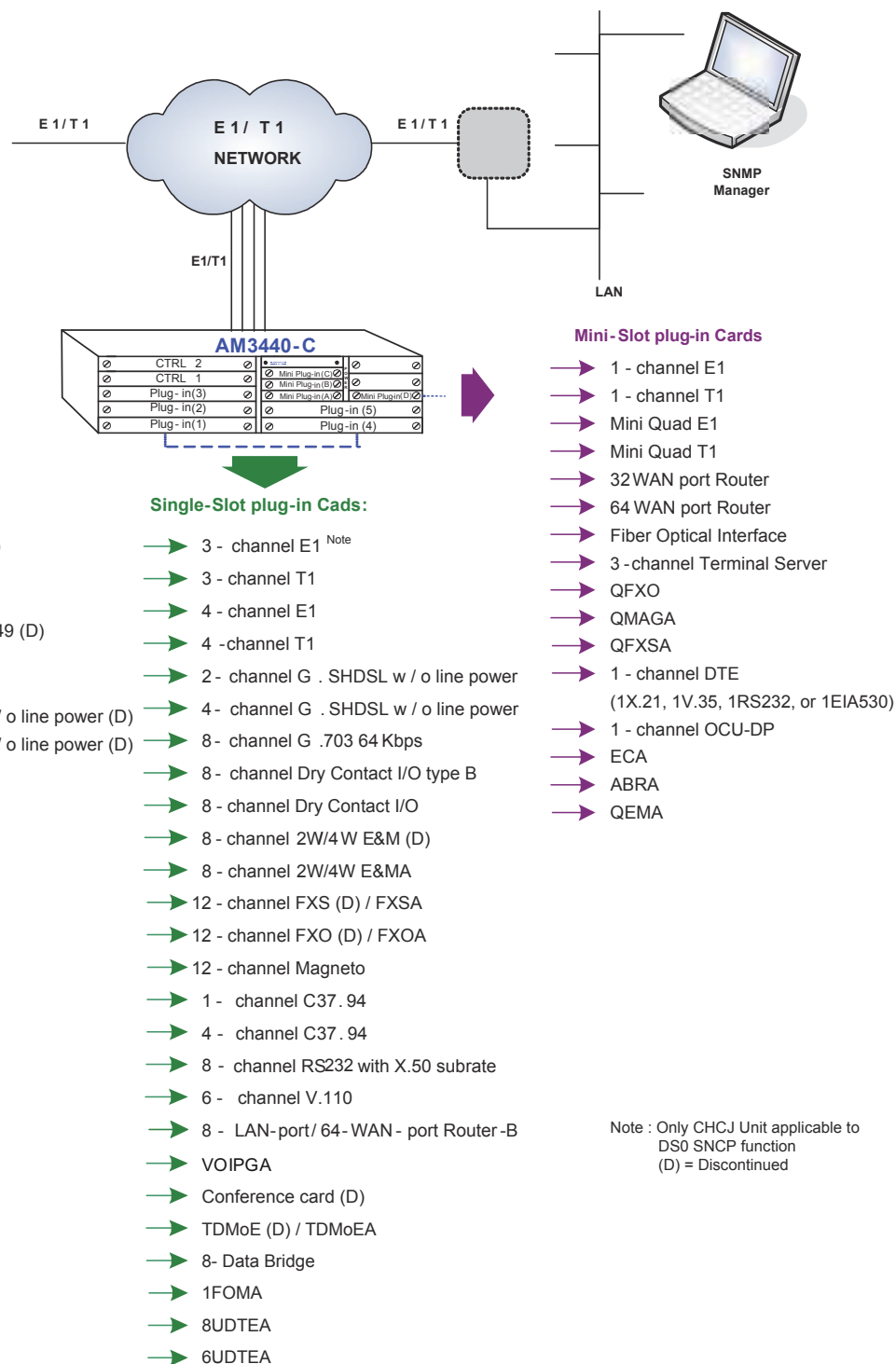
Single-Slot plug-in Cads:

- 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
- 8 - channel Dry Contact I/O Type B
- 8 - channel 2W/4W E&M (D)
- 8 - channel 2W/4W E&MA
- 12 - channel FXS (D) / FXSA
- 12 - channel FXO (D) / FXOA
- 12 - channel Magneto
- 1 - channel C37.94
- 4 - channel C37.94
- 8 - channel RS232 with X.50 subrate
- 6 - channel V.110
- 8 - LAN-port/ 64- WAN - port Router -B
- 8 - Data Bridge
- VOIPGA
- 1FOMA
- 8UDTEA
- 6UDTEA
- Conference card (D)
- TDMoE (D) / TDMoEA

Mini-Slot plug-in Cards

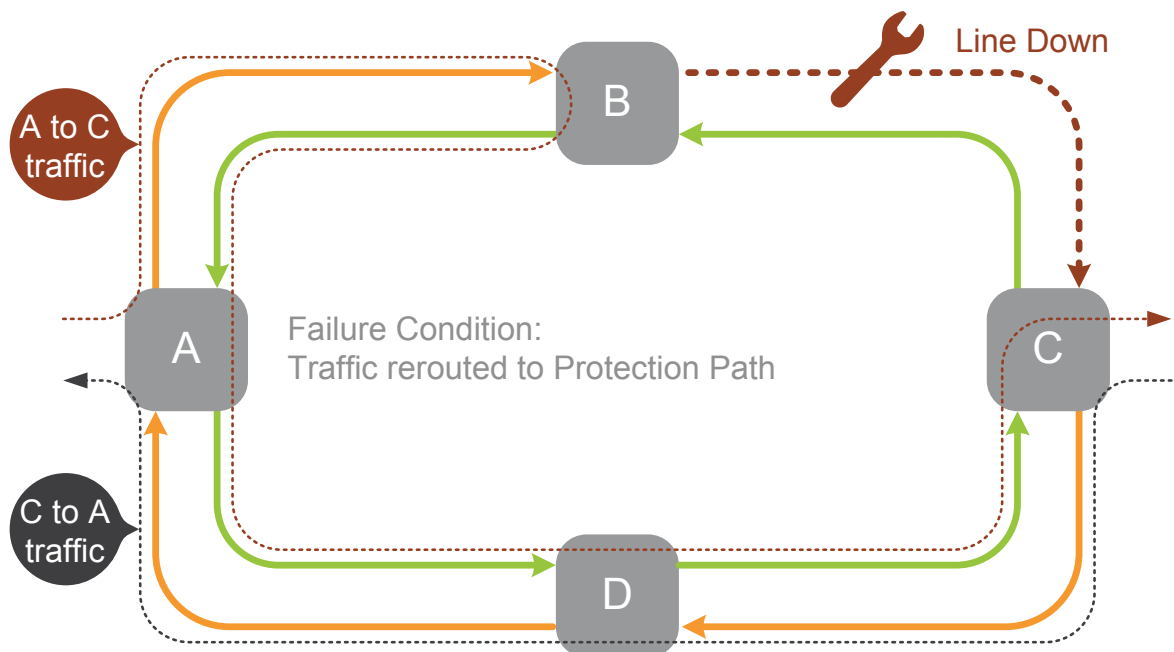
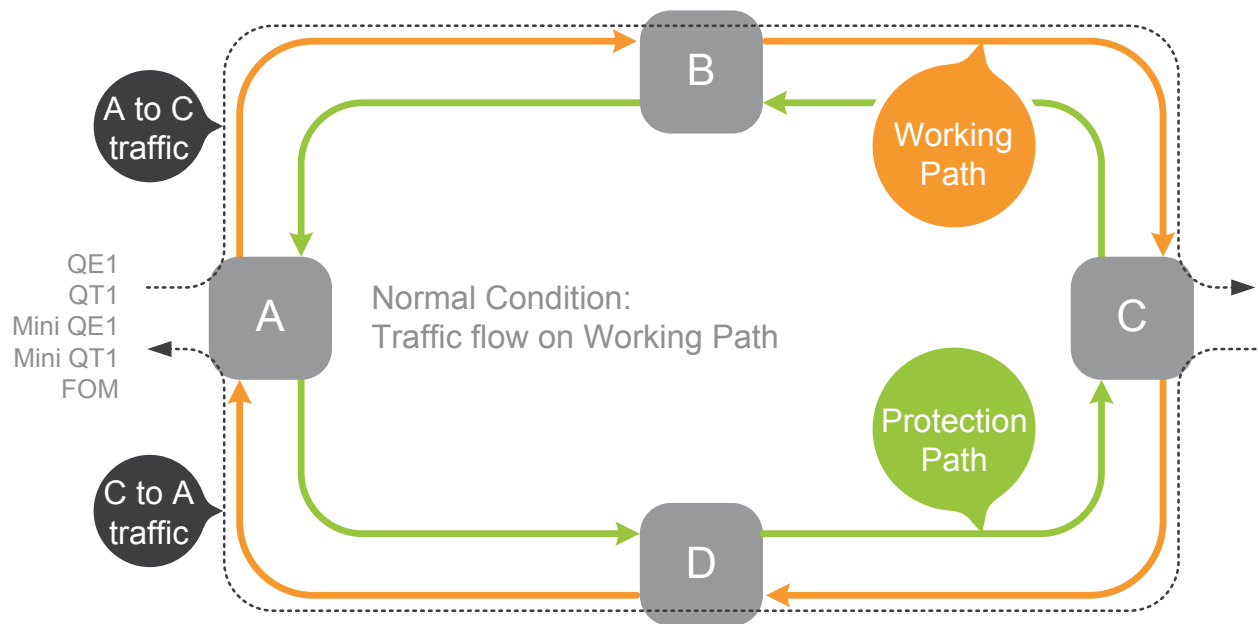
- 1- channel E1
- 1- channel T1
- Mini Quad E1
- Mini Quad T1
- 32 WAN port Router
- 64 WAN port Router
- Fiber Optical Interface
- 3- channel Terminal Server
- QFXO
- QMAGA
- QFXSA
- 1- channel DTE (1X.21, 1V.35, 1RS232, or 1EIA530)
- 1- channel OCU-DP
- ECA
- ABRA
- QEMA

Note: Not Applicable to DS0 SNCP function
(D) = Discontinued

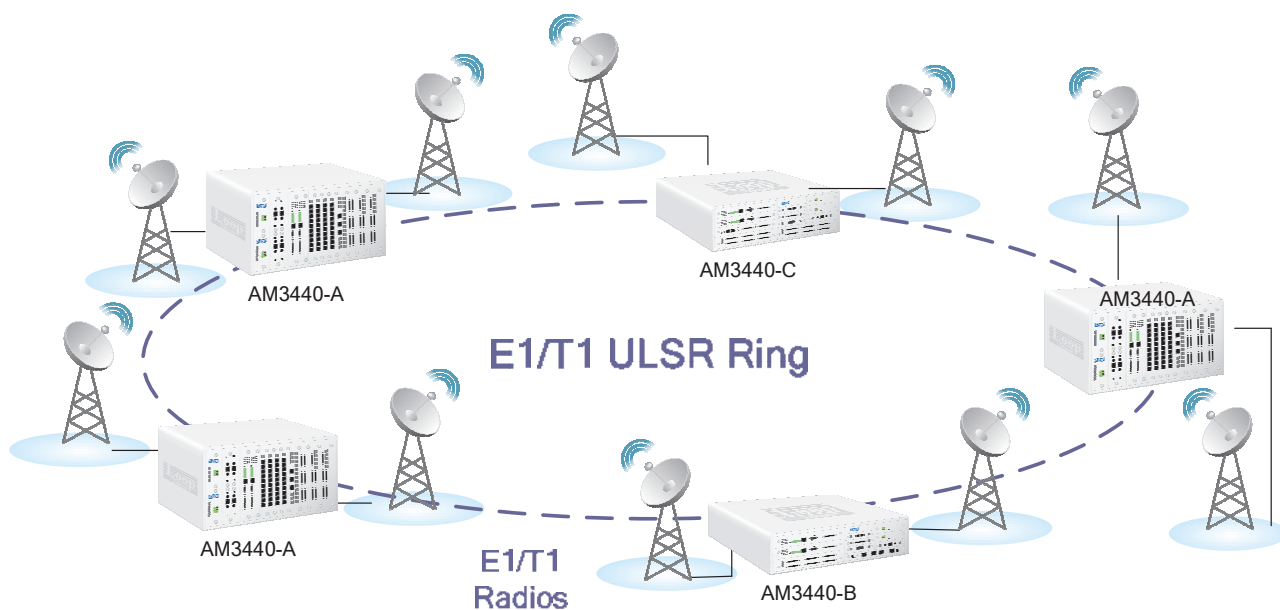




ULSR Ring Application



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

AM3440 ULSR Ring Application through E1/T1 Radio



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/T1
- 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

*Future Option

Item	AM3440-D
Chassis	2U
# of Mini-slots	9
Max. E1 Ports	36
Max. 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 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. These interfaces are compatible with other Loop products.

With Loop products such as the AM3440-D, a DTE interface can be extended over copper wire pairs or any E1 transport facility. For each mini Quad E1 plug-in card, each card can have as many as DS0 124 time slots from RS232, X.21, V.35, and EIA530 interfaces, which can be multiplexed to fill 4 E1 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.

The AM3440-D has 9 mini size plug-in slots. The plug-in cards are compatible with all mini size slots of the AM3440-A/B/C series.

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 lines, which can then be multiplexed into a full E1 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	√	√
	LS Optical M1C37 Card	√	√
	1-channel X.21	√	√
	1-channel V.35	√	√
	1-channel RS232	√	√
	1-channel EIA530	√	√
	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	√	√
	3-channel Terminal Server	√	×
	Echo Canceller card	√	√
	Analog Bridge card	√	√

√ = Supported

× = Not Supported

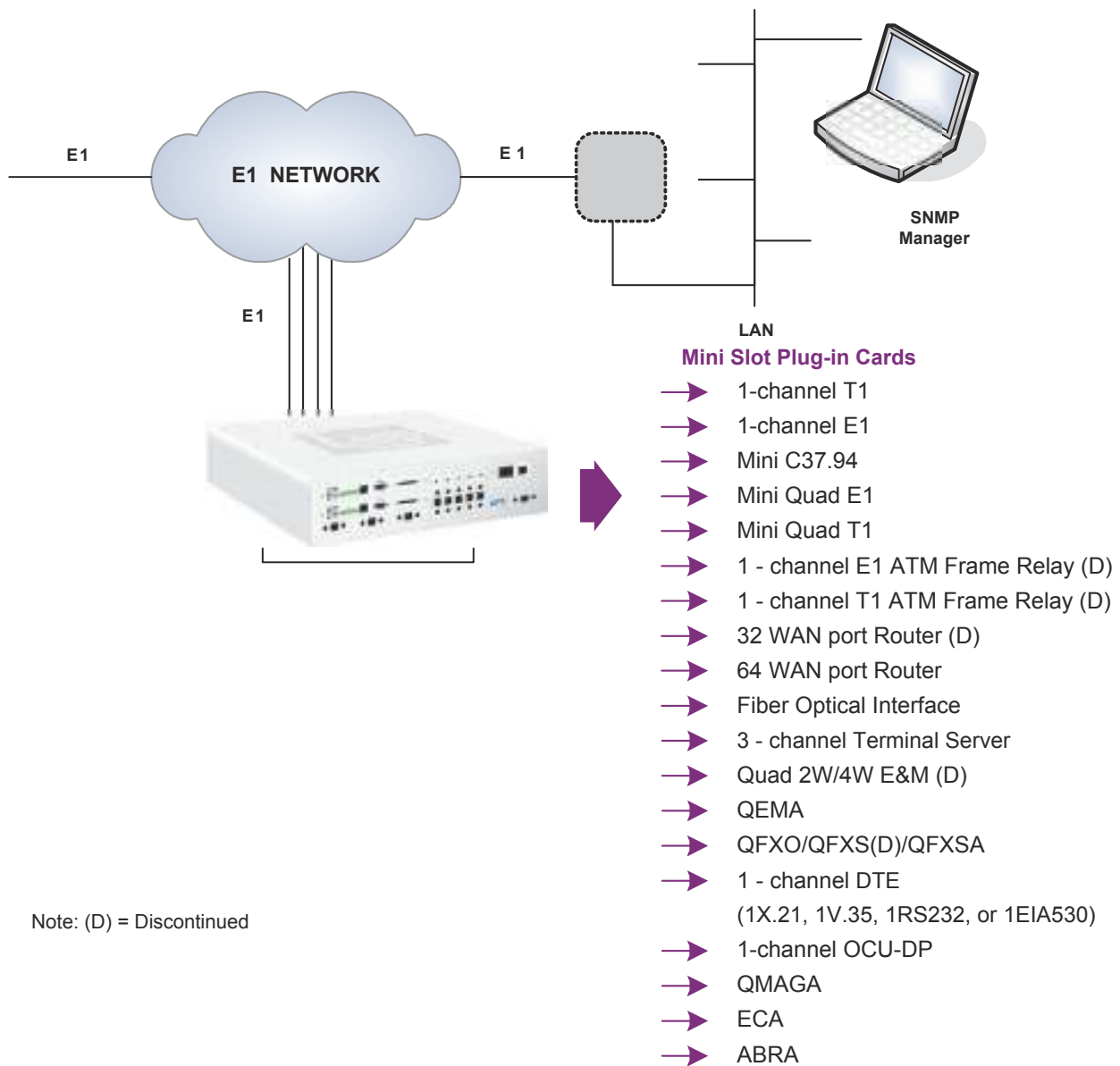
* = Future Option

Controller and Function

Controller	CCB	CCPA
Function		
LCD ^{Note}	√	×
DB9 console ^{Note}	√	×
USB console	√	√

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

Application Illustration



Note: (D) = Discontinued

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

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 products.



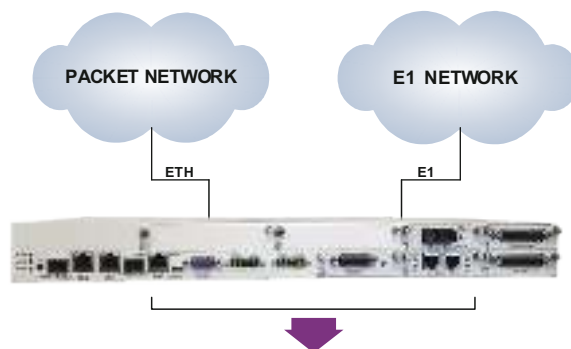
Table of Tributary Modules Applicable to AM3440-E

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	✓
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	✓
1EIA530 (1E530)	1-channel EIA530 plug-in card	✓
1RS232	1-channel RS232 plug-in card	✓
3RS232a	3-port RS232 card with V.110 encoding	✓*
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	✓
GbE	4 GbE interface card 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
- ➔ 4-channel Magneto voice 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

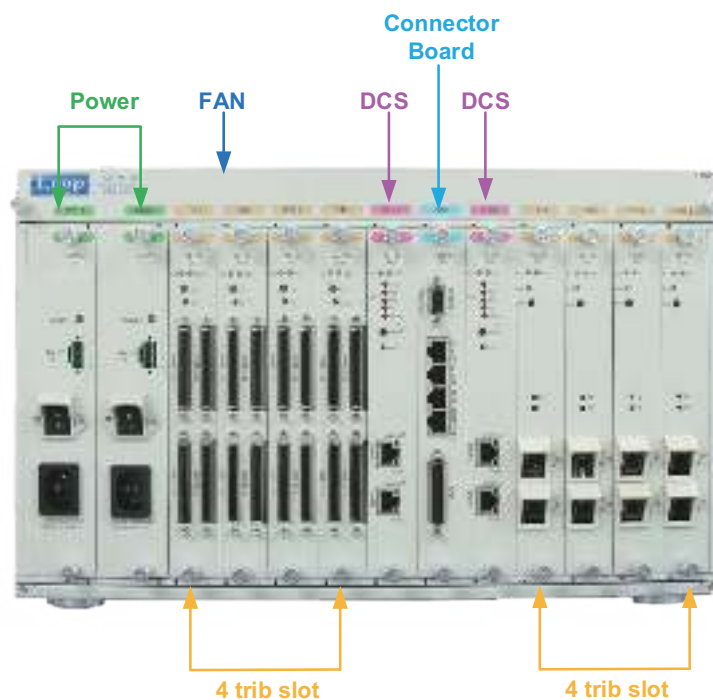
With system capacity support up to 504E1/672T1 DS0 non-blocking cross connect matrix, the V4150 DS0 Cross Connect System can offer high density capacity up to 504 E1/T1, 24 T3MX3, or 8 STM-1(OC-3).

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

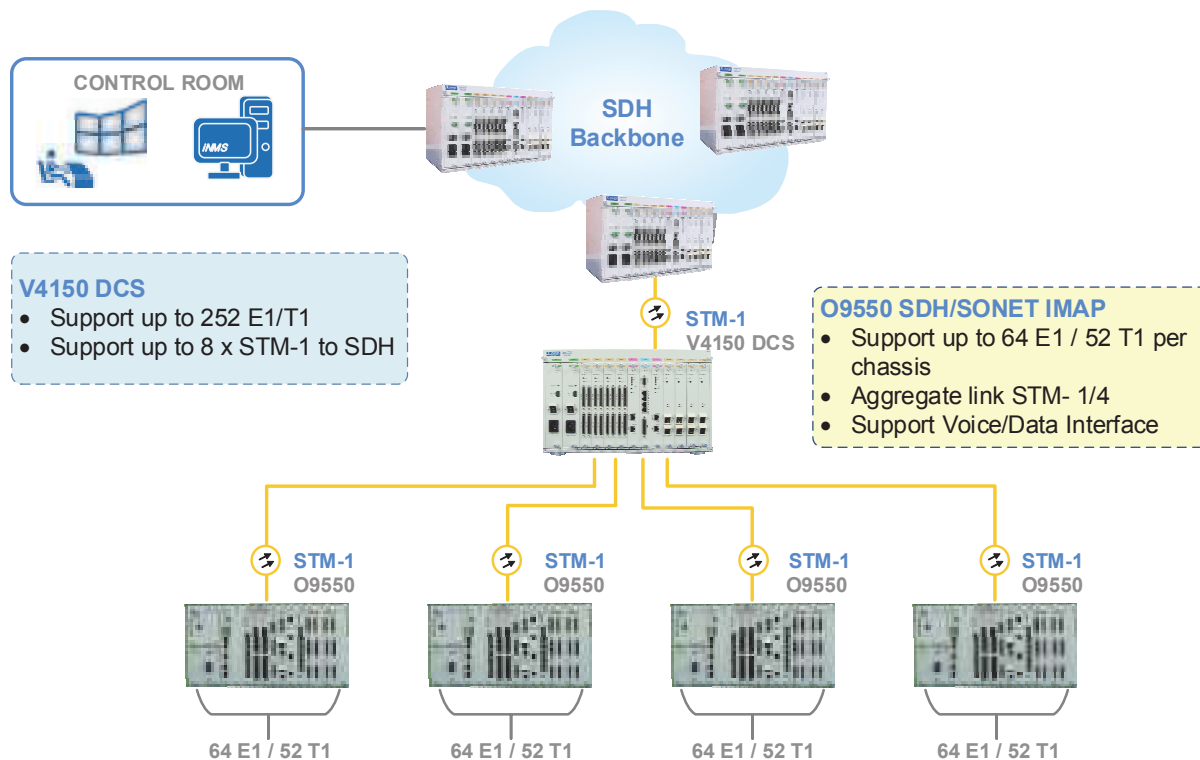
Figure 1 Tributary cards without protection

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
- Field changeable AC power supply, or dual feed dual DC power supply

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

