5

Plug-in Modules

High-speed (HS) Cards

High-speed (HS) Cards

Data Processing

Packet Access

Teleprotection Access

Clock and Alarm Interface

Compatibility Table
High-speed cards for O9500R, O9400R, and V4150

Module Schematics	Module Schematics					Module Schematics				
Model	O9500R					O9400R				
CONTROLLER	CC4		CC16		CCPA	CC4		CC16		CCPA
CHASSIS	CHA	CHAA	CHA	CHAA	CHPA	CHA	CHAA	CHA	CHAA	CHPA
B155/622	√		√		√	√		√		√
16/32/63 E1/T1	√		√		√	√		√		√
E3/T3	√		√		√	√		√		√
8GES4SWA	√		√		√	√		√		√
8GES16SWA	X		X	*	√	X		X	*	*
B2G5	X		X	√	√	X		X	√	√
PTN10G	X		X		√	X		X		√
PTNext	X		X		√	X		X		√

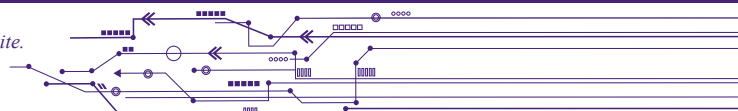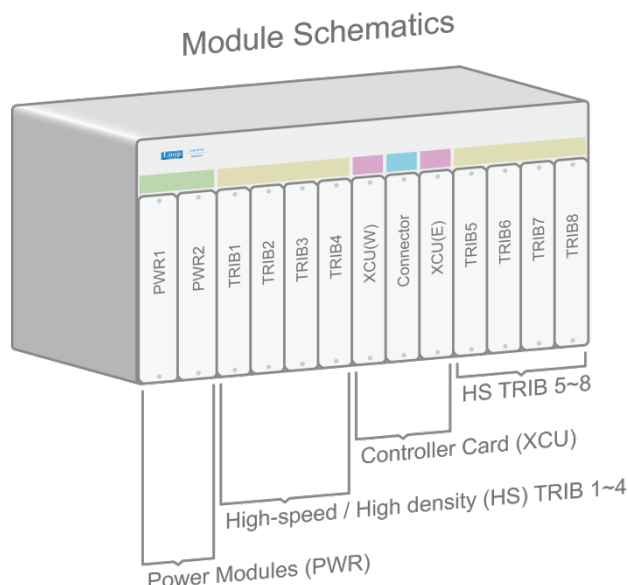**Note 1:**   √ = Supported   × = Not Supported   * = Future Option

Note 2:   HS cards with magenta background require 2.5G backplane, and are for TRIB 3 & 4 only.

Model	V4150	Module Schematics
B155	√	
16/32/63 E1/T1	√	
3-channel T3/M13 (3T3MX3)	√	

For the latest product news, updates, technical support and more, please visit our website.

(B16) B155/622 STM-1/4 (OC-3/12)
For O9400R and O9500R HS Slot

Features

- Dual ports STM-1/4 (OC-3/12) plug-in card
- Software configurable STM-1/4 and OC-3/12 interface card
- With or without MSP (1+1) card-level protection
- Hot-swappable
- RoHS compliant

Description

The B155/622 plug-in card is also known as an STM-1/4 and OC-3/12 interface card. It is software configurable. The card is hot-swappable and can be installed on O9500R and O9400R chassis for SDH/SONET path cross-connection and transportation with or without MSP 1+1 software-configured.

Note: The number of supported channels differs from chassis to chassis. Please refer to O9500R and O9400R sections.

Application Illustrations

MSP (1+1) chains with B16 on O9500R (CHAA & CHPA)
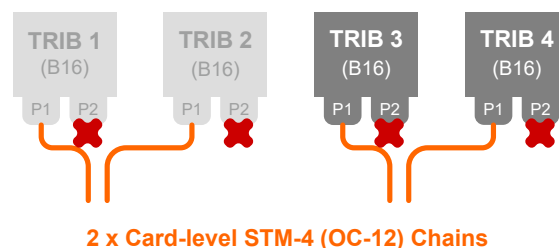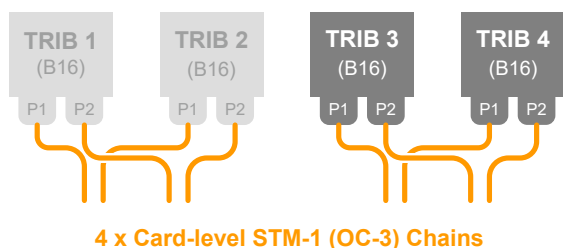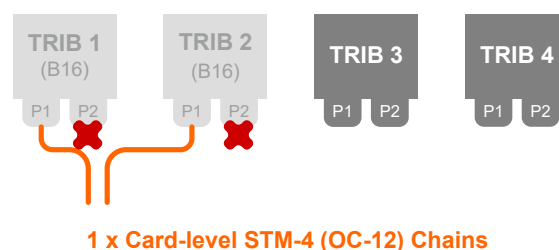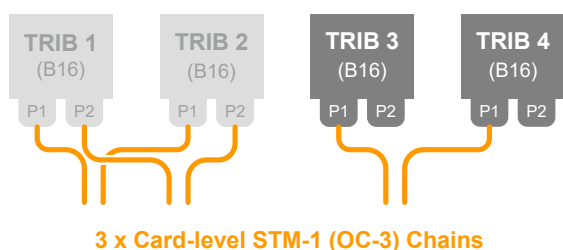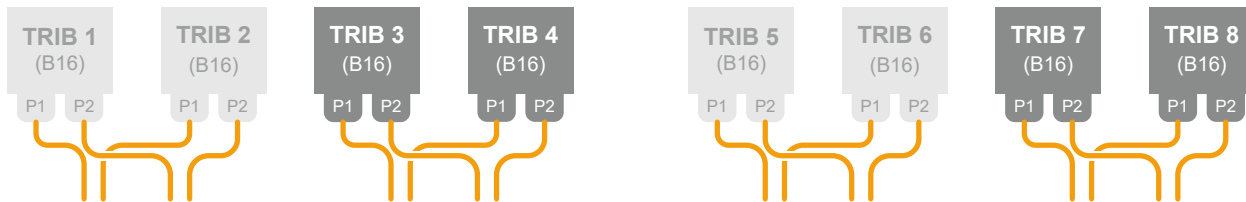
4 x Card-level STM-1 (OC-3) Chains   **2 x Card-level STM-4 (OC-12) Chains**
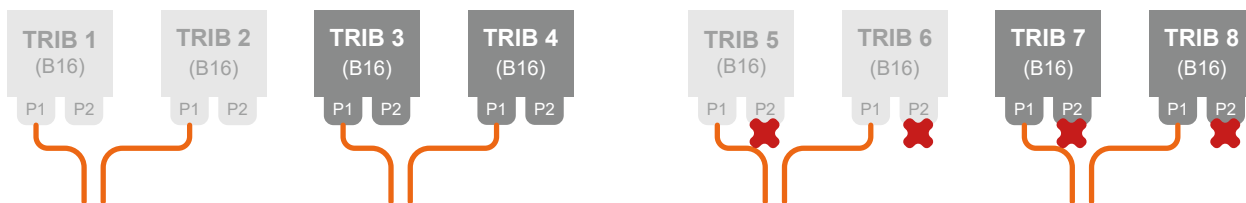
MSP (1+1) chains with B16 on O9500R (CHA)
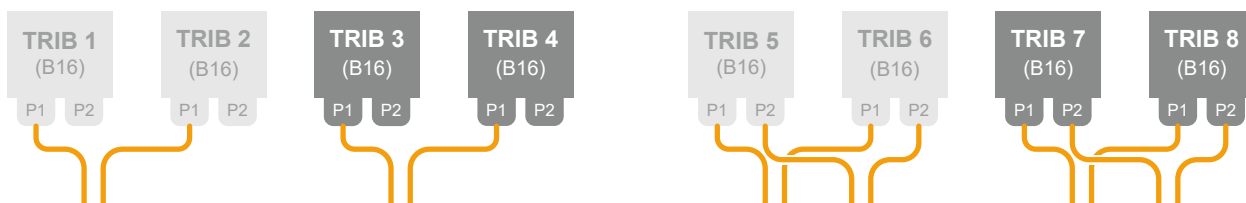
3 x Card-level STM-1 (OC-3) Chains   **1 x Card-level STM-4 (OC-12) Chains**

MSP (1+1) chains with B16 on O9400R (CHAA & CHPA)

TRIB 1 (B16)	TRIB 2 (B16)	TRIB 3 (B16)	TRIB 4 (B16)	TRIB 5 (B16)	TRIB 6 (B16)	TRIB 7 (B16)	TRIB 8 (B16)
P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2

8 x Card-level STM-1 (OC-3 Chains

TRIB 1 (B16)	TRIB 2 (B16)	TRIB 3 (B16)	TRIB 4 (B16)	TRIB 5 (B16)	TRIB 6 (B16)	TRIB 7 (B16)	TRIB 8 (B16)
P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2

4 x Card-level STM-4 (OC-12) Chains

MSP (1+1) chains with B16 on O9400R (CHA)

TRIB 1 (B16)	TRIB 2 (B16)	TRIB 3 (B16)	TRIB 4 (B16)	TRIB 5 (B16)	TRIB 6 (B16)	TRIB 7 (B16)	TRIB 8 (B16)
P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2

6 x Card-level STM-1 (OC-3 Chains

TRIB 1 (B16)	TRIB 2 (B16)	TRIB 3 (B16)	TRIB 4 (B16)	TRIB 5 (B16)	TRIB 6 (B16)	TRIB 7 (B16)	TRIB 8 (B16)
P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2

1 x Card-level STM-4 (OC-12) Chain

B2G5 1-channel STM16/OC-48
For O9400R and O9500R HS Slot

Features

- One STM-16/OC-48 channel per chassis
- Port-level or card-level protection
- STM-16/OC-48 mode software configurable
- Full non-blocking cross-connect at VC-11/VC-12/VC-3/VC-4 levels
- With or without MSP 1+1 protection
- Hot-swappable
- RoHS compliant

Description

The B2G5 plug-in module is also known as an STM-16 and OC-48 interface card. The card is hot-swappable and can be installed on O9500R and O9400R chassis for SDH/SONET path cross-connection and transportation with or without MSP 1+1. The B2G5 plug-in module provides one STM-16/OC-48 channel per O9400R/O9500R's CHAA or CHPA chassis. It is only compatible with tributary slot 3 and 4

Application Illustrations

MSP (1+1) chains with B2G5

1 x Port-level STM-16 (OC-48) Chain
Requires one B2G5 card

1 x Card-level STM-16 (OC-48) Chain
Requires two B2G5 cards
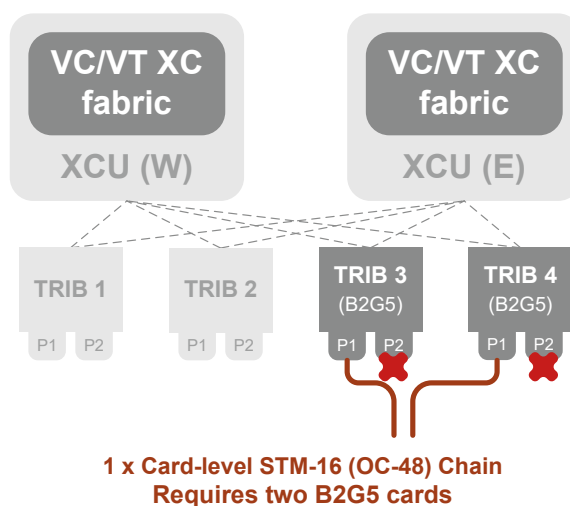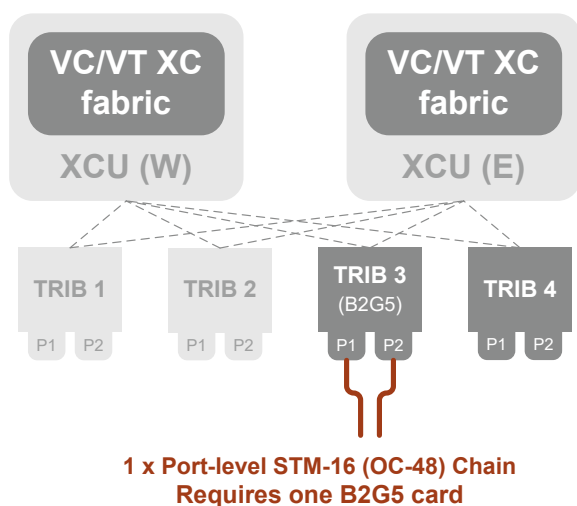
16/32/63-channel E1/T1
For O9400R, O9500R, and V4150 HS Slot

Features

- 16, 32 or 63 ports per card
- E1(120 ohm) / T1 version software-configured
- 75 ohm E1 version
- 1:1 Circuit protection and 1+1 Line protection
- Hot-swappable
- RoHS compliant

Description

The E1/T1 Interface Card is a software selectable plug-in card. Depending upon manufacturing options there are N x E1/T1 ports available, where N=16/32/63TE or N=16/32/63E75. The card is hot-swappable and can be installed on O9500R and O9400R or V4150 chassis when the device is powered up.

Note: The 75 ohm E1 card is an E1 card only. It is not configurable as a T1 card.

E1 (75 ohm) 16, 32 and 63 Ports

E1 (120 ohm) /T1 16, 32 and 63 Ports

Application Illustrations

Card-level 1+1 Line Protection

E1/T1 traffic is copied onto both lines. The remote receiving end only selects traffic from one of the two lines.

E1/T1 Network

Traffic selected from primary line

O9500R #1 | **O9500R #2**

1+1 Normal Condition

E1 #1 — Primary Line — E1 #1

Traffic copied onto both lines

E1 #2 — Secondary Line — E1 #2

Traffic selected from secondary line

O9500R #1 | **O9500R #2**

1+1 Failure Condition

E1 #1 — Primary Line — E1 #1

Primary line fail, traffic only on secondary line

E1 #2 — Secondary Line — E1 #2

For the latest product news, updates, technical support and more, please visit our website.
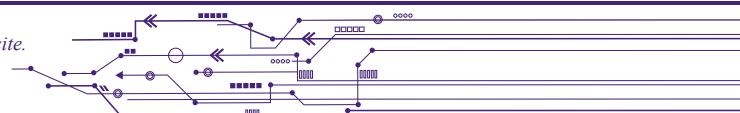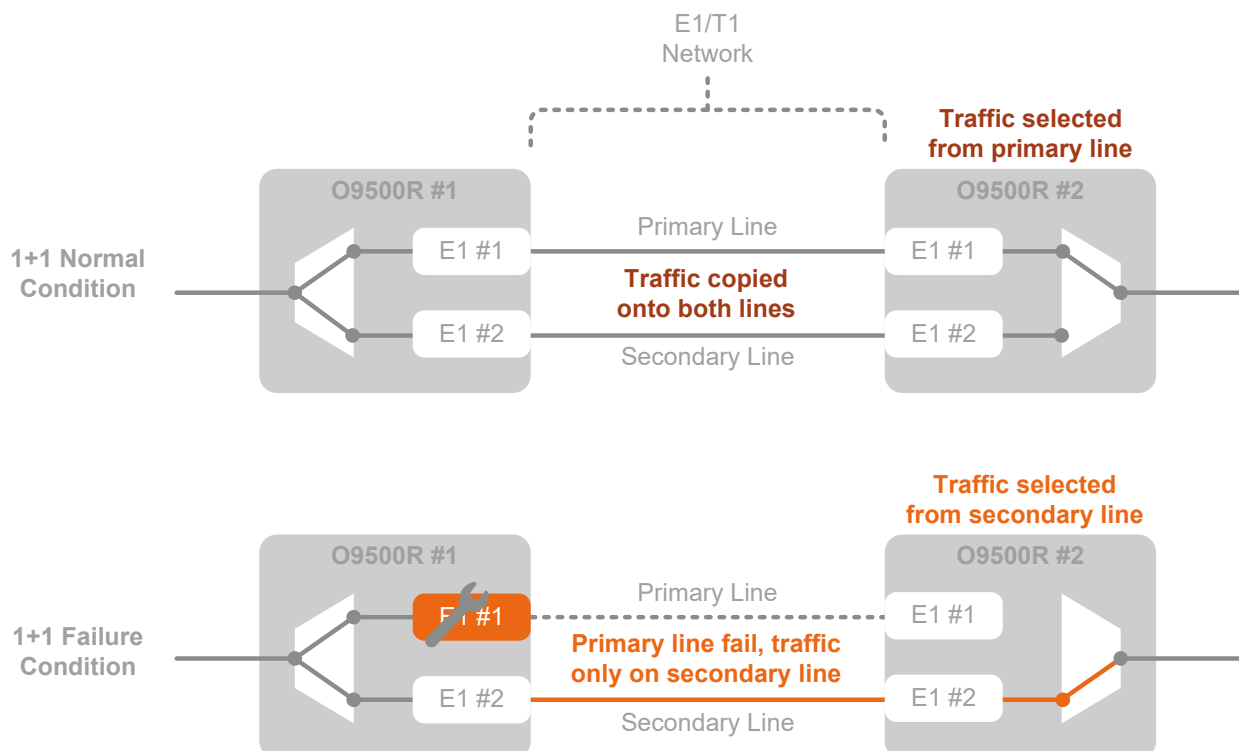
Card-level 1:1 Circuit Protection

E1/T1 traffic at the access side can be protected by a Y-box. A Y-box connects an external E1/T1 circuit onto the same port number of two E1/T1 cards to achieve card-level 1:1 protection. By pairing up two adjacent cards, protection groups are formed. The two members of a protection group must be of the same card type.

3-channel E3/T3
For O9400R and O9500R HS Slot

Features

- Software selectable E3/T3 plug-in card with three ports
- Hot-swappable
- T3 with M13 function
- 1:1 Circuit protection and 1+1 Line protection
- RoHS compliant

Description

The E3/T3 Interface Card is software-configurable and hot-swappable HS plug-in card for O9500R and O9400R. There are three E3/T3 channels per card. T3 mode with M13 function supports 21 E1 or 28 T1 mapping per T3 channel.

Application Illustrations

T3 with M13 function for E1/T1 mapping
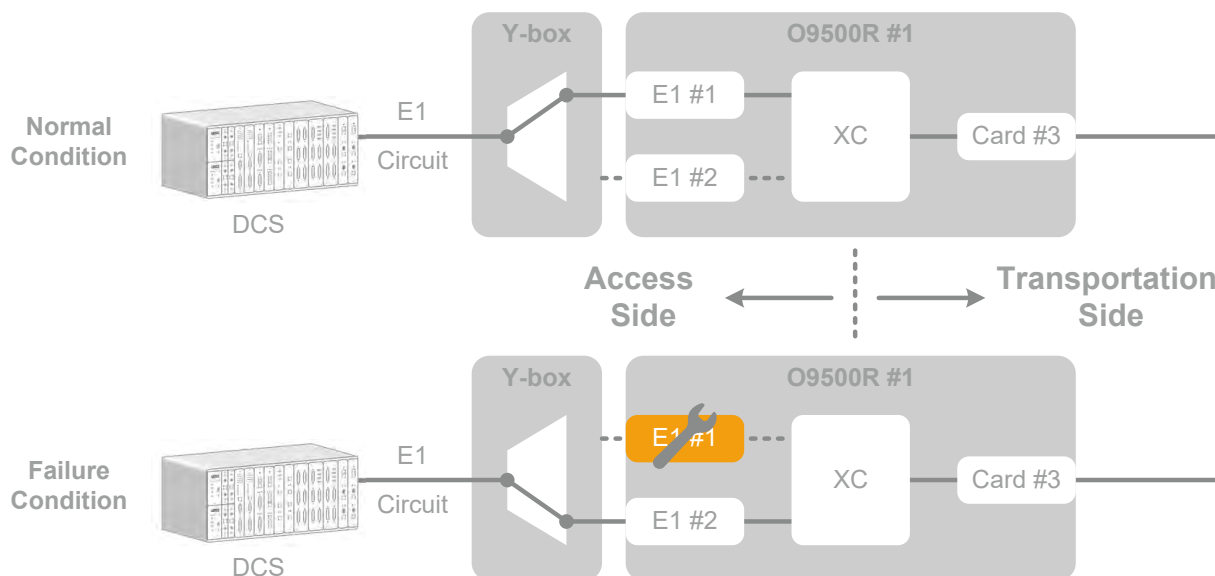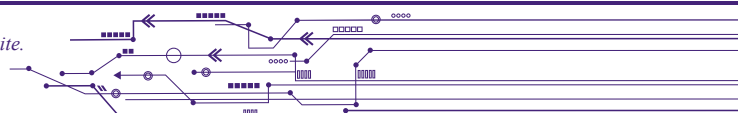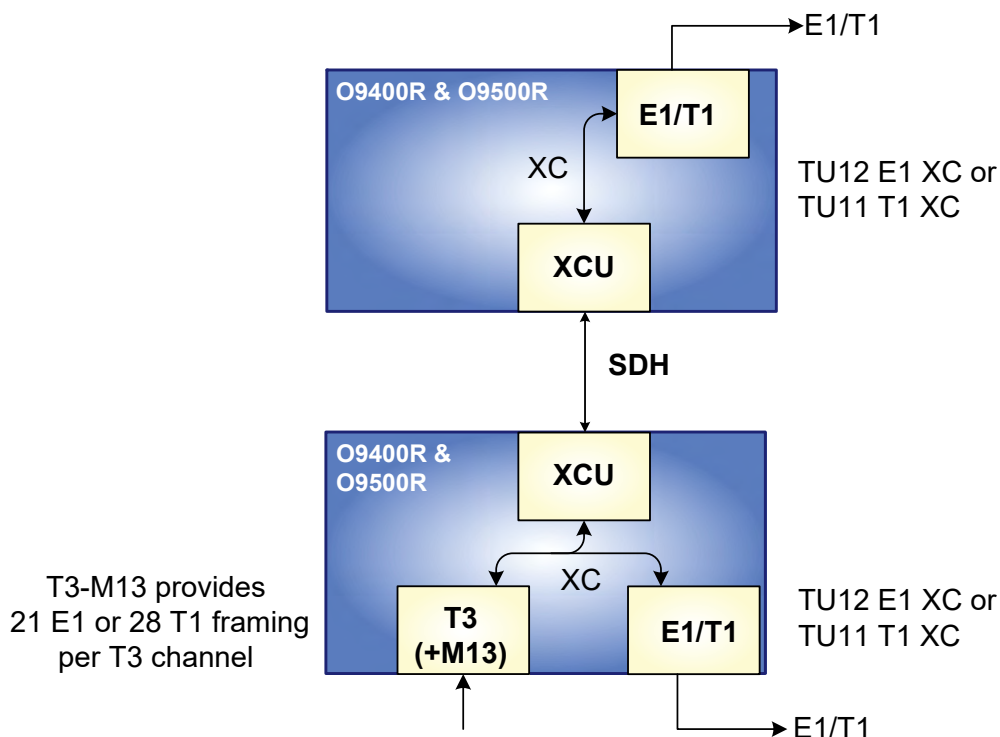
Card-level 1+1 Line Protection

E3/T3 traffic is copied onto both lines. The remote receiving end only selects traffic from one of the two lines.
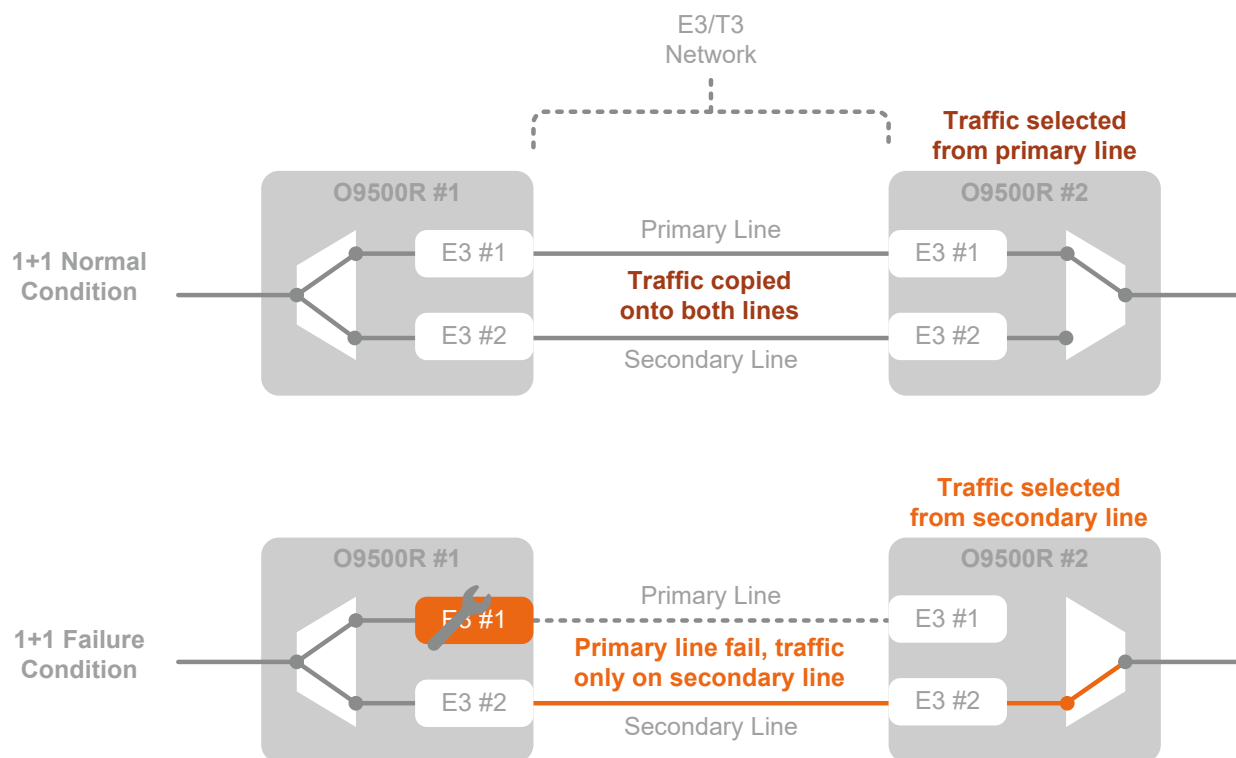
Card-level 1:1 Circuit Protection

E3/T3 traffic at the access side can be protected by a Y-box. A Y-box connects an external E3/T3 circuit onto the same port number of two E3/T3 cards to achieve card-level 1:1 protection. By pairing up two adjacent cards, protection groups are formed. The two members of a protection group must be of the same card type.
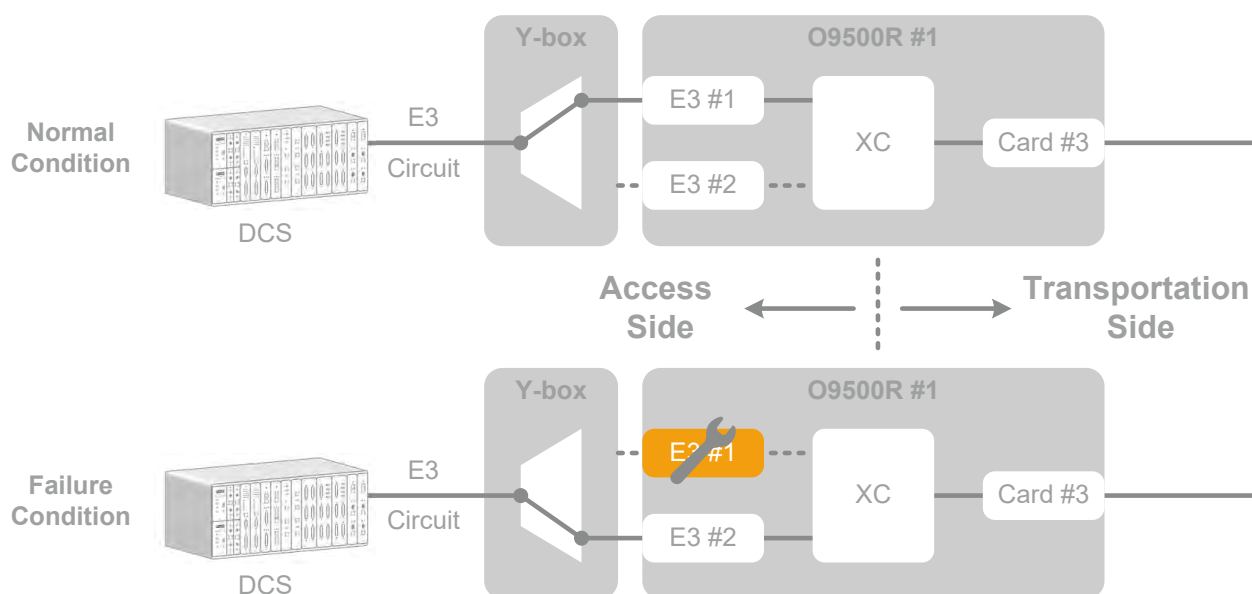
(8GESW) 8-port GbE over SDH/SONET with Switch
For O9500R and O9400R HS Slot

Features

- High-speed (HS) interface card for O9400R/O9500R
- Hot-pluggable and software configurable
- Eight GbE LAN ports
  - Four SFP optical ports with ALS
  - Four electrical ports
  - LED indicators for port and card status
- Jumbo Frame up to 9600 bytes
- Ethernet over SDH/SONET (EoS) technology
  - Virtual Concatenation (VCAT) and VCG
  - Framing/Encapsulation
    - GFP (G.7041),
    - LAPS
    - BCP Layer 2 (RFC2615)
  - LCAS (G.7042) or non-LCAS
- Ethernet Virtual Circuit (EVC) service types
  - 4 EPL
  - 8 EVPL via Q-in-Q
  - E-LAN via max.1024 VLANs and 48 VCGs
- Layer 2 switch
  - MAC Learning
  - MSTP, RSTP
  - Link Aggregation (Trunking)
  - IGMP Snooping
  - QoS
    - CoS or DSCP for priority mapping
    - Per-port 2-rate-3-color or 1-rate-3-color
    - 8 queues per port
    - Strict Priority or WRR for queue scheduling
- 622Mb/s or 2.5Gb/s backplane

Description

8GESW is a high-speed card specifically designed to transport Ethernet services over SDH/SONET networks (EoS). Customer LAN bridging types supported by 8GESW include EPL (E-line mode), EVPL (Virtual E-line mode), and EPLAN (E-LAN mode). Bridged traffic is encapsulated in SDH/SONET frames via framing protocols (GFP-F, LAPS, or BCP) and Virtual Concatenation (VCAT).

8GESW supports eight Gigabit Ethernet ports and a range of standard L2 switch functions, including VLAN, Q-in-Q, MAC learning, MSTP/RSTP, CoS and QoS, and etc. An 8GESW's total bandwidth for SDH/SONET transportation is either STM-4/OC-12 (8GES4SWA) or STM-16/OC-48 (8GES16SWA*). Dual 8GESW cards can be mounted simultaneously to achieve card-level protection. Working card failure will trigger protection switch to the backup card without any traffic interruption. SDH/SONET paths can also be protected by SNCP/UPSR ring protection scheme.

*Future Option for O9400R-CC16 and O9500R-CC16
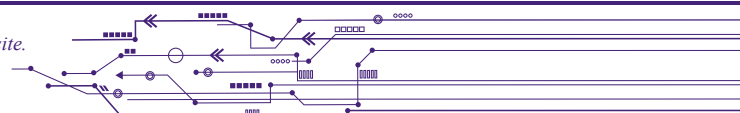
Application Illustration

EoS functional blocks

Card-level Protection

Protection Group #1

STM-4(OC-12)

LAN #1

TRIB 1 — Primary

TRIB 2 — Backup

STM-4 (OC-12)

XCU (CC4)

Protection Group #2

2 x STM-1(OC-3)

LAN #2

TRIB 3 — Primary

TRIB 4 — Backup

2xSTM-1 (OC-3)

XCU (CC4)

Non-protected

LAN #3 — TRIB 1 — 2 x STM-1 (OC-3)

LAN #4 — TRIB 2 — 2 x STM-1 (OC-3)

LAN #5 — TRIB 3 — 1 x STM-1 (OC-3)

LAN #6 — TRIB 4 — 1 x STM-1 (OC-3)

XCU (CC4)

LAN bridging via EoS

Bridged LAN

Site A

Site B

Site C

8GESW card

LAN/WAN Switching

Encapsulation

Virtual Concatenation

XCU

VC11/12/VT2/1.5 Cross-Connection

other cards

STM-n/OC-n Channel

SDH/SONET
STM-1/4/16
OC-3/12/48

O9500R

O9500R

PTN10G Interface Card
For O9500R and O9400R CHPA Chassis with CCPA Controller

Description

The PTN10G interface card supports MPLS-TP and Carrier Ethernet for Packet Transport Network (PTN) services, as well as transportation over IP Network. It is an Ethernet switch, an IP router, and an MPLS-TP router all at once. In addition to packet switching and routing, the renowned feature of PTN10G is to act as the Circuit Emulation gateway between PDH/SDH/SONET and Packet Switched Networks (PSNs).

For TDM encapsulation technologies, PTN10G supports TDMoE, TDMoIP, and TDMoMPLS. For Circuit Emulation, PTN10G supports CESoPSN (Nx64K), SAToP (Unframed E1/T1), and CEP (SDH/SONET paths). The capacity of a PTN10G module reaches up to a STM-16/OC-48 worth of TDM traffic groomed from the TDM interfaces mounted on the same O9500R device.

On-board connectivity of each PTN10G module includes three 10GbE SFP+ interfaces, eight 1GbE SFP interfaces, and one STM-16/OC-48 backplane interface. Ethernet and TDM ports from other modules on the same O9500R can be cross-connected by the Controller card and mapped to the PTN10G via the STM-16/OC-48 backplane interfaces. Each of the interfaces can be individually configured as an NNI or a UNI port.

In delivering PTN services, two PTN10G cards, coupled with two PTNext cards, equip a Loop-O9500 unit with a channel capacity of up to 96G.

The computational capacity of a PTN10G module reaches up to 100G. The switch/router residing in a PTN10G module works in isolation from any port. With two PTN10G modules simultaneously mounted, traffic from all ports on both PTN10G modules can be merged onto the primary PTN10G card, yielding a total connection of sixteen GbE, six 10GbE, and one STM-16/OC-48 bandwidth. While one PTN10G switch/router is at work, the other may serve as redundancy for protection.

PTN10G provides high availability and reliability of communication systems required in network hauling, power utilities, military and governmental network deployments, and transportation applications. Service continuity and performance can also be monitored via QoS, OAM, and multiple protection schemes. Topology, cross-connection, and management of a large scale PSN can also be achieved remotely via Loop-iNMS and Loop-iNET.

Features

- System capacity
  - Up to 3 x 10GE/1GE SFP+ ports
  - Up to 8 x GE SFP
  - 100G Packet Switching capacity per card
  - L2 switching, MPLS switching, and L3 routing (Per port setting)
  - 1008 x VC12/1344 x VC11 termination to E1/T1
  - 1008 x E1/1344 x DS1 SAToP/CES PWE3
  - 1008/1344 x PWs for VC12/VC11 CEP (1 x STM-16 worth)
  - 2.5G SDH/SONET Bus (backplane)

- MPLS-TP
  - MPLS Transport Profile per RFC-5921
  - Any Ethernet port can be configured as NNI (MPLS port) or UNI (Ethernet service port)
  - Static MPLS LSP label provisioning via NMS
  - Pseudo Wire (PW) services
    - Ethernet Pseudo Wire(VPWS, VPLS, H-VPLS)
    - PDH PWE3 (SAToMPLS, CESoMPLS)
    - SDH PWE3 (CEP)
    - Supports up to 1008 TDM PWs
  - MPLS-TP OAM
    - Section/LSP/PW monitoring using BFD (Per IEEE 8113.2)

- MPLS-TP QoS
  - 64K Granularity Rate Limit Per Flow
  - Ingress/Egress TC/EXP Class Mapping
  - TC/EXP Priority-based Queuing (8 Queues)
  - Tunnel Traffic Engineering CIR/PIR and CBS/PBS Policing/Shaping
  - PW Traffic Engineering CIR/PIR and CBS/PBS Policing/Shaping
  - WRED
  - Strictly Priority / WRR
- Carrier Ethernet (CE)
  - L2 Switching/Bridging
  - RSTP/MSTP (IEEE 802.1w/1s)
  - VLAN 1Q 802.1q/ Q in Q8 802.1ad
  - VLAN Operation: Stack/Switch/Strip
  - Link Aggregation (802.3ad): Static/LACP
  - CE OAM
    - CFM: Ethernet Service OAM (802.1ag/Y1731)
    - EFM: Ethernet Link OAM (802.3ah)
  - CE QoS
    - 64K Granularity Rate Limit Per Flow
    - Ingress/Egress CoS Class Mapping
    - CoS Priority-based Queuing (8 Queues)
    - CIR/PIR and CBS/PBS Policing/Shaping (2R/3C)
    - Hierarchical QoS
    - WRED
    - Strictly Priority/WRR
- CoS/QoS
  - 8 Priority Queues
  - Scheduling: Strict Priority, WRR with Hierarchy
  - Ingress Policing & Egress Shaping per service
  - CIR / PIR (EIR) 2-rate-3-color
  - MPLS: TC/EXP-Inferred-PSC (Per Hop Behavior Scheduling Class) LSP
- Ethernet Services
  - E-Line, E-LAN, E-Tree services as defined by MEF 9 and 14 using VPWS/VPLS*
  - Native Ethernet packets supported
  - Encapsulation: PW/LSP (MPLS-TP), VLAN tagging (1Q), VLAN double tagging (Q-in-Q)
- L3 Routing
  - Static Route
  - RIPv1 and RIPv2
  - OSPFv2 and OSPFv3
- VPLS
  - VPLS bridging
  - H-VPLS bridging

- 32K MAC addresses
- 2K VPLS instances per device
- Split horizon to prevent forwarding loops
- Network Protections
  - MPLS-TP
    - MPLS LSP 1+1/1:1
    - Dual-homing PW Protection*
    - LSP E2E protection switching within sub 50ms
  - CE
    - ERPS Ring (G.8032) Protection
    - ELPS (G.8031) Linear Protection
  - SDH/SONET
    - STM-n/OC-n MSP 1+1 Protection
- Clock Synchronization
  - IEEE 1588 v2 PTP
    - Clock modes: Ordinary/Boundary/Transparent clock
    - ToD (Time of Day)
    - PPS (Pulse per Second) output interface
  - SyncE
    - Synchronous Ethernet from all GE ports
    - Ethernet SMC per ITU-T (Ethernet Synchronous Message Channel, ESMC)
  - TDM Clocks from other modules
    - External Clock input and output (2Mbps/2MHz)
    - SDH/SONET/PDH Line Clocks
    - Stratum 3 Timing
- PWE3 Services
  - Ethernet over CE*
    - Port-based and VLAN-based services
    - EPL, EVPL, EPLAN, EVPLAN, E-Tree services as defined by the MEF 9&14
    - Encapsulation: VLAN 802.1Q/802.1ad Q in Q
  - Ethernet over MPLS
    - Port-based and VLAN-based services
    - VPWS, VPLS, H-VPLS services as defined by the MEF 9 and 14
    - Encapsulation: PW over MPLS-TP
  - PDH/SDH/SONET over MPLS/CE/IP
    - Fractional E1/T1 (64K timeslots): CES PW
    - Unframed E1/T1: SAToP PW
    - VCn/TU-n/VT-n/STS-n: CEP
    - PDH Clock Recovery : ACR/DCR/System Clock per PW configurable
    - Supports up to 1008 ACR completions
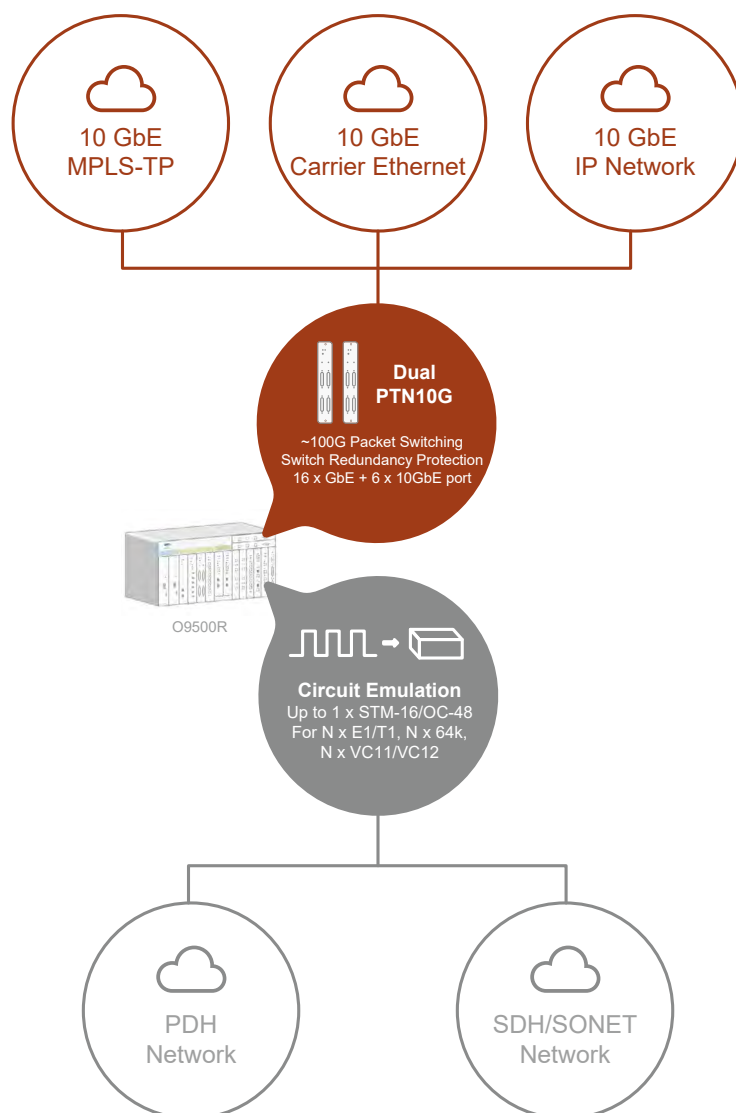
Future Option
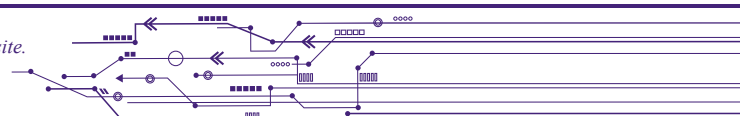
Application Illustrations

Transcend from PDH and SDH/SONET to 10G

10 GbE MPLS-TP

10 GbE Carrier Ethernet

10 GbE IP Network

Dual PTN10G

~100G Packet Switching
Switch Redundancy Protection
16 x GbE + 6 x 10GbE port

O9500R

Circuit Emulation
Up to 1 x STM-16/OC-48
For N x E1/T1, N x 64k,
N x VC11/VC12

PDH Network

SDH/SONET Network

Connectivity and capacity

PTN Side	XCU	Other Modules
Ethernet: 76G (2 x PTN10G) + 20G (2 x PTN Ext) SDH/SONET: STM-16/OC-48/2.5G (XCU)	Cross-connect Mapping	N x DS0/E1/T1 N x STM-n/OC-n Ethernet

PTN10G #1
Primary Switch
8G
30G
2.5G
20G
8G 30G

8 x 1GbE Ports
3 x 10GbE Ports

8G 30G
2.5G
20G
Stand-by Switch
PTN10G #2

8 x 1GbE Ports
3 x 10GbE Ports

10 x 1GbE — PTNext #1
10 x 1GbE — PTNext #2

TDM
XCU #1

TDM
XCU #2

O9500R
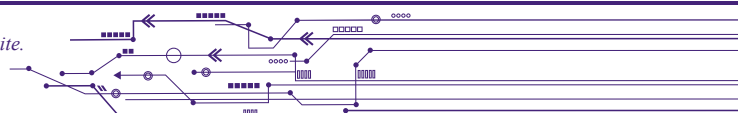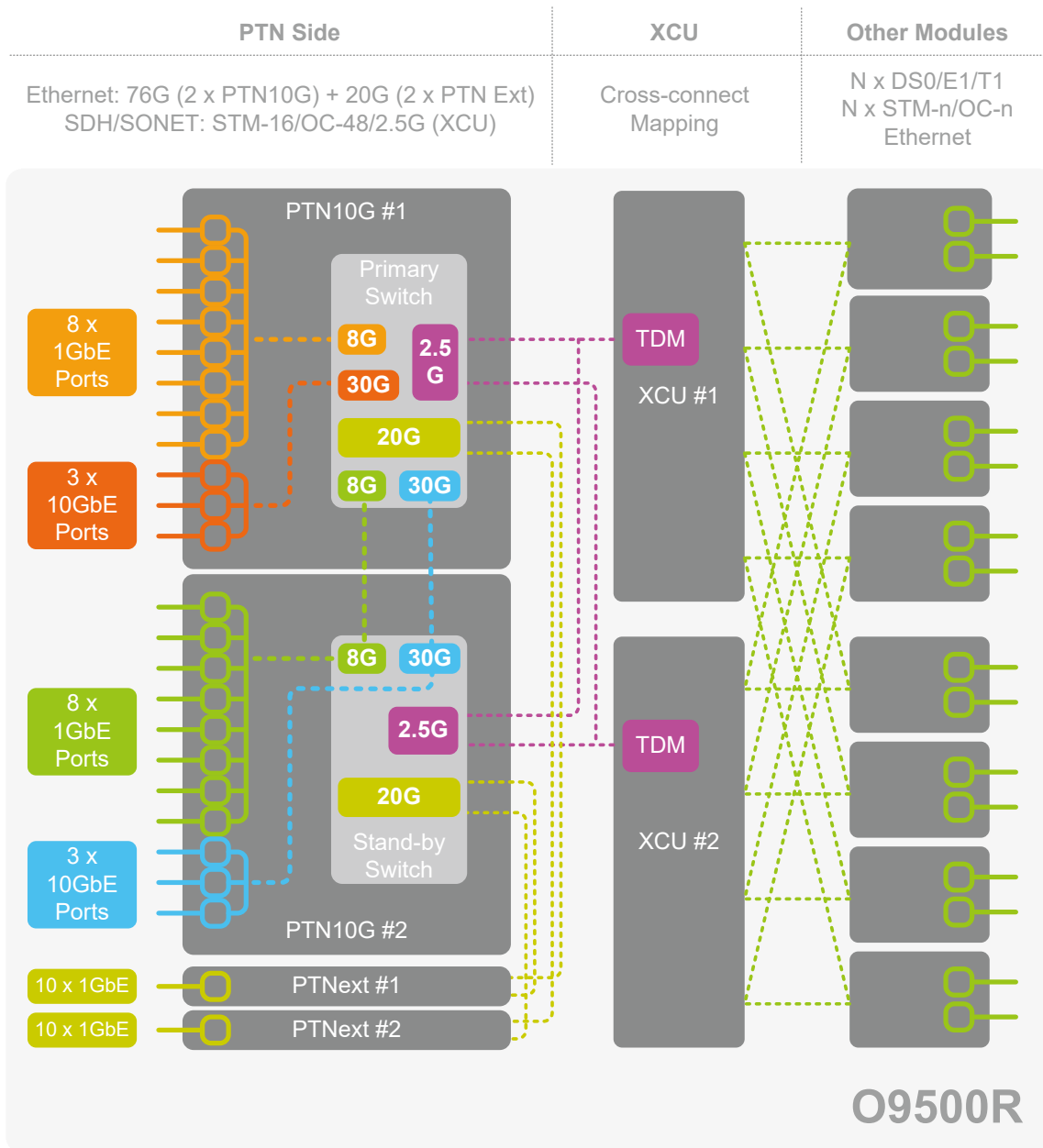
One PTN10G card per Chassis

PTN10G in TRIB 3

eth-3-1
eth-3-2
eth-3-3
eth-3-4
eth-3-5
eth-3-6
eth-3-7
eth-3-8
eth-3-9
eth-3-10
eth-3-11

1GbE ports

10 GbE ports

Primary Switch

STM-16/OC-48 (2.5G) backplane channel

XCU #1

STM-4/OC-12 (622M) backplane channel

HS (622 Mbps) modules in TRIB 4

8GESW
B155/622
E1/T1
.
.

XCU #2
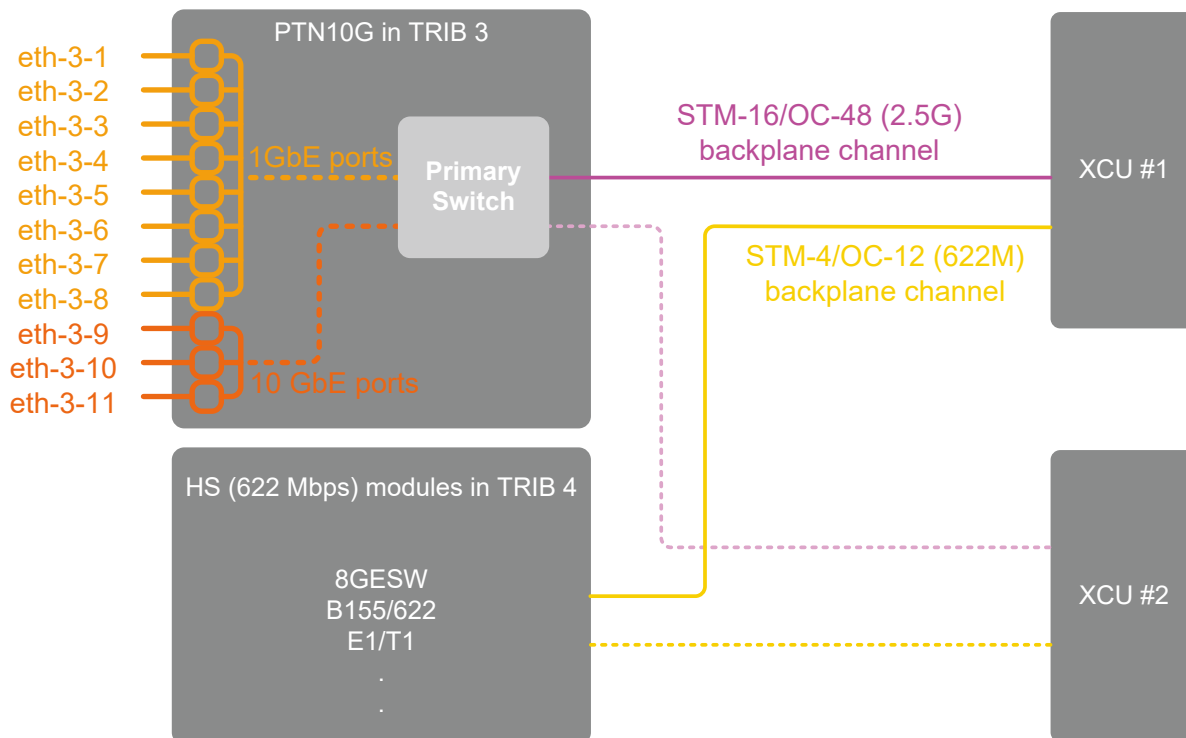
Two PTN10G cards per Chassis

PTN10G in TRIB 3

eth-3-1
eth-3-2
eth-3-3
eth-3-4
eth-3-5
eth-3-6
eth-3-7
eth-3-8
eth-3-9
eth-3-10
eth-3-11

1GbE ports

10 GbE ports

Primary Switch

STM-16/OC-48 (2.5G) backplane channel

XCU #1

eth-4-1
eth-4-2
eth-4-3
eth-4-4
eth-4-5
eth-4-6
eth-4-7
eth-4-8
eth-4-9
eth-4-10
eth-4-11

1GbE ports

10 GbE ports

Stand-by Switch

XCU #2

PTN10G in TRIB 4
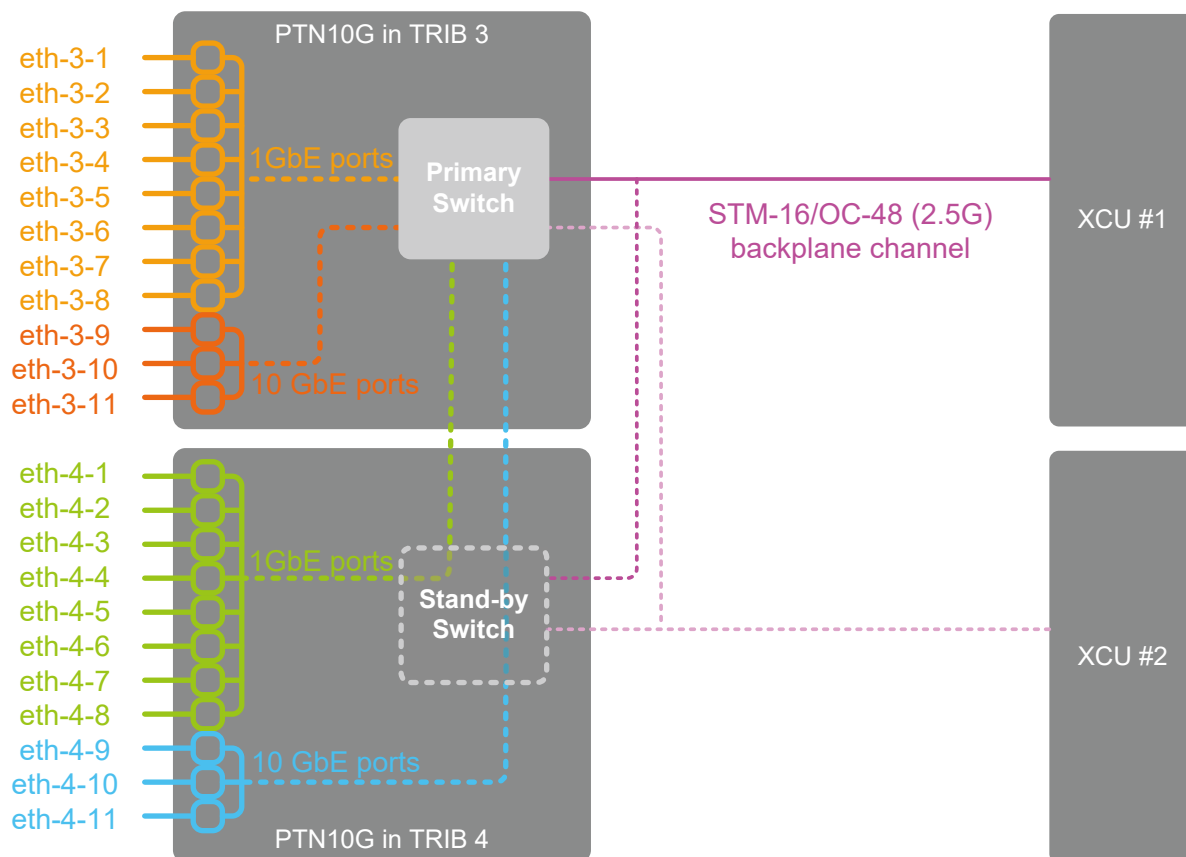
(B155) 1-channel STM-1/OC-3
For V4150 HS Slot

Features

- Single port STM-1 or OC3 plug-in card
- Software configurable STM-1 and OC3 interface card
- Hot-swappable
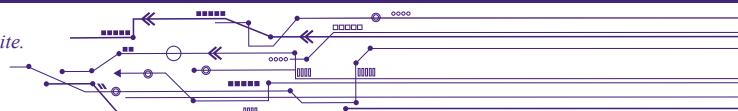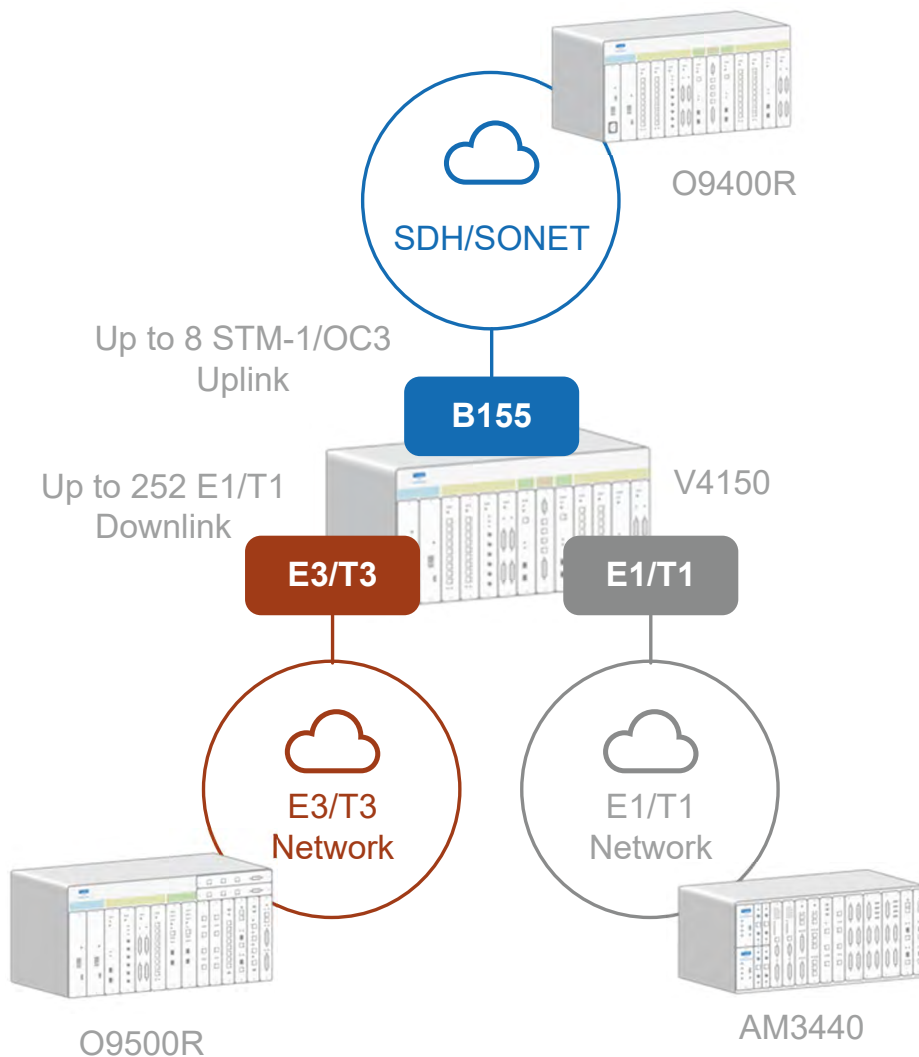- MSP 1+1 protection
- RoHS compliant

Description

The B155 plug-in card is also known as an STM-1 and OC3 interface card. It is software configurable. The card is hot-swappable and can be installed or removed from a V4150 chassis when the V4150 device is powered up.

Note: **Loop-V4150 Tributary Slots 1, 2, 3, 4, 5, 6, 7 and 8 are used for STM-1 and OC-3.**

Application Illustrations

SDH/SONET

O9400R

Up to 8 STM-1/OC3 Uplink

B155

Up to 252 E1/T1 Downlink

V4150

E3/T3

E1/T1

E3/T3 Network

E1/T1 Network

O9500R

AM3440

(3T3MX3) 3-channel T3 with M13
For V4150 HS Slot

Features

- 3T3MX3 plug-in card with three ports and MX3 function
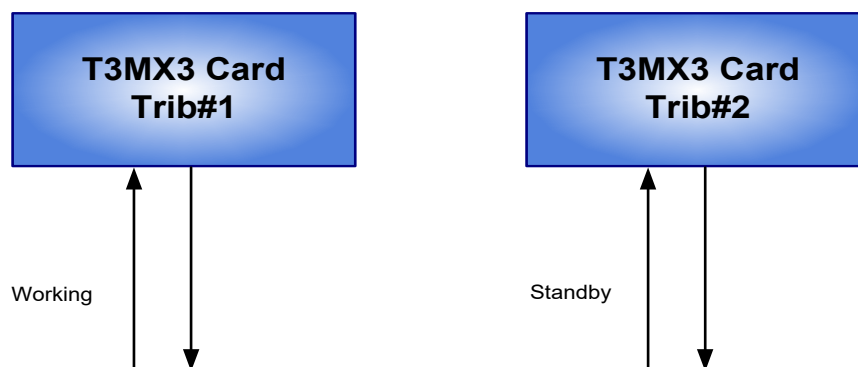- Hot-swappable
- RoHS compliant

Description

The 3T3MX3 Interface Card is a 3 port T3 with MX3 function plug-in card. The card is hot-swappable and can be installed in or removed from a powered-up Loop-V4150 device.
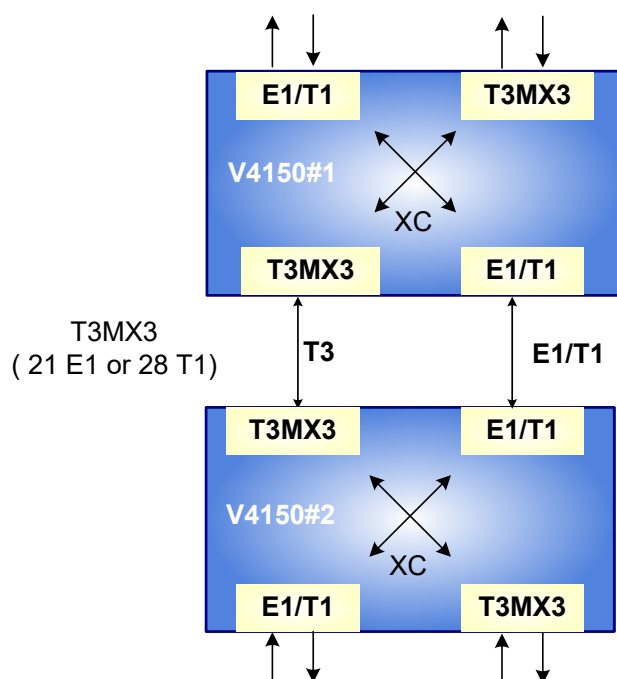
Application Illustrations

### Line 1+1 Protection

M13 Function

Compatibility and Functional Categories
Low-speed cards for AM3440, O9500R, O9550, and V4200-9

Low-speed (LS) plug-in slots come in two sizes: single slot and mini slot. In this Chapter, the cards are arranged in the order of functional categories.

Functional Category	Card	Size
Transportation	(3E1) 3-channel E1	Single Slot Plug-in cards
Transportation	(3T1) 3-channel T1	Single Slot Plug-in cards
Transportation	(4E1/T1) 4-channel E1/T1	Single Slot Plug-in cards
Transportation	(E1/T1) 1-channel E1/T1	Mini Slot Plug-in cards
Transportation	(M4E1) 4-channel E1	Mini Slot Plug-in cards
Transportation	(M4T1) 4-channel T1	Mini Slot Plug-in cards
Transportation	(TDMoEA) 4-channel TDM over Ethernet	Single Slot Plug-in cards
Transportation	(VoIPGA) Voice over IP	Single Slot Plug-in cards
Transportation	(1FOMA) 1-channel fiber optical with 1+1	Single Slot Plug-in cards
Transportation	(1FOMB) 1-channel fiber optical w/o 1+1	Single Slot Plug-in cards
Transportation	(FOM) 1-channel fiber optical with 1+1	Mini Slot Plug-in cards
Transportation	(2/4GH) 2/4-channel G.SHDSL	Single Slot Plug-in cards
Transportation	(GH) G.SHDSL	Mini Slot Plug-in cards
Serial and Digital Access	(6UDTEA) 6-channel Universal DTE	Single Slot Plug-in cards
Serial and Digital Access	(8UDTEA) 8-channel Universal DTE	Single Slot Plug-in cards
Serial and Digital Access	(1DTE) 1-channel DTE (V.35/X.21/RS232)	Mini Slot Plug-in cards
Serial and Digital Access	(3RS232A) 3-port RS232	Mini Slot Plug-in cards
Serial and Digital Access	(6RS232A) 6-port RS232	Single Slot Plug-in cards
Serial and Digital Access	(8RS232) 8-channel RS232 with X.50 subrate	Single Slot Plug-in cards
Serial and Digital Access	(6CDA) 6-channel G.703 at 64 Kbps	Single Slot Plug-in cards
Serial and Digital Access	(8CD) 8-channel G.703 at 64 Kbps	Single Slot Plug-in cards
Serial and Digital Access	(ODP) 1-channel OCU-DP	Mini Slot Plug-in cards
Serial and Digital Access	(ODP) 8-channel OCU-DP	Single Slot Plug-in cards
Voice and Analog Access	(12FXOA/FXSA) 12-channel FXO/FXS	Single Slot Plug-in cards
Voice and Analog Access	(QFXO) 4-channel FXO	Mini Slot Plug-in cards
Voice and Analog Access	(QFXSA) 4-channel FXS	Mini Slot Plug-in cards
Voice and Analog Access	(12MAGA) 12-channel Magneto	Single Slot Plug-in cards
Voice and Analog Access	(QMAGA) 4-channel magneto	Mini Slot Plug-in cards
Voice and Analog Access	(8EMA) 8-channel 2W/4W E&M	Single Slot Plug-in cards
Voice and Analog Access	(8EMB) 8-channel 2W/4W E&M	Single Slot Plug-in cards
Voice and Analog Access	(QEMA) 4-channel E&M	Mini Slot Plug-in cards
Data Processing	(8DBRA) 8-channel Data Bridge	Single Slot Plug-in cards
Data Processing	(8DC) 8-channel Dry Contact	Single Slot Plug-in cards
Data Processing	(ABRA) Analog Bridge	Mini Slot Plug-in cards
Data Processing	(ECA) Echo Canceller	Mini Slot Plug-in cards
Packet Access	(RTA) 2-LAN port/64 WAN port Router-A	Mini Slot Plug-in cards
Packet Access	(RTB) 8-LAN-port/ 64-WAN-port Router-B	Single Slot Plug-in cards
Teleprotection Access	(C37.94) 4-channel low-speed optical	Single Slot Plug-in cards
Teleprotection Access	(C37.94) 1-channel low-speed optical	Mini Slot Plug-in cards
Teleprotection Access	(TTA) Transfer Trip card [Note]	Single Slot Plug-in cards
Clock and Alarm Interface	CLKa Mini Slot plug-in card	Mini Slot Plug-in cards
Clock and Alarm Interface	CLKb Mini Slot plug-in card	Mini Slot Plug-in cards
Clock and Alarm Interface	CLKc Mini Slot plug-in card	Mini Slot Plug-in cards
Note: TTA card occupies two adjacent single slots.		

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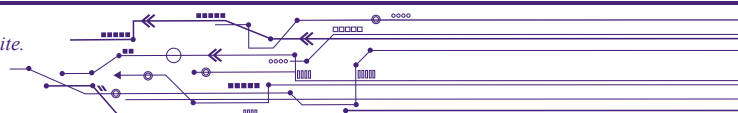
The compatibility between each card and each chassis is summarized in the following tables.

Functional Category	Single Slot Plug-in cards	AM3440-A	AM3440-C	O9500R	O9550-A
	Number of slots	12	5	6	12
Transportation	(3E1) 3-channel E1	√	√	√	√
Transportation	(3T1) 3-channel T1	√	√	√	X
Transportation	(4E1/T1) 4-channel E1/T1	√	√	√	√
Transportation	(TDMoEA) 4-channel TDM over Ethernet	√	√	√	√
Transportation	(VoIPGA) Voice over IP	//	√	*	*
Transportation	(1FOMA) 1-channel fiber optical with 1+1	√	√	X	√
Transportation	(1FOMB) 1-channel fiber optical w/o 1+1	X	X	√	X
Transportation	(2/4GH) 2/4-channel G.SHDSL	√	√	√	√
Serial and Digital Access	(6UDTEA) 6-channel Universal DTE	√	√	√	√
Serial and Digital Access	(8UDTEA) 8-channel Universal DTE	√	√	√	√
Serial and Digital Access	(3RS232) 3-port RS232	√	√	*	*
Serial and Digital Access	(6RS232A) 6-port RS232	√	√	X	√
Serial and Digital Access	(8RS232) 8-channel RS232 with X.50 subrate	√	√	√	√
Serial and Digital Access	(6CDA) 6-channel G.703 at 64 Kbps	√	√	√	*
Serial and Digital Access	(8CD) 8-channel G.703 at 64 Kbps	√	√	√	√
Serial and Digital Access	(ODP) 8-channel OCU-DP	√	X	√	√
Voice and Analog Access	(12FXOA) 12-channel FXO	√	√	√	*
Voice and Analog Access	(12FXSA) 12-channel FXS	√	√	√	*
Voice and Analog Access	(12MAGA) 12-channel Magneto	√	√	*	*
Voice and Analog Access	(8EMA) 8-channel 2W/4W E&M	√	√	√	√
Voice and Analog Access	(8EMB) 8-channel 2W/4W E&M	*	*	*	*
Data Processing	(8DBRA) 8-channel Data Bridge	√	√	√	√
Data Processing	(8DC) 8-channel Dry Contact	√	√	√	√
Packet Access	(RTB) 8-LAN-port/ 64-WAN-port Router-B	√	√	√	√
Teleprotection Access	(C37.94) 1/4-channel low-speed optical	√	√	√	√
Teleprotection Access	(TTA) Transfer Trip card Note 2	√	√	√	√

Note: √ = Supported X = Not Supported // = Supported by Chassis CHAJ * = Future option

Functional Category	Mini Slot Plug-in cards		AM3440 Chassis				O9550 Chassis		V4200-9
			A	C	D	E	A	D	
	Number of slots		4	4	9	7	4	9	9
Transportation	(E1/T1) 1-channel E1/T1		√	√	√	√	√	√	√
Transportation	(M4E1) 4-channel E1		√	√	√	√	√	√	X
Transportation	(M4T1) 4-channel T1		√	√	√	√	*	*	X
Transportation	(FOM) 1-channel fiber optical with 1+1		√	√	√	√	√	√	√
Transportation	(GH) G.SHDSL		X	X	X	X	X	X	√
Serial and Digital Access	(1DTE) 1-channel DTE	V.35	√	√	√	√	√	√	√
Serial and Digital Access		X.21	√	√	√	√	√	√	√
Serial and Digital Access		RS232	√	√	√	√	√	√	√
Serial and Digital Access	(ODP) 1-channel OCU-DP		√	√	√	X	X	X	√
Serial and Digital Access	(3RS232A) 3-port RS232		√	√	√	√	*	*	X

Voice and Analog Access	(QFXO) 4-channel FXO	#	√	√	√	√	√	√
Voice and Analog Access	(QFXSA) 4-channel FXS	#	√	√	√	√	√	√
Voice and Analog Access	(QMAGA) 4-channel magneto	#	√	√	*	X	X	X
Voice and Analog Access	(QEMA) 4-channel E&M	#	√	√	√	√	√	√
Data Processing	(ABRA) Analog Bridge	√	√	√	√	X	X	X
Data Processing	(ECA) Echo Canceller	√	√	√	√	X	X	X
Packet Access	(RTA) 2-LAN port/64 WAN port Router-A	√	√	√	√	√	√	X
Teleprotection Access	(C37.94) 1-channel low-speed optical	//	√	√	√	√	√	X
Note: √ = Supported X = Not Supported # = Supported by Chassis CHAK * = Future option // = Supported by Chassis CHAJ

Compatibility and Functional Categories

Low-speed cards for AM3440

Low-speed (LS) plug-in slots come in two sizes: single slot and mini slot. In this Chapter, the cards are arranged in the order of functional categories.

Functional Category	Plug-in cards		Controller			AM3440-CHP Series Chassis			AM3440-8GEHSWa	AM3440-CHE2GEa
	Single Slot	Mini Slot	CCPB-8GEHSWA	CCPB-2GEa	CCPB-DCSa	Aa	Ca	Da	Mini Slot	Mini Slot
Serial and Digital Access		(3RS232A) 3-port RS232	√	√	√	√	√	√	√	√
Clock and Alarm Interface		CLKa Mini Slot plug-in card	√	√	√	√	√	√	√	√
Clock and Alarm Interface		CLKb Mini Slot plug-in card	√	√	√	√	√	√	√	√
Clock and Alarm Interface		CLKc Mini Slot plug-in card	√	√	√	√	√	√	√	√
Voice and Analog Access	(8EMB) 8-channel 2W/4W E&M		√	√	√	√	√	X	X	X
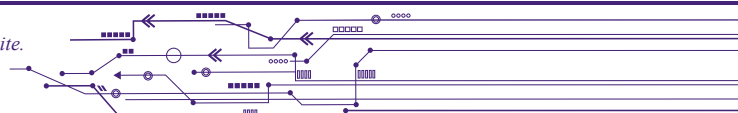
(3E1) 3-channel E1
For AM3440-A/C, O9500R, O9550-A Single Slot

Features

- Three port E1 plug-in module
- DS0-SNCP protection within 50 ms
- Programmable delay of Time Slot AIS detection for SNCP protection switching
- Synchronization Status Message (SSM) clock mode
- Full Time Slot Interchange (TSI) capability among all time slots in the main unit
- Remote diagnostics
- Single LED indicator per E1 port
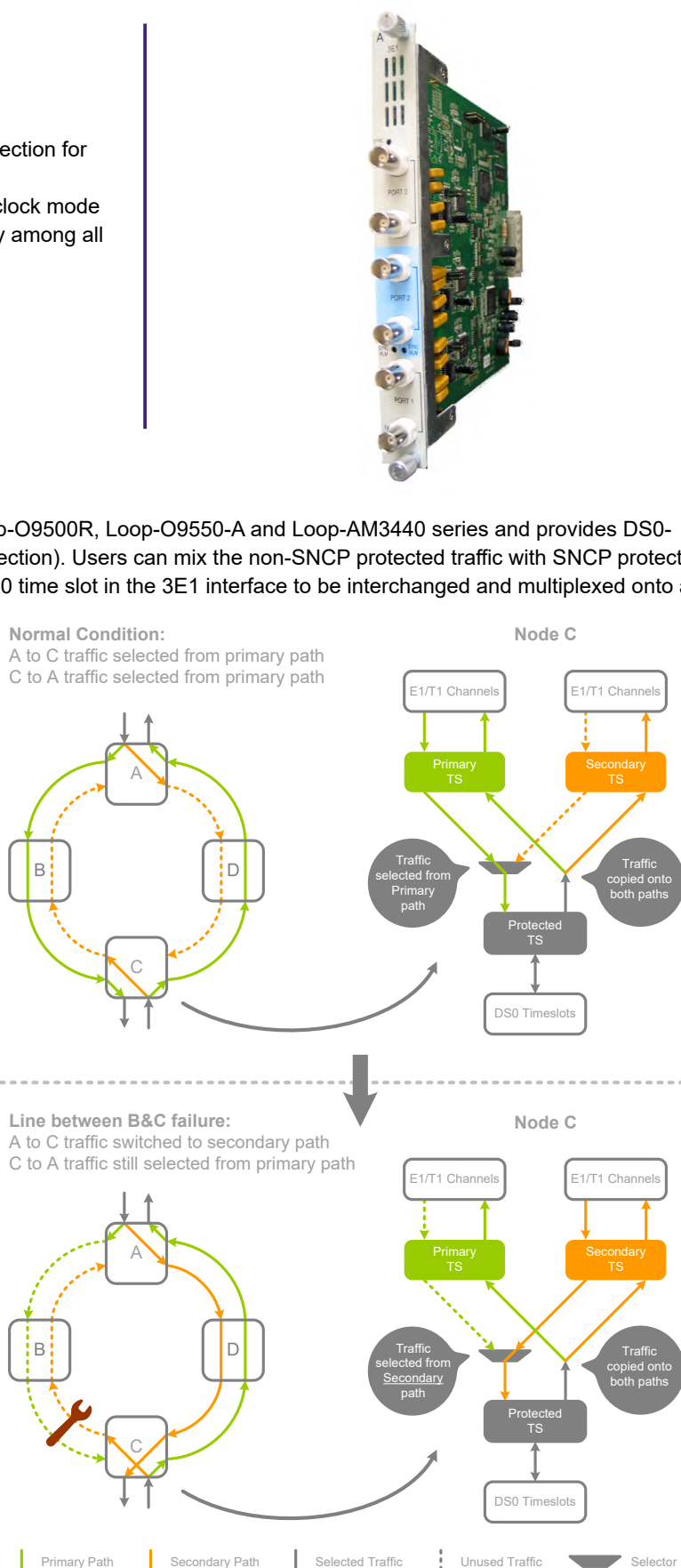- Software field upgradeable
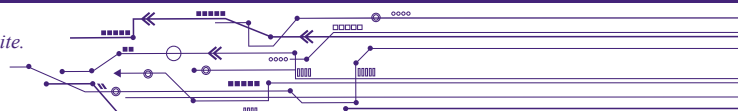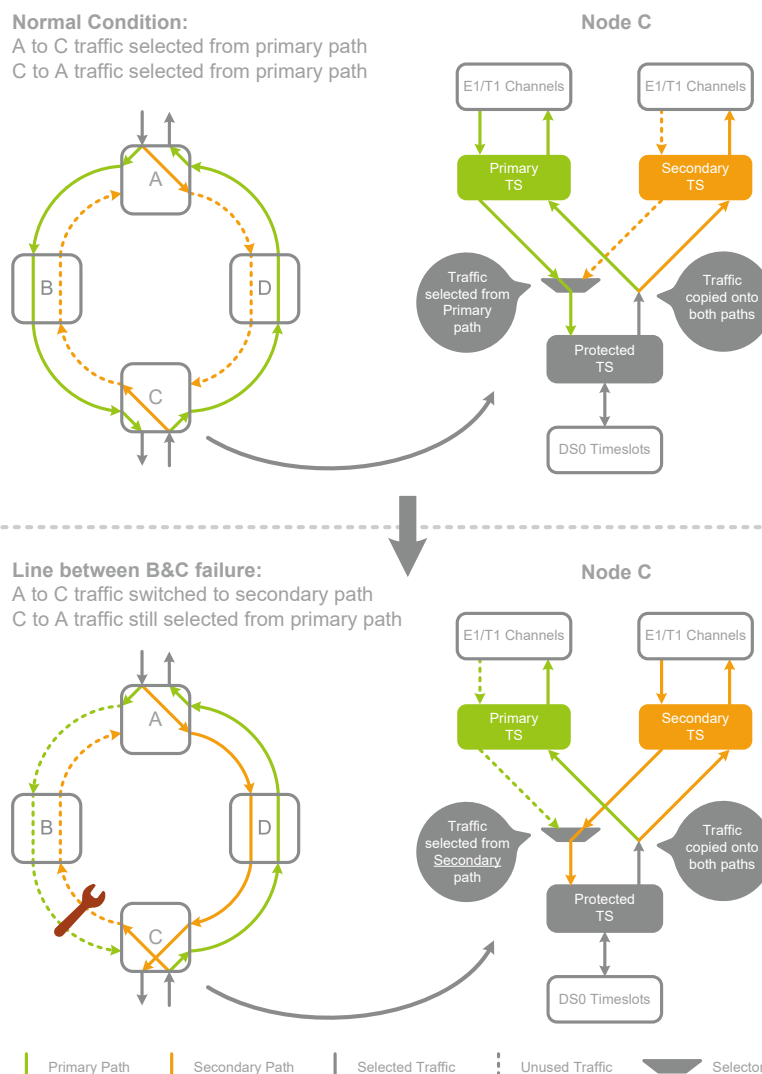- BNC or RJ48C connectors
- RoHS compliant

Description

The 3E1 plug-in card is designed for the Loop-O9500R, Loop-O9550-A and Loop-AM3440 series and provides DS0-SNCP (64 kbps sub-network connection protection). Users can mix the non-SNCP protected traffic with SNCP protected traffic on the same E1 ring. It allows each DS0 time slot in the 3E1 interface to be interchanged and multiplexed onto a digital network.

Continuous error checking, performance polling, and in-service diagnostics are provided through the main controller of the Loop-O9500R, Loop-O9550-A and Loop-AM3440 series. In addition, LEDs on the plug-in card itself provide status indicators.

Application Illustration

The DS0 signal travels on both the primary timeslots and secondary timeslots in an SNCP/UPSR. The primary timeslots are by default selected at the Rx end as the working. When a failure occurs on the primary line causing primary timeslots unusable, the selector at Rx will automatically switch to the secondary timeslots.

Normal Condition:
A to C traffic selected from primary path
C to A traffic selected from primary path

Node C

Line between B&C failure:
A to C traffic switched to secondary path
C to A traffic still selected from primary path

Node C

| Primary Path | Secondary Path | Selected Traffic | Unused Traffic | Selector |

(3T1) 3-channel T1
For AM3440-A/C and O9500R Single Slot

Features

- Three port T1 plug-in module
- DS0-SNCP protection within 50 ms
- Programmable delay of Time Slot AIS detection for SNCP protection switching
- Synchronization Status Message (SSM) clock mode
- Full Time Slot Interchange (TSI) capability among all time slots in the main unit
- Remote diagnostics
- Single LED indicator per T1 port
- Software field upgradeable
- RJ48C connectors
- RoHS compliant

Description

The 3T1 plug-in card is designed for the Loop-O9500R, and Loop-AM3440 series and provides DS0-SNCP (64 kbps sub-network connection protection). Users can mix the non-SNCP protected traffic with SNCP protected traffic on the same T1 ring. It allows each DS0 time slot in the 3T1 interface to be interchanged and multiplexed onto a digital network.

Continuous error checking, performance polling, and in-service diagnostics are provided through the main controller of the Loop-O9500R and Loop-AM3440 series. In addition, LEDs on the plug-in card itself provide status indicators.

Application Illustration

The DS0 signal travels on both the primary timeslots and secondary timeslots in an SNCP/UPSR. The primary timeslots are by default selected at the Rx end as the working. When a failure occurs on the primary line causing primary timeslots unusable, the selector at Rx will automatically switch to the secondary timeslots.

Normal Condition:
A to C traffic selected from primary path
C to A traffic selected from primary path

Node C

Line between B&C failure:
A to C traffic switched to secondary path
C to A traffic still selected from primary path

Node C

Primary Path   Secondary Path   Selected Traffic   Unused Traffic   Selector

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(4E1/T1) 4-channel E1/T1
For AM3440-A/C, O9500R, O9550-A Single Slot

Features

- Four E1/T1 ports per card
- Usable as a CSU/DSU, T1 to E1 converter
- Full DS0 timeslot cross-connection with other modules
- Remote diagnostics
- Single LED indicator per port
- Software upgradable

Description

Loop Telecom's QT1/QE1 plug-in cards are a series of 2 different plug-in cards designed for the Loop-O9500R, the Loop-O9550-A, and the Loop-AM3440-A/C series. They allow each DS0 time slot in QT1 or QE1 interfaces to be interchanged and multiplexed onto a digital network.

Continuous error checking, performance polling, and in-service diagnostics are provided through the main controller of the Loop-O9500R, the Loop-O9550-A, and the Loop-AM3440-A/C series. In addition, an LED on the plug-in provides status indication.

Application Illustration
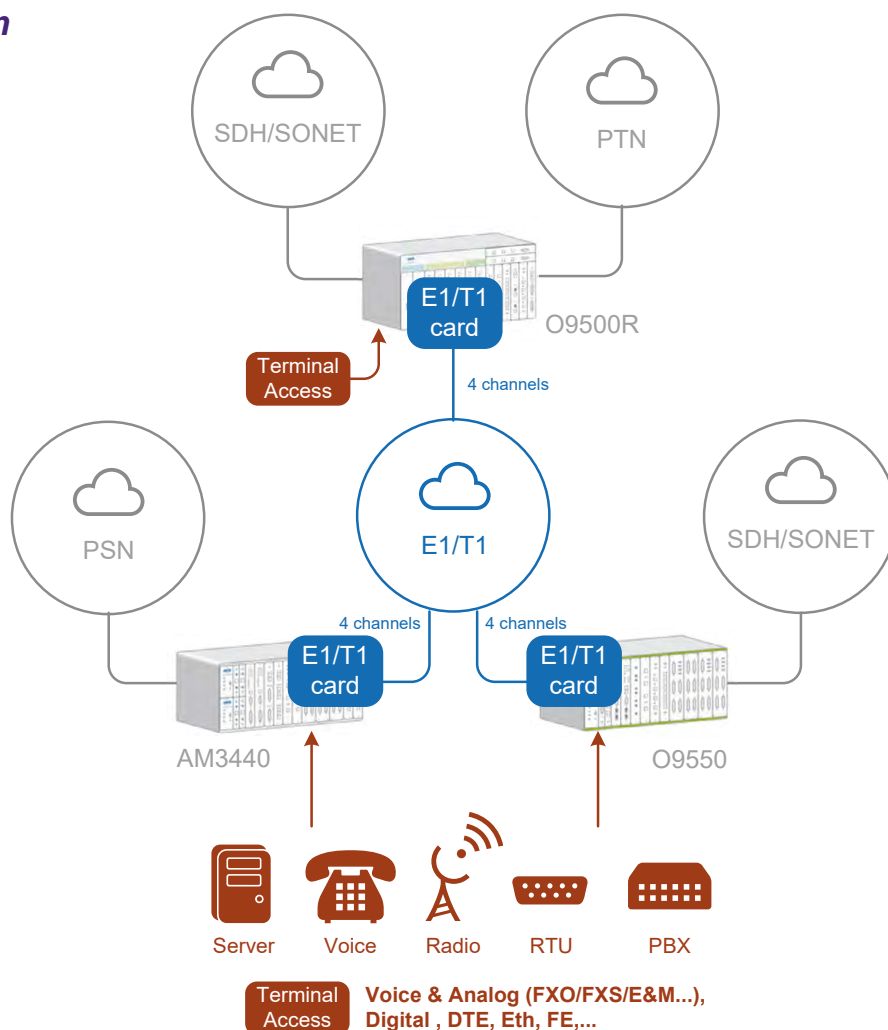
(E1/T1) 1-channel E1/T1
For AM3440-A/C/D/E, O9550-A/D, V4200-9 Mini Slot

Features

- Usable as a CSU/DSU, T1 to E1 converter
- Full TSI capability among all time slots in the main unit
- Remote diagnostics

Description

The E1/T1 plug-in cards are a series of 2 different plug-in cards designed for the Loop-AM3440 Access DCS-MUX series and O9550-A chassis. This card allows each DS0 time slot in T1 or E1 interfaces to be interchanged and multiplexed onto a digital network. Clear channel (32 DS0 channels) is also available.
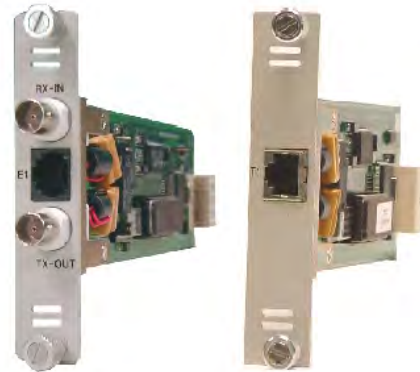
Continuous error checking, performance polling, and in-service diagnostics are provided through the main controller of the Loop-AM3440 Access DCS-MUX series and O9550-A chassis. In addition, an LED indicator on the plug in card's front face provides immediate status indication.

Application Illustration

For the latest product news, updates, technical support and more, please visit our website.
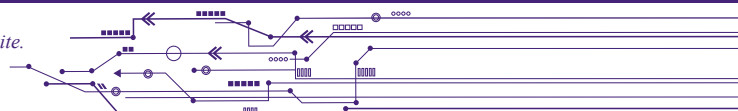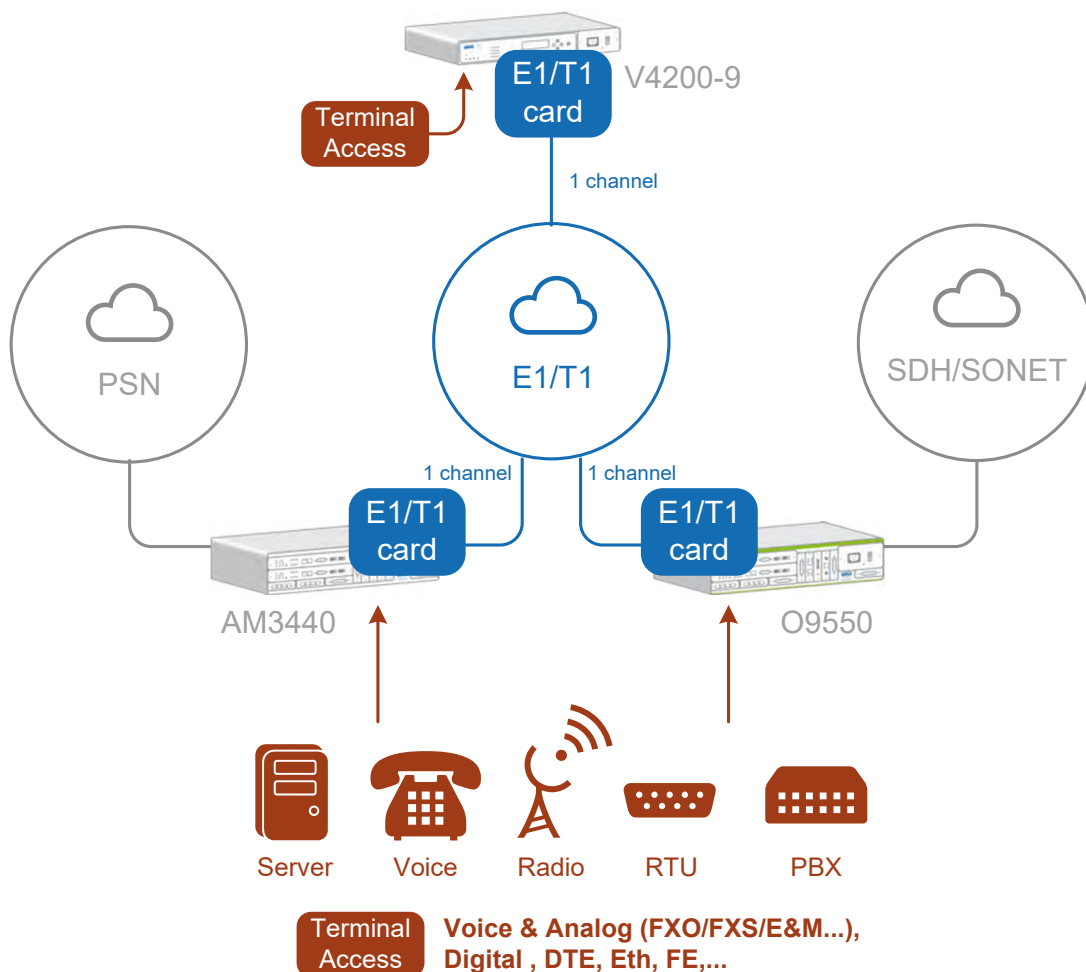
(M4E1) 4-channel E1
For AM3440-A/C/D/E & O9550-A/D Mini Slot

Features

- Usable as a CSU/DSU
- Full TSI capability among all time slots in the main unit
- Remote diagnostics
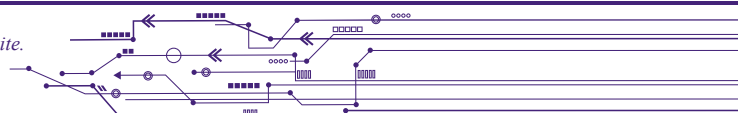- Software field upgradable

Description

The Mini Quad E1 plug-in card is designed for the 1/2 slot of the Loop-AM3440 series and O9550. It allows each DS0 time slot in the T1 or E1 interfaces to be interchanged and multiplexed onto a digital network.

Continuous error checking, performance polling, and in-service diagnostics are provided through the main controller of the Loop-AM3440 series and O9550.

Great for indoor, inside building E1 connections or drops from a SONET/SDH network. For outside connections where lightning protection is required please use our full Quad E1 interface card.

Application Illustrations
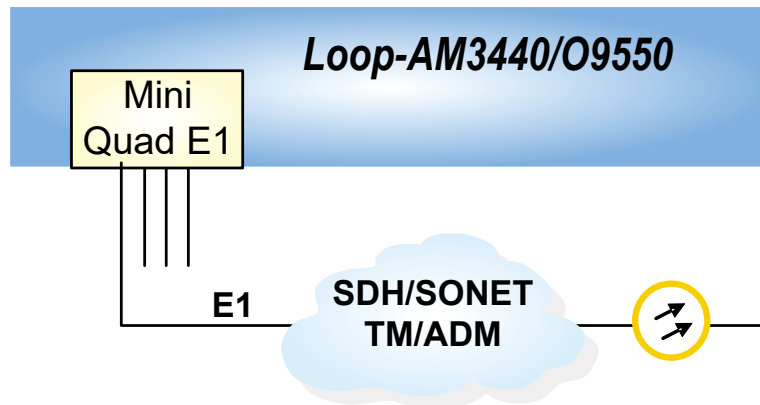
(M4T1) 4-channel T1
For AM3440-A/C/D/E & O9550-A/D Mini Slot

Features

- Usable as a CSU/DSU
- Full TSI capability among all time slots in the main unit
- Remote diagnostics
- Single LED indicator
- Software field upgradable

Description

The Mini Quad T1 plug-in card is designed for the mini slot of the Loop-AM3440 series and O9550. It allows each DS0 time slot in the QT1 interfaces to be interchanged and multiplexed onto a digital network.

Continuous error checking, performance polling, and in-service diagnostics are provided through the main controller of the Loop-AM3440 series and O9550.

Great for indoor, inside building T1 connections or drops from a SONET/SDH network. For outside connections where lightning protection is required please use our full Quad T1 interface card.

Application Illustrations

For the latest product news, updates, technical support and more, please visit our website.
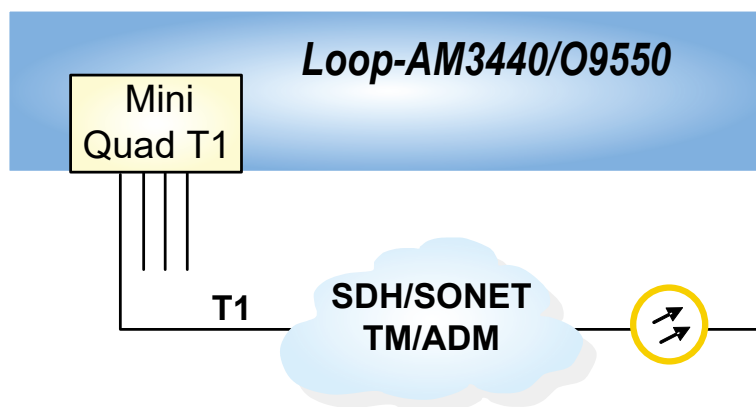
(TDMoEA) 4-channel TDM over Ethernet
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- Hot pluggable interface card for Single Slots
- Four Ethernet ports for WAN or LAN connection
  - Two combo Gigabit Ethernet (GbE) with 2 RJ45 and 2 SFP housing
  - Two 10/100/1000 BaseT Ethernet
  - IEEE 802.3ad Ethernet Link Aggregation
- Support MEF-8, CESoPSN and SAToP encapsulation format for TDM circuit emulation
  - Up to 4 x 2 M TDM bandwidth
  - Support N x DS0 circuit emulation
  - Up to 64 pseudowires per card
  - Packet Delay Variation compensation depth up to 256 ms
  - Support VLAN tag adding and removing on Pseudowires
  - User configurable ToS for each Pseudowire
- L2 switching
  - Maximum 16 VLAN Groups
  - Support 802.1q Port-Based VLAN on Ethernet Port
  - Support Q-in-Q
  - Support 802.1D STP, 802.1s MSTP*, 802.1w RSTP
  - Jumbo Frame reaches up to 10K bytes
  - Support 802.1d MAC learning
- QoS
  - Ingress Rate Limiting per Ethernet port with 64kbps/1Mbps/10Mbps granularity
  - Ethernet Network Level:
    - 3-bit Priority Code Point – PCP field within 802.1P/802.1Q Ethernet frame – CoS
    - 4 priority queues per port
  - IP Network Level:
    - 6-bit DiffServ Code Point -DSCP field – ToS
    - Scheduling Algorithm
    - Strict Priority (SP)
    - Weighted Round Robin (WRR)
- Timing
  - AM3440 system clock (Internal, external, line interfaces)
  - Adaptive Clock Recovery (ACR) for TDM Pseudowires
  - SyncE
- Protection
  - Support protection between two TDMoEA cards for E1/T1 port pseudowire protection
  - Support protection between E1/T1 pseudowires on TDMOEA and E1/T1 ports on QE1/QT1 cards
  - Support Heart Beating Protection
- Jitter & Wander
  - PPM per G.823 Traffic
- Port transmission delay measurement
- RoHS compliant

Description

The TDMoEA plug-in card is designed for the Loop-AM3440-A/C, O9500R, and O9550-A. This card is used to transport TDM (time division multiplexed) traffic over the IP network in addition to normal Ethernet traffic. As the communications network migrates from TDM to IP, the TDMoEA card provides a flexible and cost effective choice for the transport of legacy TDM signals. Furthermore, the TDMoEA card of the AM3440 can work with IP6702A/ IP6704A/IP6750 TDMoE product family and with TDMoEA card of O9500R.
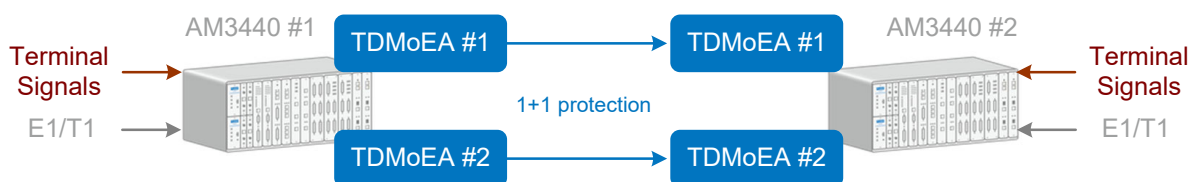
* Future Option

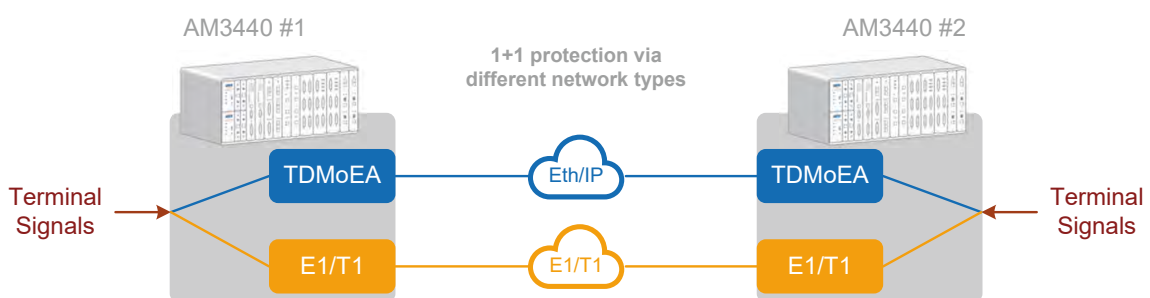## *Application Illustrations*

TDMoEA emulates and encapsulates TDM traffic (DS0/E1/T1) into packets for IP or Ethernet transportation
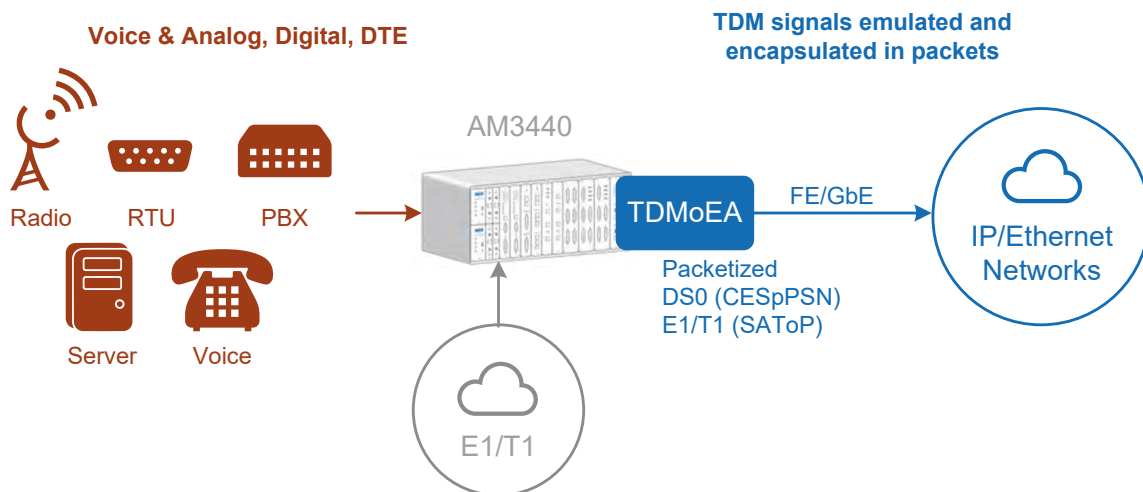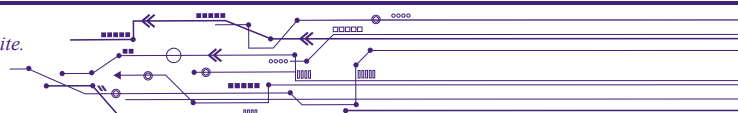

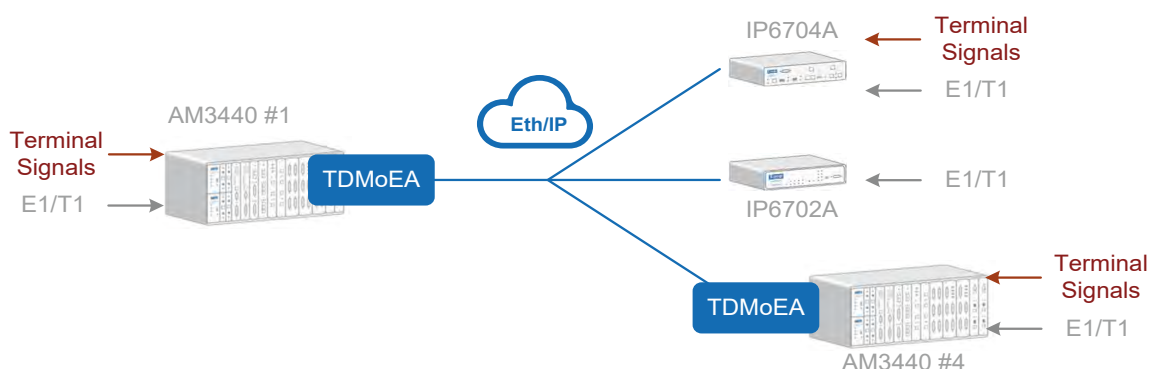**Point-to-point bridging with 1+1 protection**
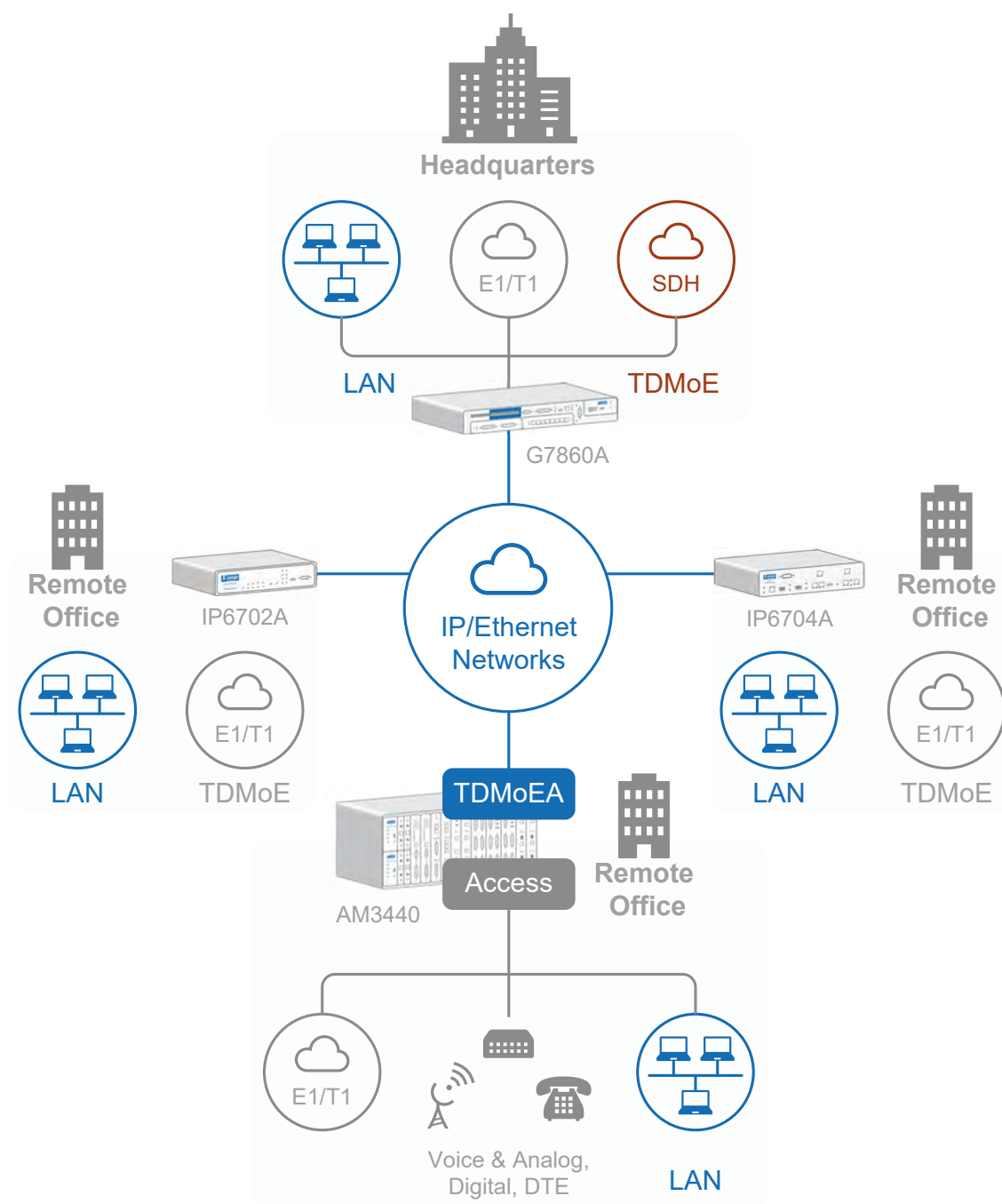

1+1 protection via TDMoEA and QE1/T1

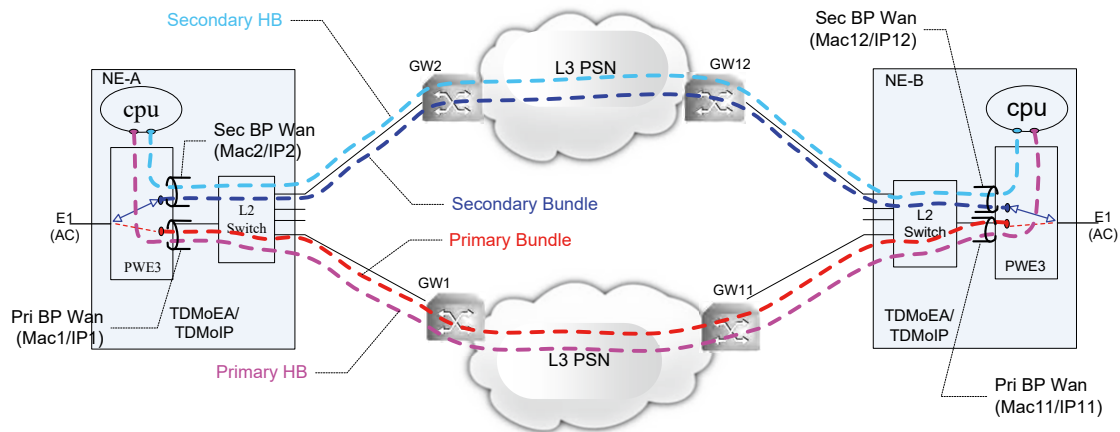**Point-to-multipoint bridging**

VPN Corporate Private Network

For a company that needs a Virtual Corporate Private Network to connect remote branches to company headquarters, the Loop TDMoEA line of products can create an E1/T1 lease line for faster connections.
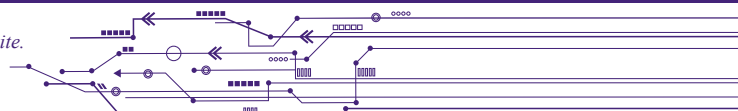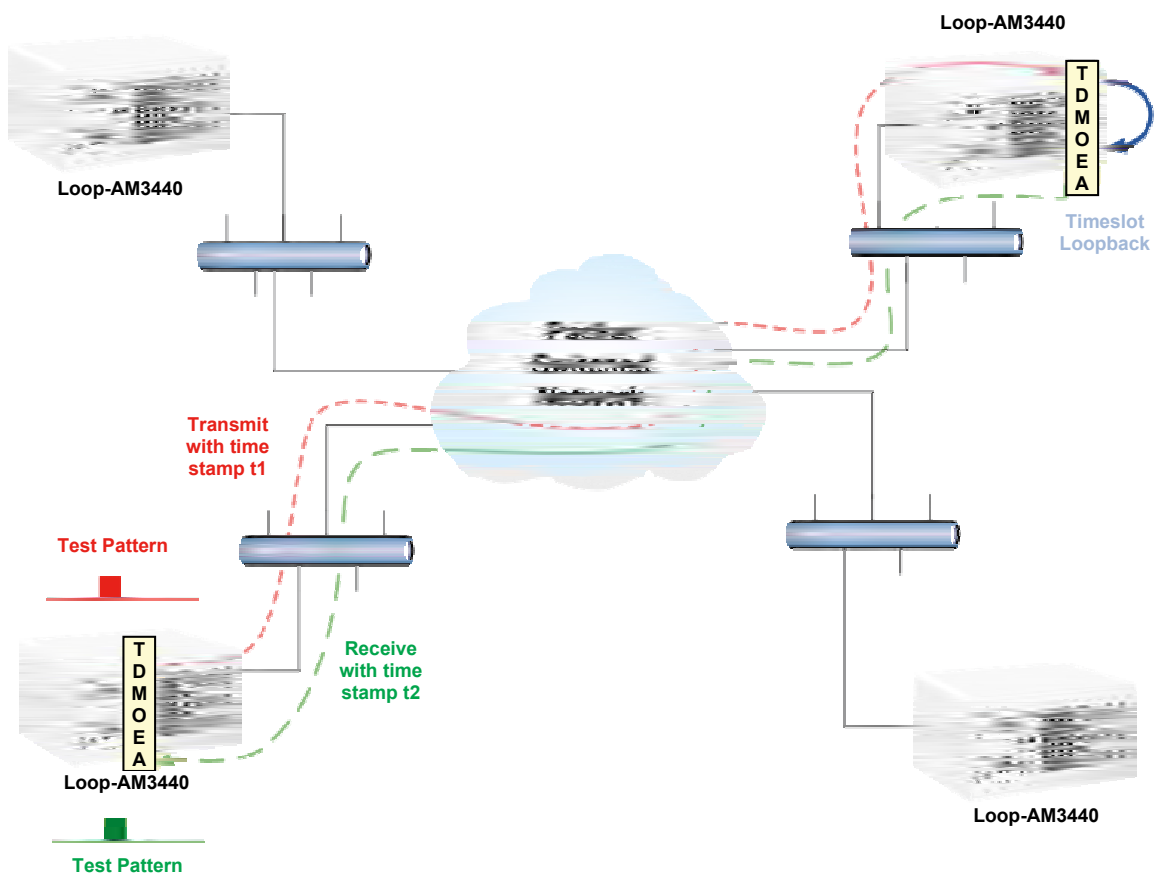
Heart Beating Protection

Transmission Delay Measurement

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(VoIPGA) Voice over IP
For AM3440-A/C Single Slot

Features

- Physical Interfaces
  - WAN: 1 x 10/100/1000 base-T
  - LAN: 2 x 10/100/1000 base-T
- Voice Features
- G.711 a/μ, G.726(32K), G.729, G.723.1
  - Silence Suppression and Detection
  - Echo Cancellation (G.168)
  - Adjustable jitter buffer
  - Adjustable packet time (by Codec type)
  - Programmable Gain Control[Note]
  - Adjustable call progress tone volume[Note]
- Telephony Specifications
  - In-Band DTMF, Out-of-Band DTMF Relay (RFC2833 or SIP INFO)
  - Caller ID[Note]
  - T.30 FAX passthrough, T.38 Real Time FAX Relay[Note]
- SIP Call Features
  - Peer to Peer Call
  - Call Forward - unconditional, busy[Note]
  - Do Not Disturb[Note]
  - Hot Line and Warm Line
- SIP Account Management
  - By channel registration
  - Invite with Challenge
  - Support RFC3986 SIP URI format
  - Phone Book Function (point-to-point call, and cross-area call without SIP Server)

Note: Configurable only through WEB management.

Description

The VoIPGA plug-in card is designed for the Loop-AM3440-A/C. This card serves as a VoIP Gateway that converts up to 60 voice and fax channels to IP networks and in reverse direction. VoIPGA works with FXS, FXO, and E1/T1 interface modules on the AM3440 unit. It uses high-quality embedded DSP chips to provide stable and clear voice quality. It supports G.711 a/mμ-law, G.726-32K, G.729 and G.723.1 voice compression formats to maximize its compatibility with other SIP devices.

VoIPGA provides a cost-effective solution for connecting legacy services to the IP network via VoIP technology.
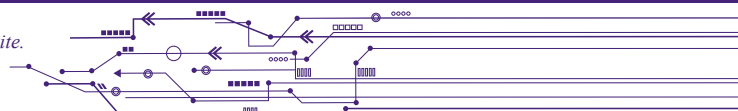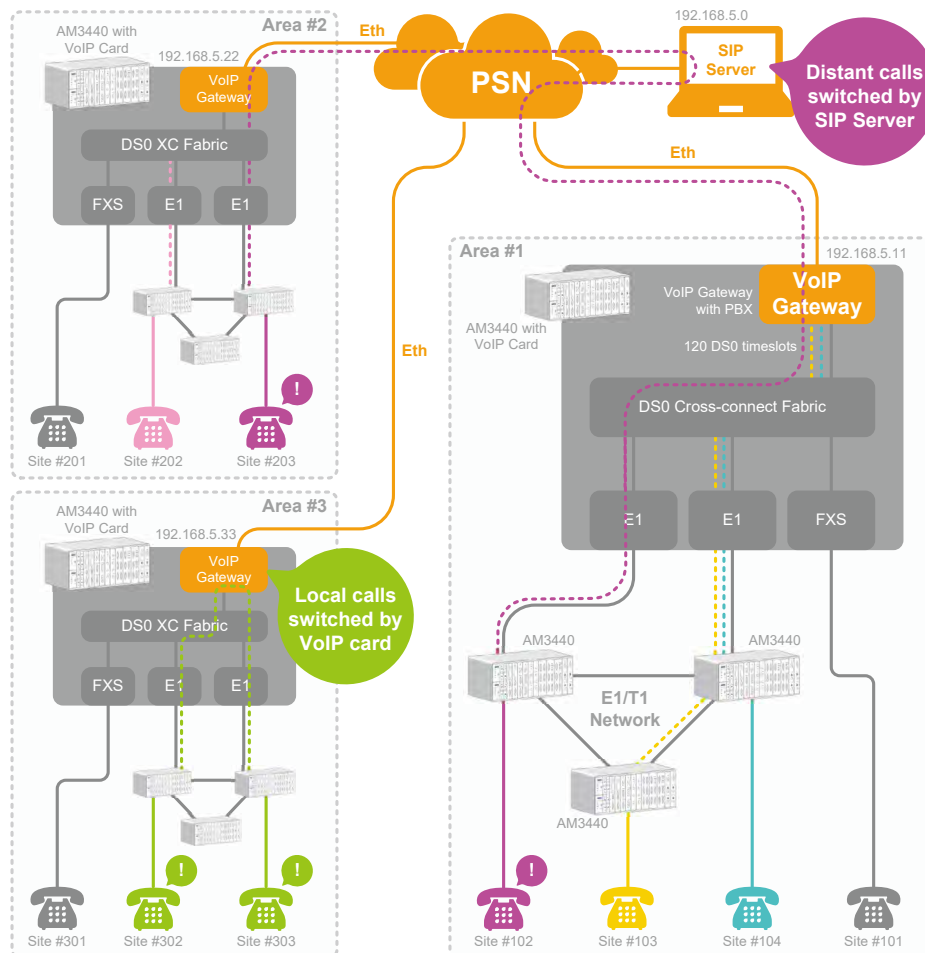
Application Illustration

VoIP Gateway for FXS, FXO, E&M 2W/4W, MAG, and E1-/T1-CAS services
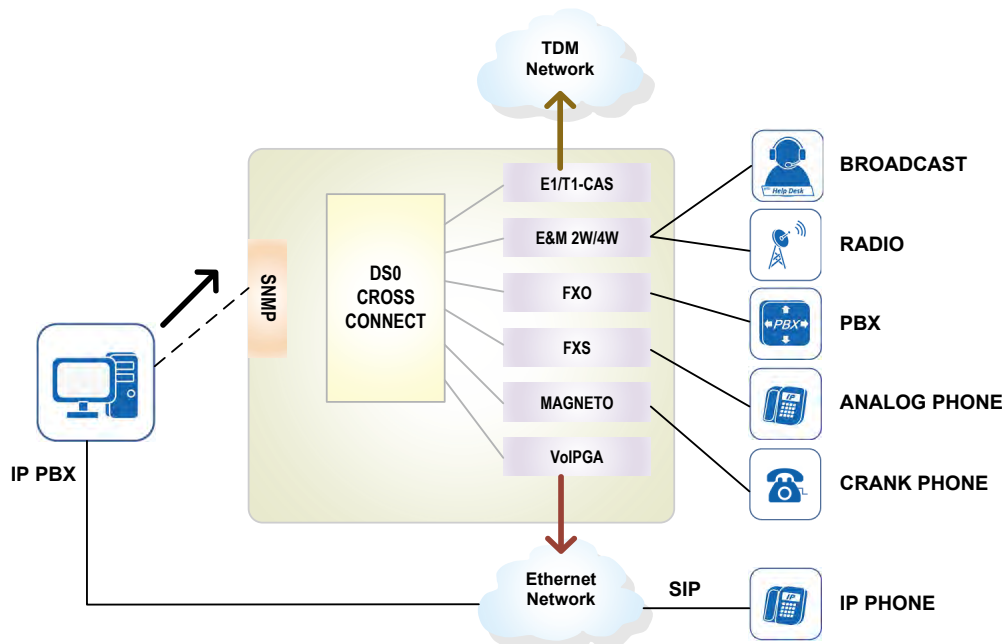
VoIP Gateway and SIP Proxy Server

For the latest product news, updates, technical support and more, please visit our website.

(1FOMA) 1-channel fiber optical with 1+1
For AM3440-A/B/C and O9550-A/C Single Slot

Features

- 1 optical interface port (FOM) to connect with remote O9310-E1, FOM interface for AM3440-A/C/D.
- Designed for O9550-A and AM3440-A/C single slots
- N x 64K bps cross-connection with 4E1 bandwidth
- Performance & Diagnosis
  - Performance monitoring
  - Alarm monitoring
  - Local Bert and loopback
- Protection
  - 1 + 1 protection function
  - FOM ring protection function
  - Supports APSD (Auto Power Shutdown)
- Management
  - Loop View
  - Supports remote management via EOC channel
  - Provide multi-color LED indicator

Description

The 1FOMA fiber optical interface is a plug-in module that can be used in the standard single slots of the O9550-A chassis and AM3440-A/C chassis. Designed for Loop-O9550 and Loop-AM3440 as an embedded 1 or 4 E1 fiber optical modem, the 1FOMA interface is able to aggregate 1 or 4 E1 channels to single fiber optical interface and connect with Loop-O9310-E1, and FOM interface for Loop-AM3440-A/C/D.

Note: Although the Fiber Optical Interface serves the same hardware function on O9550 and AM3440, they have different firmware.
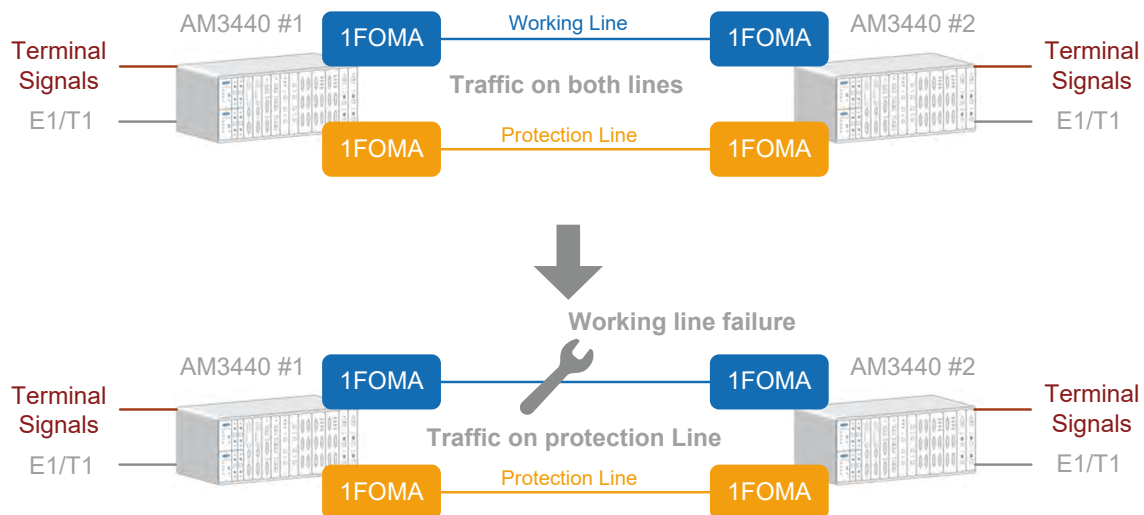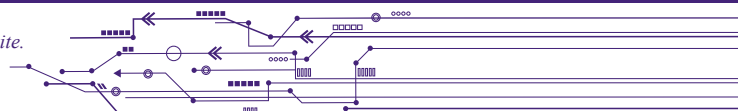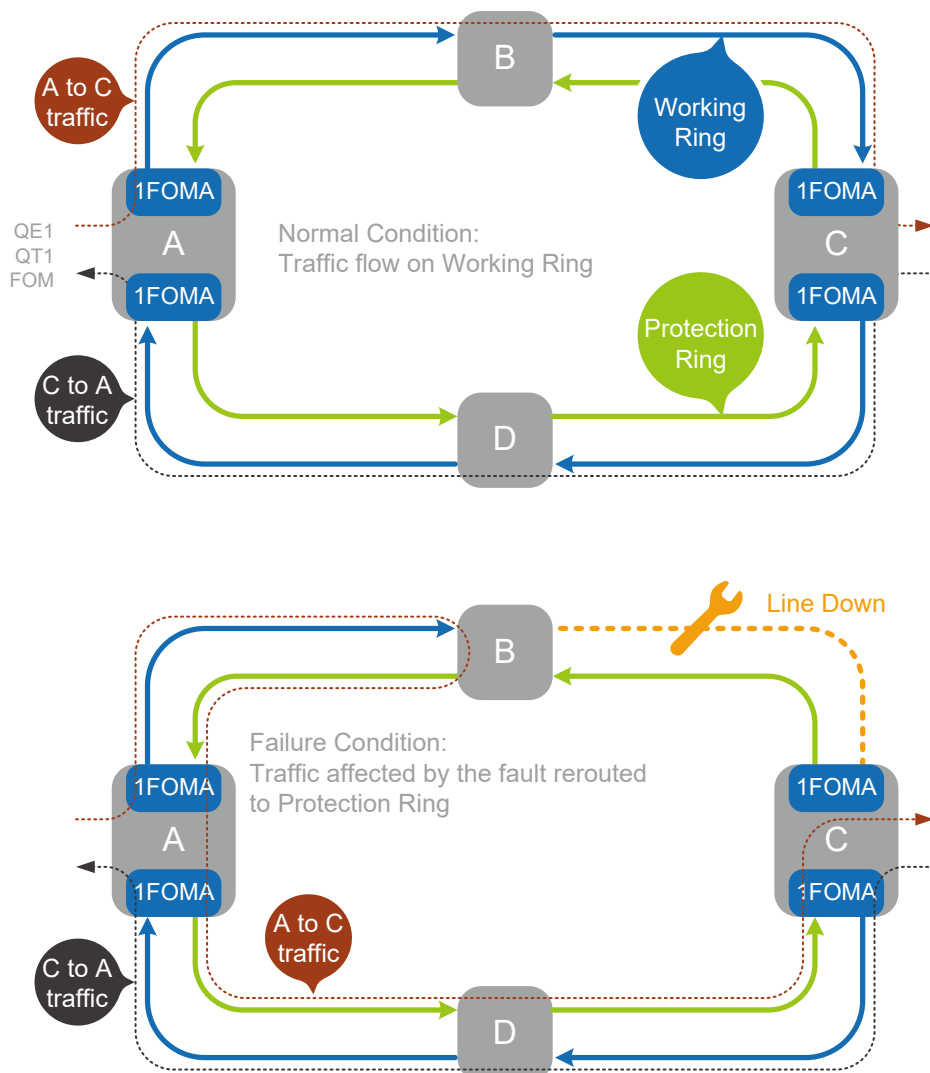
Application Illustrations

Point to Point

1 + 1 Protection

AM3440 #1   1FOMA   Working Line   1FOMA   AM3440 #2

Terminal Signals

E1/T1

Traffic on both lines

1FOMA   Protection Line   1FOMA

Terminal Signals

E1/T1

Working line failure

AM3440 #1   1FOMA   1FOMA   AM3440 #2

Terminal Signals

E1/T1

Traffic on protection Line

1FOMA   Protection Line   1FOMA

Terminal Signals

E1/T1

ULSR protection

A to C traffic

B

Working Ring

1FOMA

A

QE1
QT1
FOM

Normal Condition:
Traffic flow on Working Ring

1FOMA

C

1FOMA

1FOMA

Protection Ring

C to A traffic

D

Line Down

B

1FOMA

A

Failure Condition:
Traffic affected by the fault rerouted
to Protection Ring

1FOMA

C

1FOMA

1FOMA

C to A traffic

A to C traffic

D

(1FOMB) 1-channel fiber optical w/o 1+1
For O9500R Single Slot

Features

- One port Fiber Optical Multiplexer interface
- Connect with remote O9310-E1
- Designed for O9500R low speed slots
- N x 64K bps cross-connection with 4E1 bandwidth
- Performance & Diagnosis
    - Performance monitoring
    - Alarm monitoring
    - Local Bert and loopback
- Protection
    - FOM ring protection function
    - Supports APSD (Auto Power Shutdown)
- Management
    - Supports remote management via EOC channel
    - Provide multi-color LED indicator

Description

The one FOMB fiber optical interface is a plug-in module that can be used in the low speed slots of the O9500R chassis. Designed for Loop-O9500R as an embedded 1 or 4 E1 channels over single fiber optical interface and connect with Loop-O9310-E1.
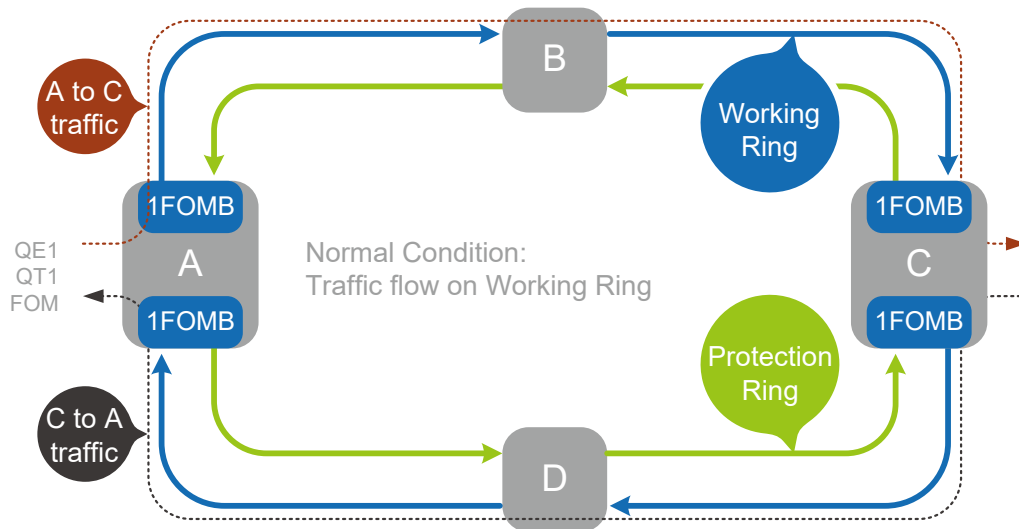
Application Illustrations

Point to Point

Terminal Signals — O9500R #1 — 1FOMB — Optical Line — 1FOMB — O9500R #2 — Terminal Signals

E1/T1 / E1/T1

ULSR protection

A to C traffic

QE1
QT1
FOM

C to A traffic

Working Ring

Protection Ring

Normal Condition:
Traffic flow on Working Ring

B

1FOMB
A
1FOMB

1FOMB
C
1FOMB

D

Line Down

Failure Condition:
Traffic affected by the fault rerouted to Protection Ring

C to A traffic

A to C traffic

B

1FOMB
A
1FOMB

1FOMB
C
1FOMB

D
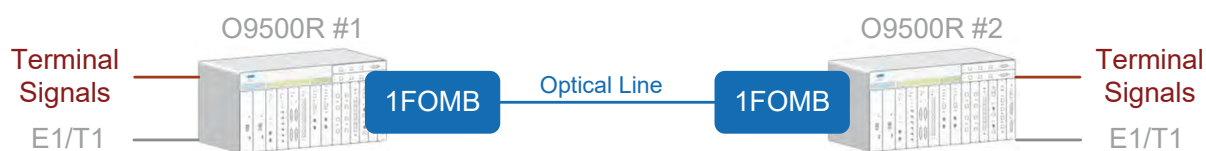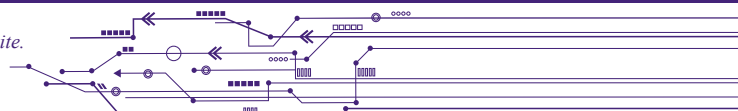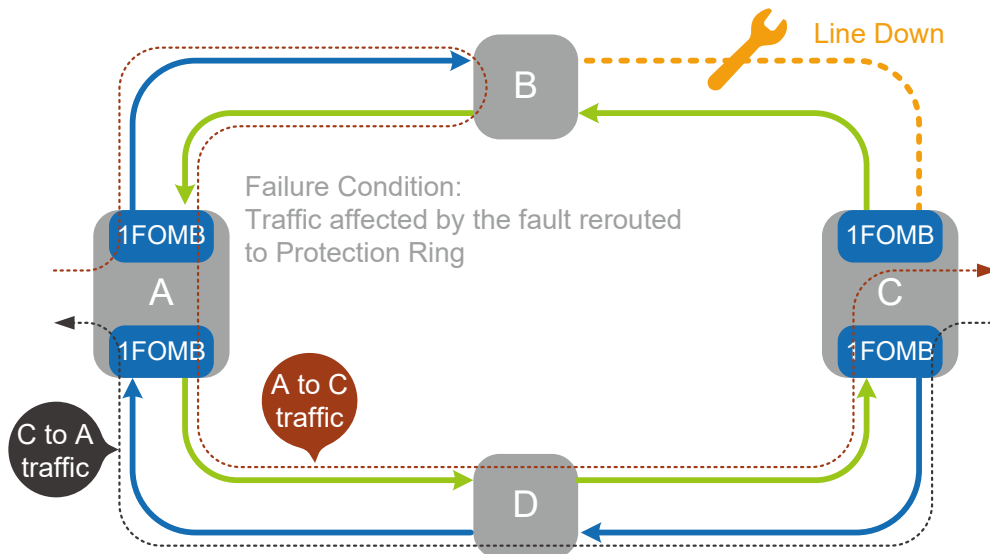
(FOM) 1-channel fiber optical with 1+1
For AM3440-A/C/D/E and O9550-A/D Mini Slot

Features

- Supports 1 + 1 protection functionality
- Supports ring protection functionality
- Supports remote management via EOC channel
- Provides a multi-color LED indicator

Description

The fiber optical interface is designed for Loop-AM3440 and O9550-A/C as embedded 1 or 4 E1 fiber optical modem. This plugged-in card can be used to aggregate 1 or 4 E1 channels to a single fiber optical interface to connect with other Loop-AM3440, O9550-A/C and Loop-O9310-E1 units.

Application Illustrations

**Point to Point**

1 + 1 Protection

ULSR protection

A to C traffic

QE1
QT1
FOM

Working Ring

Protection Ring

Normal Condition:
Traffic flow on Working Ring

FOM
A
FOM

B

FOM
C
FOM

D

C to A traffic

Line Down

Failure Condition:
Traffic affected by the fault rerouted to Protection Ring

FOM
A
FOM

B

FOM
C
FOM

D

A to C traffic

C to A traffic
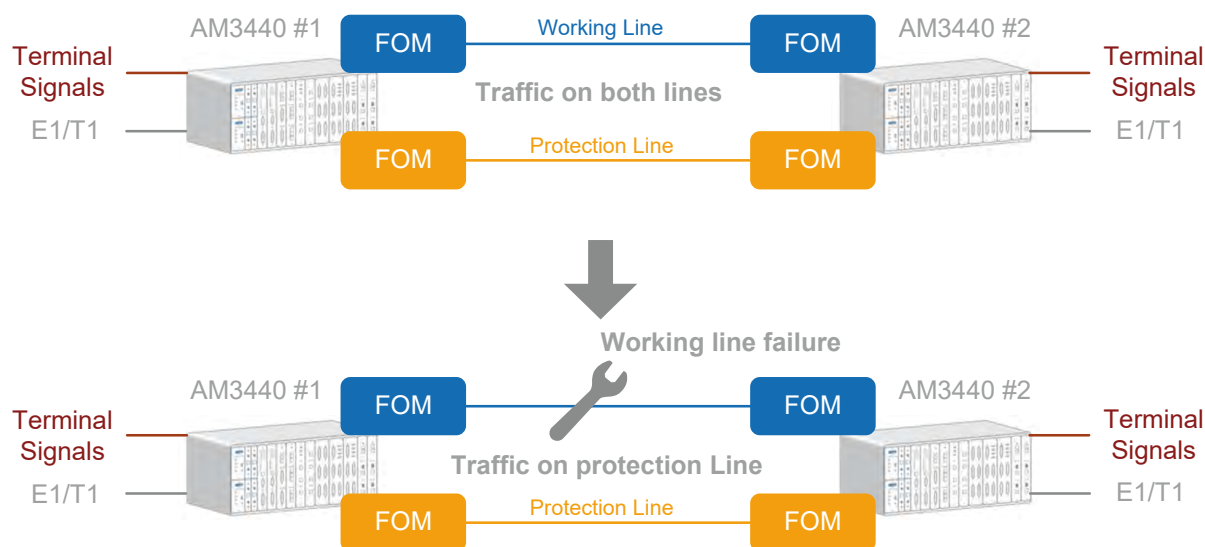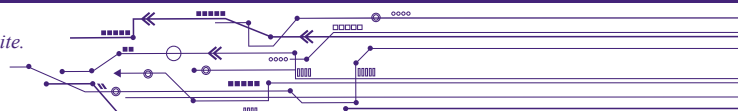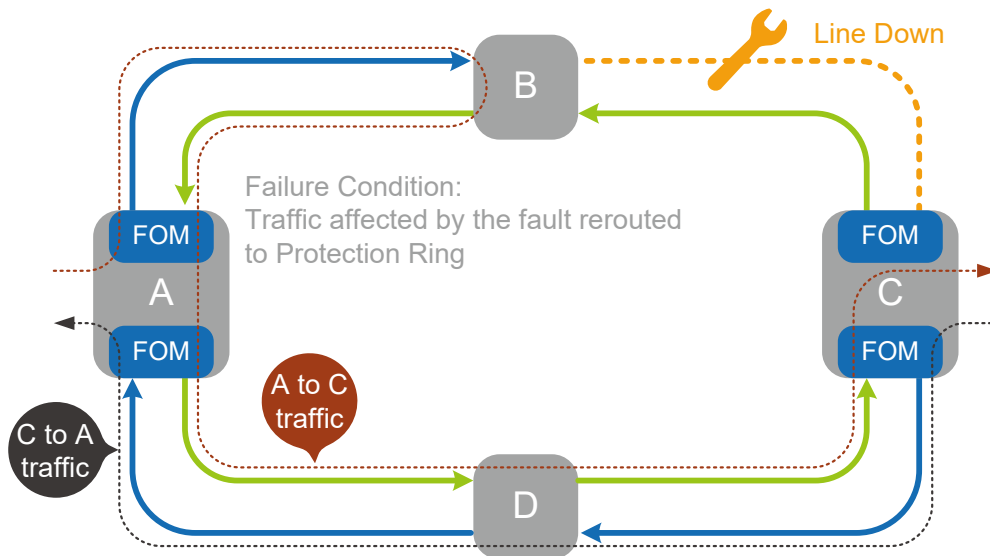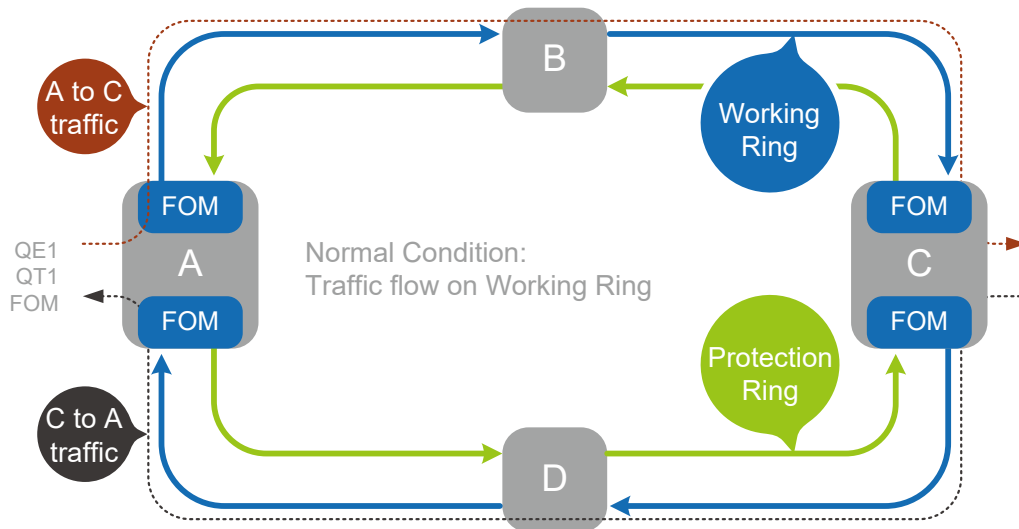
(FOM) 1-channel fiber optical with 1+1
For V4200-9 Mini Slot

Features

- 1 E1 channel for one single fiber optical
- Remote management via EOC channel
- Multi-color LED indicator
- Supports 1 + 1 protection function when installed in a Loop-V4200-9 device
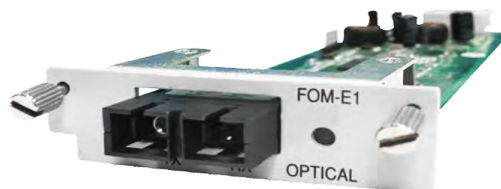
Description

Loop Telecom's 1-port 2 Mbps optical plug-in card is designed for Loop-V4200 device as an embedded 1E1 fiber optical modem. This plug-in card can transport 1 E1 to single fiber optical to connect with other Loop device such as the V4200-9, AM3440-A, or O9310.

Application Illustrations

Point to Point

1 + 1 Protection
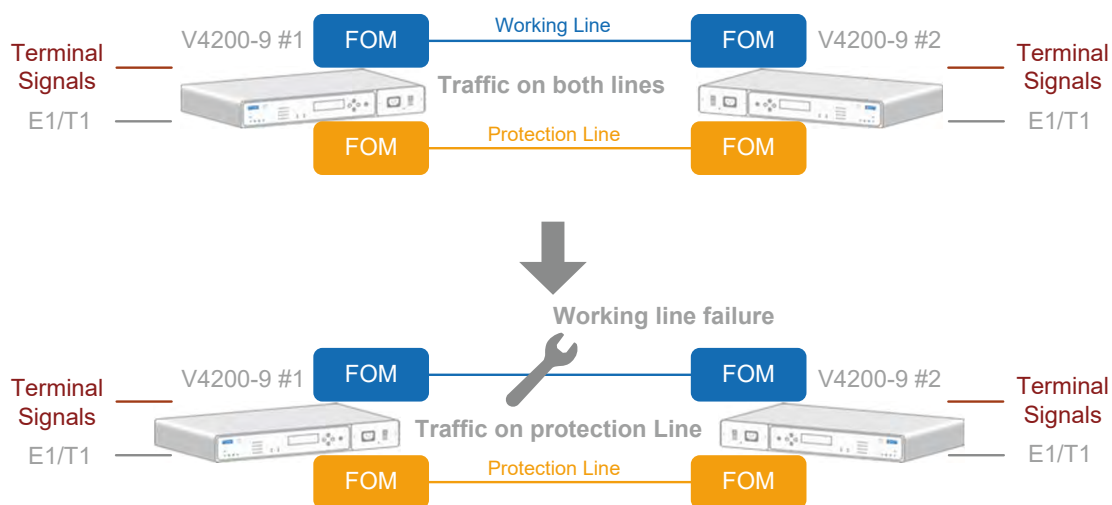
(2/4GH) 2/4-channel G.SHDSL
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- Data rate of N x 64 kbps
  - where N can range from 1 to 31
- Distances vary by line rate
- Uses industry standard PAM line format
- Software field upgradable
- One-LED indicator per port
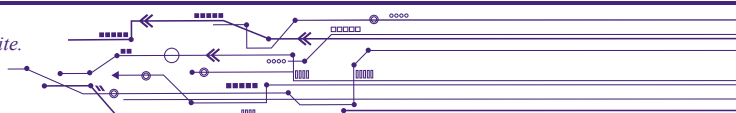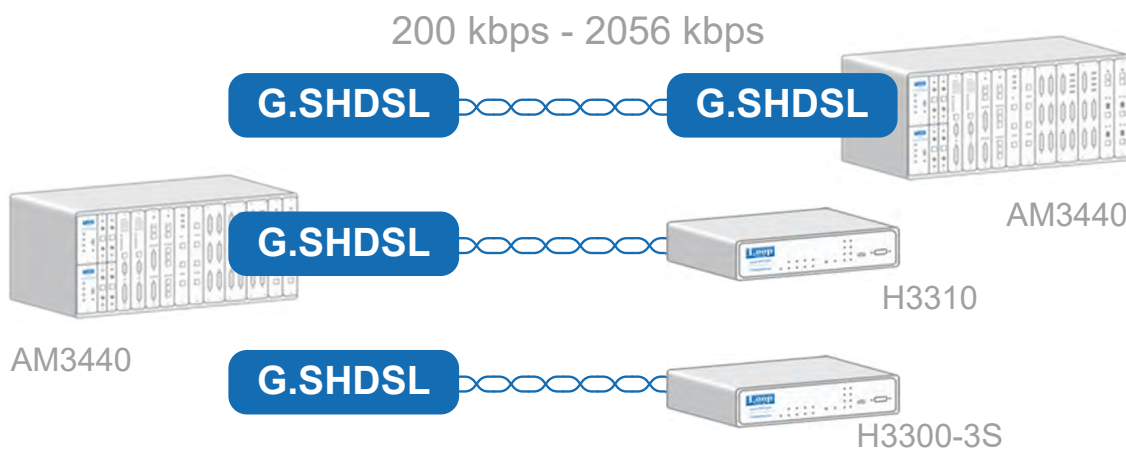- Two port G.shdsl card supports 1+1 protection

Description

The G.SHDSL plug-in card is designed for the Loop-O9500R, Loop-O9550-A, and Loop-AM3440 series. This card allows direct connection to wire pairs using 16PAM transmission technology. Versatility of this card comes from the choice of data rates, with the lower data rates applicable to longer reaches. The G.shdsl plug-in card can work with the Loop-H3300-3S and H3310, and is compatible with other G.SHDSL equipment.

The G.SHDSL plug-in card supports configuration and diagnostics using a local or remote terminal connected to the main unit. This allows in-service diagnostics and fault isolation.

Application Illustration

200 kbps - 2056 kbps

G.SHDSL ⟿ G.SHDSL

AM3440

G.SHDSL ⟿

H3310

AM3440

G.SHDSL ⟿

H3300-3S

For the latest product news, updates, technical support and more, please visit our website.

(GH) G.SHDSL
For V4200-9 Mini Slot

Features

- Data rate of n x 64 kbps, n=1 to max n, where max n = 3, 4, 6, 8, 12, 16, 18, 24, 32
- Distances vary by line rate
- Uses industry standard PAM line format
- Software field upgradeable
- One-LED indicator per card

Description

Loop Telecom's G.SHDSL plug-in card is designed for the Loop-V4200 series. This card allows direct connection to wire pairs using 16-TCPAM transmission technology. Versatility of this card comes from the choice of data rates, with the lower data rates applicable to the longer reaches. The G.SHDSL plug-in card can work with the Loop-H3300, and is compatible with other G.SHDSL equipment.

The G.SHDSL plug-in card supports configuration and diagnostics by using a local or remote terminal connected to the main unit. This allows in-service diagnostics and fault isolation.

Application Illustration

200 kbps - 2056 kbps

G.SHDSL — G.SHDSL
V4200-9

V4200-9
G.SHDSL — H3310

G.SHDSL — H3300-3S
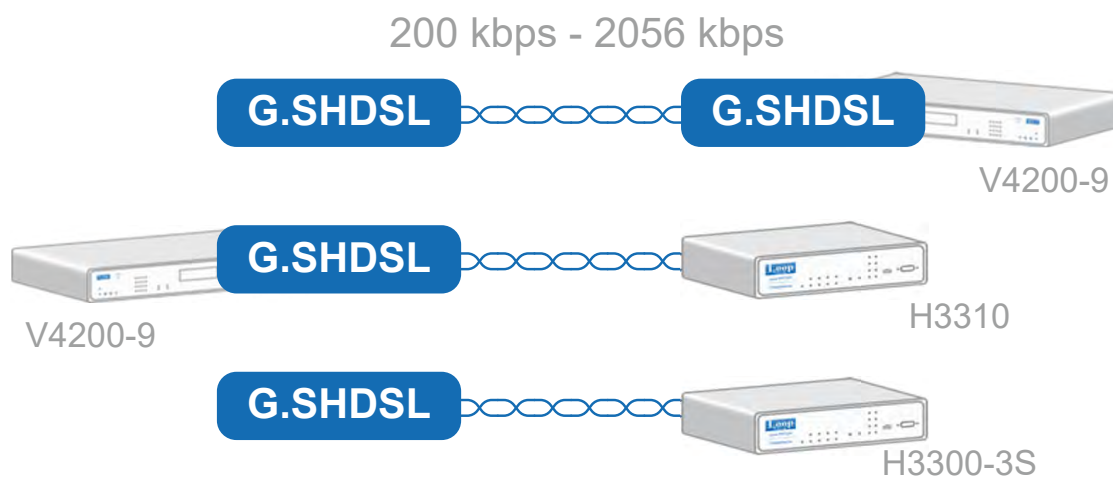
(6UDTEA) 6-channel Universal DTE
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- Supports X.21/RS232/RS422/V.35/V.36/EIA530/RS449
- Supports both synchronous and asynchronous data
- Port 1 to 4: two DB44 connectors
- Port 5 to 6: two RJ48 connectors
- Five software configurable modes
- MODE 1: V.110
  - Supports MUX/NON-MUX Mode for SYNC/ASYNC data
  - Port 1 to 4: RS232/RS422/X.21, SYNC/ASYNC 64kbps and sub-rate with V.110 encoding
  - Port 5 to 6: RS232 for 64kbps and sub-rate, ASYNC only
- MODE 2: N x 64K
  - Port 1 to 4: X.21/RS449/RS422/RS232/V.35/V.36/EIA530 SYNC N*64k (N=1~32)
  - Port 5 to 6: Disabled
- MODE 3: N x 64K + Oversampling
  - Port 1 to 3: X.21/RS449/RS422/RS232/V.35/V.36/EIA530 SYNC N*64k, (N=1~32).
  - Port 4: X.21/RS449/RS422/RS232/V.35/V.36/EIA530 SYNC, N*64k, (N=1~20).
  - Port 5 to 6: RS232 N*64k (N=1~6) oversampling for ASYNC data.
- MODE 4: Clock Pass Through
  - Port 1 to 4: RS232/RS422/X.21/V.35/V.36/EIA530 SYNC 38.4K and subrate
  - Port 5 to 6: Disabled
- MODE 5: N x 64K + Local and Remote Loopback
  - Port 1 to 4: X.21/RS449/RS422/RS232/V.35/V.36/EIA530 SYNC N*64k (N=1~32)
  - Port 5 to 6: Disabled
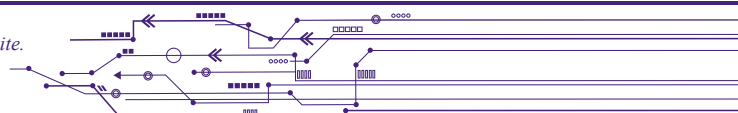 - Local and Remote Loopbacks with BERT, supporting V.54

Description

The 6-port Universal Data Interface Card (6UDTEA) card for single slots is designed to transport DS0 and sub-rate signals. Both SYNC and ASYNC data of X.21, RS449, RS422, RS232, V.35, V.36, EIA530 can be transported on the four ports (i.e. port 1 to 4) of DB44 connector. ASYNC RS232 can be transported on the additional ports (i.e. port 5 and 6) of RJ48 connector. Per-port software configuration is available.
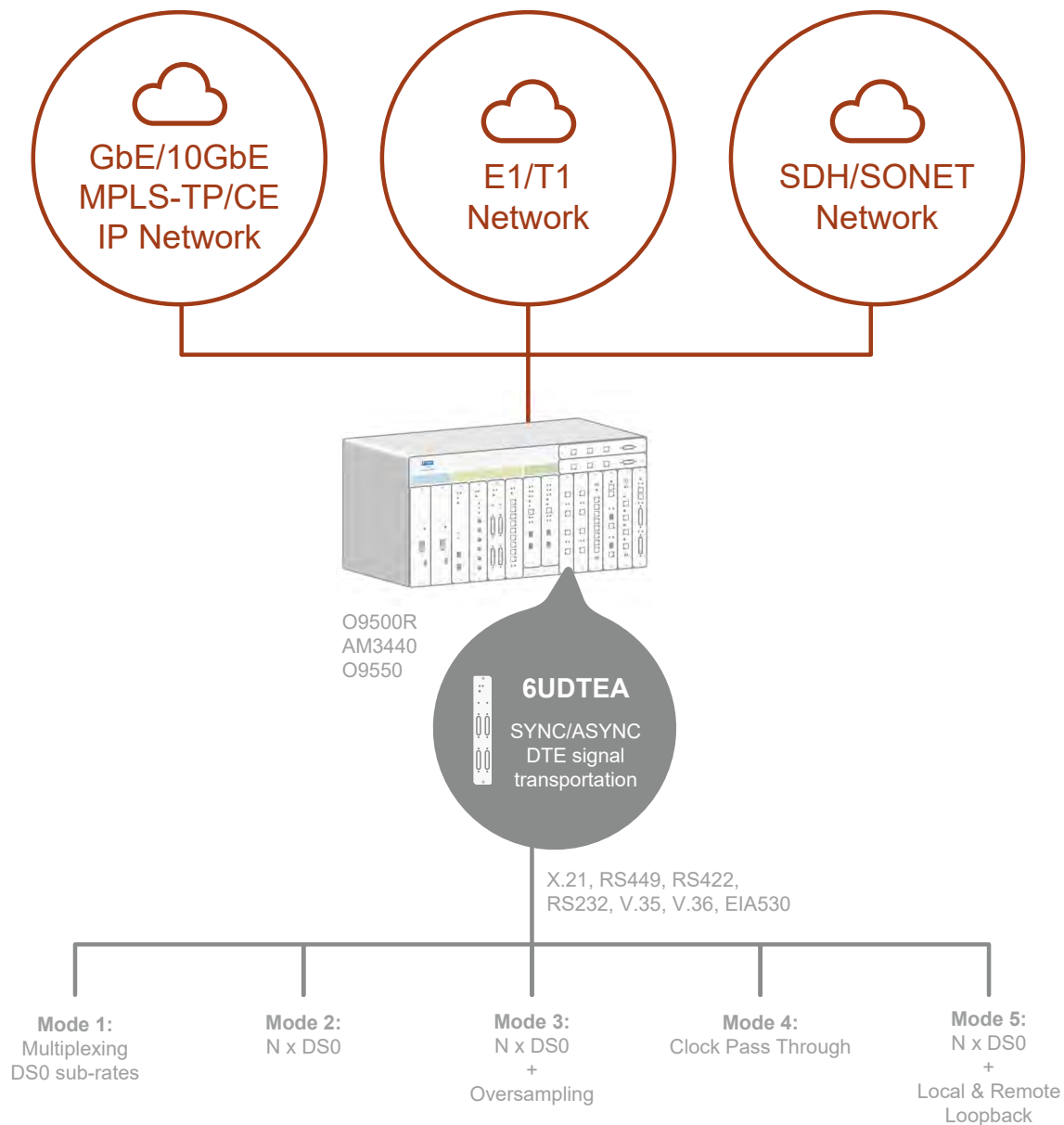
Five modes are designed to provide different requirements of DTE signal transportation.

- In Mode 1, all 6 ports can be MUXed (V.110) into one 64K channel. When the card is set to NON-MUX in Mode 1, asynchronous data rate per channel/port can be up to 38.4 Kbps, and synchronous data rate per channel/port can be up to 64 Kbps.
- In Mode 2, 3 and 5, each of the four ports is able to transport N x 64K synchronous signals. Mode 3 supports additional RS232 asynchronous data, and Mode 5 supports Local and Remote Loopbacks with BERT
- In Mode 4, Clock Pass Through is available for port 1 to 4.

Application Illustration

```
    GbE/10GbE              E1/T1              SDH/SONET
    MPLS-TP/CE            Network             Network
    IP Network
```

O9500R
AM3440
O9550

6UDTEA

SYNC/ASYNC
DTE signal
transportation

X.21, RS449, RS422,
RS232, V.35, V.36, EIA530

Mode 1: Multiplexing DS0 sub-rates	**Mode 2:** N x DS0	**Mode 3:** N x DS0 + Oversampling	**Mode 4:** Clock Pass Through	**Mode 5:** N x DS0 + Local & Remote Loopback

(8UDTEA) 8-channel Universal DTE
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- Single slot card for O9500R, O9550-A, and AM3440-A/C series
- 8-port universal data interface card supports RS232/RS422/RS485 interface
  - DCE interface per port
  - Per port software configurable
  - RS485 supports 4 wires Full Duplex
  - RS422 supports 4 wires
  - Supports Full-Duplex and Half-Duplex modes (optional)
- Oversampling channel to transmit ASYNC data
- N x 56/64K bps, N = 1 to 6 for DS0 channels to oversample the ASYNC data
- Channel for 56Kbps or 64Kbps is software configurable for each card application
- Card base options are Omnibus, Terminal Server, and Clock Pass Through functions
  - Terminal Server (TS)
    - 8 remote IP address for each physical port
    - Router Mode: 64WANS, RIP-I, RIP-II, Static route
    - Bandwidth for each WAN is N x 64Kbps; N=1 to 32
  - Omnibus (OMNI)
    - Omnibus for data
    - Application of Daisy Chain, Star, Point to Multi-point
    - Maximum 8 groups/per port
  - Clock Pass Through (CPT)
    - Pass through RS232 clock transparently for RADAR application
- Handshaking for RS232 only
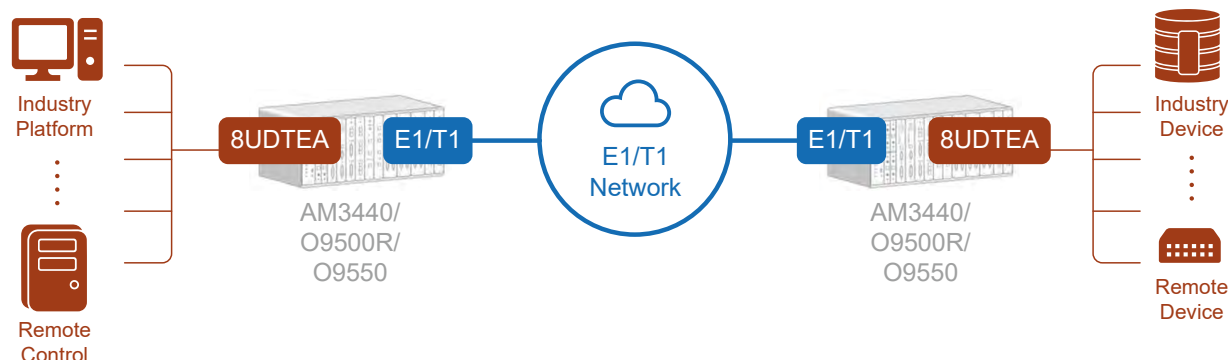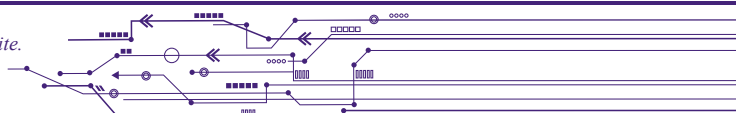- Flow control for RS232 only
- Loopback
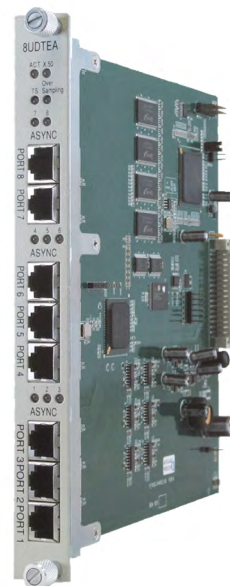
Description

The 8UDTEA card of O9500R, O9550 and AM3440 series is 8-port universal data interface card that complies with RS232/RS422/RS485 DCE interface for ASYNC data transmission by oversampling SYNC data channel. It allows multiplexing of n x 56/64Kbps data to multiply of DS0 time slot onto a digital network.

The 8UDTEA card provide oversampling function as basic, it can be set to be Omnibus (OMNI), Terminal Server (TS), or Clock Pass Through (CPT) by card base.
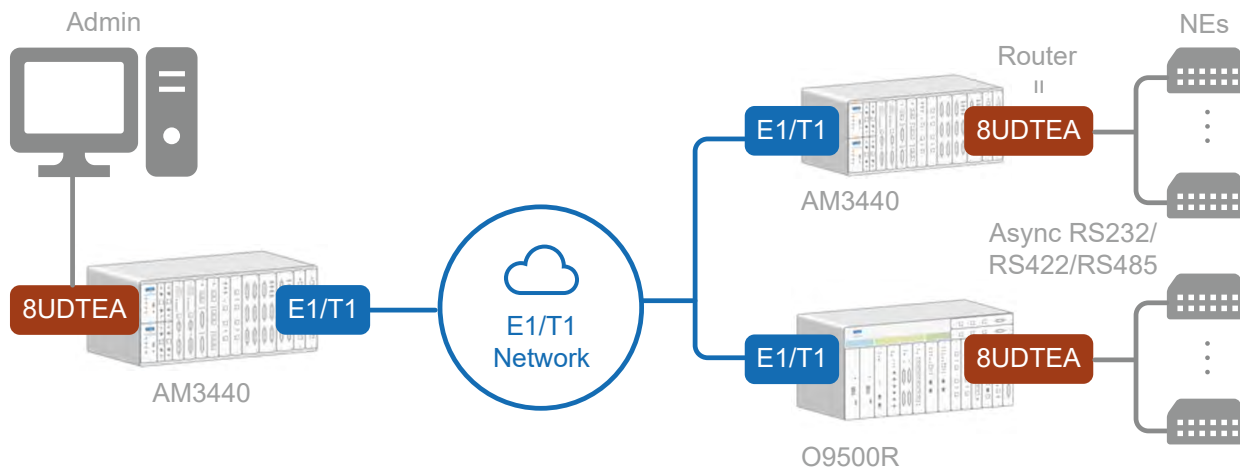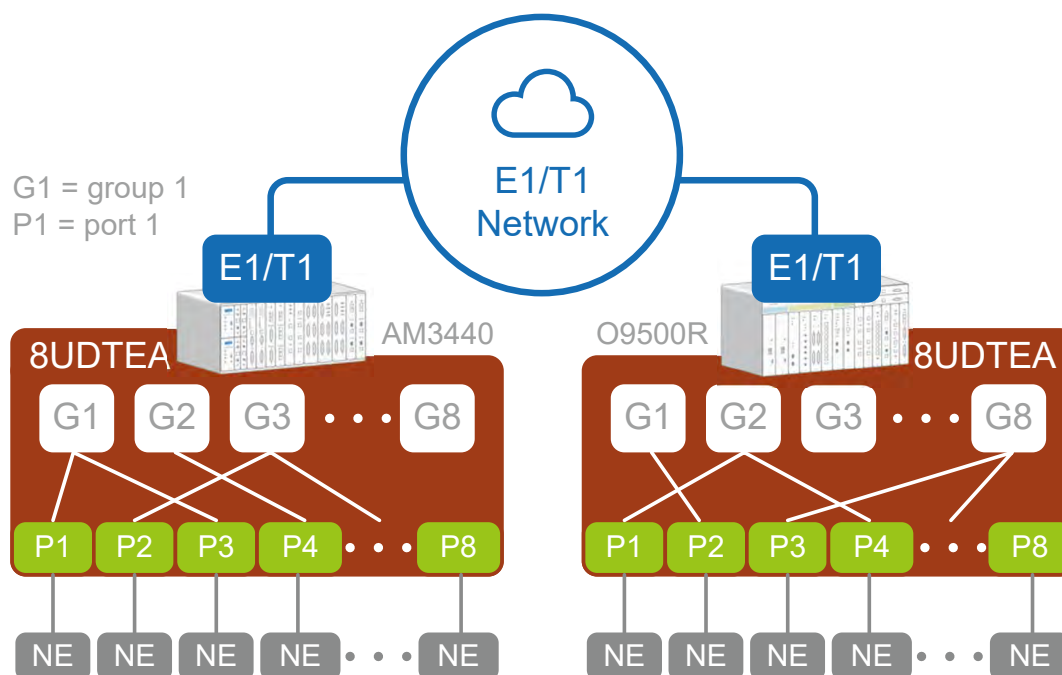
Application Illustration

Universal DTE

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Terminal Server: Point-to-Multipoint

Admin

8UDTEA

AM3440

E1/T1

E1/T1
Network

E1/T1

8UDTEA

AM3440

Router
II

NEs

E1/T1

8UDTEA

O9500R

Async RS232/
RS422/RS485

Omnibus

G1 = group 1
P1 = port 1

E1/T1
Network

E1/T1

AM3440

O9500R

E1/T1

8UDTEA

G1   G2   G3   • • •   G8

P1   P2   P3   P4   • • •   P8

NE   NE   NE   NE   • • •   NE

8UDTEA

G1   G2   G3   • • •   G8

P1   P2   P3   P4   • • •   P8

NE   NE   NE   NE   • • •   NE

(1DTE) 1-channel DTE (V.35/X.21/RS232)
For AM3440-A/C/D/E and O9550-A/D, and V4200-9 Mini Slot

Features

- 1-channel DTE plug-in cards for mini slot (V.35, X.21, RS232)
- Maximum date rate
  - V.35 and X.21 N x 56 or 64 kbps, N = 1 to 32
  - RS232: N x 56 or 64 kbps, N = 1 to 2
- Mapping to any sequential time slots
- Remote diagnostics

Description

Loop Telecom's 1-channel V.35/RS232/X.21 plug-in cards are designed for the mini slot of Loop-AM3440 and O9550 series. It allows multiplexing of N x 64 kbps data to multiples of DS0 time slots onto a digital network. An LED on the front panel of the Loop-AM3440-A/C and O9550-A chassis provides status indicators.

Application Illustration
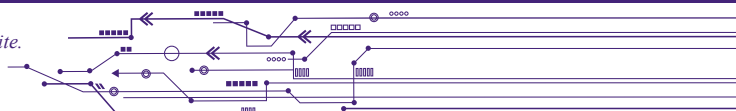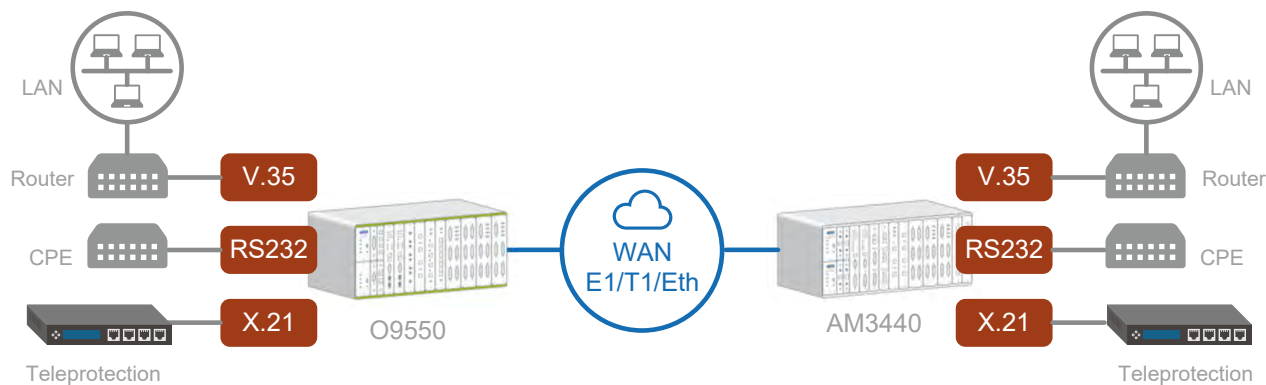
3RS232a Card
for Loop-AM3440 Mini Slot

Features

- Supports RS232
- Supports one DB44 connector for Port 1, 2, and 3.
- Two software configurable modes:
- RS232 DTE/DCE Sub-rate mode and Multi-protocol Nx64K mode.
- RS232 DTE/DCE Sub-rate Mode:
    - Port 1 and Port 2: Sync/Async RS232
    - Port 3: Async RS232
    - Supports V.110 sub-rate
    - Supports both synchronous and asynchronous data
    - Data rate
        - Sync: 0.6K, 1.2K, 2.4K, 4.8K, 7.2K*, 9.6K, 14.4K*, 19.2K, 38.4K, 48K, 64K
        - Async: 0.6K, 1.2K, 2.4K, 4.8K, 7.2K*, 9.6K, 14.4K*, 19.2K, 38.4K
- Supports MUX or NON-MUX (independent) operation
- Async supports: 7 or 8bits data, 1 or 2 stop bits, odd/even/none parity
- DCE mode/DTE mode per-card software configurable, with different conversion cable supported

*proprietary transport mode for 7.2K and 14.4K data rate

Description

The 3RS232a card for Loop-AM3440 series has three interface ports. The DB44 connector is available in Asynchronous and Synchronous modes and provides three ports. One cable supported is for converting from DB44 connector to two DB25 and one DB9 connectors.

For Asynchronous signals, each of the three asynchronous ports up to 38.4 Kb/s rate, is assigned a separate 64 Kb/s channel in independent mode. Moreover, each port can be used in either NON-MUX (independent) mode or MUX mode for Sync/Async applications.

The 3RS232a card is designed to allow users to transport subrate signals on a 64Kbps channel and the data will fill into the bit stream. Users are able to have customized MUX configuration as wishes. Also, all three ports can be MUXed; only port 1 is in MUX mode at all time, and all the configured MUX ports will be merged to port 1. Furthermore, there will be solely one MUX group and all Mux port kbits cannot be larger than 64kbits.

Application Illustration
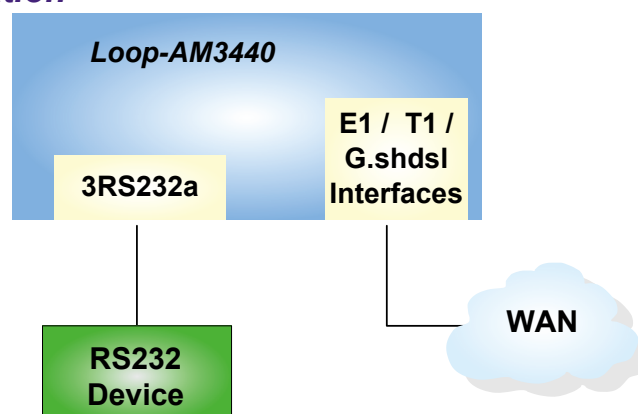
(6RS232A) 6-port RS232
For AM3440-A/C and O9550-A Single Slot

Features

- 6 RS232 ports per card
- Supports V.110 protocol
- Data rate
  - Sync: 0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 48K, 64K
  - Async: 0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K
- Mode: MUX or NON-MUX (independent) mode
- RTS remote management
- Two card types:
  - 6 RJ48 only card: 6 ports RS232 Async
 - 2 DB44 card: Up to 4 ports RS232 Sync/Async + 2 ports RS232 Async

Description

The 6RS232A card for Loop-O9550 and Loop-AM3440 series has 6 interface ports. For the RJ version, 6 RJ48 connectors are available in Asynchronous mode. For the DB version, 2 DB44 connectors are available in Asynchronous and Synchronous modes, and provide 3 ports each. Two cables are included. Each cable converts from DB44 connector to two DB25 and one DB9 connectors.

For Asynchronous signals, each of the 6 asynchronous ports up to 38.4 Kb/s rate, is assigned a separate 64 Kb/s channel in independent mode. Moreover, each port can be used in either NON-MUX (independent) mode or MUX mode for Sync/Async applications.

The 6RS232A card is designed to allow user to transport subrate signals on a 64Kbps channel and the data will fill into the bit stream. Users are able to have customized MUX configuration as wishes. Also, all 6 ports can be MUXed; only port 1 is in MUX mode at all time, and all the configured MUX ports will be merged to port 1. Furthermore, there will be solely one MUX group and all Mux port kbits cannot be larger than 64kbits.

Application Illustration

For the latest product news, updates, technical support and more, please visit our website.
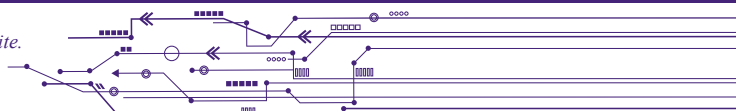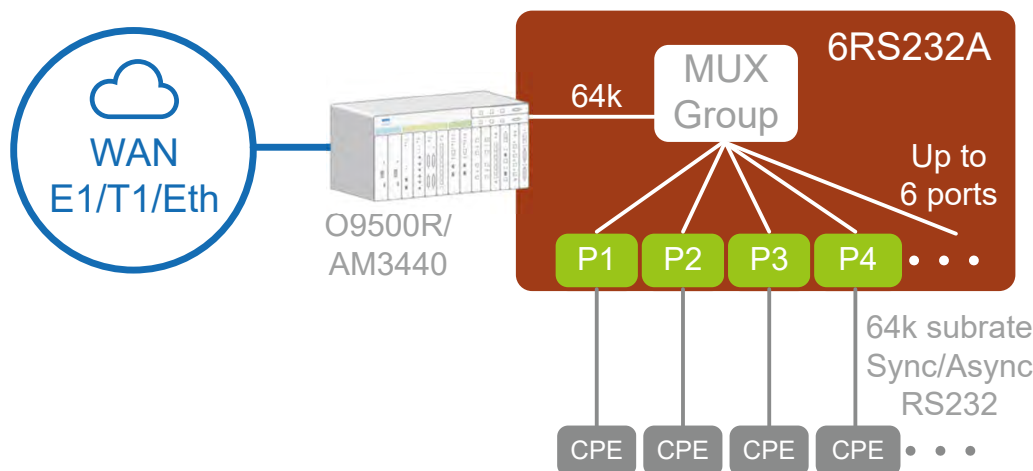
(6CDA) 6-channel G.703 at 64 Kbps
For AM3440-A/C and O9500R Single Slot

Features

- 6-port G.703 single slot plug-in card for the AM3440 series
- ITU G.703 64 Kbps Co-directional and Contra-directional
- Per port configurable for Co-directional or Contra-directional interfaces
- Co-directional Alarm: LOS and insert AIS(All 1)
- Contra-directional: LOO (Loss Of Octet)
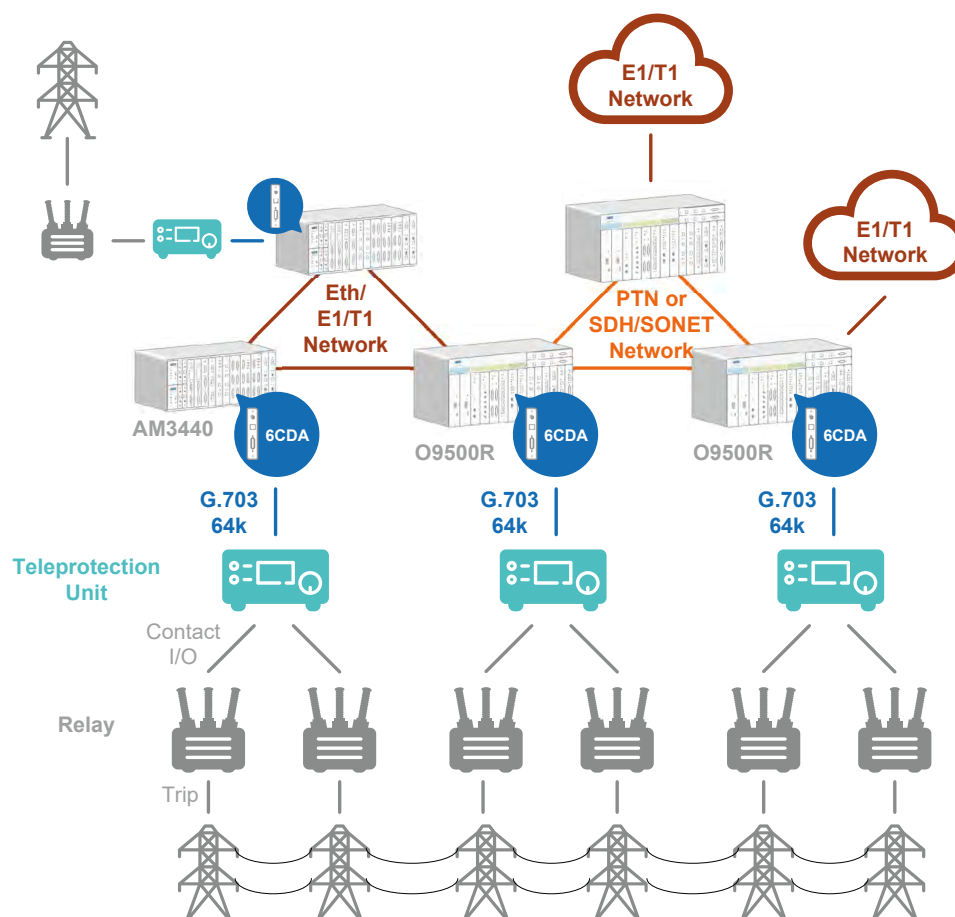- Loop back: DTE Payload Loopback, Local Loopback

Description

The 6CDA plug-in card is designed for the single slot of Loop-AM3440 series. This interface supports 64 kbps data transport using the G.703 co-directional or contra-directional timing standard over a balanced wire.

The 6CDA card provides three co-directional/contra-directional mode options for different field requirements: (a) Co-directional + Contra-directional controlling (DCE) mode, (b) Co-directional + Contra-directional subordinate (DTE) mode, and (c) Mixed mode.

The 6CDA card supports diagnostics and alarms. This allows diagnostics and fault isolation.

Application Illustration

(8CD) 8-channel G.703 at 64 Kbps
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- 8-port G.703 single slot plug-in card for the AM3440 series
- Supports data rate at 64 kbps
- Supports G.703 transmission over balanced wire
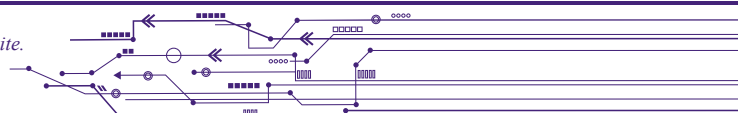- Eight LED indicators per card

Description

The G.703 plug-in card is designed for the single slot of Loop-O9500R, O9550-A, and Loop-AM3440 series. This interface supports 64 kbps data transport using the G.703 co-directional timing standard over a balanced wire.
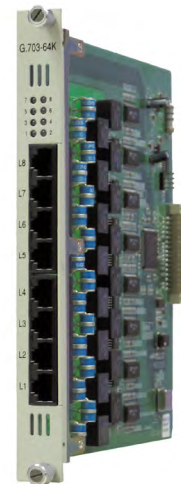
The G.703 plug-in card supports diagnostics and alarm setup by LCD operation or using a local or remote terminal connected to the main unit. This allows in-service diagnostics and fault isolation.

Note: Although the G.703 Interface Cards serve the same hardware function on O9500R, O9550, and AM3440, they have different firmware.

Application Illustration
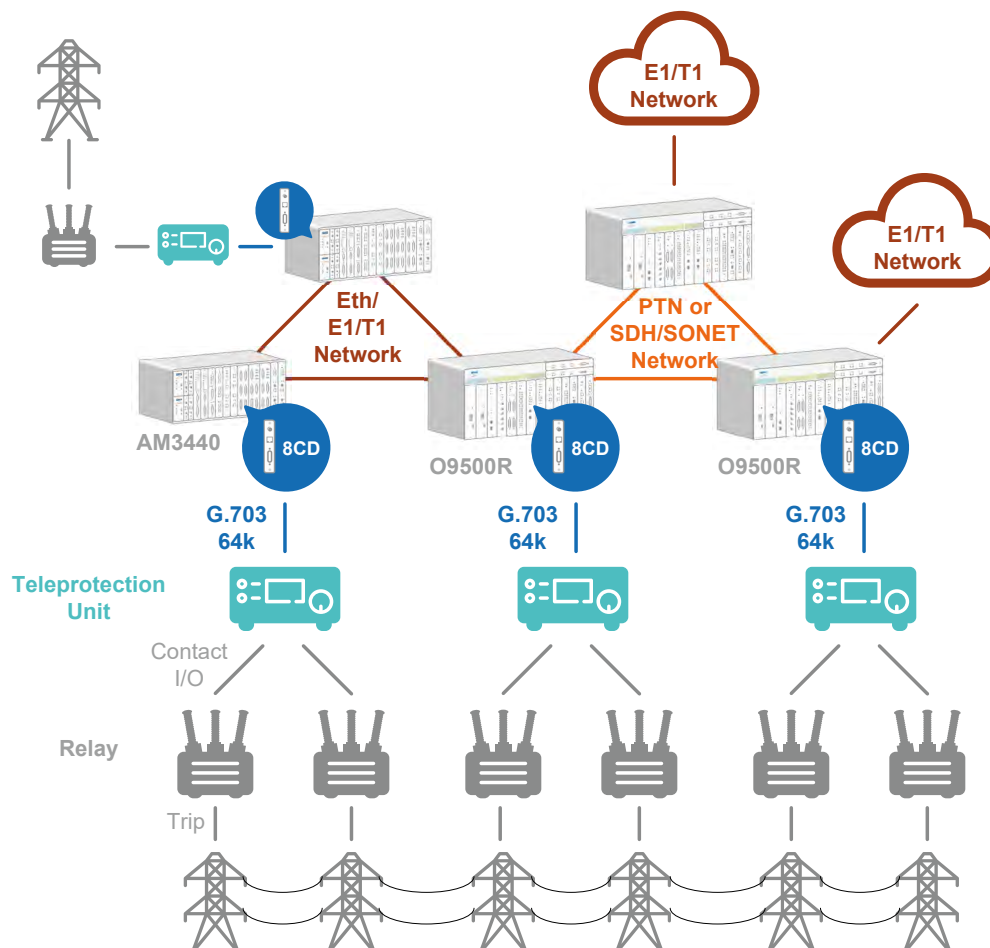
(8RS232) 8-channel RS232 with X.50 subrate
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- Supports X.50 division 2 and X.54
- Single slot
- Two card types:
  - 8 RJ48 only card: 8 ports RS232 Async
  - 2 RJ48 + 2 DB44 card: Up to 4 ports RS232 Sync + 4 ports RS232 Async
- MUX mode: 4 Sync ports at 9.6Kb/s share one 64K
- LED status indicator
- Hot swappable
- Supports Async rates from 600 bps to 38400 bps
- Supports Sync rates from 600 bps to 64000 bps
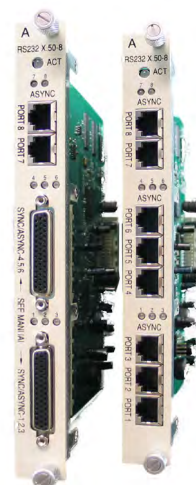
Description

The 8RS232 interface card for Loop-O9500R, Loop-O9550-A, and Loop-AM3440 series has 8 interface ports. For the RJ version, 8 RJ48 connectors are available in Asynchronous/Sync mode. The sync mode method used is oversampling at 64 Kbps, the max data rate for each RJ48 is 19.2 Kbps only available in some ports. For the DB version, 2 RJ48 provide 2 ports and 2 DB44 connectors provide 3 ports each. Two cables are included. Each cable converts from DB44 connector to two DB25 and one DB9 connectors.

For asynchronous signals, the card can be used in either INDEPENDENT mode or MUX mode. In the INDEPENDENT mode, each of the 8 asynchronous ports up to 38.4 Kb/s rate, is assigned a separate 64 Kb/s channel. In the MUX mode, up to 5 ports, each up to 9.6 Kb/s, can share a single 64 Kb/s channel. The remaining 3 ports will be multiplexed to another 64Kb/s channel.

For synchronous signals only four of the ports can be used, leaving another 4 ports as asynchronous. In the INDEPENDENT mode, each of the 4 synchronous ports can be up to 64 Kb/s. The rest of the 4 asynchronous ports, each up to 38.4 Kb/s rate, is assigned a separate 64 Kb/s channel per port. In the MUX mode, the 4 synchronous ports, each up to 9.6 Kb/s, share a single 64 Kb/s channel. The other 3 asynchronous ports will be multiplexed to another 64Kb/s channel.

The 8RS232 interface card uses the multiplexing format defined in ITU-T X.50 Div.2 and in X.54 for rates below 64 Kbps. For 64 Kbps transport, standard RS232 format is used. In the INDEPENDENT mode when only one subrate signal is transported, the unused bandwidth is filled with "1s".

Application Illustrations

(ODP) 1-channel OCU-DP
For AM3440-A/C/D and V4200-9 Mini Slot
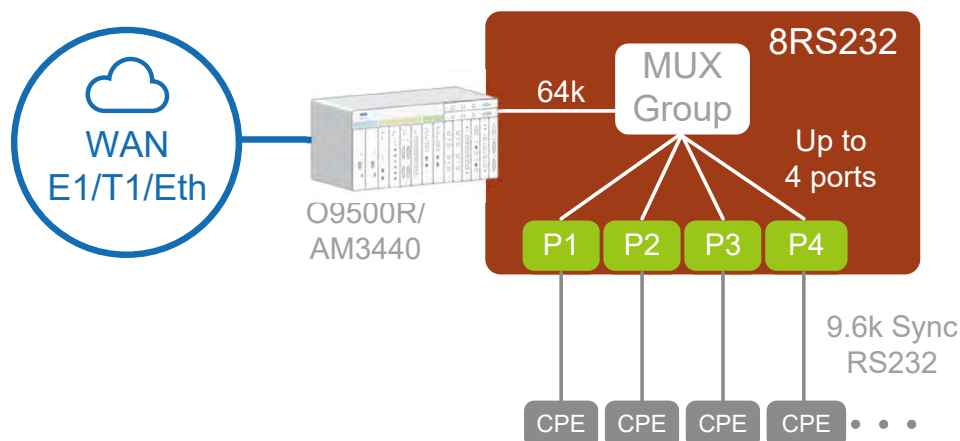
Features

- RJ45 & 4-wire non-loaded balanced loop connector
- Supports data transmission sub-rates up to 64kbps
- DDS or Switched 56
- Configuration software field upgradeable
- Automatic line equalization
- Can be multiplexed with other ports
- Easy configuration from SNMP, Telnet, and VT-100 terminal
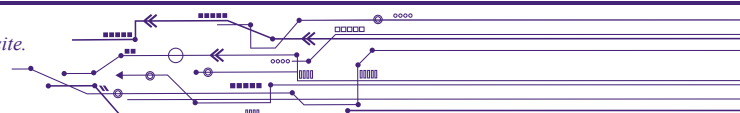
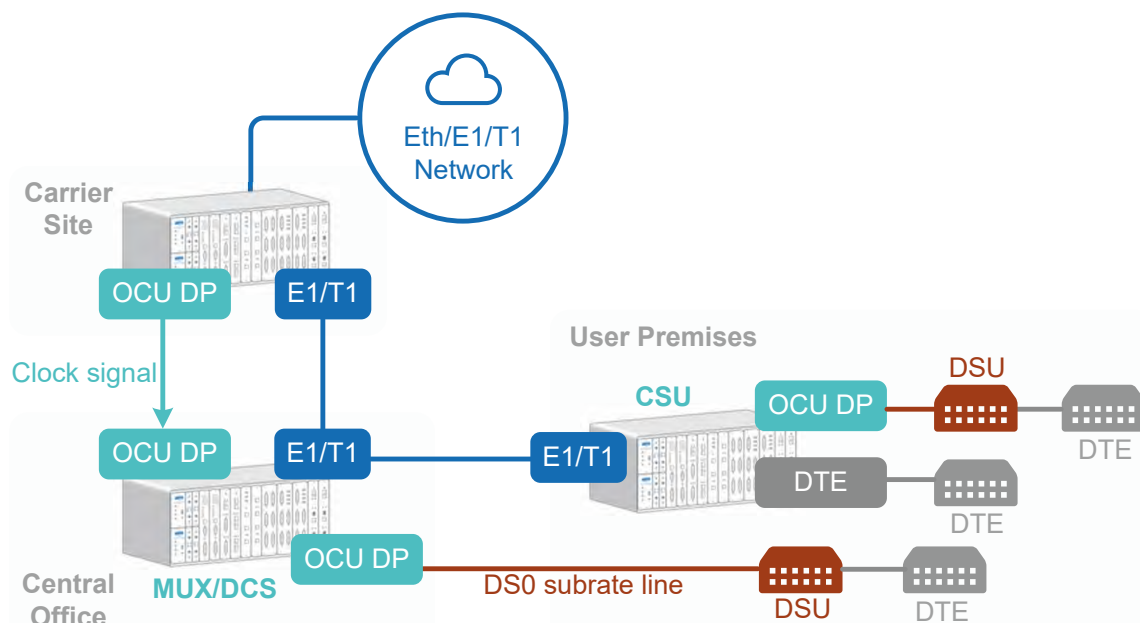**For AM3440-A/C**

For AM3440-D/V4200-9

Description

OCUDP card is a single-slot interface card designed for 64K signals from switches, frame relay, and etc. with up to 5.5 km reach. OCU-DP is often used for leased lines to provide voice, video, and data service transportation. An AM3440 at the Central Office serves as a multiplexer (MUX) or DCS by connecting via OCUDP cards to user premises equipment for leased lines. At the user premises, an AM3440 can also work as CSU by connecting to the Central Office via E1/T1 cards, and to existing DSUs via OCUDP cards and DTE via DTE cards.

OCUDP serves with different additional functions when facing different sites. At the DDS and DTE sides, it can also provide diagnostic functions by sending test messages at different circuit levels. At the Central Office facing the Carrier side, the OCUDP can be used for clock synchronization by being a Slave Clock and receives clock messages from the OCUDP at the Carrier Sites that serves as a Master Clock.

Application Illustration

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(ODP) 8-channel OCU-DP
For AM3440-A, O9500R, and O9550-A Single Slot

Features

- 8 ports per card
- Connector: Eight RJ48S or one Telco 64
- 4-wire non-loaded balanced loop connector
- Supports data transmission sub-rates up to 64 kb/s
- DDS or Switched 56
- Automatic line equalization

Description

OCUDP card is a single-slot interface card designed for 64K signals from switches, frame relay, and etc. with up to 5.5 km reach. OCU-DP is often used for leased lines to provide voice, video, and data service transportation. An AM3440 at the Central Office serves as a multiplexer (MUX) or DCS by connecting via OCUDP cards to user premises equipment for leased lines. At the user premises, an AM3440 can also work as CSU by connecting to the Central Office via E1/T1 cards, and to existing DSUs via OCUDP cards and DTE via DTE cards.

OCUDP serves with different additional functions when facing different sites. At the DDS and DTE sides, it can also provide diagnostic functions by sending test messages at different circuit levels. At the Central Office facing the Carrier side, the OCUDP can be used for clock synchronization by being a Slave Clock and receives clock messages from the OCUDP at the Carrier Sites that serves as a Master Clock.

Application Illustration

(12FXOA/FXSA) 12-channel FXO /FXS
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- 12 RJ11 connectors or one Telco 64 connector
- 12 telephone connections for FXS
- 12 central office or PBX line connections for FXO
- Supports PLAR
- Loop start or Loop start/ground start option
- Battery reverse supported
- DID supported
- 12 kHz and 16 kHz metering pulse option
- A, B, C, D signaling bit software programmable
- A-law or μ-law coding
- Most signaling conventions supported
- Multi-color LED indicators for each port

12FXOA

Description

The 12FXSA/12FXOA plug-in cards are designed for the single slot of Loop-AM3440 series, O9500R and O9550-A. It allows voice frequency interfaces to be multiplexed as a 64 kbps DS0 signal onto a digital network. 12FXSA provides 12 voice Interfaces connect to telephones. 12FXOA provides connections from telephone lines, either from a central office or from a PBX in RJ11 x 12 connectors or one Telco 64 connector. Coding is either A-law or μ-law selectable by user. Most popular signaling conventions are supported, including PLAR.
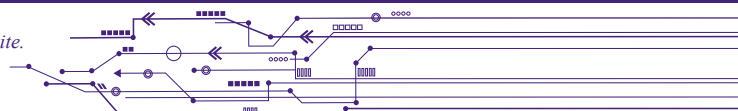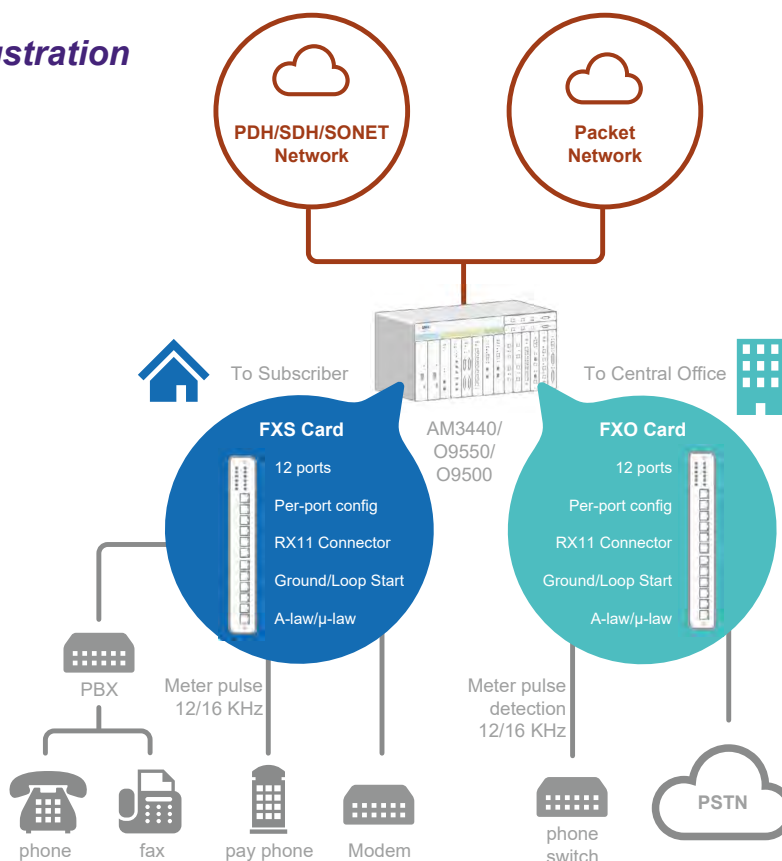
12FXSA

Application Illustration

PDH/SDH/SONET Network

Packet Network

To Subscriber

AM3440/ O9550/ O9500

To Central Office

FXS Card
- 12 ports
- Per-port config
- RX11 Connector
- Ground/Loop Start
- A-law/μ-law

FXO Card
- 12 ports
- Per-port config
- RX11 Connector
- Ground/Loop Start
- A-law/μ-law

PBX

Meter pulse 12/16 KHz

Meter pulse detection 12/16 KHz

phone   fax   pay phone   Modem   phone switch   PSTN
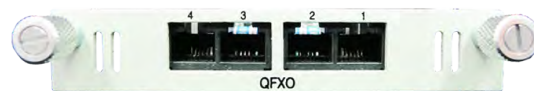
(QFXO) 4-channel FXO
For AM3440-A/C/D/E, O9550-A/D, and V4200-9 Mini Slot

Features

- 4 central office or PBX line connections for QFXO
- Loop start or ground start (manufacturing option)
- 12 khz or 16 khz metering pulse (manufacturing option)
- ANSI, ETSI (manufacturing option)
- A, B, C, D Bit (manufacturing option)
- User programmable A-law or Mu-law coding
- User programmable loss adjustment
- User programmable balance 600/900 ohm impedance
- Most signaling conventions supported
- Battery reverse supported

QFXO (for AM3440-A/C & O9550R-A)

QFXO (for AM3440-D/E & O9550R-D)

Description

The QFXO plug-in card is designed for the Loop-AM3440 and O9550. It allows voice frequency interfaces to be multiplexed as a 64 kbps DS0 signal onto a digital network. The QFXO provides four voice connections to central office or PBX and provides user selectable A-law or mu-law coding.

Application Illustrations

PDH/SDH/SONET Network

Packet Network

To Subscriber

QFXOA

AM3440/ O9550

To Central Office

Meter pulse Detection 12/16 KHz

Central Office Switch

PSTN

(QFXSA) 4-channel FXS
For AM3440-A/C/D/E, O9550-A/D, and V4200-9 Mini Slot

Features

- 4 telephone connections
- PLAR supported
- 3 options supported: Loop Start, Ground Start, Metering Pulse
- Metering Pulse support 12KHz/16KHz
- User programmable signaling Bit A, B, C, D
- User programmable A-law or Mu-law coding
- User programmable gain adjustment
- User programmable balance 600/900 ohm impedance
- Complied with ±48 Vdc (SDB) and AC (SAB) power modules
- Signaling and voice tests
- Status monitoring

QFXSA Card Panel View
(for AM3440-A/C & O9550R-A)

QFXSA Card
(for AM3440-D/E & O9550R-D)

Description

The QFXSA plug-in card is designed for the Loop-AM3440 and O9550. It allows voice frequency interfaces to be multiplexed as a 64 kbps DS0 signal onto a digital network. QFXSA provides connections to four telephones and it also provides user programmable A-law or mu-law coding. Most popular signaling conventions are supported, including PLAR (Private Line Automatic Ring down). The QFXSA supports signaling tests, including ring test, battery reverse test, channel swap, metering pulse test, and tip open test. Moreover, it supports status monitoring: line, signaling bit, and jump setting.
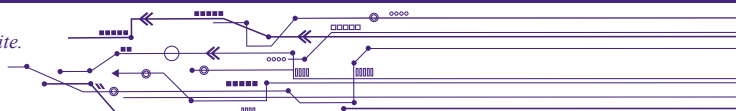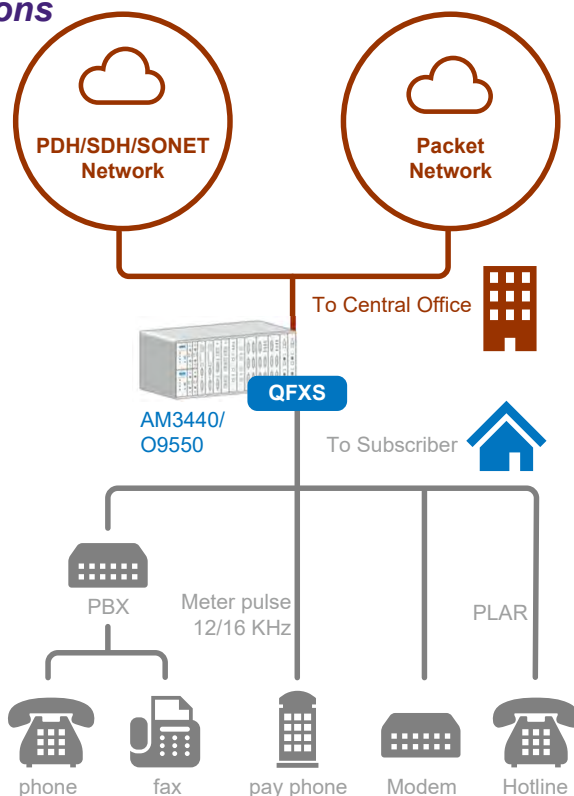
Application Illustrations

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(12MAGA) 12-channel Magneto
For AM3440-A/C, O9500R, and O9550-A Single Slot
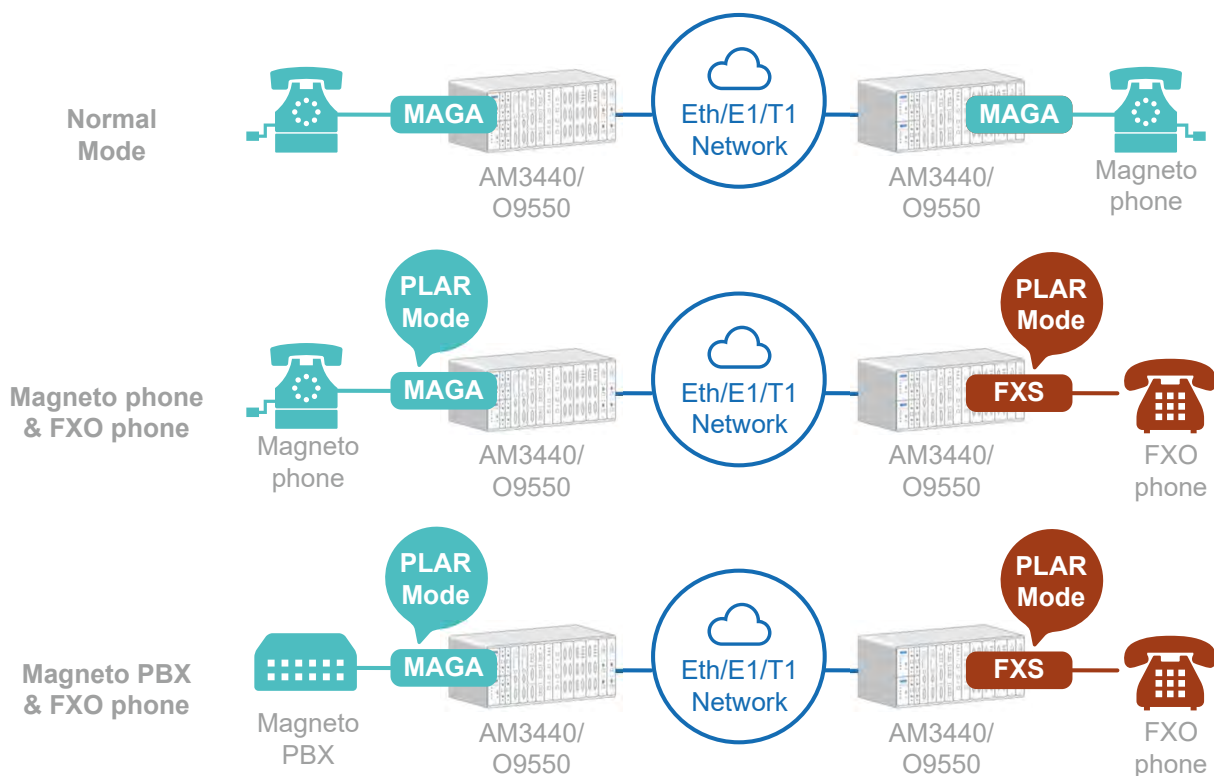
Features

- 12 telephone connections for Magneto
- Twelve RJ11 connectors or one Telco 64 connector
- Supports MRD (manual ring down)
- Supports Magneto to FXS speak PLAR function
- Supports dual type L1/L2 and L1/GND magneto phone or MRD
- Per port software programmable for ringing and ring detection on L1/L2 or L1/GND
- 16 Vrms minimum detectable ring
- Intended for use with 110-220 Vac (SAB) or ±48 Vdc (SD, SDA, SDB, SD125) powered main units

Description

The twelve channel magneto (12MAGA) plug-in card is designed for the low speed single slot of Loop-O9500R, Loop-O9550-A, and Loop-AM3440-A/C devices. This module allows communications between magneto telephones. With the card set in PLAR mode, communications can take place between a magneto telephone and a regular telephone. All signaling is carried transparently by the digitizing process.

Application Illustrations

Normal Mode

Magneto phone & FXO phone

Magneto PBX & FXO phone

(QMAGA) 4-channel Magneto
For AM3440-A/C/D, O9550-D, and V4200-9 Mini Slot
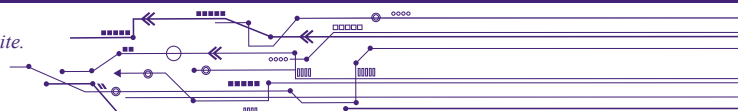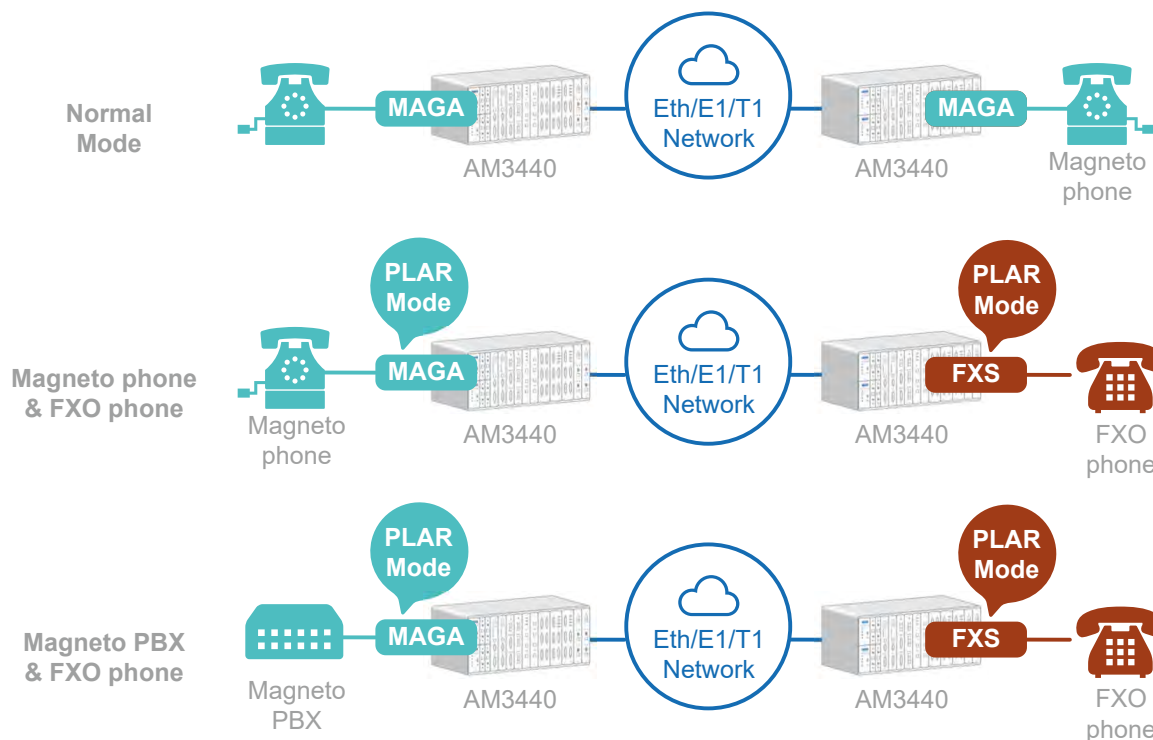
Features

- 4 telephone connections for Magneto
- Supports MRD (manual ring down)
- Supports Magneto to FXS speak PLAR function
- Supports dual type L1/L2 and L1/GND magneto phone or MRD
- Per port software programmable for ringing and ring detection on L1/L2 or L1/GND
- 16 Vrms minimum detectable ring
- Intended for use with 110-220 Vac (SAB) or ±48 Vdc (SD, SDA, SDB, SD125) powered main units

Description

The four channel magneto (QMAGA) plug-in card is designed for mini slot. This module allows communications between magneto telephones. With the card set in PLAR mode, communications can take place between a magneto telephone and a regular telephone. All signaling is carried transparently by the digitizing process.

Application Illustrations

For the latest product news, updates, technical support and more, please visit our website.

(8EMA) 8-channel 2W/4W E&M
## For AM3440-A/C, O9500R, and O9550 Single Slot

Features

- Eight RJ45 connectors or one Telco 64 connector for E&M
- Supports E&M signaling over Type 1, Type 2, Type 3, Type 4 and Type 5
- Programmable gain setting per-port
- A side and B side supported (A side is exchange side, B side is carrier side)
- 2 wire, 4 wire supported
- Transmit only (TO) type supported
- A-law or µ-law coding
- Provides ±24, ±48 or ±125Vdc powered manufacture options

Description

Loop Telecom's E&MA plug-in card is designed for the single slots. It allows 8 ports E&M interfaces to be multiplexed to 64 kbps DS0 signals. It can also be used as TO (Transmit Only). Voice coding can be selected as either A-law or µ-law. Manufacture options are available to use on AM3440 system with ±24, ±48 or ±125Vdc power input.

Application Illustration
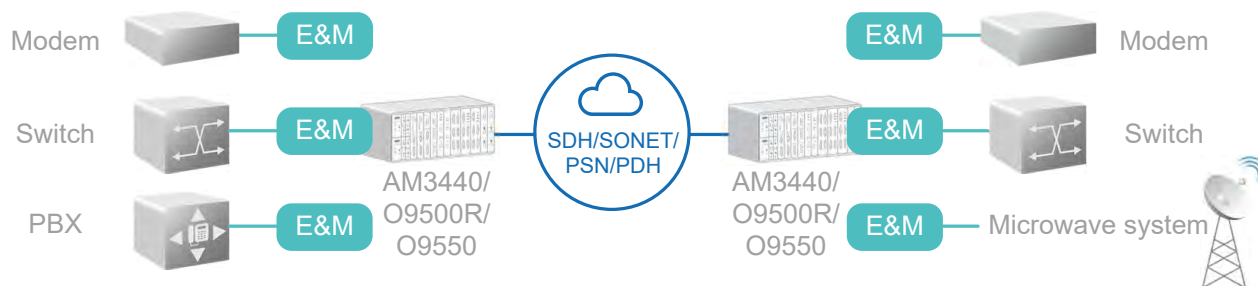
(QEMA) 4-channel E&M
For AM3440-A/C/D/E, O9550-A/D, and V4200-9 Mini Slot

Features

- Five E&M signaling types are supported: Type I, Type II, Type III, Type IV, and Type V
- Jumpers selectable for Type I, II, III, IV, V or Tx only
- TO (Transmit Only) supported
- A-side and B-side supported: A-side is exchange side; B-side is carrier side
- User programmable A-law or mu-law coding
- User programmable loss adjustment
- User programmable balance 600/900 ohm impedance
- CAS signaling convention
- Jumper selectable: 2/4 WIRE, A/B SIDE
- Support diagnostic functions, including:
  - off hook test
  - loopback test
  - LED display bit for signaling monitoring

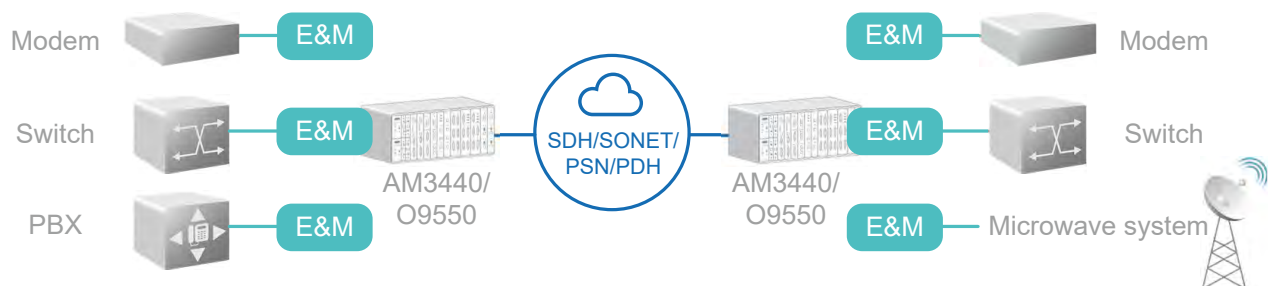**QEMA Card (for AM3440-A/C & O9550R-A)**

QEMA Card (for AM3440-D/E & O9550R-D)

Description

The QEMA card requires an external cable to support 4-RJ45 ports for connecting to PBX tie lines, carrier facilities, or 4-wire modems. Each RJ45 port has 8 pins supporting the following signaling and transmission pairs: E/M, SG/SB, T/R, and T1/R1.

The card can configure different types, A/B side and 2/4 wire options by jump location. Users can utilize additional jumpers enclosed in the package for Type I, II, III, IV, V and TO (Transmit Only) signaling options. Type TO provides dedicated 4-wire transmit and receive paths to lease-line modem equipment. There are choices of two side: Using A side mode, the card can operate as switching equipment. Using B side mode, the card can operate as channel equipment. There are 3 diagnostic functions supported: off hook test, loopback test, and LED display bit for signaling monitoring. Moreover, users could have LEDs provide channel setting and channel status indicators.

Application Illustration
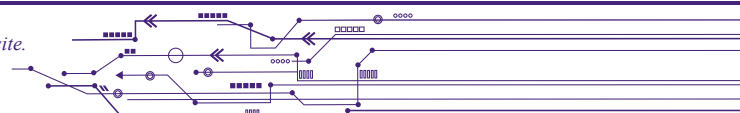
(8DBRA) 8-channel Data Bridge
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- Hot pluggable single slot card for O9500R, O9550, and AM3440 series
- ASYNC RS232 data only
- Two card types, both support 8 ports RS232 ASYNC
  - 8 RJ48C card
  - 2 RJ48C + 2 DB44 card
- Data bridge features
  - Each card supports up to 128 DS0
  - Each port supports bridge functionality to N remote tributary sites (N = 1-20)
  - Works with the other equipment in the transmission of 1200 to 19200 bps asynchronous data via oversampling channel
- Protection
  - 1+1 port protection
  - 1+1 slot protection, switching time < 50 ms
  - Dual Host Data Server
- LED status indicator

Description

The Data Bridge Card for Loop-O9500R, Loop-O9550, and Loop-AM3440 series has 8 RS232 ports. On the Data Bridge Card, each RS232 port uses data bridge function on 1DS0 sync 56 kbps or 64 kbps channel to get the ASYNC data from the host data server (ASYNC data rate ranges from 1.2K bps - 19.2K bps). Then the host data server will broadcast the data to the remote tributary site.

Under operation, 1 to 20 end points per multi-drop circuit go into a logical ended 56K or 64K channel, and the data at the tributary and the host end enters the channel banks through RS232 synchronous interfaces. The primary is then either mapped out the RS232 synchronous port, or is mapped to another upstream DS0. Each port RS232 could support the data bridge function reaching to 20 remote tributary sites. Each tributary is asynchronous data sent over synchronous channel using over-sampling techniques.

Protection can be (a) 1+1 on a pair of ports on the same card which provides line protection, (b) 1+1 on pair of ports on adjacent cards which provides card protection, or (c) 1+1 on a pair of ports on different chassis which provides chassis and site protection.

Note: Although the Data Bridge Cards serve the same hardware function on O9500R, O9550, and AM3440, they have different firmware.

Applications

The host data server is responsible for sending requests to the target tributary site. Only one tributary site is allowed to send data to the host data server at a time. When the tributary site gets the request, it sends ASYNC data through E1/T1 network into the O9500R, O9550, and AM3440 devices. The data from the tributary sites could either travel on separate DS0 within a single E1/T1 Network, or within separate E1/T1 Networks. The data goes into the O9500R, O9550, and AM3440 through the QE1/QT1 card, TSI connect mapping and the Data Bridge Card, then to the host data server.
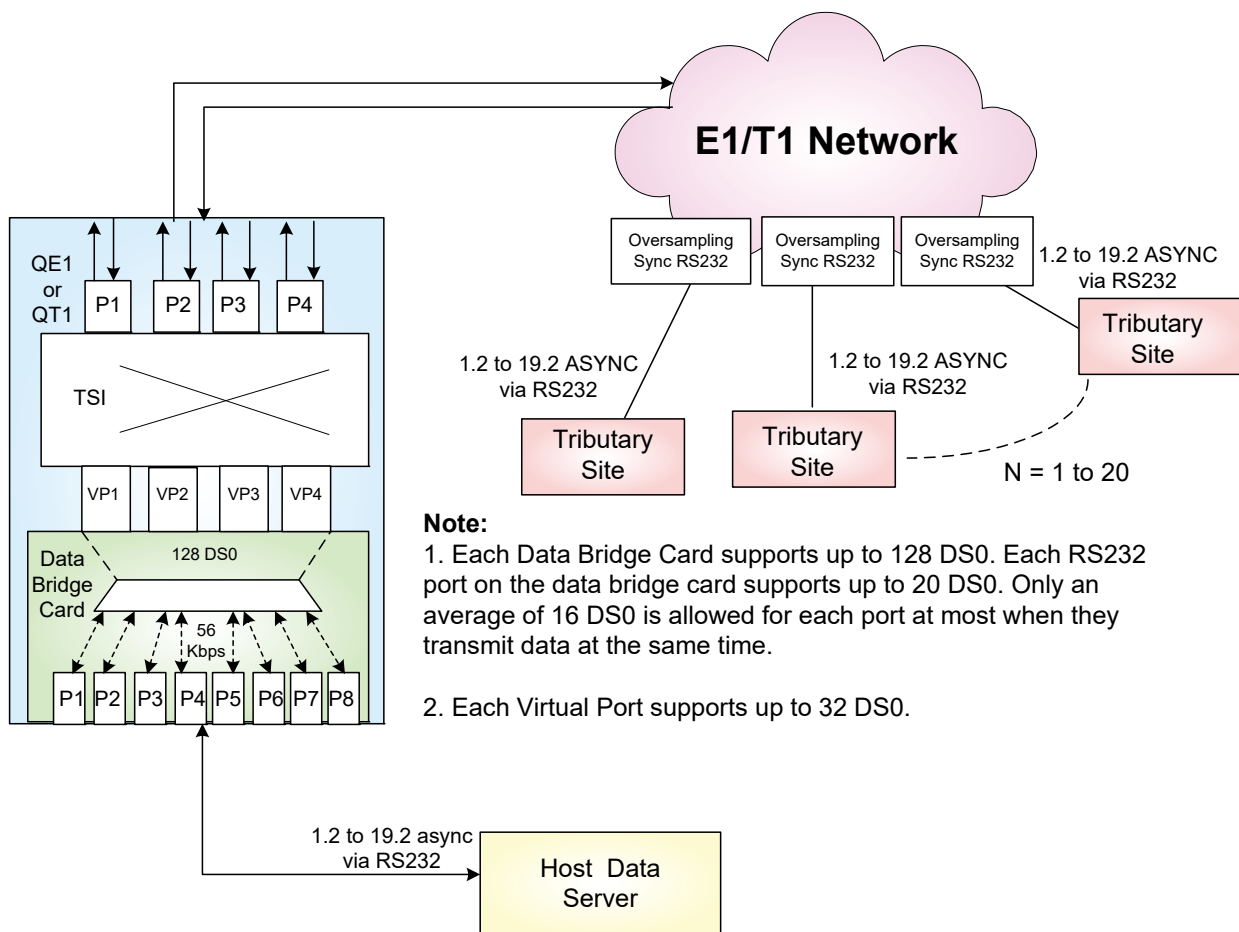
Note:

1. Each Data Bridge Card supports up to 128 DS0. Each RS232 port on the data bridge card supports up to 20 DS0. Only an average of 16 DS0 is allowed for each port at most when they transmit data at the same time.
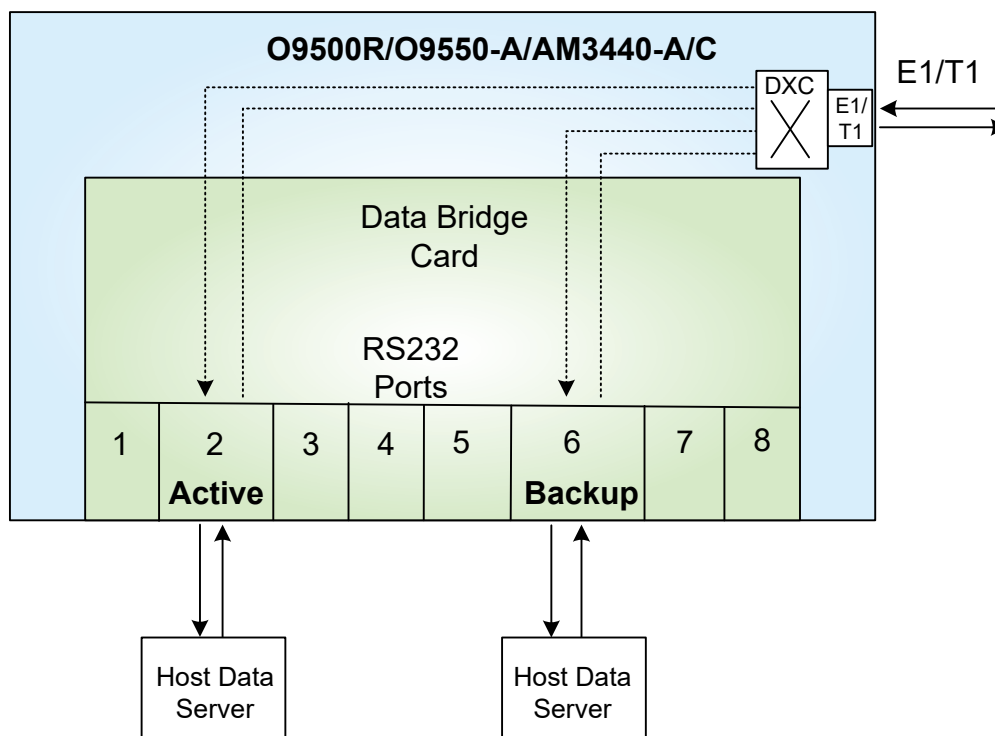
2. Each Virtual Port supports up to 32 DS0.
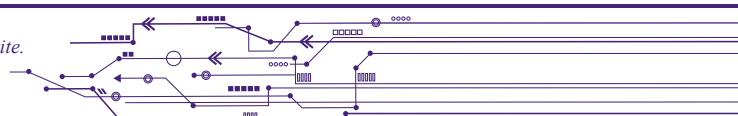
Port-level 1 + 1 backup with one card

RS232 port1 and 5, port 2 and 6, port 3 and 7, port 4 and 8 work in pairs to support 1+1 backup function. Port1 to port 4 connects to the active host data server, and port 5 to port 8 connects to the backup host data server.
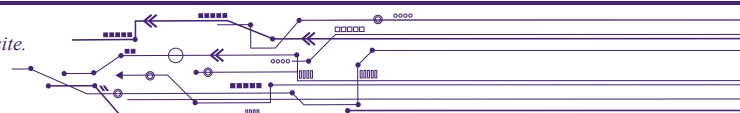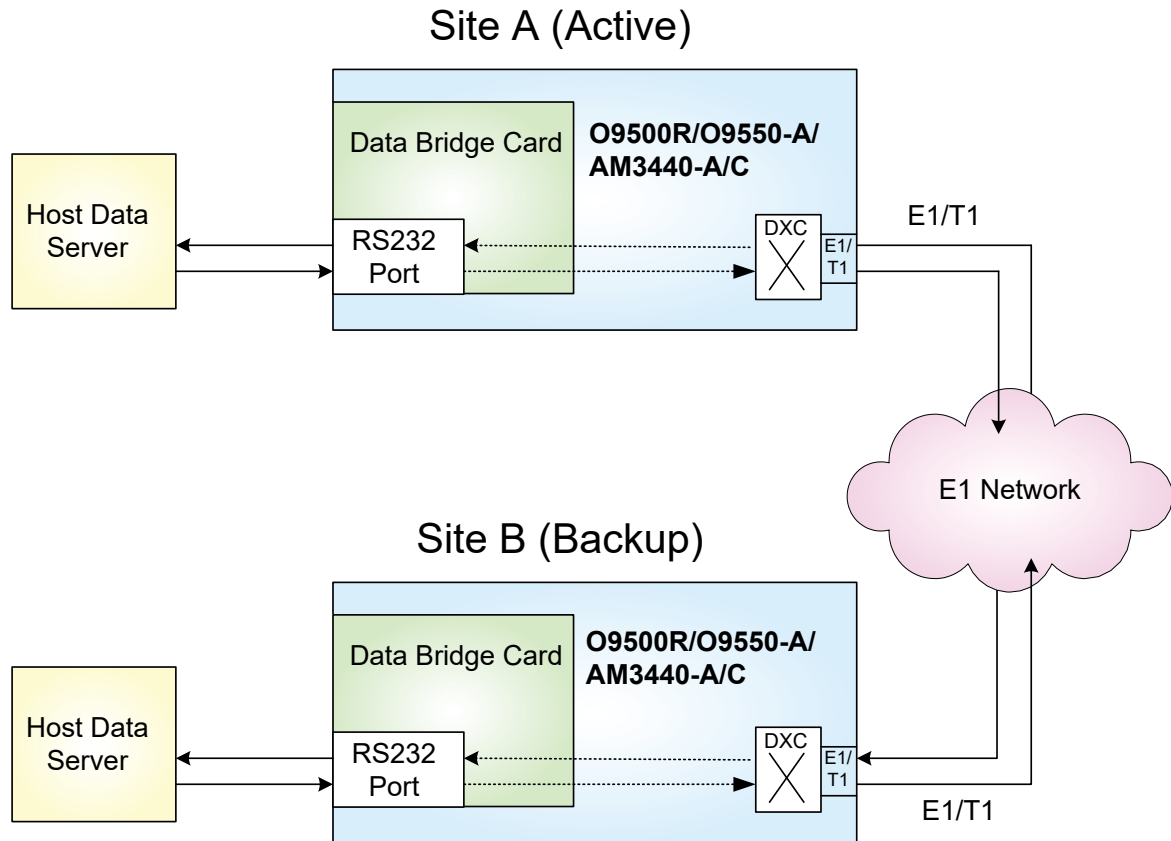

Card-level 1 + 1 backup with two cards

The Data Bridge Cards in slot 1 and 2, slot 3 and 4, slot 5 and 6…slot 11 and 12 work in pairs for card-level 1+1 backup function.
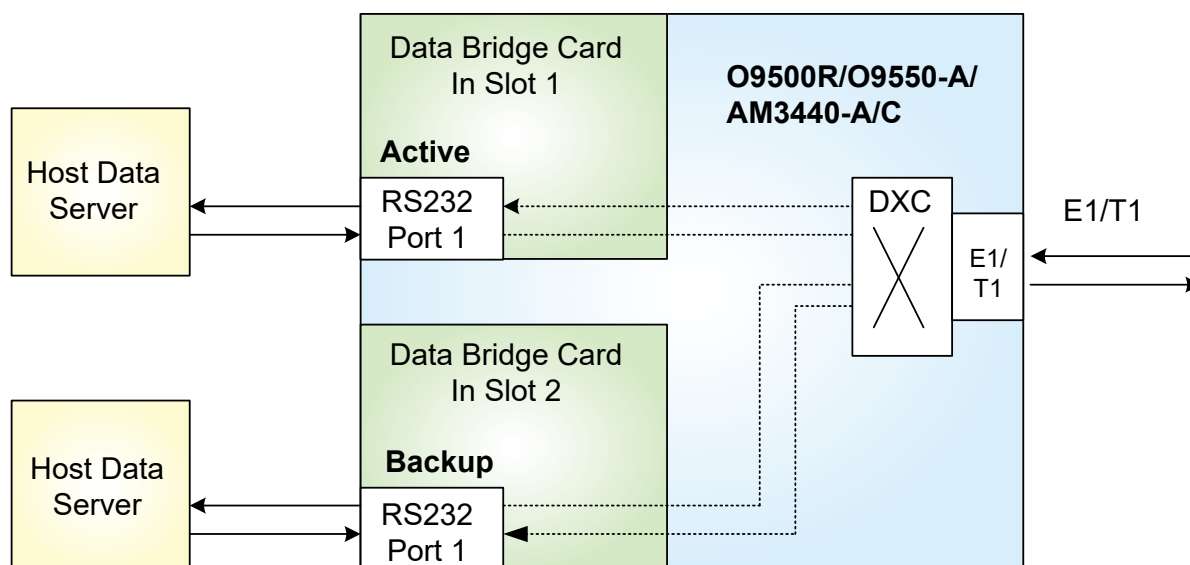
Site-level 1 + 1 backup with two chassis

The data bridge card supports dual host data box function. When one host data server fails, the other host data server takes over and sends the data to the remote tributary data boxes.

Site A (Active)

Site B (Backup)

For the latest product news, updates, technical support and more, please visit our website.

(8DC) 8-channel Dry Contact
For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- Two Dry Contact plug-in cards are available
  - Dry Contact type A card
  - Dry Contact type B card
  - Lighting Protection (IEC61850-3, IEEE1613)
- Dry Contact Inputs
  - 8 pairs per card (2 ports per card, 4 pairs per port)
  - Connector: RJ45
  - Collect dry contact input signals and send alarm traps via SNMP port or inband to EMS management system
  - Collect dry contact to be transferred via the E1 or fiber optic cable to a dry relay contact output
  - Type A input port provides 3.3V output
- Dry Contact Outputs
  - 8 pairs per card
  - Connector: Screw
  - Enable dry contact output signals through instructions via SNMP port or inband to EMS management system
  - Enable dry contact from the E1 or fiber cable to a dry relay contact output
  - Support Open/Short function

Dry Contact Type A   **Dry Contact Type B**
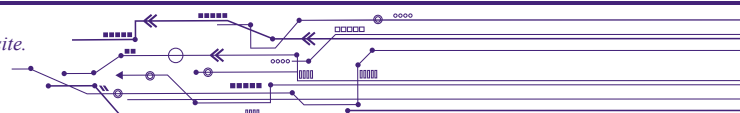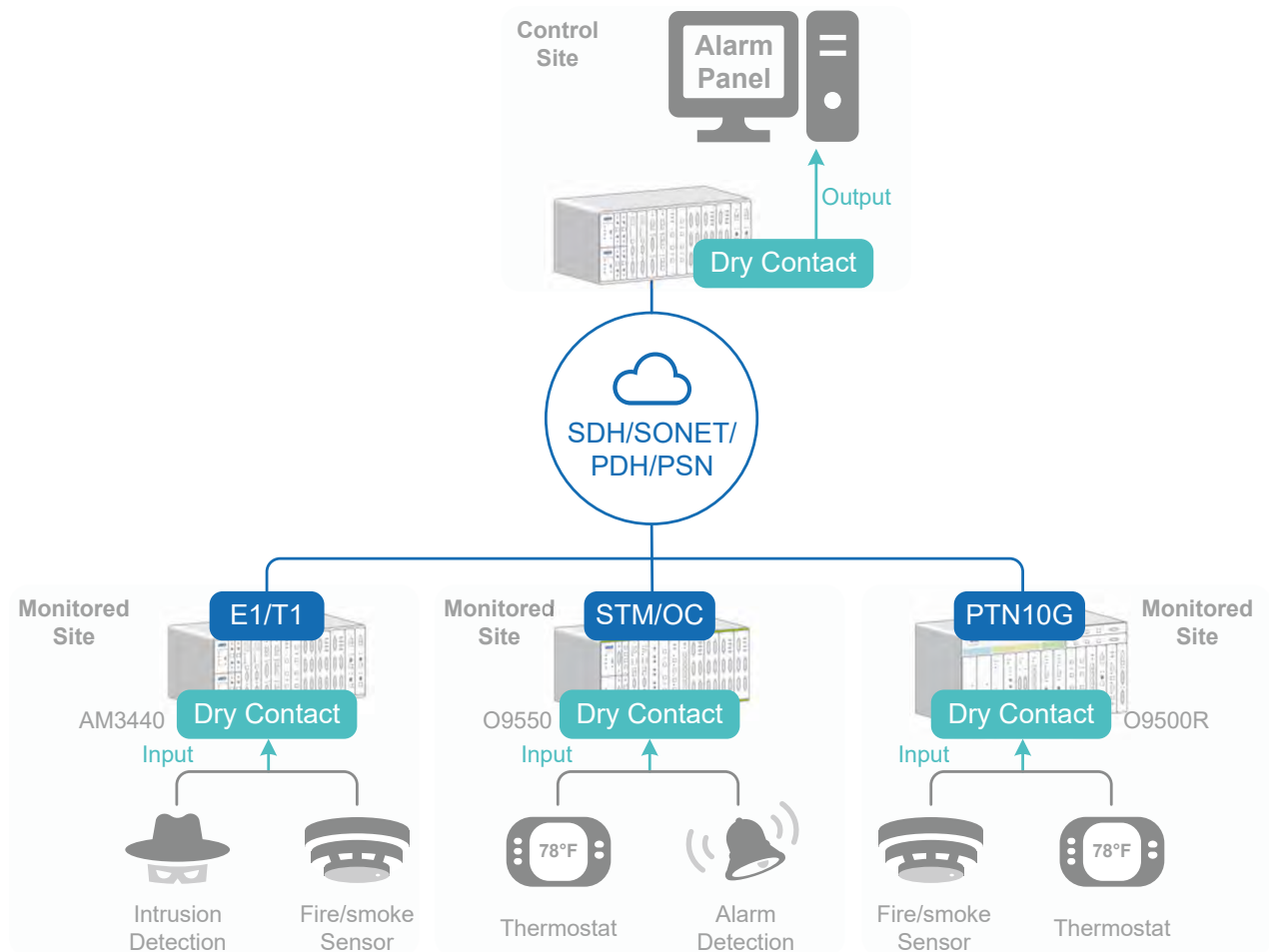

Description

Loop Telecom's Dry Contact type A and Dry Contact type B plug-in cards are designed for the Loop-AM3440 series, O9550 and O9500R. These Dry Contact cards, which can be assigned to 2 DS0 time slots or 16 DS0 time slots, are used for (1) collecting alarm inputs from non-SNMP devices and issuing alarms via an SNMP trap, (2) sending commands to close remote contacts for relay devices, and (3) repeat a remote contact closure with a local contact closure.

The difference between Dry Contacts type A and type B is the higher voltage for type B interface card. These cards are used to detect remote contact closures activated by alarms and to provide remote contact closures to control network operation where needed.

When 2 DS0 time slots are chosen to carry the dry contact signals, 8 bits of one time slot carry the input contact status, and 8 bits of the other carry the output contact commands. When 16 DS0 time slots are chosen to carry the dry contact signals, one bit of each of 8 DS0 time slot carry the input contact status, and one bit of each of other 8 DS0 carry the output commands.

Application Illustrations

Control Site — Alarm Panel — Output — Dry Contact

SDH/SONET/PDH/PSN

Monitored Site — E1/T1 — AM3440 — Dry Contact — Input — Intrusion Detection — Fire/smoke Sensor

Monitored Site — STM/OC — O9550 — Dry Contact — Input — Thermostat 78°F — Alarm Detection

Monitored Site — PTN10G — O9500R — Dry Contact — Input — Fire/smoke Sensor — Thermostat 78°F

(ABRA) Analog Bridge
For AM3440-A/C/D/E Mini Slot

Features

- Mini-Slot plug-in module for AM3440-A/C/D
- Up to 8 bridge groups
- Analog Bridge function
  - Data Bridge
    - Working with voice cards (**E&M, FXS,** and **Magneto**) on the AM3440
    - Downstream: two to many
    - Upstream: many to two
    - Master/Slave Architecture
      - Up to 2 Masters and 14 Slaves in one group
      - 2 Masters for 1+1 protection
- Voice Conference Hotline Mode with CAS Signaling
  - Any-to-Any architecture
  - Up to 16 members in one group
- RS232 Data Bridge function
  - Working with 8RS232, 8DBRA cards on the AM3440
  - Downstream: two to many
  - Upstream: many to two
  - Master/Slave Architecture
    - Up to 2 Masters and 14 Slaves in one group
    - 2 Masters for 1+1 protection
- Voice Protection Mode
  - One Master to two Slaves for 1+1 protection
  - Analog signals only
  - 42 protection groups
- OCU-DP Data Bridge function
  - Downstream: one to many
  - Upstream: many to one
  - Data rate: 2.4, 4.8, 9.6, 19.2, 56, and 64K
  - Master/Slave Architecture
    - 1 Master to 14 Slaves in one group

For AM3440-A/C   **For AM3440-D/E**

Description

The Analog Bridge Card (ABRA) is designed for the AM3440 series which is for analog bridging and digital bridging function. It works with E&M, FXS, and Magneto cards in analog data bridging and voice conferencing mode with CAS. It works with 8RS232 and 8DBRA in digital data bridging mode. Digital bridging can be performed at either 64k bit/s or sub-rates (when MJU function is enabled) to support sub-rate signals from interface cards such as OCU-DP.
The ABRA Card supports up to eight independent analog or digital bridge groups. An analog group can be set to either the conference mode or Master/Slave mode; a digital group can be set only to Master/Slave mode.
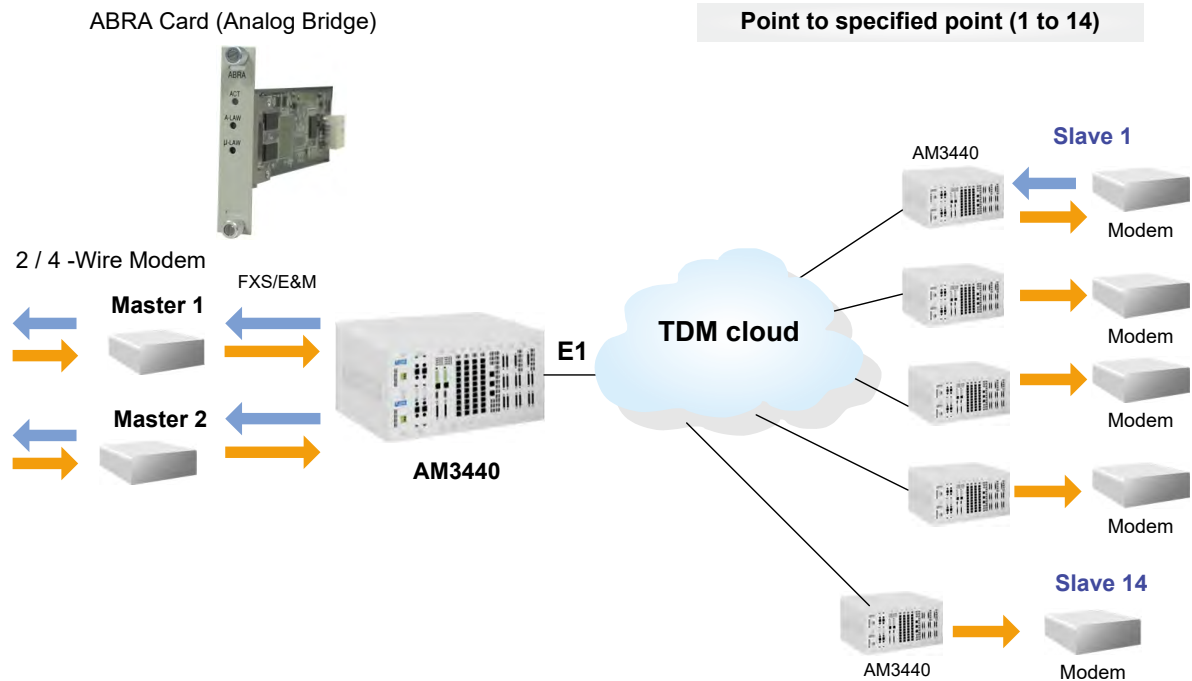
In the conference mode, up to 16 members in one conference group are allowed to participate in a single any-to-any voice conference with hotline signaling. Voice traffic coming from E&M, FXS, and Magneto interfaces could be mapped to a member channel and broadcast to other member channels.

In the Master/Slave mode, data are bridged upstream and downstream in master/slave architecture. Upstream, the card checks all Rx data from slave ports in a master/slave group and sends the data from only one active slave to the master port. Downstream, it duplicates traffic coming from the master and then broadcasts the traffic to all slaves.
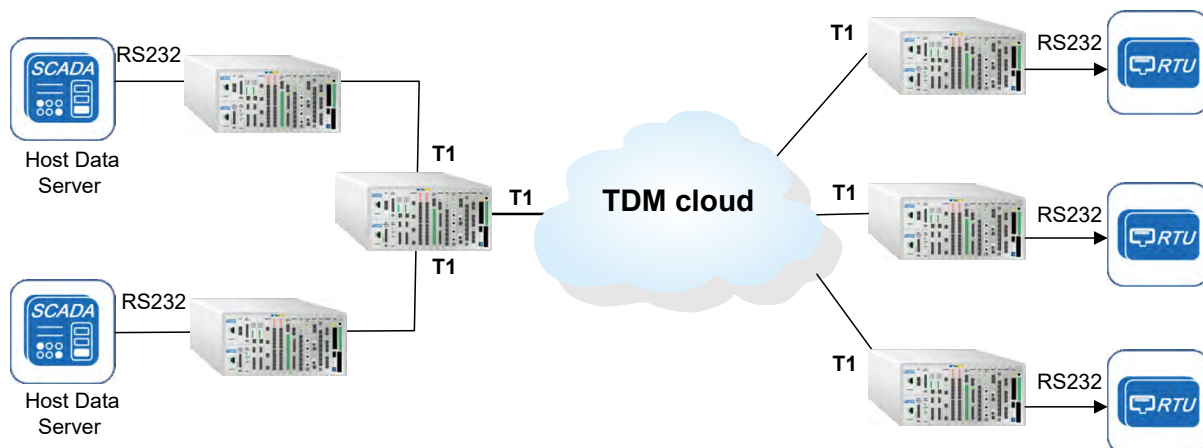
The ABRA card can be set to the Voice Protection mode to enable 1+1 protection for analog signals.
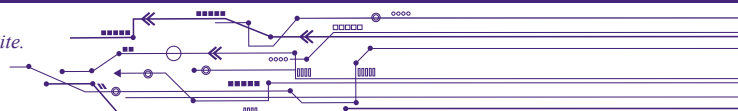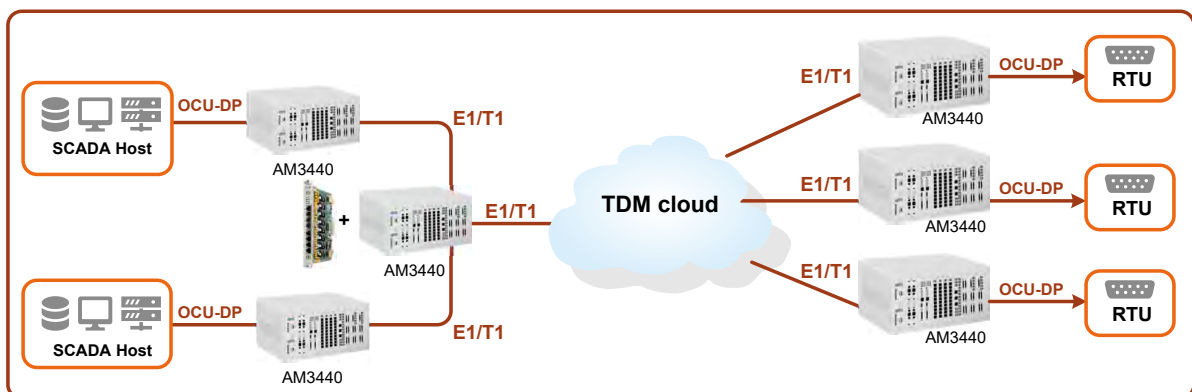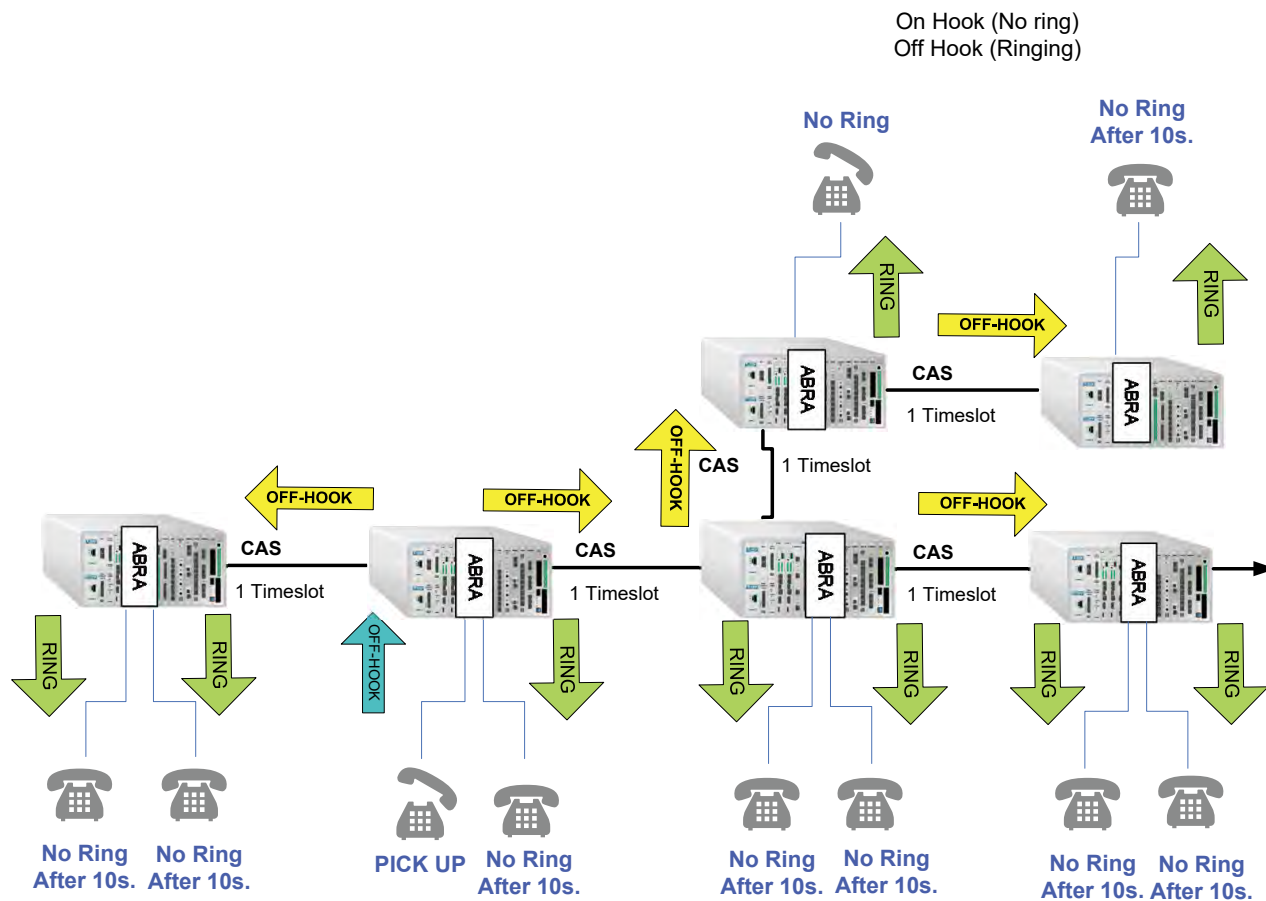
Application Illustrations

ABRA Card (Analog Bridge)

Point to specified point (1 to 14)

2 / 4 -Wire Modem

FXS/E&M

Master 1

Master 2

AM3440

E1

TDM cloud

AM3440 **Slave 1**

Modem

Modem

Modem

Modem

Slave 14

AM3440

Modem

Upstream mapping through DS0

RS232

Host Data Server

T1

T1

T1

TDM cloud

T1 RS232

T1 RS232

T1 RS232

RS232

Host Data Server

OCUDP Card (Data Bridge)

OCUDP Data Bridge (available only in the MJU mode)

OCU-DP

SCADA Host

AM3440

E1/T1

E1/T1

TDM cloud

E1/T1 OCU-DP RTU
AM3440

E1/T1 OCU-DP RTU
AM3440

E1/T1 OCU-DP RTU
AM3440

OCU-DP

SCADA Host

AM3440

E1/T1

Voice Conferencing with CAS Signaling

On Hook (No ring)
Off Hook (Ringing)

No Ring

No Ring
After 10s.

RING

RING

OFF-HOOK

CAS
1 Timeslot

OFF-HOOK

CAS | 1 Timeslot

OFF-HOOK

OFF-HOOK

CAS
1 Timeslot

OFF-HOOK

CAS
1 Timeslot

OFF-HOOK

CAS
1 Timeslot

RING

RING

OFF-HOOK

RING

RING

RING

RING

RING

No Ring
After 10s.

No Ring
After 10s.

PICK UP

No Ring
After 10s.

No Ring
After 10s.

No Ring
After 10s.

No Ring
After 10s.

No Ring
After 10s.

(ECA) Echo Canceller
For AM3440-A/C/D/E Mini Slot

Features

- Carrier Grade Echo Canceller pass AT&T voice quality test
- 64ms bi-directional or 64/128ms uni-directional
- Maximum 64 channels
- One way or bi-direction echo cancellation from PCM bus to ECA card
- E1/T1 multichannel echo cancellation
- A-law/Mu-law coding
- Comply ITU-T G.165 and ITU-T G.168-2000 and 2002

Description

The Echo Canceller Card (ECA) is designed for the AM3440 series which is for voice quality improvement in 4-wire lines to 2-wire lines and long distance telephony applications. The echo canceller card is up to 64 channels echo canceller which supports 64ms uni-directional or 64ms bi-directional or 128ms uni-directional.

For AM3440-A/C   For AM3440-D/E

The path change detector of ECA card provides the push from slow to fast convergence. The narrow-band detector detects these discrete tones, freezes the echo canceller to stay adapted and maintain excellent performance.

The ECA card supports uni-directional or bi-directional echo cancellation from PCM bus to ECA card which allows digital data transmission on user-selected time-slots which completely bypass the echo cancellation function.

The ECA card designs disable and bypass voice echo cancellers with Disable Tone per ITU-T recommendation by G165.

Application Illustrations

ECA at both ends required when delay greater than 64 ms

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E1/T1

E1/T1 Network

E1/T1

FXO ↔ ECA

FXS

PBX

ECA only required at one end when delay smaller than 64 ms

PSTN

Central Office

PBX phone exchange

FXO

TDMoEA

LAN

TDMoEA

IP/Ethernet Networks

LAN

TDMoEA

FXS ↔ ECA

ECA ↔ FXS

Delay variance introduced by packet networks resolved by ECA

Traditional FXO phone

Traditional FXO phone

(RTA) 2-LAN port/64 WAN port Router-A
For AM3440-A/C/D/E and O9550-A/D Mini Slot

Features

- 10/100 Base T interfaces
- Auto MDI/MDI-X crossover
- Routing protocols RIP-I, RIP-II, OSPF, and static
- Remote bridge
- Software field upgradeable
- Supports protocols: PPP, MLPPP, HDLC, Frame Relay, and Cisco compatible HDLC
- VLAN-ID mapping
- Up to 64 WAN ports with aggregate data rate of 4 Mb/s
- Remote bridge support (padding/un-padding Ethernet FCS)
- Supports of QoS (Quality of Service)
- Support IEEE 802.1ad VLAN Q-in-Q

For AM3440-A/C & O9550-A
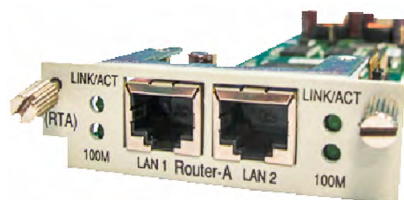
For AM3440-D/E & O9550-D

Description

The Router-A card is designed for the one mini slot Loop-AM3440 series and O9550-A. When used within the Loop-AM3440 series and O9550-A, this card acts as a router, directing Ethernet traffic to and from multiple WAN channels. With this card, access from LAN to WAN is accomplished within one card, saving both cost and space.
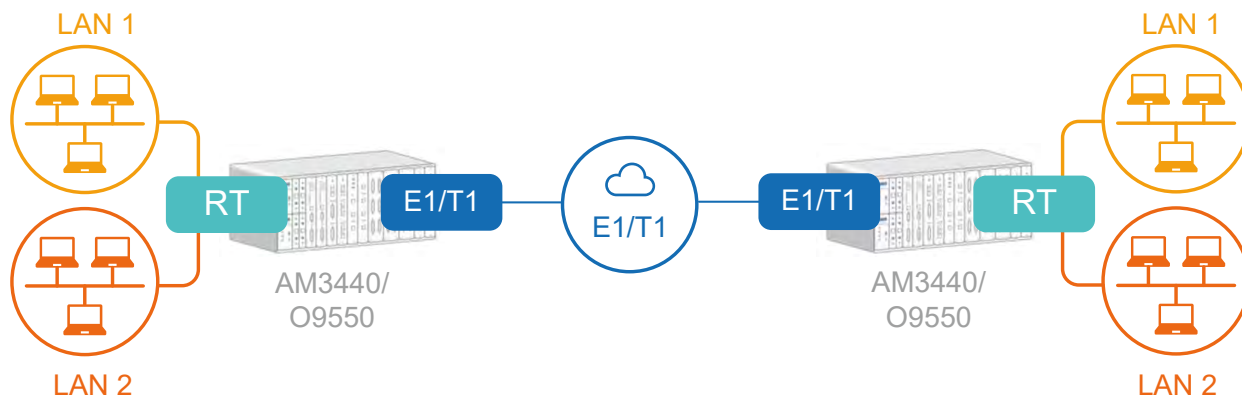
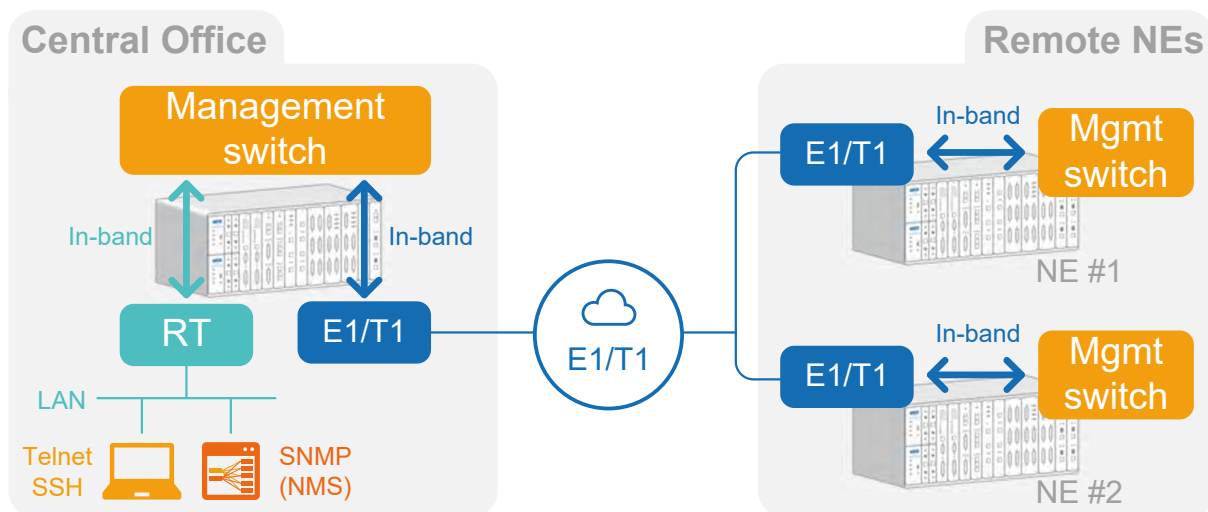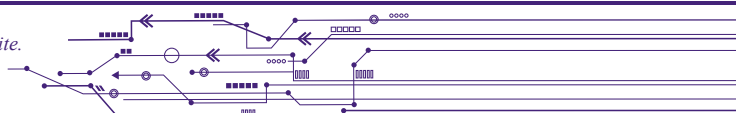### Application Illustrations

As a router

For the latest product news, updates, technical support and more, please visit our website.
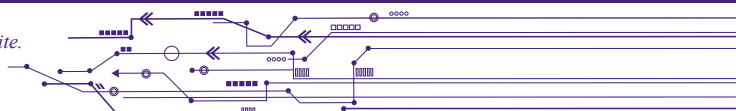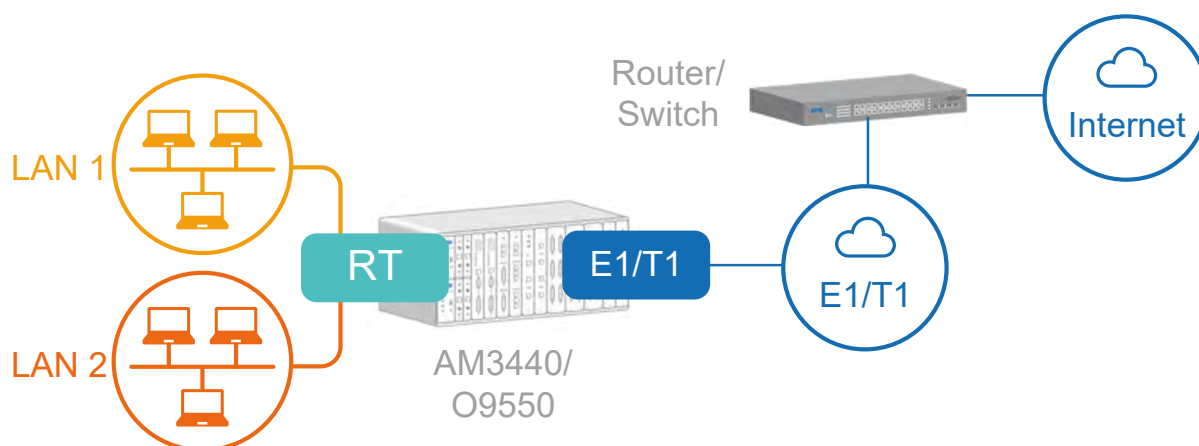
As LAN bridges

Remote Management via in-band

(RTB) 8-LAN-port/ 64-WAN-port Router-B
For AM3440-A/C, O9500R, and O9550-A/C Single Slot

Features

- Eight ports of 10/100BaseT interfaces
- Auto MDI/MDI-X crossover
- Routing Protocol: RIP-I, RIP-II, OSPF (Open Shortest Path First) and static route
- Remote Software Upgradeable
- Supporting Protocols: PPP, MLPPP, HDLC, Frame Relay, and Cisco compatible HDLC
- VLAN-ID mapping
- Up to 64 WAN ports with aggregate data rate of 8 Mbps
- Remote bridge support (padding/un-padding Ethernet FCS)
- Support of QoS (Quality of Service)
- Support IEEE 802.1ad VLAN Q-in-Q

Description

The Router-B plug-in card is designed for the single slot of Loop-O9500R, O9550-A, and AM3440-A/C devices. When used within the Loop-O9500R, this card combines the function of a router and directs Ethernet traffic to/from multiple WAN channels. Access from LAN to WAN is accomplished within one card, saving both space and money.
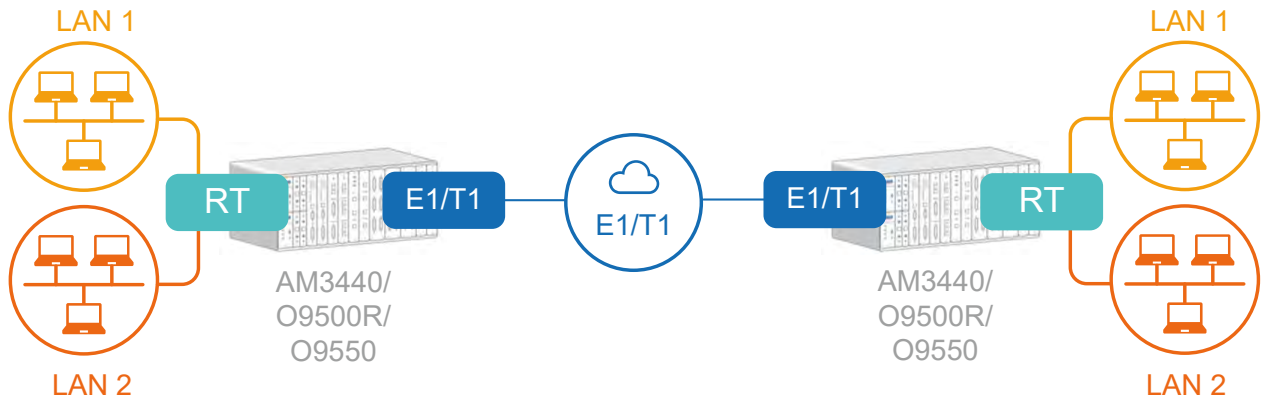
Note: Although the Router-B Interface Cards serve the same hardware function on O9500R, O9550, and AM3440, they have different firmware.
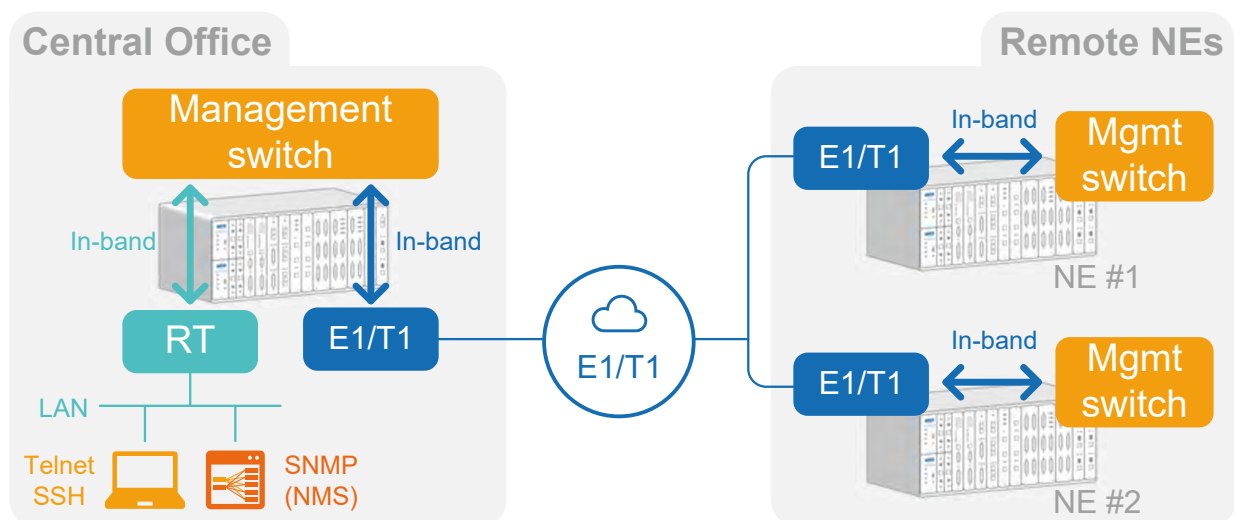
Application Illustrations

As a router
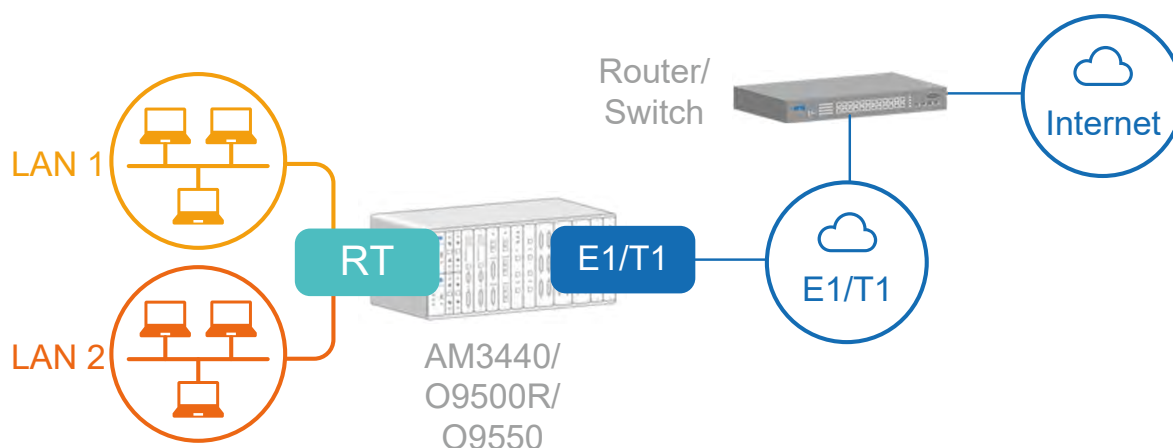
As LAN bridges

Remote Management via in-band

(C37.94) 4-channel low-speed optical
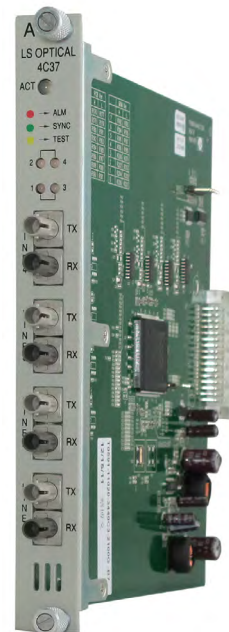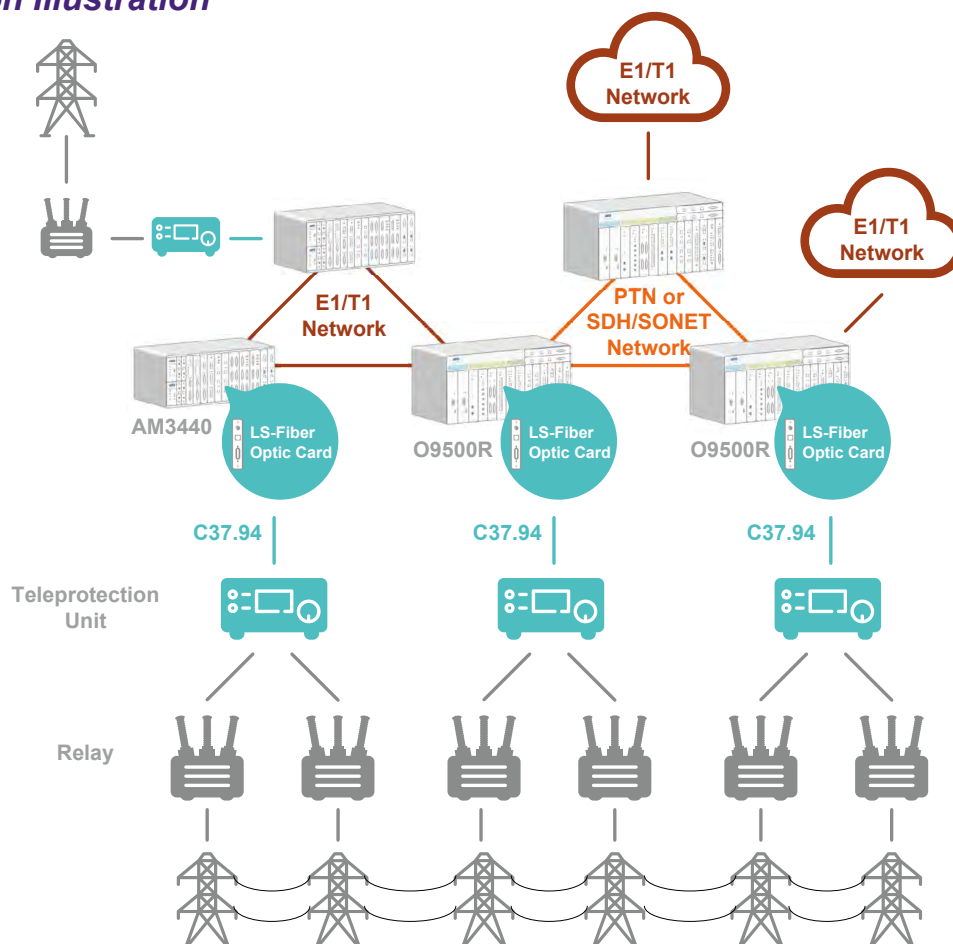## For AM3440-A/C, O9500R, and O9550-A Single Slot

Features

- Optical fiber interface for C37.94 signals
- 4-port per card
- Per-port data rate up to 12 x DS0(64kb)
- Loopback and BERT for diagnostics
- Multi-color LED indicators
- With ALS (Automatic Laser Shutdown)
- 4-port SFP for O9500R-CCPA:
 - Use with LC connector SFP 850 optical module

Description

The LS-Fiber Optical interface is a low-speed single-slot plug-in card designed for O9500R series to transport C37.94 teleprotection signals between power substations. Each port of the interface supports a configurable bandwidth of 1 to 12 DS0 (64K), and is protected by Automatic Laser Shutdown (ALS). Teleprotection signals are then cross-connected by the XCU to merge onto E1/T1, SDH/SONET, or Packet Network for transportation. Link and module integrity can be diagnosed via loopback signals.
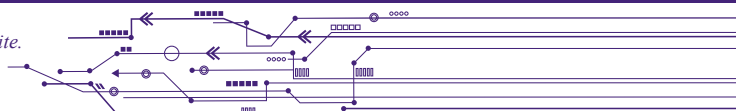

4-port Optical Fiber   **4-port SFP**

Application Illustration
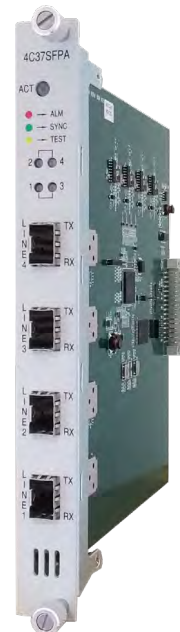
(C37.94) 1-channel low-speed optical
For AM3440-A/C/D/E and O9550-A/C/D Mini Slot

Features

- 1 port per card, single slot to AM3440 series
- Supports data rates up to 12x64kb
- Provide multi-color LED indicator
- With ALS (Automatic Laser Shutdown)

Description

The LS-Fiber Optical plug-in mini card is designed for the single slot of Loop-AM3440 series as embedded 1 C37.94 low speed optical interface. This card can aggregate 1 to 12 DS0 channels to single fiber optical interface to connect with another Loop-AM3440 or C37.94 Modem.
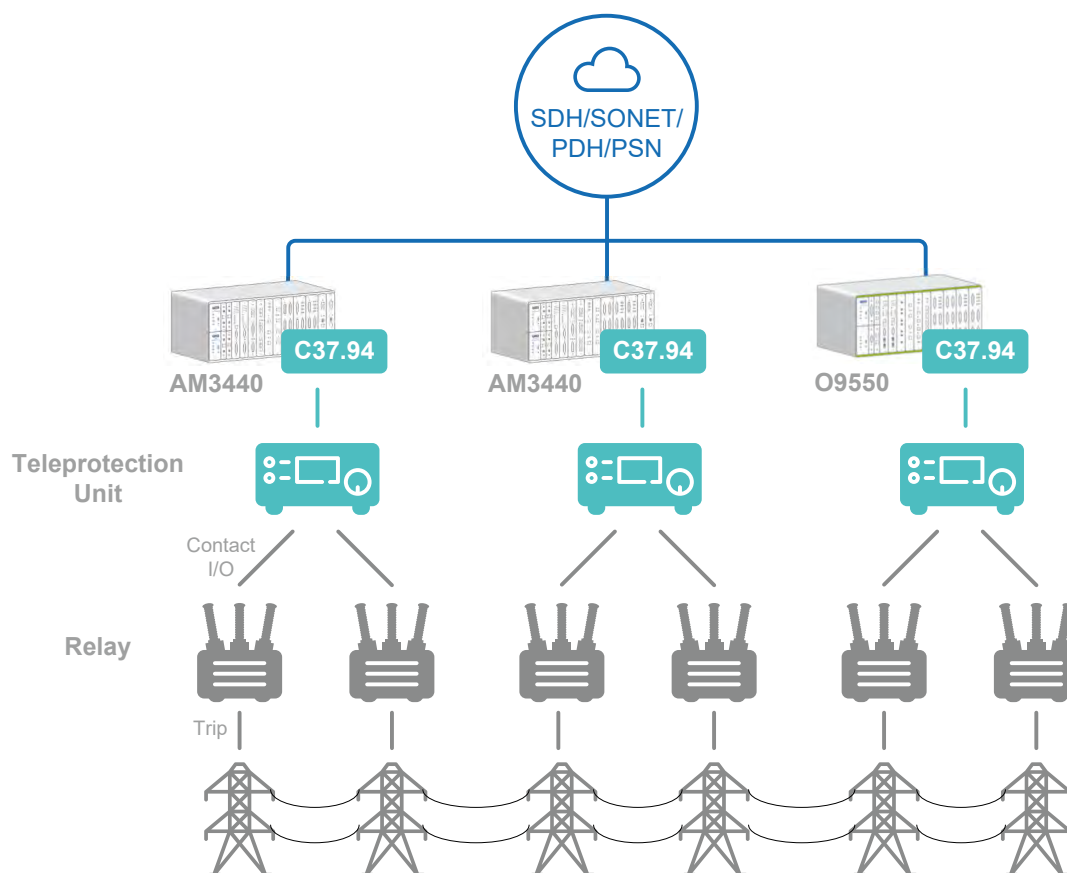

AM3440-A/C   **For AM3440-D/E**

Application Illustrations

(TTA) Transfer Trip card
For AM3440-A/C, O9500R, and O9550-A Dual Slot

Features

- Dual slot plug-in module for AM3440-A/C
- Four ports for DTT input and output using bi-directional DS0
- Supports point-to-point and point-to-multipoint architectures
- For point-to-point architecture, each input port is associated with one DS0 in a communication link to a remote output port
- For point-to-multipoint architecture, each input port is associated with N X DS0's, where N = 2 or 3, in a communication link to N remote output ports
- Capable of measuring and recording round-trip delay.
- Dependency: 30000 cycle test without command loss.
- Availability: greater than 99.997% up-time.
- Multiplexing up to 4 input signals over one 64K channel
- Can be used for other on/off-type command protection relay schemes such as Permissive*, and Blocking*.

* Future Option

Description

The Transfer Trip Card is designed for the AM3440 series which is for transfer trip function. It can be used in a protection system to send a trip command to remote circuit breakers.

The Transfer Trip card is a dual slot module provides four ports of input and output using bi-directional DS0's.

The Transfer Trip Card is capable of measuring and recording round trip delay. The measurement is run continuously and an alarm is generated if the round trip delay exceeds a user preset value. Besides, the Transfer Trip card provides several user configurable timers to fit application requirement and keep the proper operations of the system.

Application Illustrations
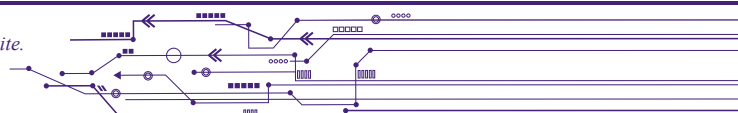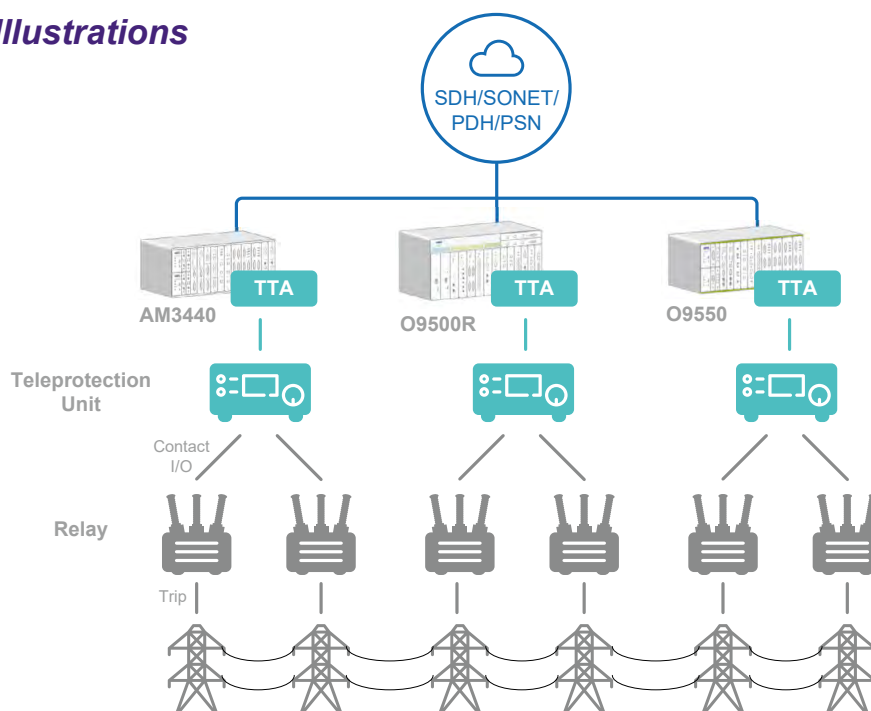
CLKa/CLKb/CLKc Card
For AM3440-A/C, O9500R, and O9550-A Dual Slot

Features

- Mini-slot plug-in module for AM3440-CHPAa, AM3440-CHPCa, AM3440-CHPDa, AM3440-CHE8GESWa and AM3440-CHE2GEa
- 1 x Fuse Alarm
- 1 x System Alarm
- 1 x Alarm input
- 2 x Clock input
- 1 x Clock output
- Multi-color LED for alarm status indication.

Description

The AM3440-CLKa and CLKb* are mini slot plug-in modules that provide alarm in/out and clock in/out interfaces while AM3440-CLKc* provides clock, 1PPS and ToD. Each of them are connector boards that extend clock and/or alarm I/O connectors from the Controller card.
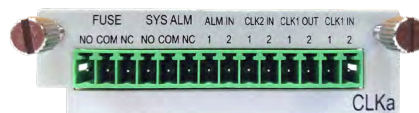
The AM3440-CLKa provides 1 x ALM_IN, 2 x ALM_OUT, 2 x CLK_IN and 1 x CLK_OUT with 14 pin terminal block for connection.

The AM3440-CLKb* provides 1 x FUSE ALM, 1 x CRITICAL ALM, 1 x MAJOR ALM, 1 x MINOR ALM, 2 x CLK IN and 2 x CLK OUT.

The AM3440-CLKc* provides PPS, ToD, and External Clock.

For AM3440-CHPAa, AM3440-CHPCa

For AM3440-CHPDa, AM3440-CHE8GESWa, AM3440-CHE2GEa, and AM3440-CHEDCSa

* Future Option

Application Illustration

Clock output for local device clock synchronization — Clock Output 1

2.048Mbps, 1.544Mbps, 2048KHz clock input selectable — Clock Input 1 / Clock Input 2

Visual/Audible Alarm Device

AM3440

CLKa

Fuse Alarm/System Alarm output

Alarm Input

The CLKa detects external alarm attached to the ALM_IN port, and sends alarm trap via SNMP for alerting the problem on management system.