

CXR-HX9500R-PTN/SDH/SONET/PDH IMAP

(CHPAa chassis & CCPA Controller)



Features

- 6U height, full front access (ETSI) shelf
- SDH/SONET VCn/VTn Cross-Connect Capacity: 14Gbps bidirectional non-blocking
- PTN (CE and MPLS-TP) Switching Capacity: 100Gbps bidirectional non-blocking
- All modules hot-swappable
 - Cross-connect modules (controller modules)
 - STM-1/4/16 (OC-3/12/48) aggregate lines
 - Software configurable
 - Tributary Modules
 - High-Speed/High Density (HS) modules
 - Low-Speed (LS) modules
 - Power Modules
 - DC Modules 48 Vdc, 500W
 - Dual Power (1+1) Protection
- Cross-connect Unit Protection Scheme
 - Dual Controller for Redundancy
 - MSP (1+1), SNCP/UPSR Ring
- Tributary protection Schemes
 - E1/T1: Card/Port (1:1) using Y-box, Line (1+1), DS0 SNCP (3E1/T1 card only)
 - E3/T3: Line (1+1)
 - B155/622, B2G5: MSP 1+1, SNCP/UPSR
 - Ethernet Card protection : ELPS, ERPS
 - PTN10G Switch Fabric 1:1
 - MPLS tunnel LSP (1+1/1:1), switch time < 50msec
- Ethernet Functions
 - Link Aggregation (Inter and Intra board)
 - LSP Linear Protection (1+1/1:1) switch time within 50ms
 - External/Internal/Line timing source with SSM via SyncE, IEEE 1588, and TDM clocks
 - Ethernet over SDH:SONET supports GFP, LAPS, VCAT, LCAS and non-LCAS, ERPS G.8032
 - Alarm suppression, masking and reports
- Circuit Emulation and Encapsulation for TDM data over Packet Switched Network (Satop, CESOPSN, CEP)
- Management
 - Console port, VT100 menu-driven
 - SNMP, Telnet and SSH for remote management
 - In-band management channels
 - SDH/SONET DCC (XCU, B16, B2G5)
 - MPLS pseudowire (PTN10G)
 - DS0 timeslots (Low Speed cards)
 - Centralized management with CXR's EMS/NMS
 - CXR-iNET GUI EMS
 - CXR-iNMS with full FCAPS and end-to-end circuit management and diagnosis
 - Bridge mode or OSPF routing
- RoHS compliant

Description

The CXR-HX9500R-PTN/SDH/SONET/PDH IMAP (Integrated Multi-Services Access Platform) is an economical, all-in-one solution for integrating various types of signals and transportation over various types of networks within one enclosure.

Its universal roles and modular design make it effortless to perform traffic grooming for both peripheral and core networks by providing access interfaces, multiplexing, cross connection, gateways, and transportation channels.

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

For **multiplexing and cross-connection**, HX9500R-PTN provides non-blocking cross-connection of up to 672 DS0 timeslots, which equal to 21 E1 channels, to serve as a MUX/DACS, and VC-n/VT-n fabric for SDH/SONET non-blocking cross-connection to serve as an ADM.

For **transportation**, high-speed modules provide transportation channels such as 10Gb MPLS/Carrier Ethernet/IP switching and routing from PTN10G card, STM-1/4/16(OC-3/12/48) channels from Controller, B155/622, and B2G5 cards, Optical channels from 7-port FOM cards, E1/T1 channels from 63-port E1/T1 cards, and E3/T3 channels from 3-port E3/T3 cards.

For **gateways**, the signals from different interfaces can be freely encapsulated, cross-connected, and transported over a variety of transportation networks. For instance, E1/T1 and E3/T3 channels can be encapsulated into VT/VC paths and transported over SDH/SONET. Modules such as TDMoE and 8GESW make it possible for TDM traffic to be transported over Ethernet (DS0 over Ethernet) and the other way around (Ethernet over SDH/SONET) via circuit emulation and virtual concatenation technologies. Using the PTN10G card, SDH/SONET and DS0 circuits can also be encapsulated for packet network transportation.

Multiple **protection schemes** are designed at different levels, including path-level SNCP/UPSR and sectionlevel MSP (1+1) for SDH/SONET, circuit and line protection for access interfaces, DS0 SNCP/UPSR and ULSR for low-speed modules, MPLS-TP with two LSPs per tunnel, ELPS and ERPS, and 1+1 module redundancy for power, controller, and plug-in cards.

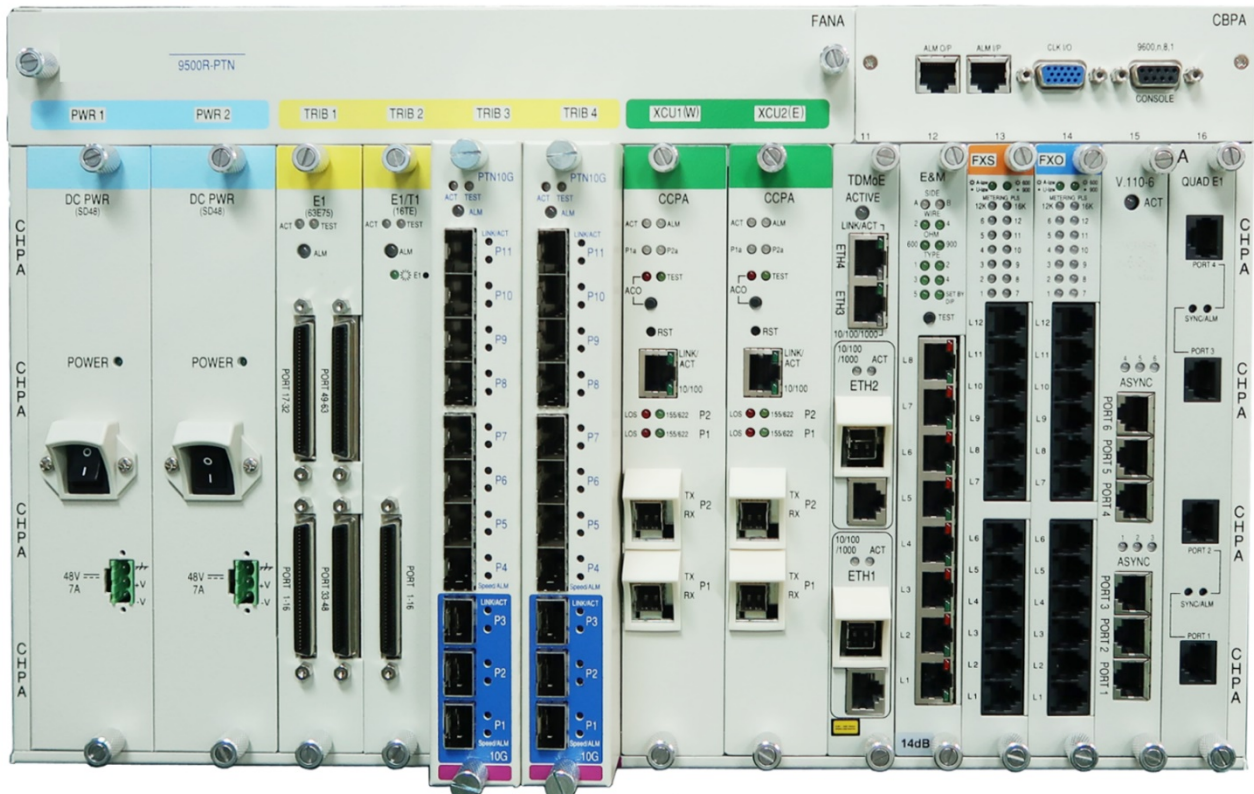
Performance and fault are also monitored to ensure service integrity. Operation, Administration, Maintenance and Provisioning (OAM&P). These functionalities are fully incorporated into the operation system. HX9500R-PTN is fully compatible with CXR-iNET (EMS) and CXR-iNMS (Integrated NMS) to achieve centralized management for large scale networks.

HX9500R-PTN (CCPA) Compatible Tributary Modules

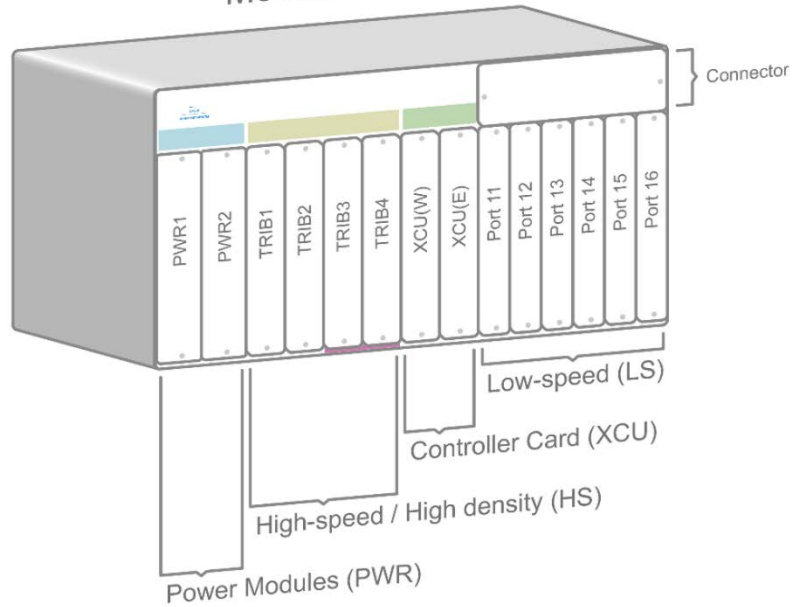
Plug-in cards with yellow background are high-speed cards using **622M backplane**, and those with magenta background are high-speed cards using **2.5G backplane**. Plug-in cards without background color are low-speed cards.

Type	Module	Description	
High-speed/ High Density (HS)	PTN10G	3 x 10GbE + 8 x 1GbE PTN plug-in module	
	PTN Ext	10 x 1GbE PTN plug-in module	
	B155/622	2-channel STM-1 (OC-3) tributaries with or without MSP 1+1	
		1-channel STM-4 (OC-12) tributaries with or without MSP 1+1	
	B2G5	1-channel STM-16 (OC-48) tributaries with or without MSP 1+1	
	E1/T1	63 port E1/T1 tributaries	
		32 port E1/T1 tributaries	
		16 port E1/T1 tributaries	
	E1(75 ohm)	63 E1(75 ohm) plug-in card	
		32 E1(75 ohm) plug-in card	
		16 E1(75 ohm) plug-in card	
	E3/T3	3 T3 or 3 E3 software programmable interface with M13/Mx3 function for T3 interface only	
8GESW	8 GbE Ethernet over SDH card with L2 switch (8GES4SWA/8GES16SWA*)		
Low-speed (LS) Single slot	RTB	8-port Bridge/Router	
	4E1/4T1	4-channel E1/T1	
	3E1/3T1*	3-channel E1/T1	
	2GH	2-channel G.SHDSL (2 pairs) without line power	
	4GH	4-channel G.SHDSL (1 pairs) without line power	
	6CDA	6-channel G.703 card at 64 Kbps data rate	
	4C37	4 channel C37.94 (low-speed optical)	
	8RS232	8-channel RS232/V.24	
	8DC	8-channel Dry Contact I/O	
	8DCB	8-channel Dry Contact I/O type B	
	8E&MA	8-channel 2W/4W E&M	
	12FXSA	12-channel FXS	
	12FXOA	12-channel FXO	
	12MAGA	12-channel Magneto	
	TDMoEA	4 GbE for TDM signal over Ethernet	
	8DBRA	8-channel Data Bridge	
	8UDTEA	8-channel DTE	
	1FOMB	1 port FOM (1FOMB)	
	OCUDPA	8-channel OCU/DP	
	6UDTEA	6-channel DTE	
	Low-speed (LS)	TTA	Four ports for DTT input and output.

Front Panel View of HX9500R-PTN (CHPAa with CCPA)



Module Schematics



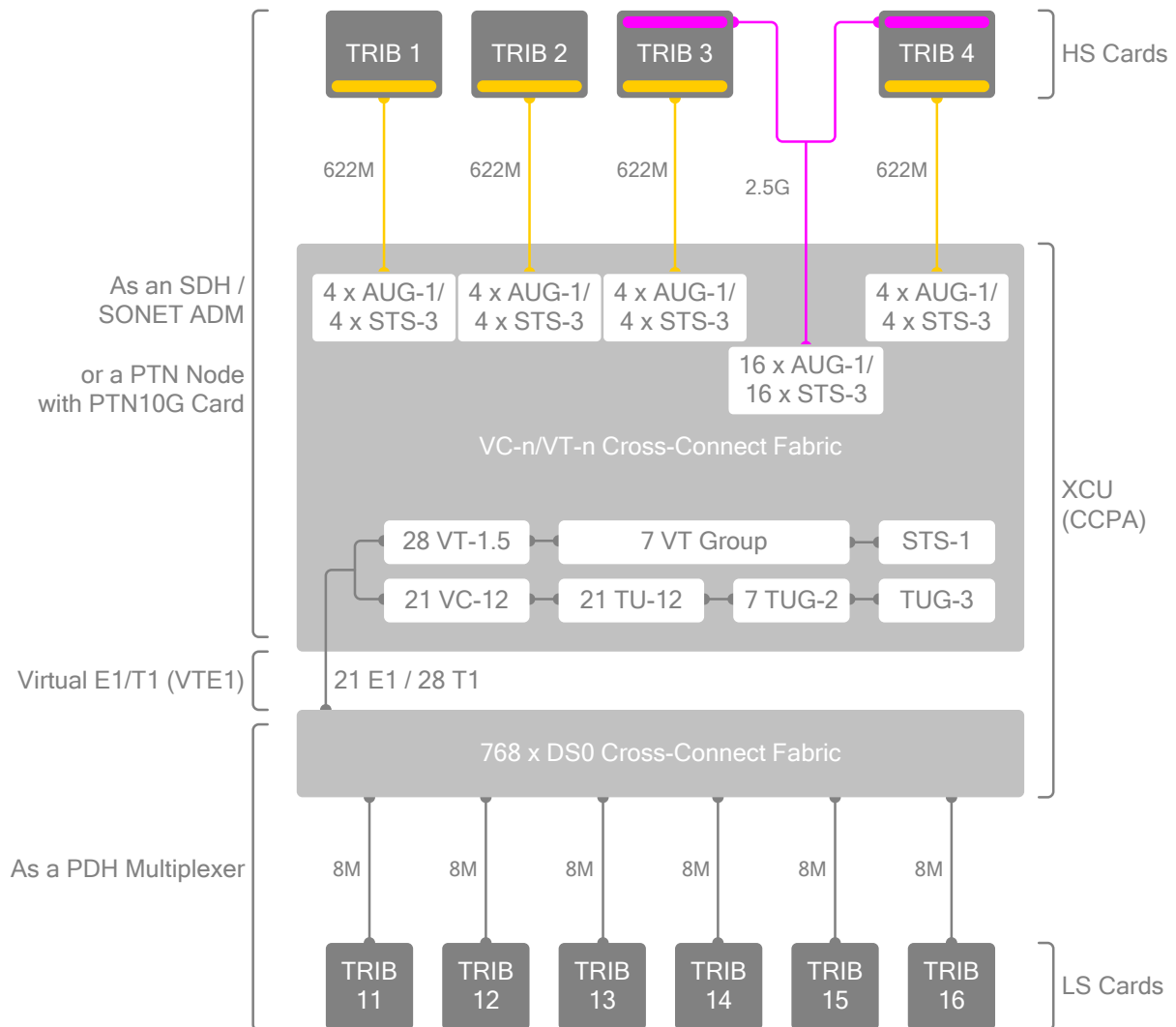
Connectivity

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

Tributary Module: Backplane Payload

TRIB 1	TRIB 2	TRIB 3	TRIB 4	TRIB 11~16
4 x 155M or 1 x 622M	4 x 155M or 1 x 622M	4 x 155M or 1 x 622M	4 x 155M or 1 x 622M	8M (each)
		1 x 2.5G		

Traffic of each tributary card is connected to the XCU via backplane channels. Each **LS slot (TRIB 11~16)** is provided with **4 E1/T1 (8M)** worth of bandwidth, and each **HS card (TRIB 1~4)** with **4 STM-1/OC-3 (622M)**. Especially, an **additional STM-16/OC-48 (2.5G)** channel is shared by **TRIB 3 and 4** for extra high-speed connection. These 2.5G HS cards are marked with a magenta patch at the bottom of the panel to indicate the existence of the 2.5G channel. Traffic from **HS cards** are directed to the **VC-n/VT-n cross-connect fabric**, while traffic from **LS cards** are directed to the **DS0 cross-connect fabric**. Traffic from LS cards can be merged onto SDH/SONET via the internal **virtual E1/T1 channels**.



Tributary Module: Maximum Capacity without Protection

High-speed Module	Channel	TRIB 1	TRIB 2	TRIB 3	TRIB 4	System Max. Channels
E1/T1	E1/T1	63	63	63	63	252
E3/T3	E3/T3	3	3	3	3	12
8GES4SWA	GbE	8	8	8	8	32
B155/622	STM-1	2	2	2	2	8
	STM-4	1	1	1	1	4
B2G5	STM-16	N/A	N/A	1	N/A	1
PTN10G	10GE	N/A	N/A	3	3	6
	1GE	N/A	N/A	8	8	16

Low-speed Module	Channel	Maximum Channels	
		TRIB 11~16 each	System
1FOMB	FOM	1	6
RTB	FE bridge and router	8	48
2/4 channel G.SHDSL	G.SHDSL	2/4	12/24
4E1/T1	E1/T1	4E1/4T1	21E1/28T1
3E1/T1*	E1/T1	3	18
6CDA	G.703	6	36
4C37	C37.94	4	24
8DC	Dry Contact	8	48
8DCB	Dry Contact	8	48
8RS232	RS232	8	48
12FXSA	FXS	12	72
12FXOA	FXO	12	72
12MAGA	Magneto	12	72
8E&MA	E&M	8	48
TDMoEA	TDMoE	4	24
8DBRA	RS232	8	48
8UDTEA	RS232/RS422/RS449	8	48
OCUDPA	OCU/DP	8	48
6UDTEA	RS232/X.21/V.35/V.36/EIA530	6	36

*Future Option

Tributary Module: SDH/SONET Channel and Protection

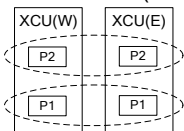
HS Module	Channel	TRIB 1	TRIB 2	TRIB 3	TRIB 4
B155/622	STM-1	2	2	2	2
	STM-1 MSP (1+1)	2		2	
	STM-4	1	1	1	1
	STM-4 MSP (1+1)	1		1	
B2G5	STM-16	N/A	N/A	1	N/A
	STM-16 MSP (1+1)	N/A	N/A	1	N/A
		N/A	N/A	1	

Controller Card: SDH/SONET Channel and Protection

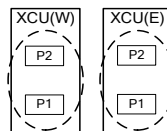
Channel	XCU 1	XCU 2	System
	2	2	4
STM-1/4/16	1 MSP (1+1)	1 MSP (1+1)	2
	2 MSP (1+1)		2

Note 1 STM-16 (OC-48) is not available on HX9500-R-CCPA-S4 unless activated by a premium license.

Note 2 MSP (1+1) chains on XCU (W) and XCU (E) can be paired as follows:



Card-level protection (horizontal):
 XCU(W) port 1 and XCU(E) port 1
 XCU(W) port 2 and XCU(E) port 2



Port-level protection (vertical):
 XCU(W) port 1 and XCU(W) port 2
 XCU(E) port 1 and XCU(E) port 2

Tributary Module: Non-SDH/SONET High-speed Channel and Protection

HS Module	Channel	Protection	Number of channels			
			TRIB 1	TRIB 2	TRIB 3	TRIB 4
16/32/63TE	E1/T1	X	16/32/63	16/32/63	16/32/63	16/32/63
		O	16/32/63	(B)	16/32/63	(B)
3TE	E3/T3	X	3 E3	3 E3	3 E3	3 E3
		O	3 E3	(B)	3 E3	(B)
8GES4SWA	Ethernet 10/100/1000BT	X	8 ports	8 ports	8 ports	8 ports
		O	8 ports	(B)	8 ports	(B)
PTN10G <i>Note 2</i>	10GbE	X	N/A	N/A	3	3
	1GbE	X	N/A	N/A	8	8
PTN Ext <i>Note 3</i>	1GbE	X	10	10	N/A	N/A
	10GbE	X	1	1	N/A	N/A

(B) signifies backup/protection

Note 1: Protection Group on HX9500R-PTN shall always be neighboring Tributary cards. Two cards of the identical model shall be mounted on TRIB 1 & 2 or TRIB 3 & 4 to form a protection group. TRIB 1 and TRIB 3 serve as the primary cards while TRIB 2 and TRIB 4 serve for protection.

Note 2: PTN10G card on TRIB 4 should be registered to protection, even if PTN10G on TRIB 3 is not available for up to 3 x 10G and 8 x 1G. PTN10G card on TRIB 3 can only be registered without protection for up to 3 x 10G and 8 x 1G. PTN10G card on TRIB 3 and TRIB 4 can also be registered with protection for up to 6 x 10G and 16 x 1G.

Note 3: The 1GbE ports and the 10GbE port are mutually exclusive.

*Future Option



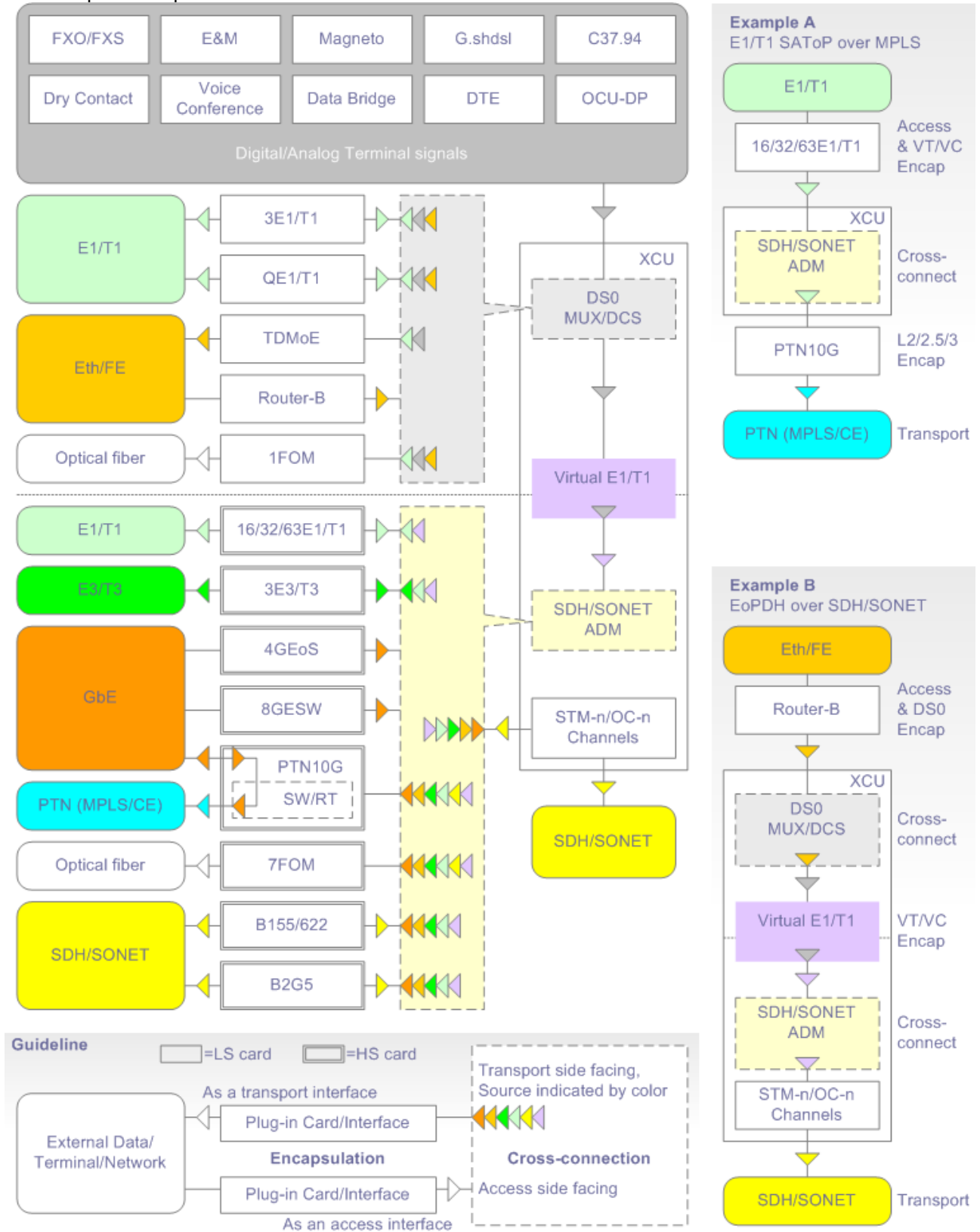
Cross-model Comparison for Plug-in Card Compatibility

Plug-in Card	HX9500R-PTN			HX9400R-PTN			QX3440-A/C
	CC4	CC16	CCPA	CC4	CC16	CCPA	
16/32/63TE	v	v	v	v	v	v	x
16/32/63E75	v	v	v	v	v	v	x
3TE3	v	v	v	v	v	v	x
3TE3M13	v	v	v	v	v	v	x
7FOM	v	v	v	v	v	v	x
8GES4SWA	v	v	v	*	*	*	x
8GES16SWA	x	*	v	x	v*	v*	x
B16	v	v	v	v	v	v	x
B2G5	x	v	v	x	v	v	x
PTN10G	x	x	v	x	x	v	x
4E1	v	v	v	x	x	x	v
4T1	v	v	v	x	x	x	v
3E1	v	v	v	x	x	x	v
3T1	v	v	v	x	x	x	v
2GH	v	v	v	x	x	x	v
4GH	v	v	v	x	x	x	v
8DC	v	v	v	x	x	x	v
8DCB	v	v	v	x	x	x	v
6CDA	v	v	v	x	x	x	v
4C37	v	v	v	x	x	x	v
8RS232	v	v	v	x	x	x	v
8DBRA	v	v	v	x	x	x	v
RTB	v	v	v	x	x	x	v
TDMoEA	v	v	v*	x	x	x	v
6UDTEA	v	v	v	x	x	x	v
8UDTEA	v	v	v	x	x	x	v
8EMA	v	v	v	x	x	x	v
12MAGA	*	*	v*	x	x	x	v
12FXSA	v	v	v	x	x	x	v
12FXOA	v	v	v	x	x	x	v
1FOMB	v	v	v*	x	x	x	v
OCUDPA	v	v	v*	x	x	x	x
TTA	v	v	v	x	x	x	v

* Future Option

Transport/Access interface and module functional block

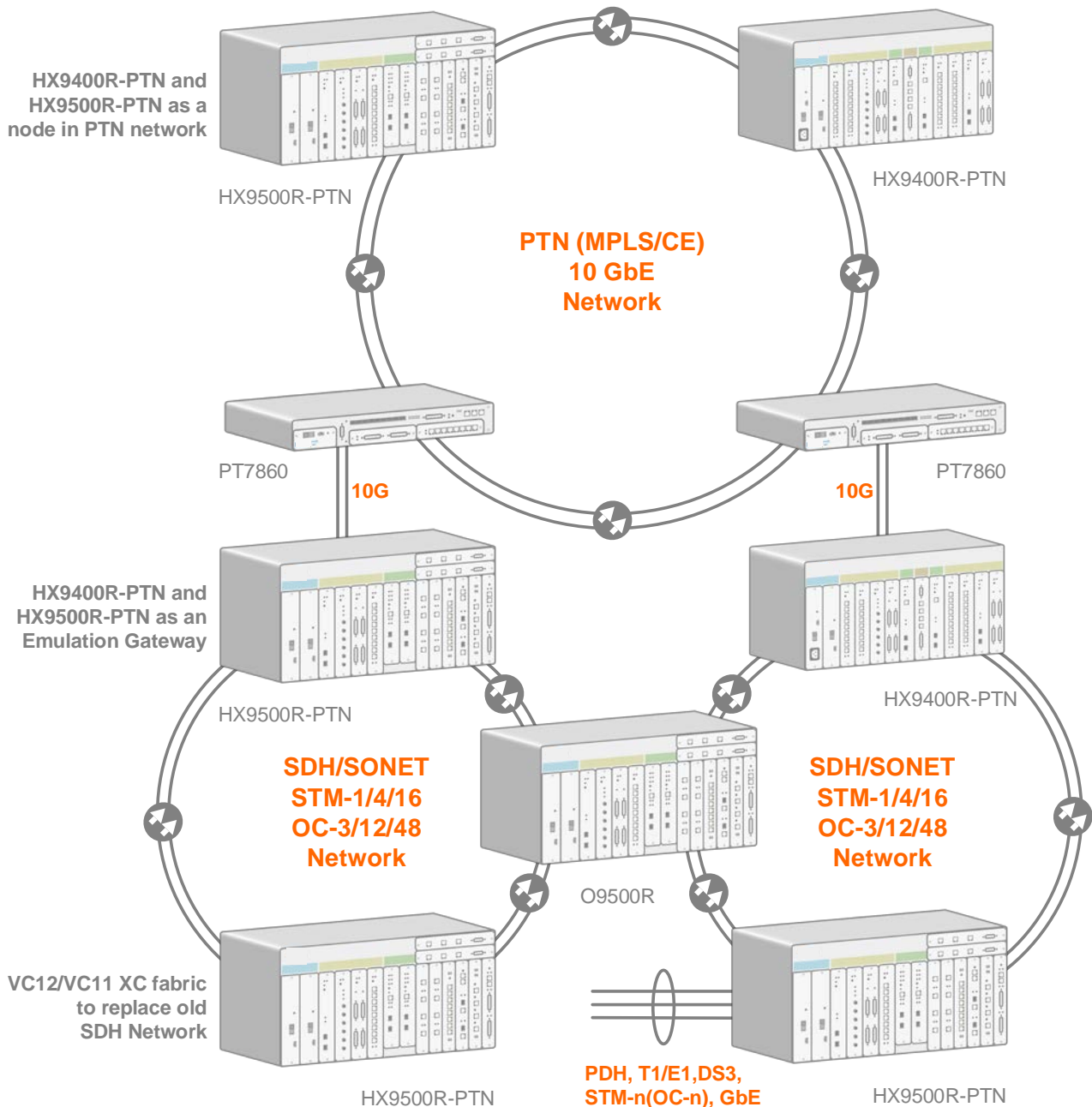
HX9500R-PTN can serve as the gateways between different network types and encapsulates traffic of a certain type into another type for transportation. Interfaces for the **access side** and interfaces for the **transport side** are required. Traffic from the access side will be directed to the transport side and go through cross-connection and encapsulation processes.



Application Illustration

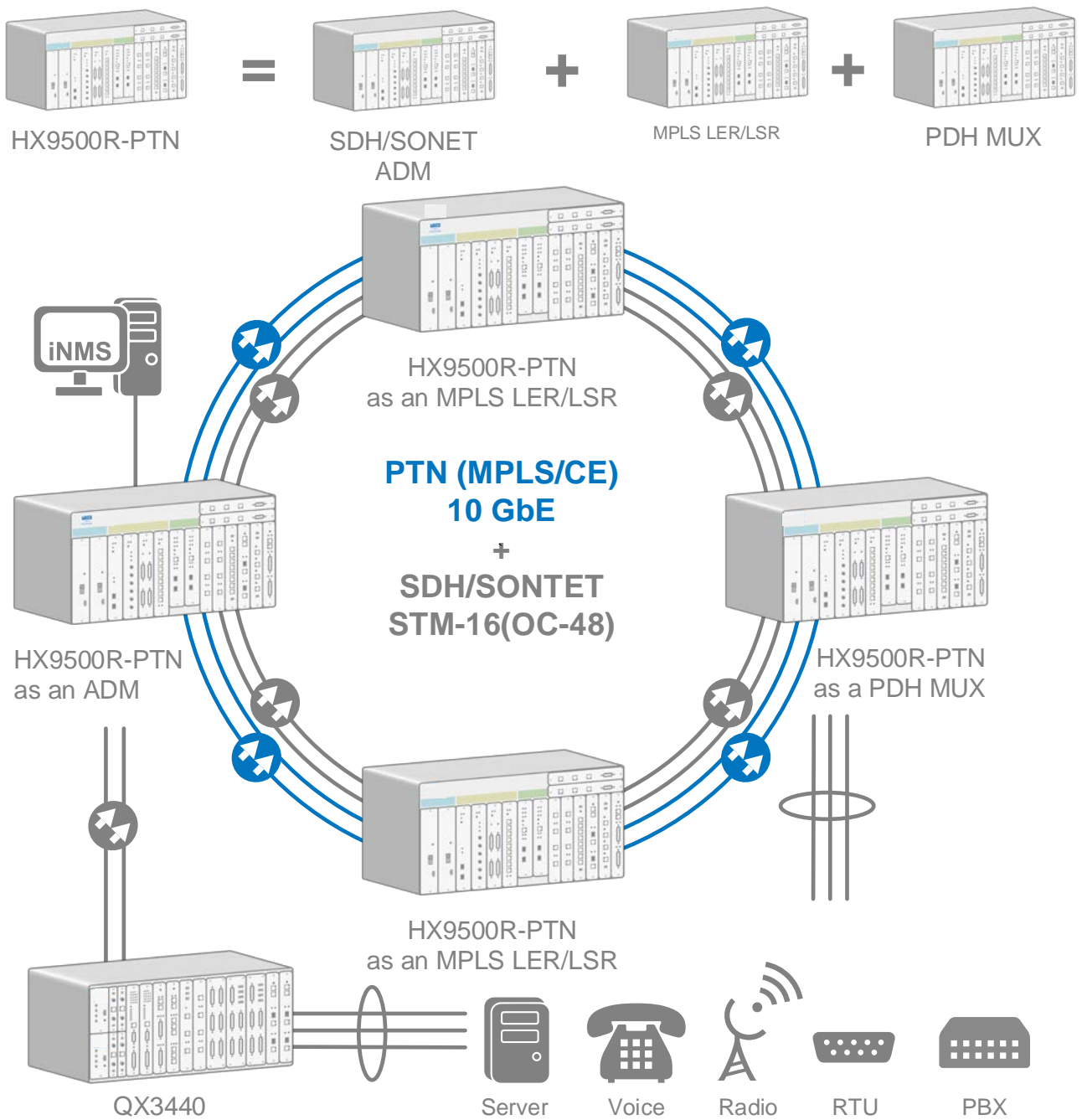
PTN and SDH/SONET Ring Application

HX9500R-PTN acts as a node in a PTN 10G Network ring or as an Emulation Gateway to merge SDH/SONET traffic onto PTN (MPLS/CE) stream. Distinct from HX9400R-PTN, HX9500R-PTN is also capable of cross-connecting PDH and SDH/SONET traffic within the same enclosure, acting as both a Terminal Multiplexer (TM) and a Cross-connect system (DACS).



Dual Ring and Triple Role

One HX9500R-PTN can be simultaneously connected to PTN and SDH/SONET backbone rings. PTN10G module and STM-16(OC-48) interface can be simultaneously mounted in HX9500R-PTN and form a dual ring (PTN and SDH/SONET rings). The roles of an HX9500R-PTN can be a deluxe combination of an SDH/SONET ADM, a PTN MPLS Label Edge Router (LER), and a PDH Multiplexer.



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

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

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

SNCP/UPSR:

Traffic copied onto both paths

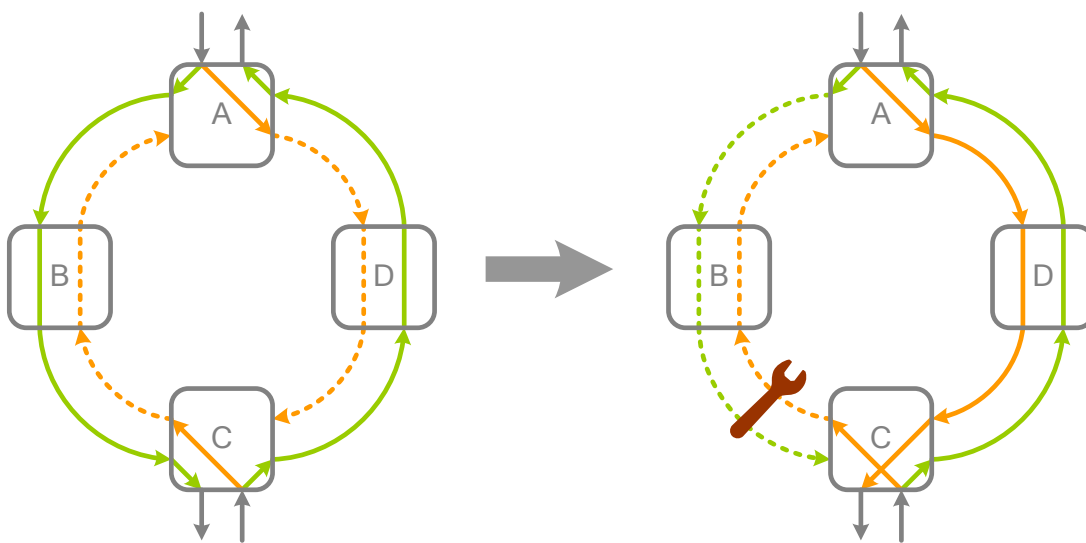
Selector at Rx selects traffic from either path



Primary Path



Secondary Path



Normal Condition:

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

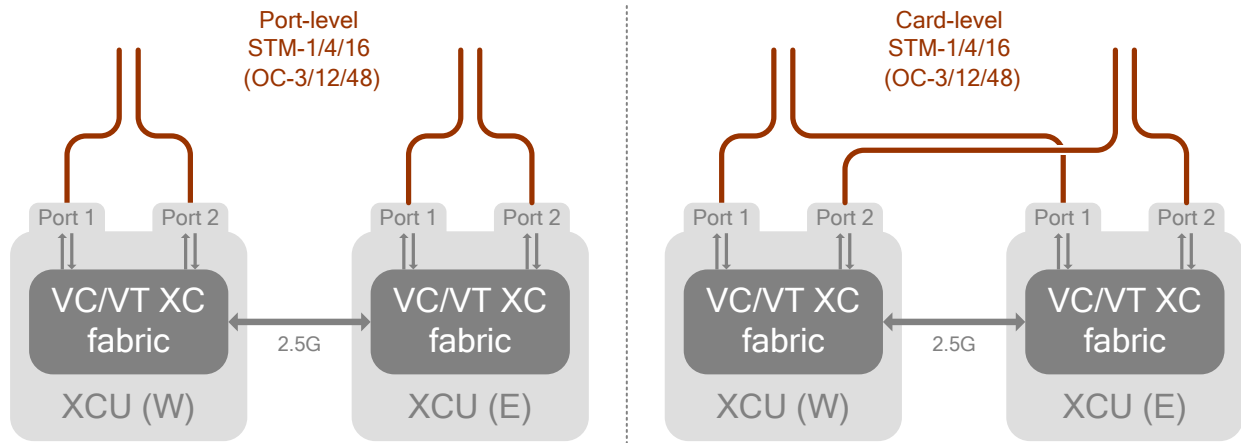
Line between B&C failure:

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

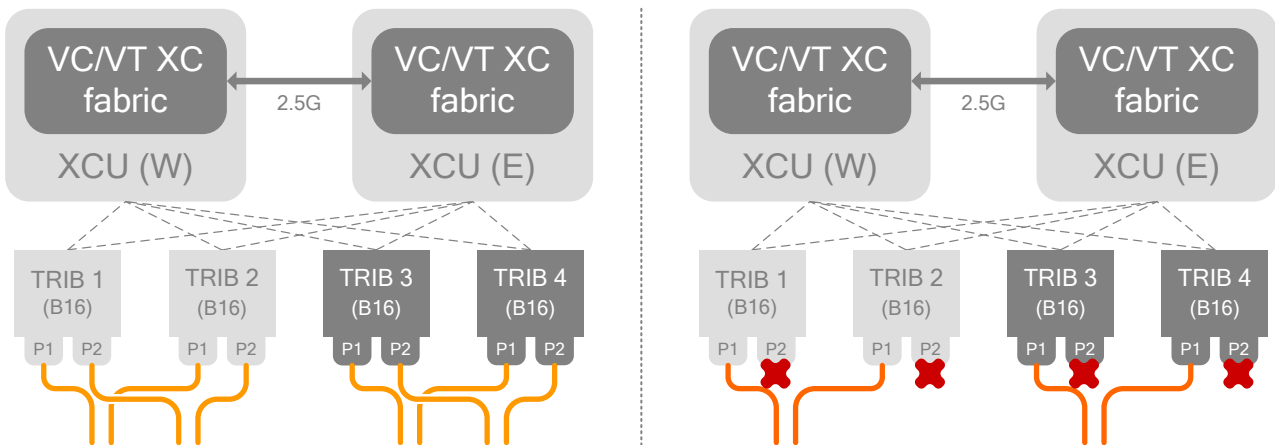
SDH/SONET MSP (1+1) Protection

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

MSP (1+1) with XCU

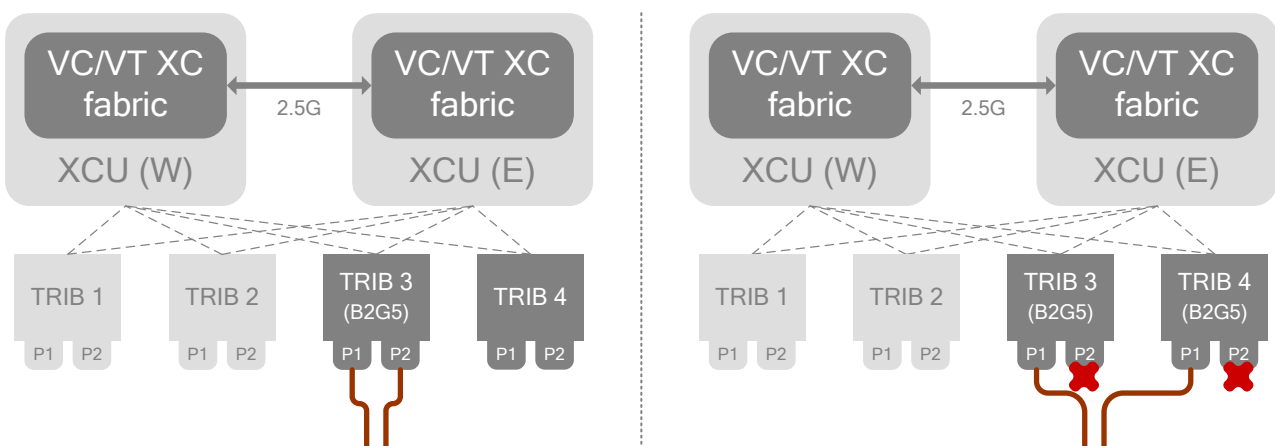


MSP (1+1) with B16 or B2G5 cards



4 x Card-level STM-1 (OC-3) Chains

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



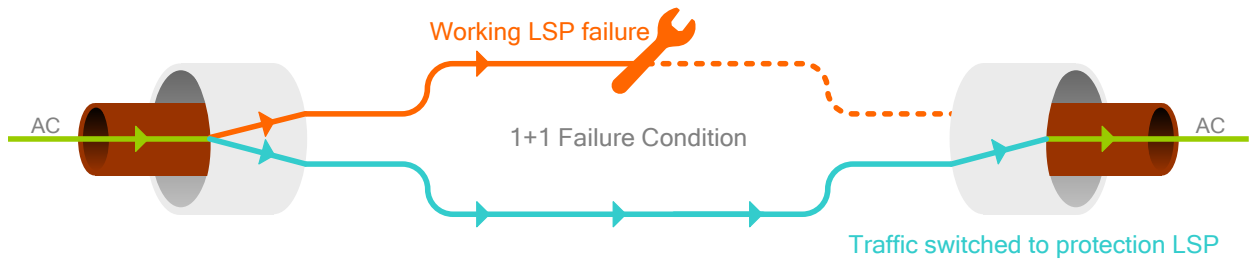
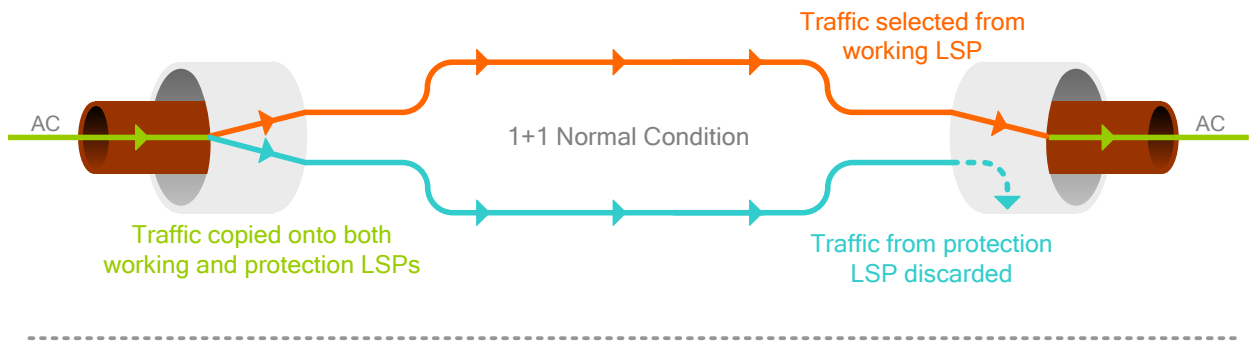
1 x Port-level STM-16 (OC-48) Chain

1 x Card-level STM-16 (OC-48) Chain

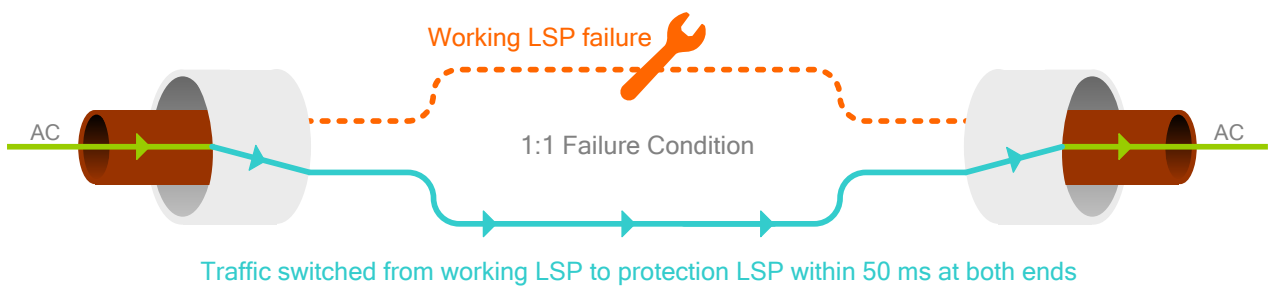
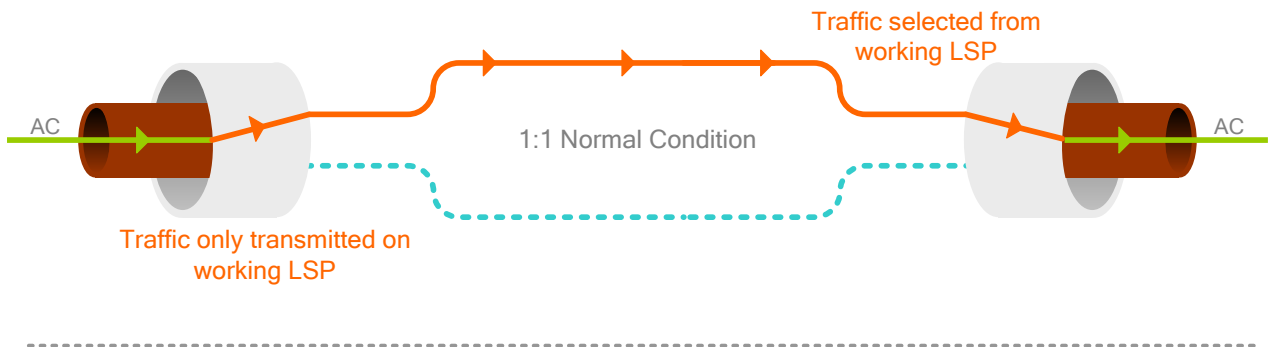
MPLS-TP Protection Schemes

MPLS-TP network is now only supported by PTN10G card. Protection scheme of an MPLS-TP network is standardized as part of the protocol. By deploying static nodes in the network, traffic transported by a tunnel between remote ends is protected by two label switching paths (LSPs) to achieve **1:1** or **1+1** protection.

In 1+1 mode, traffic is copied onto both working and protection LSPs. When receiving traffic, the remote LER only selects traffic from one of the two LSPs to decapsulate.



In 1:1 mode, traffic flows only on the working LSP. When a failure occurs on the working LSP, traffic is then switched to the protection LSP within 50 ms.

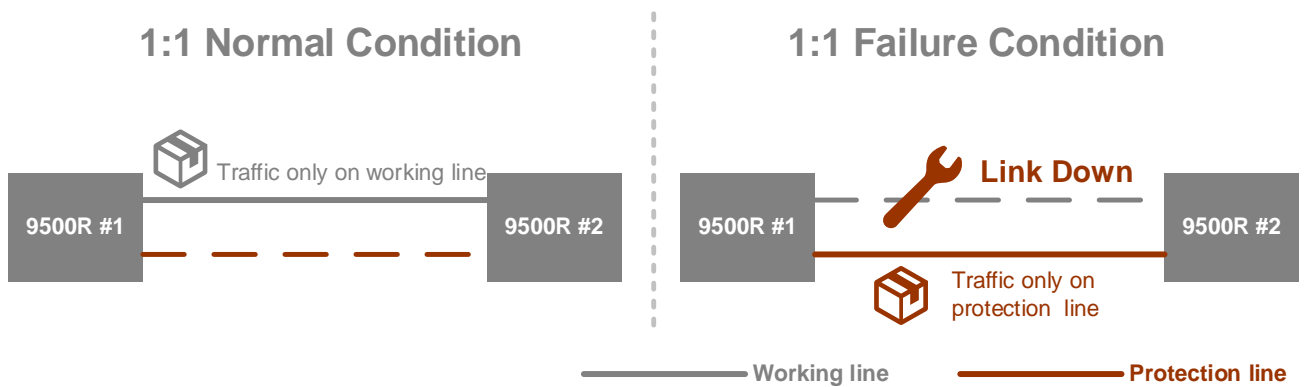


Carrier Ethernet Protection Schemes

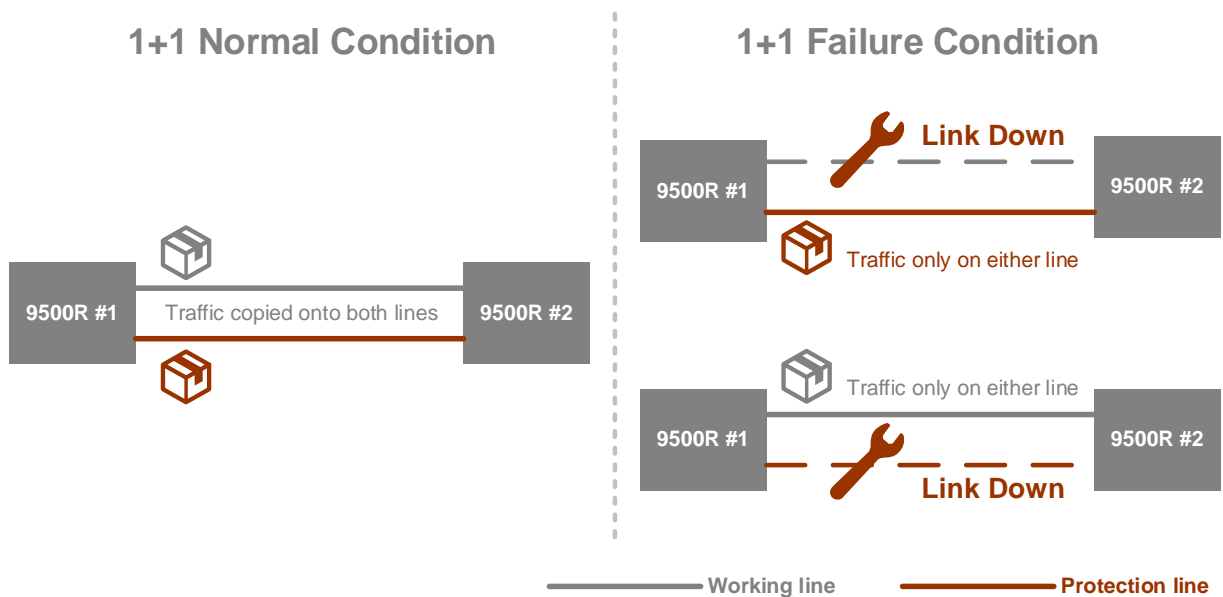
In Carrier Ethernet networks, protection schemes of static route provisioning are usually required for service providers to achieve service reliability and monitoring. **Ethernet linear protection switching (ELPS)** standardized in ITU-T G.8031 and **Ethernet ring protection switching (ERPS)** standardized in ITU-T G.8032 are the two most commonly adopted protection schemes.

ELPS is provisioned between two nodes by constructing point-to-point VLAN or Q-in-Q tagging. A pair of lines (i.e. working line and protection line) achieves either **1+1** or **1:1** protection.

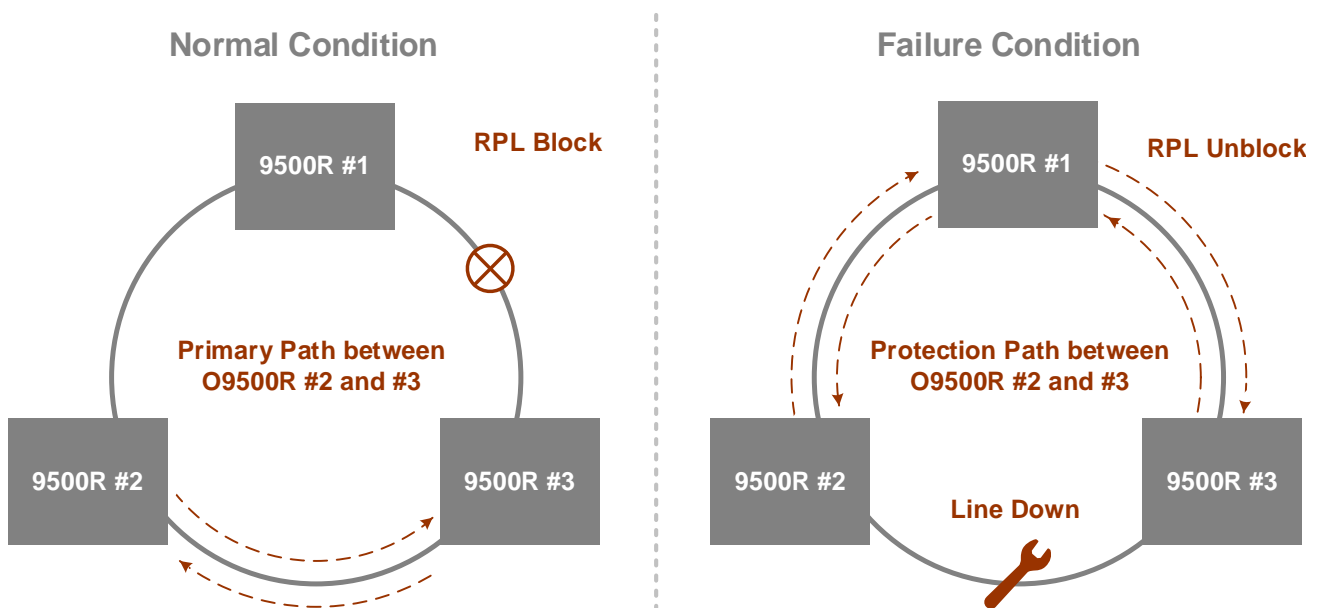
In **1:1 protection** mode, traffic only travels on the working line, and will only switch to the protection line when failure of the working line is detected.



In **1+1 protection** mode, traffic from the head end of a 1+1 link is copied and transmitted on both lines. When line failure occurs in either line, the other line will then become the sole working line.



ERPS is a highly reliable and stable protection mechanism in ring networks with loop prevention. In a ring network, each given node is connected to at least two neighbor nodes via separate links. Multiple nodes interconnected in the topology then form a ring. Any two nodes in the ring can be connected via at least two paths, serving as a protection scheme. The two ports on both ends of a line on neighboring devices are known as ring ports. The minimum amount of nodes in a ring is three. Provisioning is also achieved via VLAN. To avoid the occurrence of a loop, traffic is allowed to flow on all ring sessions except for the **Ring Protection Link (RPL)**. Under normal conditions, the RPL is blocked from any traffic by the host switches. When a failure in the network is detected, the RPL host unblocks the RPL to allow traffic to pass through. Failure activates protection switching via **Ring Automatic Protection Switching (R-APS)** message relay.



Ordering Information

Note1: All devices and shelves are RoHS compliant units.

Note2: Modules that do not conform to the temperature range from -20°C to 65°C are marked orange

Model	Description	Notes
Main Unit		
HX9500R-PTN-CHPA-6U	Main chassis HX9500 PTN10Gw/o modules, CPU & power supply, support : - 4 slots for tributary card (STM1/STM4,xE1,xE3, 8 FE/GE of 622Mbps) of the HX9400-6U - 6 slots for QX3440 card (1 or 2 slots)	
Controller Modules (CPU)		
HX9500R-PTN-CC16	CCPA Controller module with cross-connect unit and two STM-1/4/16 (OC-3/12/48) interfaces without SFP (mini-GBIC) optical modules	<ul style="list-style-type: none"> Order two for redundancy. Please order SFP optical modules separately from SFP optical modules brochure
HX9500R-PTN-CC4	CCPA Controller module with cross-connect unit and two STM-1/4 (OC-3/12) interfaces without SFP (mini-GBIC) optical modules	Use with CXR-HX9500-R-PTN-CHPA- G
Connector Board and Fan Modules		
HX9500R-PTN-CB	Connector Board for PTN10G Chassis. Require one for each chassis	<ul style="list-style-type: none"> CBPA is required for each chassis. Clock I/O cable 1meter are included
HX9500R-PTN-CBPOE	Connector Board for PTN10G Chassis with PoE+. Require one for each chassis	
HX9500R-PTN-CB-VOIP	Connector Board for PTN10G with built-in VoIP order wire port. (1 per chassis). With alarm I/O, external clock I/O, RS232 console port DB9F and EoW using VoIP technology (Analog phones supported). Include 1m cable for PPS, ToD, Clock I/O (Ref HX9x00-ACC-CAB-HDB15M-100-2BNC-3RJ45M)	
HX9500R-PTN-FAN	Fan Board	<ul style="list-style-type: none"> One required for each chassis.

High Speed or High Density Tributary Modules

HX9400R-PTN-16E1/T1	16 E1 (120 ohm) or 16 T1 software programmable plug-in card	For HX9400 or HX9500
HX9400R-PTN-32E1/T1	32 E1 (120 ohm) or 32 T1 software programmable plug-in card	
HX9400R-PTN-63E1/T1	63 E1 (120 ohm) or 63 T1 software programmable plug-in card	
HX9400R-PTN-16E1-75	16 E1(75 ohm) plug-in card	
HX9400R-PTN-32E1-75	32 E1(75 ohm) plug-in card	
HX9400R-PTN-63E1-75	63 E1(75 ohm) plug-in card	
HX9400R-PTN-3DSE3	3 T3 or 3 E3 software programmable interface plug-in card (Temperature range from -5°C to 65°C)	
HX9400R-PTN-3DSE3-M13	3 T3 or 3 E3 software programmable interface plug-in modules with M13 /Mx3 function for T3 interface only (Temperature range from -5°C to 65°C)	

HX9400R-PTN-8GES4SW	Ethernet tributary HX9400R-PTN/HX9500R-PTN-A card manageable switch level 2 with 4 x electrical 10/100/1000BaseT and 4 x SFP ports, Backplane 622Mbps, compatible with CPU CC4. Without SFP modules.	
HX9400R-PTN-8GES16SW	Ethernet tributary HX9400R-PTN/HX9500R-PTN-A card manageable switch level 2 with 4 x electrical 10/100/1000BaseT and 4 x SFP ports, Backplane 2,5Gbps, compatible with CPU CC16. Without SFP modules.	
HX9400R-PTN-2CB-2GSF	4 GbE card with 2 combo and 2 optical (10/100/1000BaseT) interface plug-in module with L2 switch (Temperature range from -20°C to 55°C)	<ul style="list-style-type: none"> • Available on tributary slot 3 and 4 only • Compatible with CHAA/CHPA and CC16/CCPA only • SFP optical modules are not included. Please order SFP modules separately. • Order two for redundancy
HX9400R-PTN-ADSTM1/4	B16 STM-1/4 (OC-3/12) software configurable plug-in card without SFP (mini-GBIC) optical modules	B16 For HX9400 or HX9500
HX9400R-PTN-ADSTM1/4/16	B2G5 STM-16/OC-48 software configurable interface plug-in module without SFP (mini-GBIC) optical modules	<ul style="list-style-type: none"> • B2G5 • Available on tributary slot 3 and 4 only • Compatible with CHAA/CHPA and CC16/CCPA only • SFP optical modules are not included. Please order SFP modules separately. • Order two for redundancy
HX9500R-PTN10G	MPLS-TP plug-in module with 3 x 10G SFP+ ports and 8 x GE SFP ports, without SFP (mini-GBIC) optical modules (Temperature range from -20°C to 55°C)	Only compatible with HX9500R-PTN-CHPA-6U and HX9500R-PTN-CC16

*Future Option

Low Speed Tributary Modules (Single Slot). Mainly same as QX3440 large slot cards

QX3440-4E1	4-channel E1 plug-in card.	<ul style="list-style-type: none"> • For cc option, please refer to the table below for detail information
QX3440-4T1	4-channel T1 plug-in card	
QX3440-3E1-120	3-channel E1 plug-in card with DS0 (64K bps) SNCP protection	<ul style="list-style-type: none"> • For cc option, please refer to the table below for detail information.
QX3440-3T1	3-channel T1 Interface	<ul style="list-style-type: none"> • For software version 3.02.01 or newer versions
QX3440-2GSH4W	2-channel G.SHDSL plug-in card (2 pair)	
QX3440-2GSH4W	4-channel G.SHDSL plug-in card (1 pair)	
QX3440-TOR-8I-8O	8-channel dry contact plug-in card with maximum voltage 100 Vdc or 250 Vac	
QX3440-TOR-8I-8O-B	8-channel dry contact type B plug-in card with maximum voltage 220 Vdc or 250 Vac	
QX3440-8G703-64K	8-channel G.703 plug-in card at 64 Kbps data rate	
QX3440-C3794	1- channel C37.94 plug-in card	<ul style="list-style-type: none"> • For LSFOM option, please refer to the table below for detail information
QX3440-4C3794	4- channel C37.94 plug-in card	



QX3440-8RS232-A	8-port RS232 plug-in card with X.50 subrate multiplexing scheme and X.54 encoding, with 8 RJ48 connectors for 8 RS232 Async ports	•
QX3440-8RS232-A4S	8-port RS232 plug-in card with X.50 subrate multiplexing scheme and X.54 encoding, with 2RJ48 connectors and 2 DB44 connectors for Async and Sync ports	Two conversion cables are included. (Each cable has one DB44 connector to one DB9 and two DB25 connectors).
QX3440-8BR-RS232	8-channel data bridge plug-in card, with 8 RJ48 connectors for 8 data bridge Async ports	•
QX3440-SW8RT	8-LAN port/64 WAN ports router/bridge plug-in card	
QX3440-CONF2	Conference plug-in card with two RS232 data ports, two FXS ports and two E&M ports	•
QX3440-TDMoE	TDMoE card with 2 GbE combo interfaces and 2 Ethernet interfaces (10/100/1000BaseT) plug-in module. Support G.823 Traffic (Temperature range from -20°C to 55°C)	• The SFP module is not included in the TDMoE card. Please order separately for SFP optical modules from SFP optical brochure.
QX3440-6RS-4SERIAL	6-port universal data interface card that supports three software configurable modes: Port 1 to 4: two DB44 connectors Port 5 to 6: two RJ48 connectors Mode 1: Port 1 to 4: RS232/RS422/X.21, Async/Sync 64kbps with V.110 encoding Port 5 to 6: RS232 for ASYNC only Mode 2: Port 1 to 4: X.21/RS422 SYNC N*64k, (N=1~32) Port 5 to 6: Not available Mode 3: Port 1 to 3: X.21/RS422 SYNC N*64k, (N=1~32). Port 4: X.21/RS422 SYNC, N*64k, (N=1~20). Port 5 to 6: RS232 N*64k (N=1~6) oversampling data. Mode 4: Port 1 to 4: X.21/RS422/V.35/V.36/V.54/EIA530/RS449 SYNC N*64k (N=1~32) Port 5 to 6: Disabled	• Please order separately for SFP optical modules from SFP optical brochure. • No conversion cable is included. Please order conversion cable separately from below table. • Three conversion cable types are available: CXR-ACC-CAB-DB44M-100-2DB25F-VB CXR-ACC-CAB-DB44M-100-2DB15F-VB CXR-ACC-CAB-DB44M-100-1DB15F-1DB25F-VB
QX3440-8RS485-TS-BUS	8-port universal data interface card that supports RS232/RS422/RS485 DCE interface which is software configurable Available options: Terminal Server, Omnibus, Clock Pass Through, and full-/half duplex modes	• For opm option, please refer to the table below for detail information.
QX3440-8E&MA	8-channel 2W/4W E&M plug-in card with 8 RJ45 (Temperature range from -5°C to 65°C)	For x option, please refer to the table below.



QX3440-12MAGA	12-channel Magneto ring-one-time plug-in module w/ L1. GND	<ul style="list-style-type: none"> • 12MAG-A-1G2 includes all function of 12MAG-A cards.
CXR-HX9500-R-12MAG-A-1G2-x-G	12-channel Magneto ring-one-time plug-in module w/ L1, L2, and L1. GND	
QX3440-12FXSA	12-channel FXS plug-in card with 600/ 900 Impedance, Battery Reverse, PLAR, without Ground Start and Metering Pulse. Used with 12 RJ11.	<ul style="list-style-type: none"> • 12MAG-A-1G2 includes all function of 12MAG-A cards. • 12FXS-GMP includes all FXS Card functions.
QX3440-12FXSA-M	12-channel FXS plug-in card with 600/ 900 Impedance, Battery Reverse, PLAR, [Metering Pulse]. Used with 12 RJ11.	
QX3440-12FXOA	12-channel FXO plug-in card with 600/ 900 Impedance, Battery Reverse, without Ground Start and Metering Pulse. Used with 12 RJ11.	

*Future Option

Low Speed Tributary Modules (Dual Slots)

QX3440-4TTA	Dual slot transfer trip plug-in module for HX9500R-PTN. Four ports for DTT input and output.	
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Feature Activation License

HX9500-R-3M13-UL	Feature Activation License for HX9500-R-PTN 3TE3 module to support M13/Mx3 function for T3 interface only	<ul style="list-style-type: none"> • Use with 3TE3 HS tributary module
QX3440-E1-RING	Feature Activation License for HX9500-R-PTN controller module to support framed E1 PDH-Ring function	<ul style="list-style-type: none"> • Use with 4E1 or FOM LS tributary modules
QX3440-T1-RING	Feature Activation License for HX9500-R-PTN controller module to support framed T1 PDH-Ring function	<ul style="list-style-type: none"> • Use with 4T1 LS tributary modules

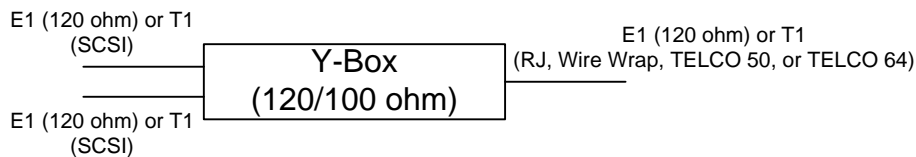
Accessories

SFP Optical Modules		
Please place your order using the 5-digit alphanumeric codes listed in the separate SFP Optical Module Brochure.		
Note: Non-CXR SFP modules are not guaranteed to work with our equipments. It is strongly recommended to buy CXR-logo SFP modules.		
Power Modules		
HX9500R-PTN-DC48-500	Single power module -48Vdc (SD48P) , 500W	<ul style="list-style-type: none"> • For redundancy purposes, order 2 single DC.
HX9500R-PTN-DC48/125	Single power module (300W) Input, 48Vdc/125Vdc (36 to 140Vdc)	<ul style="list-style-type: none"> • For redundancy purposes, order 2 single DC.
Power Adaptor (All power adaptor are RoHS compliant)		
ACDC-48VDC-5A-US	240 Watt, AC (100 to 120 Vac, 5.0A/200 to 240 Vac, 2.5A auto sensing) to DC (-48 Vdc, 5A) adaptor for USA 🇺🇸	<ul style="list-style-type: none"> • This power adaptor is only for HX9500R-PTN-DC48
ACDC-48VDC-5A	240 Watt, AC (100 to 120 Vac, 5.0A/200 to 240 Vac, 2.5A auto sensing) to DC (-48 Vdc, 5A) adaptor for Europe 🇪🇺	
ACDC-48VDC-5A-UK	240 Watt, AC (100 to 120 Vac, 5.0A/200 to 240 Vac, 2.5A auto sensing) to DC (-48 Vdc, 5A) adaptor for UK 🇬🇧	
Mounting Ear		
19"/23" ear mounts	A pair of 19"/23" ear mounts is supplied as part of standard package. Note: For other sizes, please contact your nearest CXR sales representative.	
Conversion Panels		
IX-PAN-16E1T1-RJ45	1u panel for one SCSI to 16 RJ connectors	<ul style="list-style-type: none"> • Use with 16/32/63TE HS tributary



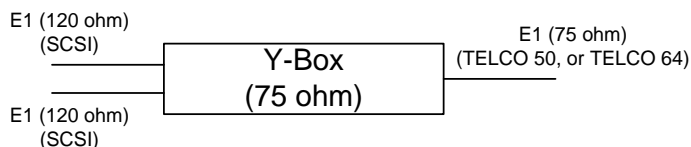
	without cable. Add 1 SCSI cable 432x44x23mm (WxHxD)	modules • This panel can also be used in the CXR-HX9400R-PTN.
IX-PAN-16E1T1-WR	1u panel for one SCSI to 16 Wire Wrap connectors without cable. Add 1 SCSI cable 432x44x40mm (WxHxD)	• Use with 16/32/63TE or 16/32/63E75 HS tributary modules • This panel can also be used in the CXR-HX9400R-PTN.
IX-PAN-16E1-BNC	1.5u panel for one SCSI to 16 BNC connectors without cable. Add 1 SCSI cable 432x66x53mm (WxHxD)	• Use with 16/32/63E75 HS tributary modules • This panel can also be used in the CXR-HX9400R-PTN.

Y-box Panels for 120/100 ohm



ACC-Y-2SCSI-16RJ-G	1u Y-box 16-port panel for two SCSI (E1(120 ohm) or T1) to 16 RJ (E1(120 ohm) or T1) connectors without cable	Use with CXR-HX9500-R-16TE-G
ACC-Y-2SCSI-16WW-G	1u Y-box 16-port panel for two SCSI (E1(120 ohm) or T1) to 16 Wire Wrap (E1(120 ohm) or T1) without cable	
ACC-Y-2SCSI-2T50P8-16TE-G	1u 16-port Y-box panel in (E1(120 ohm) or T1) for two SCSI to two TELCO 50 (E1(120 ohm) or T1) connectors (8 ports per TELCO connector) without cable	
ACC-Y-2SCSI-2T50P12-16TE-G	1u 16-port Y-box panel in (E1(120 ohm) or T1) for two SCSI to two TELCO 50 (E1(120 ohm) or T1) connectors (12 ports to the first TELCO connector, 4 ports to the second TELCO connector) without cable	
ACC-Y-2SCSI-1T64P16-16TE-G	1u 16-port Y-box panel in (E1(120 ohm) or T1) for two SCSI to one TELCO 64 (E1(120 ohm) or T1) connectors (16 ports per TELCO connector) without cable	Use with CXR-HX9500-R-32TE or CXR-HX9400-R-63TE
ACC-Y-4SCSI-4T50P8-32TE-G	1u 32-port Y-box panel in (E1(120 ohm) or T1) for four SCSI to four TELCO 50 (E1(120 ohm) or T1) connectors (8 ports per TELCO connector) without cable	
ACC-Y-4SCSI-3T50P12-32TE-G	1u 32-port Y-box panel in (E1(120 ohm) or T1) for four SCSI to three TELCO 50 (E1(120 ohm) or T1) connectors (12 ports to the first TELCO connector, 12 ports to the second TELCO connector and 8 ports to the third TELCO connector) without cable	
ACC-Y-4SCSI-2T64P16-32TE-G	1u 32-port Y-box panel in E1 120 ohm or T1 for four SCSI to two TELCO 64 (E1(120 ohm) or T1) connectors (16 ports per TELCO connector) without cable	

Y-box Panels for 75 ohm



ACC-Y-2SCSI-2T50P8-16E75-G	1u 16-port Y-box panel for two SCSI (E1(120 ohm)) to two TELCO 50 (E1(75 ohm)) connectors (8 ports per TELCO connector) without cable	Use with CXR-HX9500-R-16TE-G
ACC-Y-2SCSI- 2T50P12-16E75-G	1u 16-port Y-box panel for two SCSI (E1(120 ohm)) to two TELCO 50 (E1(75 ohm))connectors (12 ports to the first TELCO connector, 4 ports to the second TELCO) straight without cable	Use with CXR-HX9500-R-32TE or CXR-HX9500-R-63TE
ACC-Y-2SCSI- 1T64P16-16E75-G	1u 16-port Y-box panel for two SCSI (E1(120 ohm)) to one TELCO 64 (E1(75 ohm))connectors (16 ports per TELCO connector) straight without cable	Use with CXR-HX9500-R-16TE-G
ACC-Y-4SCSI- 4T50P8-32E75-G	1u 32-port Y-box panel for four SCSI (E1(120 ohm)) to four TELCO 50 (E1(75 ohm))connectors (8 ports per TELCO connector) without cable	
ACC-Y-4SCSI- 3T50P12-32E75-G	1u 32-port Y-box panel for four SCSI (E1(120 ohm)) to three TELCO 50 (E1(75 ohm))connectors (12 ports to the first TELCO connector, 12 ports to the second TELCO connector and 8 ports to the third TELCO connector) without cable	Use with CXR-HX9500-R-32TE or CXR-HX9500-R-63TE-G
ACC-Y-4SCSI- 2T64P16-32E75-G	1u 32-port Y-box panel for four SCSI(E1(120 ohm)) to two TELCO 64 (E1(75 ohm))connectors (16 ports per TELCO connector) without cable	

Y-Box (All Y-Box are RoHS compliant)

CXR-VV-B-G	1 for 1 protection Y-Box with BNC connectors (4-E1)	Use with CXR-HX9500-R-4E1-BNC-G
CXR-VV-R-G	1 for 1 protection Y-Box with RJ48C connectors (16-E1)	Use with CXR-HX9500-R-4E1-RJ-G
CXR-VV-T-G	1 for 1 protection Y-Box with RJ48C connectors (16-T1)	Use with CXR-HX9500-R-4T1-G

Conversion Cables (All conversion cables are RoHS compliant)

ACC-CAB-SCSI68M-200-1SCSI68M-G	SCSI 68 pin/Male to SCSI 68 pin/Male Extension Cable Length:200cm	Used in CXR-HX9500R-PTN Y-box panels and conversion panels
ACC-CAB-DB44M- 100-2DB25F-1DB09F-DB	DSUB-44 pin/Male to two DSUB-25 pin/Female- one DSBU-9 pin/Female Length 100cm	Used in CXR-HX9500-R-8RS232-DB and CXR-HX9500-R-8DBRA-DB plug-in card
ACC-CAB-DB25M-30-1M34F	DSUB-25pin/Male to M34/Female V.35 Conversion cable Length: 30 cm	Used in CXR-HX9500-R-6V35A plug-in card
ACC-CAB-DB25M-30-1DB37F	DSUB-25pin/Male to DSUB-37/Female RS449 Conversion cable Length: 30 cm	Used in CXR-HX9500-R-6V36A and CXR-HX9500-R-6R449A plug-in cards

Blank Panels

HX9500R-PTN-PAN-PTN	Blank panel for CPU slot (CCPA)	
HX9400R-PTN-PAN-PW	Blank panel for power supply slots	Applicable on the CXR-HX9400R-PTN and CXR-HX9500R-PTN as well.
HX9400R-PTN-PAN	Blank panel for High-speed slots (Slots 1~4)	
QX3440-PAN-SLOT	Blank Panel for Low-speed slots (Slots 11~16)	Applicable on the CXR-QX3440 as well.

For 4E1 and 3E1 card:

■ Where **cc** is used to select connector:

cc =	Description	Notes
RJ	RJ48C connector	
BNC	BNC connector	

For 8UDTEA card:

■ Where **opm** is used to select 8UDTEA functions:



opm =	Description
DCE	Support RS232/RS422/RS485 DCE interface which is software configurable
TS	Support Terminal Server Function and DCE
OMNI	Support Omnibus Function and DCE
CPT	Support Clock Pass Through function and DCE
TSOMNI	Support Terminal Server, Omnibus Function and DCE
HD	Support RS232/RS422/RS485 DCE interface with Full- and Half-Duplex modes
TSHD	Support Terminal Server Function and DCE with Full- and Half-Duplex modes
OMNIHD	Support Omnibus Function and DCE with Full- and Half-Duplex modes
TSOMNIHD	Support Terminal Server, Omnibus Function and DCE with Full- and Half-Duplex modes
FULL	Support Terminal Server, Omnibus Function, Clock Pass Through and DCE with Full- and Half-Duplex modes
Feature Activation License	
Description	
CXR-HX9500-R-8UDTEA-UPGR-TS	Feature Activation License for HX9500-R 8UDTE card to support Terminal Server function
CXR-HX9500-R-8UDTEA-UPGR-OMNI	Feature Activation License for HX9500-R 8UDTE card to support Omnibus function
CXR-HX9500-R-8UDTEA-UPGR-CPT	Feature Activation License for HX9500-R 8UDTE card to support Clock Pass Through function
CXR-HX9500-R-8UDTEA-UPGR-TSOMNI	Feature Activation License for HX9500-R 8UDTE card to support Terminal Server function and Omnibus function
CXR-HX9500-R-8UDTEA-UPGR-HD	Feature Activation License for HX9500-R 8UDTE card to support Full- and Half-Duplex modes
CXR-HX9500-R-8UDTEA-UPGR-TSHD	Feature Activation License for HX9500-R 8UDTE card to support Terminal Server function with Full- and Half-Duplex modes
CXR-HX9500-R-8UDTEA-UPGR-OMNIHD	Feature Activation License for HX9500-R 8UDTE card to support Omnibus function with Full- and Half-Duplex modes
CXR-HX9500-R-8UDTEA-UPGR-TSOMNIHD	Feature Activation License for HX9500-R 8UDTE card to support Terminal Server function and Omnibus function with Full- and Half-Duplex modes
CXR-HX9500-R-8UDTEA-UPGR-FULL	Feature Activation License for HX9500-R 8UDTE card to support Terminal Server, Omnibus and Clock Pass Through functions with Full- and Half-Duplex modes

For 1FOMB* Card:

■ where **opt** is used to select optical module type:

opt =	Description	Notes
SAA	single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 30 km - S1.1 physical layer*	<ul style="list-style-type: none"> • Use 2 fibers • * ITU-T Rec G.957 application code
SBB	single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 50 km - L1.1 physical layer*	
SCC	single optical module with dual uni-directional fiber, 1310 nm, FC optical connector, 30 km - S1.1 physical layer*	
SDD	single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 20 km - S1.2 physical layer*	
SEE	single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 100 km - L1.2 physical layer*	
SSM	single optical module with single bi-directional fiber (master), 1310 nm transmit and 1550 receive, SC optical connector, 30 km reach - S1.1/ S1.2 physical layer*	<ul style="list-style-type: none"> • 1310 nm from master to slave • Order SSM to use with SSS • Use 1 fiber • * ITU-T Rec G.957 application code
SSS	single optical module with single bi-directional fiber (slave), 1310 nm receive and 1550 transmit, SC optical connector, 30 km reach - S1.1/ S1.2 physical layer*	<ul style="list-style-type: none"> • 1550 nm from slave to master • Order SSS to use with SSM • Use 1 fiber • * ITU-T Rec G.957 application code

NOTE: For other special optical modules, please contact your nearest CXR sales representative.



For 8-channel 2W/4W E&M card:

■ Where **x** is used to select all of voice card signaling bits. If this option is not required, omit the **x** field in the ordering code.

	x =	Description	Note
8EMA	E	Follows ETSI signaling bits	Jumper selectable for all channels
	A	Follows ANSI signaling bits	
	R	Reverse for ON-HOOK and OFF-HOOK signaling bits exchange	
	AR	Follows ANSI signaling bits and reverse bit	
	ER	Follows ETSI signaling bits and reverse bit	
	S	Follows customer's special bit or function assignment	
	S4	Disable the function of the test button	
	S5	Forcing all ports to be OFF-HOOK when an alarm occurs	
	S6	Forcing all ports to be ON-HOOK when an alarm occurs	

Note:

1. For S (customer's special bit), please contact your nearest CXR sales representative.
2. If x is not selected from table above, the default setting for signaling bits is ETSI and for trunk condition is ON-HOOK.

For 12/24-channel FXS card:

■ Where **sn** is used to select special function. If this option is not required, omit the **sn** field in the ordering code.

sn =	Description	Note
sn = omit	FXS Loop Feed = -48 Vdc with 25 mA current limit; alarm tone enable; normal ring	
S1	FXS Loop Feed = -48 Vdc with 35 mA current limit	
S4	Remove alarm tone	
S5	Double ring tone transmit	

Note: For sn (special function), please contact your nearest CXR sales representative.

■ Where **pt** is used to select the following functions.

pt=	Description	Note
PWR	with -48Vdc or -125Vdc power modules	
PWR1613	with -48Vdc power modules complied with IEEE 1613 standard	Only for 12FXS

For Magneto Card:

■ Where **x** is used to select version type:

x=	Description	Note
16	16 Hz ring generator	20 Hz is the general setting for all MAG cards. For special settings (16, 25, 50), please specify your need by filling in the x option.
20	20 Hz ring generator	
25	25 Hz ring generator	
50	50 Hz ring generator	

For C37.94 Card:

■ Where **LSFOM** is to select **LS-Fiber Optical Module** option, each module has 5 letters.



LSFOM	Description										Notes
	Mode		Data Rate		Wave Length		Distance		Connector		
	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	
ZHHTT	Z	Multi-mode	H	155 M	H	820nm	T	2km	T	ST connector	1 * 8 Separate transceiver & receiver
QHATT	Q	Multi-mode	H	155 M	A	850nm	T	2km	T	ST connector	1 * 9
NFB3T	N	Single mode	F	125 M	B	1310nm	3	30km	T	ST connector	
QFBTT	Q	Multi-mode	F	125 M	B	1310nm	T	2km	T	ST connector	
NHC2S	N	Single mode	H	155 M	C	1550nm	2	20km	S	SC connector	
NHCUS	N	Single mode	H	155 M	C	1550nm	U	100km	S	SC connector	

For Transfer Trip (TTA) Card:

■ Where **pwr** is used to select the following functions.

pwr=	Description	Note
24	Complied with 24/48V voltage	*Future option
48	Complied with 48/125V voltage	
125	Complied with 125/250V voltage	*Future option

CXR-HX9500R-PTN PTN/SDH/SONET/PDH IMAP Product Specification

High Speed or High Density Tributary Modules

Max. Number of Aggregate Lines on Controller Module

4 x STM-1/4/16 (OC-3/12/48) aggregate optical lines

Max. Number of HS Tributary Lines for the Controller Module

- 2 x STM-4 (OC-12) tributaries without protection
- 8 x STM-1 (OC3) tributaries without protection
- 12 x E3/T3 tributaries without protection
- 252 x E1/T1 tributaries without protection
- 8 x GbE and 32 x FE EoS with build in L2 switch tributaries without protection
- 32/4 x FE/GE EoS without build in L2 switch tributaries without protection
- 28 x FOM tributaries without protection
- 6 x 10G SFP+ and 16 x 1G SFP tributaries without protection

T1 Interface

Line Rate	1.544 Mbps ± 32 ppm	Jitter	ITU G.824
Line Code	AMI/B8ZS	Framing	Unframed with a framing monitor on receiving side
Input Signal	ITU G.703 DSX-1 0dB to -6dB	Impedance	100 ohm twisted pair
Output Signal	ITU G.703 DSX-1 w/short (0-110, 110-220, 220-330, 330-440, 440-550, 550~660 (feet)	Connector	SCSI-II 68-pin
Output Mask	Bellcore GR-499-core		One connector for 16 ports Two connectors for 32 ports Four connectors for 63 ports



E1 Interface

Line Rate	2.048 Mbps \pm 50 ppm	Jitter	ITU G.823
Line Code	AMI/HDB3	Framing	Unframed with a framing monitor on receiving side
Input Signal	ITU G.703	Impedance	75 ohm coax/120 Ω twisted pair
Output Signal	ITU G.703	Connector	SCSI-II 68-pin One connector for 16 ports Two connectors for 32 ports Four connectors for 63 ports
Output Mask	ETS 300 689 Sec.4.2.1.2 ITU G.703		

E3 Interface

Line Rate	34.368 Mbps \pm 20ppm	Jitter	ITU G.823
Line Code	HDB3	Framing	Unframed, G.751
Input Signal	ITU G.703	Impedance	75 ohm coax
Output Signal	ITU G.703	Connector	BNC connector
Output Mask	ETS 300 689 Sec.4.2.1.2 ITU G.703	Temperature	-5 $^{\circ}$ C to 65 $^{\circ}$ C

T3 interface

Line Rate	44.736 Mbps \pm 20ppm	Jitter	ITU G.824
Line Code	B3ZS	Framing	Unframed, M13/Mx3 (unframed E1/T1), G.747
Input Signal	ITU G.703	Impedance	75 Ω coax
Output Signal	ITU G.703	Connector	BNC connector
Output Mask	Bellcore GR-499-core	Temperature	-5 $^{\circ}$ C to 65 $^{\circ}$ C

8-port Gigabit Ethernet Interface (8GES4SWA/8GES16SWA)**LAN Gigabit Ethernet (GbE) Interface**

Electrical Ports	4 RJ45 ports (Port 5 to 8) BaseT 10/100/1000 Mbps per port Auto MDI/MDIX
Optical Ports	4 ports of SFP housing (Port 1 to 4) 10/100/1000 Mbps per port auto laser shutdown (ALS)
Speed	10/100/1000 Mbps, auto-negotiation
Direction	duplex(half/full), auto-negotiation

WAN Transmission

Throughput	STM-4/OC-12 (622M) 2 x STM-1/OC-3 or 1 x STM-4/OC-12, software configurable
EVC services	E-line mode: Port-based E-line (Ethernet Private Line, EPL) Virtual E-line mode: VLAN-based E-line (Ethernet Virtual Private Line, EVPL) E-LAN mode: Port-based E-LAN (Ethernet Private LAN, EPLAN)
EVC grouping	4 EPL pipes, 8 EVPL pipes, 1024 VLANs and 48 VCGs for EPLAN
Protection	External switch connected to two 8GESW cards at the same time for card-level 1+1 protection

Ethernet over SDH/SONET

Line Rate	10/100/1000 Mbps
SDH/SONET Mapping	n x AU4/AU3/TU3/TU11/TU12 (STS3C/STS1/VT1.5/VT2)
Multiplexing	G.707
Layer 2 Protocols	RSTP (802.1W), VLAN (802.1Q, 802.1P) Flow Control (802.3X) MSTP (802.1S) IGMP Snooping QoS
EoS Protocols	Virtual Concatenation (VCAT) Encapsulation: GFP(G.7041), LAPS or BCP LCAS (G.7042) and non-LCAS
Bridge	802.1d MAC learning (maximum MAC table 16K entry)

VLAN	IEEE 802.1q bridging Supports tag stacking, up to 2 VLAN tags VLAN packet transparent
QoS	Eight priority queues per LAN/WAN port Packet classification based on 802.1p user priority (CoS) or DSCP Traffic Engineering supports TRTC and SRTC meter rules, and packet color remark Queue scheduling algorithm either Strictly Priority or Weighted Round-Robin (WRR)

Standards Compliance

IEEE	802.1q, 802.1p, 802.3, 802.3u, 802.3ab, 802.3z, 802.1s, 802.1w, 802.1x G.7041, G.7042
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PTN10G/PTNext Interface

1 GbE		10 GbE	
Number of Ports	8 PTNext (Operable with PTN10G only): 10	Number of Ports	3 PTNext (Operable with PTN10G only): 1
Connector	SFP	Connector	SFP+

SDH/SONET

Number of Ports	1 STM-16/OC-48
Connector	Backplane to XCU

Circuit Emulation

SAToP	Unframed E1/T1 packets
CESoPSN	Fractional E1/T1 (N x DS0) packets
CEP	SDH/SONET path packets

Encapsulation

TDM	over MPLS, over Carrier Ethernet, over IP (using pseudowire)
IP	over MPLS (using pseudowire)
Ethernet	VPWS, VPLS (using pseudowire)

QoS

Eight priority queues per port
Scheduling – Strict Priority, Weighted Round Robin with hierarchy
Ingress policing per service
Egress shaping per service
CIR / PIR (EIR) Two-rate, three-color. (Committed Information Rate, Peak or Expected Information Rate)
E-LSP: EXP-Inferred PSC (Per Hop Behavior Scheduling Class) LSP. (Label Switching Path)
WRED for congestion management. (Weighted Random Early Detection)



Standard Compliance**IEEE**

802.1d	STP
802.1w	RSTP
802.1s	MSTP
802.1q	VLAN
802.1ad	VLAN Tag Stacking (Q-in-Q)
802.1ag	Ethernet OAM (CFM)
802.3ah	Ethernet in the First Mile (EFM)
1588 v2	Precision Time Protocol (PTP)

ITU-T

G.8031	ELPS
G.8032	ERPS
G.8113.2	MPLS-TP OAM
Y.1731	Ethernet OAM

EMC/EMI

FCC15 Class A
EN55022 Class A
EN55035

RFC (IETF)

2131 & 2132	DHCP
6378	MPLS-TP Linear Protection
1058	RIPv1
1389	RIPv2
2328	OSPFv2
5340	OSPFv3
4842	Circuit Emulation over Packet (CEP)
3985	Pseudowire End-to-end Emulation (PWE3)

Safety

EN60950-1

B155/622 STM-1/4 (OC-3/12) Interface Card

Total Ports		2
Data Rate		155/622 Mbps
Line Code	LC connector	NRZ
	BNC Connector	CMI
Output Mask	BNC Connector	ITU.G703
Connector		LC, BNC
Jitter		ITU G.703
Impedance	BNC Connector	75ohm coax
Loopback	Local loopback, payload loopback, line loopback:	
BERT		

Note: For SFP modules, please refer to SFP brochure.

B2G5 STM-16/OC-48 Interface Card

Total Ports	2
Data Rate	2.5Gbps
Line Code	NRZ
	CMI
Output Mask	ITU.G703
Jitter	ITU G.703

Note: For SFP modules, please refer to SFP brochure.

Low Speed Tributary Modules**Network Line Interface – 4E1**

Line Rate	2.048 Mbps \pm 50 ppm	Framing	ITU G.704
Line Code	AMI or HDB3	Connector	BNC/RJ48C
Input Signal	ITU G.703	Electrical	75 ohm Coax/120 ohm twisted pair
Output Signal	ITU G.703	Jitter	ITU G.823

Network Line Interface - 4T1

Line Rate	1.544 Mbps \pm 32 ppm	Output Signal	DSX1 w/0, -7.5, -15 dB LBO
Line Code	AMI or B8ZS	Framing	D4/ESF (selectable)
Input Signal	DSX-1 0 dB to -30 dB w/ALBO	Connector	RJ48C

Network Line Interface - 3E1

Line Rate	2.048 Mbps \pm 50 ppm	Framing	ITU G.704
Line Code	AMI or HDB3	Connector	BNC/RJ48C
Input Signal	ITU G.703	Electrical	75 ohm Coax/120 ohm twisted pair
Output Signal	ITU G.703	Jitter	ITU G.823
Function	Support DS0-SNCP		

Network Line Interface – 3T1*

Line Rate	1.544 Mbps \pm 32 ppm	Framing	D4/ESF
Line Code	AMI/B8ZS	Output Signal	DSX-1 w/0, -7.5, -15 dB LBO
Input Signal	DSX-1 0dB to -30dB w/ALBO	Connector	RJ48C
Jitter	AT&T TR 62411	Pulse Template	AT&T TR 62411
Data Rate	n * (64) Kbps (n = 1 to 24)	Surge Protection	FCC Part 68 Sub Part D

G.shdsl Line Interface (2GH/4GH)

Number of ports	2 or 4
Line Rate for 4-channel G.shdsl	n x 64Kbps (n= 3 to 31)
Line Rate for 2-channel G.shdsl	n x 64Kbps (n= 3 to 15)
Line Code	16-TCPAM, full duplex with adaptive echo cancellation
Connector	RJ45
Electrical	Unconditioned 19-26 AWG twisted pair
Sealing current	Max. 20 MA source current
Clock Source	From System, Line
Diagnostic Test	G.SHDSL Loopback: To-LINE, To-bus BERT: QRSS

C37.94 Interface (1C37 / 4C37)

Ports	1-port Fiber, 4-port Fiber, or 4-port SFP
Source	LED
Wavelength	820nm 2Km reach
Connector	ST
Optical Budget	50 Micron core/9.6 db 62.5 Micron core/ 15db

Note: For SFP modules, please refer to SFP brochure.

Dry Contact I/O card (8I-8O)

Inputs -		Outputs -	
8-channel	2-port per card, 4-pair per port	8-channel	8-pair per card
Connector	RJ45	Connector	Screw type
Internal Resistance	1 K	Initial Insulation Resistance	Min. 100M ohm (at 500 Vdc)
Activation Current	3 ma	Max. Current	5A
Deactivation Current	1.5 ma	Max. Voltage	100 Vdc, 250 Vac
Allowable Current	4 ma		

Dry Contact Type B Interface

Inputs -		Outputs -	
8-channel	2-port per card, 4-pair per port	8-channel	8-pair per card
Connector	RJ45	Connector	Screw type
Internal Resistance	100 K	Initial Insulation Resistance	Min. 1000M ohm (at 500 Vdc)
Activation Current	3 ma	Max. Current	2A
Deactivation Current	1.5 ma	Max. Voltage	220 Vdc, 250 Vac



Allowable Current 4 ma

Co-directional (G.703) card

Interface ITU G.703 64 Kbps co-directional interface
 Connector 120ohm, RJ48
 Line Distance Up to 500 meters
 Loopback DTE Payload Loopback, Local Loopback

Router-B Interface (SW8RT)

Number of ports 8 LAN ports, Max. 64 WAN ports. Each WAN port has data rate n x 64K bps, 1 ≤ n ≤ 32 (≤ 8Mbps for total of all 64 WAN ports)
 Physical Interface 10/100 BaseT x 8
 Connector RJ45
 Routing protocol RIP-I, RIP-II, OSPF, Static
 Supporting Protocols PPP (IPCP/BGP), MLPPP, HDLC, Frame Relay, and Cisco compatible HDLC, NAT/NAPT, DHCP
 Diagnostic Ping, Trace route
 QoS Rate limit

DTE(RS232-X.50 mux. 8-port) Interface (RS232)

Data Port Up to twelve 8-port RS232 cards
 MUX Maximum 5 subrate port per 64K bps
 Data Rate
 Asynchronous Mux mode 0.6K, 1.2K, 2.4K, 4.8K, 9.6K
 Independent mode 0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K
 Synchronous Mux mode 0.6K, 1.2K, 2.4K, 4.8K, 9.6K
 Independent mode 0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 48K, 64K

Card Type	Port Number							
Eight RJ48	1	2	3	4	5	6	7	8
Two DB44 + Two RJ48 Connector	Async	Async	Async	Async	Async	Async	Async	Async
Conversion Cable	A three-into-one conversion cable adapts the DB44 connector to 3 connectors (one DB9S and two DB25S)							
Electrical	RS232 Interface, DCE							

6CDA G.703 co-directional and Contra-directional Interface Card

Data Port Interface 6-port
 cc mode : ITU G.703 64 Kbps co-directional and Contra-directional controlling (DCE) interface
 mixed mode : ITU G.703 64 Kbps co-directional, Contra-directional controlling (DCE) and Contra-directional subordinate (DTE) interface
 Connector 120ohm, RJ48
 Line Distance Up to 500 meters
 Alarm Co-directional : LOS and insert AIS(All 1)

Loopback Contra-directional : LOO (Loss Of Octet) Loopback DTE Payload Loopback, Local Loopback

Data Bridge Card

Data Port Feature Up to twelve 8-port data bridge card (each card supports up to 120 DS0 for data bridge)
 20 end points per multi-drop circuit to into a logical ended 56K or 64K channel
 Per port supports bridge function to N remote Trib. Site (N=1~20)
 Data Rate Asynchronous Support to receive 1200 to 19200 bps asynchronous data via oversampling channel
 Bridge function one port with one DS-0 to many (Maximum is 20 for remote Tributary data box)
 20 drops for each DS0 to remote Tributary data box and 8 ports RS232 shared the 128 channels.



6UDTEA Universal Data Interface Card**Mode 1****Multiplexing**

One MUX group per card
 MUX group bandwidth up to 64Kbps
 Maximum 6 port-based sub-rate

DTE Interface (RS232)**Data Port Up to 2 (Port 5 and Port 6)**

Data Rate	Asynchronous	Mux mode	0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K
		Independent mode	0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K
Connector	RJ48 (port5, port6)		
Alarm	Remote Alarm		
	RTS Loss		
Loopback	To-DTE		
	To-DS1 (To Line)		
Electrical	DCE		
Protocol	V.110		

DTE Interface (X.21/RS422/RS232)**Data Port Up to 4 (Port 1 to Port 4)**

Data Rate	Asynchronous	Mux mode	0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K
		Independent mode	0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K
	Synchronous	Mux mode	0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K,
		Independent mode	0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 48K, 64K
Connector	DB44 (Port 1 and Port 2), DB44 (Port 3 and Port 4)		
Alarm	Remote Alarm		
	RTS Loss		
Loopback	To-DTE		
	To-DS1 (To Line)		
Electrical	DCE		
Protocol	V.110		

Mode 2**DTE Interface (X.21/RS449/RS422/RS232/V.35/V.36/EIA530)****Data Port Up to 4 (Port 1 to 4)**

Data Rate	Synchronous N x 64kbps, N = 1~32
	Asynchronous mode is not supported.
Connector	DB44
Alarm	RTS Loss
Loopback	To-DTE
	To-DS1 (To Line)
Electrical	DCE

Note: When oversampling is enabled in MODE 2, port 5~6 will be disabled.

Mode 3**DTE Interface (X.21/RS449/RS422/RS232/V.35/V.36/EIA530)****Data Port Up to 4 (Port 1 to 4)**

Data Rate	Synchronous N x 64 Kbps, N = 1 to 32 for Port 1~3
	Synchronous N x 64 Kbps, N = 1 to 20 for Port 4
Connector	DB44
Alarm	RTS Loss
Loopback	To-DTE
	To-DS1 (To Line)
Electrical	DCE

DTE Interface (RS232)**Data Port Up to 2 (Port 5 to 6)**

MUX	Max 2 oversampling port / 64kbps
Data Rate	Asynchronous 200, 300, 0.6k, 1.2k, 2.4k, 4.8k, 9.6k, 19.2k, 38.4k
Connector	RJ48 (Port 5 & 6)
Alarm	Remote Alarm
	RTS Loss



Loopback	To-DTE To-DS1 (To Line)
Electrical	DCE

Mode 4: Clock Pass Through ***DTE Interface (X.21/RS422/RS232/V.35/V.36/EIA530)**

Data Port	Up to 4 (Port 1 to 4)
Data Rate	Synchronous 600, 1200, 2400, 4800, 9600, 19.2K, 38.4K Tx and Rx byte count
Connector	DB44
Alarm	LOLC, LOCH, CRE
Loopback	To-DTE To-DS1 (To Line)
Electrical	DCE

Note: When the card is switched to Mode 4, port 5-6 will be disabled.

8UDTEA (RS232/RS422/RS485) Universal Data Interface Card

Data Port	8 port UDTE card
ASYNC Data Rate	200,300, 600, 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K, 128K bps by oversampling
Connector	RJ48C
Interface	DCE only
Flow Control (RS232 only)	Hardware (RTS and DTR), none
Loopback function	DTE to DTE loopback; DTE to Line loopback

1FOMB

Source	MLM Laser	Line Code	Scrambled NRZ
Wavelength	1310 ± 50 nm, 1550 ± 40 nm 50 Km reach	Detector Type	PIN-FET

NOTE: Longer or shorter, 15 to 120Km, on special order.

Voice Card 12 MAG (Magneto)

Connector	Twelve RJ11
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ -law, user selectable together for all
Impedance	Balanced 600 or magneto telephone impedance match
Longitudinal Conversion Loss	> 46dB
Gain Adjustment	-21 to +10 dB / 0.1dB step transmit & receive
Signal/ Distortion	> 25dB with 1004 Hz, 0dBm input
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
Idle Channel Noise	Max. -65 dBm0p
Min Detectable Ringing Voltage	16 Vrms
Ringing Detectable Across	L1 and L2 (Tip and Ring), L1 and GND (Tip and GND)
Ringing Generation	Voltage: 76 Vrms (sine wave) Frequency: 20Hz (with optional choices of 16, 25, 50 Hz) Cadence: 1. Normal: Ring after crank 2. PLAR ON: -Single Ring Type: ring for 2 sec. and stop, or ring for 4 sec. and stop -Continuous Ring Type: 1 sec on 2 sec off, or 2 sec on 4 sec off
Ringing Send Across	L1 and L2 (Tip and Ring), L1 and GND (Tip and GND)
Signaling	Magneto MRD(Ringing across Tip and Ring or Tip and Ground)
Signaling Bit A,B,C,D	Programable
Signaling is carried transparently by the digitizing process.	
Use Magneto card default setting for communications between magneto telephones	
Use Magneto card PLAR mode setting for communications between a magneto telephone and a regular telephone	

Voice Card- E&MA (8EMA)

Connector	Eight RJ45
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF



Encoding	A-law or μ -law, user selectable together for all
Impedance	Balanced 600 or 900 ohms
Gain Adjustment (Per-port setting)	-16 to +7 dB / 0.1dB step for transmit (D/A) gain -16 to +14 dB / 0.1dB step for receive (A/D) gain
I/O Power Range	A/D Analog input level: -66 dBm (0.00039 Vrms) ~ + 3 dBm (1.09 Vrms) D/A Analog output level: -66 dBm (0.00039 Vrms) ~ + 4 dBm (1.22 Vrms)
Gain Variation	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
Longitudinal Conversion Loss	> 46dB
Total Distortion	> 35 dB at 0 dBm0 input
Idle Channel Noise	Max. -65 dBm0p
Carrier Connection	Side A (exchange side) and Side B (carrier side) setup by side switch
Wire Mode	2 wire and 4 wire (programmable)
Signaling	Type 1, Type 2, Type 3, Type 4, and Type 5, Transmit only (programmable)
Modems	Full compatibility with V.90 modems
Output Power on E/M leads	-48Vdc
Temperature	-5°C to 65°C

All in-band signaling tones are carried transparently by the digitizing process.
Customer is responsible for in-band signaling compatibility between a telephone and a switch, or between a PBX and a switch.

Voice Card (12FXS, 12FXOA)

12 FXS/FXO Connector	Twelve RJ11										
24 FXS/FXO Connector	One RJ21X femail connector										
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF										
Encoding	A-law or μ -law, user selectable together for all										
AC Impedance	Balanced 600 or 900 ohms (selectable together for all)										
Longitudinal Conversion Loss	> 46dB										
Cross talk measure	Max -70dBm0										
Gain Adjustment	FXS: -21 to +3 dB / 0.1dB step transmit & receive FXO: -21 to +10 dB / 0.1dB step transmit & receive										
Signal/ Distortion	> 25dB with 1004 Hz, 0dBm input										
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712										
Idle Channel Noise	Max. -65 dBm0p										
Variation of Gain	± 0.5 dB										
FXO	<table> <tr> <td>Ringin REN</td> <td>0.5B (AC)</td> </tr> <tr> <td>Detectable Ringing</td> <td>25 Vrms</td> </tr> <tr> <td>Loop Resistance</td> <td>$\leq 1800 \Omega$</td> </tr> <tr> <td>DC Impedance (ON-HOOK)</td> <td>> 1M Ω</td> </tr> <tr> <td>DC Impedance (OFF-HOOK)</td> <td>235 Ω @ 25mA feed 90 Ω @ 100mA feed</td> </tr> </table>	Ringin REN	0.5B (AC)	Detectable Ringing	25 Vrms	Loop Resistance	$\leq 1800 \Omega$	DC Impedance (ON-HOOK)	> 1M Ω	DC Impedance (OFF-HOOK)	235 Ω @ 25mA feed 90 Ω @ 100mA feed
Ringin REN	0.5B (AC)										
Detectable Ringing	25 Vrms										
Loop Resistance	$\leq 1800 \Omega$										
DC Impedance (ON-HOOK)	> 1M Ω										
DC Impedance (OFF-HOOK)	235 Ω @ 25mA feed 90 Ω @ 100mA feed										
FXS Loop Feed	-48Vdc with 25mA current limit per port Jumper Selectable: 25mA(default=25mA), 30mA, or 35mA(sn=S1)										
FXS Signalling	Normal / PLAR: Private Line Auto Ring down										
FXS Ringing	1 REN at 5K meters per port 16.7Hz, 20Hz, 25Hz, 50Hz, user selectable for all ports Jumper selectable: 64, 76, and 85 Vrms (triangle wave), (default= 76 Vrms for Ring Voltage) 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR ON										
FXS Tone	Alarm Tone: 480Hz/620Hz/-24dBm Ring Back Tone: 440Hz/480Hz/-19dBm										
FXS functions	Basic functions: Bettary Reverse, Loop Star, PLAR Optional functions: PLAR ON/PLAR bit programmable, Ground Start, and/or Meter Pulse.										
Signaling Bit A,B,C,D	Programable bit										

- All in-band signaling tones are carried transparently by the digitizing process.
- Customer is responsible for in-band signaling compatibility between a telephone and a switch, or between a PBX and a switch.

TDMoEA**Combo Gigabit Ethernet(GbE) Interface**

Number of Ports	2
Speed	10/100/1000M bps
Connector	RJ45 for twisted pair GbE, LC for optical GbE, auto detection

Gigabit Ethernet(GbE) Interface

Number of Port	2
Speed	10/100/1000 BaseT
Connector	RJ45

Ethernet Function

Basic Features	MDI/MDIX for 10/100/1000M BaseT auto-sensing Ping function contained ARP Per port, programmable MAC hardware address learn limiting (max. MAC table 8192 (8k) ent Packet Delay Variation: - Unframed T1: Up to 340 ms - Framed T1: Up to 256 ms - E1: up to 256 ms - Framed T1 with CAS: Up to 192 ms
Packet Transparency	Packet transparency support for all types of packet types including IEEE 802.1q VLAN and 802.1ad (Q-in-Q)
QoS	User configurable 802.1p CoS, ToS in out going IP frame
Traffic Control	Ingress packet Rate limiting buckets per port for ethernet port Supporting Rate-based and Priority-based rate limiting for LAN port Granularity: a. From 64 Kbps to 1 Mbps in increments of 64 Kbps b. From 1 Mbps to 100 Mbps in increments of 1 Mbps c. From 100 Mbps to 1000 Mbps in increments of 10Mbps Pause frame issued when the traffic exceeding the limited rate before packet dropped followi IEEE802.3X
Link Aggregation	WAN support link aggregation

Jitter & Wander

PPM: per G.823 Traffic

Standard Compliance

IETF	TDMoIP (RFC5087), SAToP (RFC4553), CESoPSN (RFC5086)
IEEE	802.1q, 802.1p, 802.1d, 802.3, 802.3u, 802.3x, 802.3z, 802.1s, 802.1w, 802.1AX

OCU/DP Interface

Ports	8 Ports for each card
Line Status Indicator	Per Port 1 dual color LED; Red for LOS, Green for SYNC
Network Connector	RJ48S
Electrical network connection	Tip/Ring and Tip1/Ring1
Transmit Source Impedance	135 Ohms +/- 20%
Receive Input Impedance	135 Ohms +/- 20%
Receiver Sensitivity/ Dynamic Range	0 to 43 dB loop loss at 72K & 56K 0 to 34 all other rates Automatic line equalization
Pulse Amplitude	+/- 1.5 V (+/- 10%) peak, all rates except 9.6k +/- 0.75 V (+/- 10%) peak at 9.6k Bipolar Return to zero, 50% duty cycle
Sealing Current	Typically 16 mA DC
Operating Modes	4-wire DDS
Circuit Rates	Switched 56 support is optional. SYNC: 2.4, 4.8, 9.6, 19.2, 56, 72kbps (64k) clear channel Conforms with AT&T Pub 41458
Encoding and decoding rules	Use bipolar violation to indicate control information: Idle, out of service, Zero substitution using unframed loops
Maintenance control	DSU Non-latching CXR-back code (for 2.4, 4.8, 9.6, 19.2, 56k circuit rate) DSU Latching CXR-back (TIP, LSC, LBE, FEV) code (for 72k circuit rate)
	Machine maintenance OCU/DP card* operation: Payload loopback OCU loopback Local loopback Bi-directional loopback V.54 remote loopback code Custom defined remote loopback code
Fault and Performance	BERT test support all ones, all zeros, 2047, 511, 63 pattern. LOS, OOS, ES, SES and UAS alarm. Current, last 96 registry and 7 days performance storage.
Environment	Humidity: Up to 90% RH non-condensing
Specification Standard	ANSI T1.410; AT&T Pub 62319, AT&T Pub 62310, ITU-T V.54

EoW with VoIP Technology – Connector Board with EoW**Data Networking**

Router or Bridge Mode of Operation

Voice Gateway

SIPv2	Session Initiation Protocol Version 2 (RFC3261, 3262, 3263, 3264)
Voice Algorithms	G.711 (A-law and mu-law)
Attenuation	Gain Adjustments

Physical Interfaces

Two RJ-45 Port	Ethernet 100BaseT Interface (IEEE 802.3)
Two RJ-11 FXS Port	For Analog Circuit Telephone Device (Tip/Ring)

Subscriber Line Interface Circuit(SLIC)

Ring Voltage	40 – 55 V _{RMS} Configurable
Ring Frequency	10Hz – 40Hz
Ring Waveform	Trapezoidal and Sinusoidal
Max. Ringer Load	3 REN
On-hook/off-hook	Characteristics
	On-hook voltage (tip/ring) : -50 V _{NOMINAL}
	Off-hook current : 20 mA min
	Terminating Impedance : 600 ohms

Regulatory Compliance

FCC Part	15 Class B
CE	Mark
ICES-003	
ESD level	Class B
	Air: ± 8Kv
	Contact: ± 4Kv

Power Supply

DC	Input Voltage: +5 VDC at 2.0 A Max.
Power Consumption	5 Watts

Indicator Lights

Indicator Lights/LED	Power
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Storage Temperature

Storage	Temperature -13° F to 185° F (-25°C to 85°C)
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Unit Dimensions

W x H x D	122.5mm x 43.7mm x 92.8mm
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System Operation and management

System Clock

Clock Source	Internal clock 4 aggregate lines clocks (STM-1/4 (OC-3/12)) 6 tributary clocks 1 external input clocks (ITU-T G.703 - 2.048 MHz or E1 or T1) 1 PPS
Clock Output	SyncE (over Ethernet interface on PTN10G) 1 external output (E1 or T1) 1 ToD/PPS

Management Interface

LED	Multi colors
Console	Electrical: RS232 Connector: DB9S (DCE) Protocol: Menu driven VT-100
SNMP	SNMPv1, v3 (RFC1213, RFC2863, RFC1493)
OSS interface	10/100BaseT FE (IEEE 802.3u)
NE/NE interface	DCC/HDLC/Ethernet type II

Alarm Input/Output

Inputs

Channel	4
Connector	RJ45
Internal Resistance	1K
Activation Current	3 mA
Deactivation Current	1.5 mA
Allowable Current	4 mA

Outputs

Channel	4
Connector	RJ45
Initial Insulation Resistance	Min. 100M ohm (at 500Vdc)
Maximum switching voltage	110 V DC, 125 V AC

Diagnostics

XCU card

Loopback Test	Local loopback, payload loopback, line loopback
BERT Test	Optical interface Direction: to optical lines

B155/622 card

Loopback Test	Local loopback, payload loopback, line loopback:
BERT Test	Optical interface Direction: to optical lines

E1/T1 card

Loopback Test	Local loopback, line loopback:
BERT Test	E1/T1 interface Direction: to optical lines, to tributary lines

7 FOM card

Optical Fiber	Local and remote loopbacks
E1 Test Pattern	To optical direction or backplane direction

Performance Monitor

Performance Reports	Performance Parameters: Error Block (EB), Background Block Error (BBE), Error Second(ES), Burst Error Second (BES), Severe Error Second (SES), Unavailable Second(UAS)
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Alarm History	System Alarm	Alarm Cut Off, Power Loss/Uneqp, Fan Fail, Fan Module Uneqp, Overheat, TS Sync Loss, Logon and Logout, Optical Port Uneqp, Card In, Card Out, Card Type Mismatch, Card Port Number Mismatch, Card Fail, Card Registration, SNCP Switch, MSP Switch, Trib Protection Sync, Standby XCU Takeover, Standby Trib Takeover, XCU Sync, SFP Tx Fail, SFP Rx Fail, SFP Temperature, LS Protection, LS ID Mismatch
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SDH/SONET	SDH	Line	PI-LOS RS-LOF RS-TIM MS-SD MS-SF MS-AIS
Line Alarm			MS-RDI MS-REI B1-BIP B2-BIP



Alarm History	Ho-Path	AU-LOP AU-AIS HP-SD HP-SF HP-UNEQ HP-PLM HP-TIM HP-RED-P HP-RDI-S HP-RDI-C HP-LOM HP-REI
	Lo-Path	TU-LOP TU-AIS LP-SD LP-SF LP-UNEQ LP-PLM LP-TIM LP-RDI-P LP-RDI-S LP-RDI-C LP-REI LP-BIP
	SONET Line	LOS-PI, LOF-S, TIM-S, SD-L, SF-L, AIS-L, RDI-L, REI-L UAS, B1-BIP, B2-BIP
	STS-Path	LOP-P, AIS-P, SD-P, SF-P, UNEQ-P, PLM-P, TIM-P, RDI-P-P, RDI-S-P, RDI-C-P, RDI-P-P, LOM-P, REI-P, B3-BIP-P
Alarm Queue	Contains up to 300 alarm records of latest alarm types, alarm severity, date, and time.	
	VT-Path	LOP-V, AIS-V, SD-V, SF-V, UNEQ-V, PLM-V, TIM-V, RDI-P-V, RDI-S-V, RDI-C-V, REI-V, BIP-V

Electrical

DC Power Single/ Dual -48 Vdc power module (SD48P): -36 to -72 Vdc , 500 W
 Power Consumption 337 Watts (may vary according to the number of equipped modules)

Module Type	Module	Power Consumption (Watt)
Controller (XCU)	CCPA	28W
Connector Board	Connector Board	3W
	Connector Board with EoW	4w
High-Speed (HS) Card	STM-4 (OC-12)/ STM-1 (OC-3) tributaries (B155/622)	14W
	16/32/63 TE and 16/32/63 E75 port E1/T1 tributaries (E1/T1)	14W
	3-port E3/T3 tributaries (E3/T3)	7W
	B2G5	19W
	8GES4SWA	30W
	PTN10G	41W
Low-Speed (LS) Card	Quad E1/T1 (4-channel E1/T1)	4W
	2-channel G.SHDSL (2 pairs) w/o line power (2GH)	6W
	4-channel G.SHDSL (2 pairs) w/o line power (4GH)	6W
	6-channel G.703 card at 64 Kbps data rate (8CD)	3W
	8-channel Dry Contact I/O (8DC)	4W
	8-channel 2W/4W E&M (8EM)	8W
	12-channel FXS (12FXS)	27W
	12-channel FXO (12FXO)	5W
	1 or 4 channel C37.94 (low speed optical) (1C37/4C37)	3W
	8-channel RS232/V.24 (8RS232)	3W
	8-port Bridge/Router (Router B)	7W
	TDMoE	6W
	6-channel X.21/V.11 (6X21A)	5W
	6-channe V.35 (6V35A)	5W
	6-channe V.36 (6V36A)	7W
	6-channe EIA530 / RS449 (6E530A/6RS449A)	7W
	8-channel Dry Contact I/O type B (8DC B)	4W
	12-channel Magneto	8W
	8-channel Data Bridge	2W
	3-channel E1	3W
Conference card	13W	
8UDTEA	4W	
1FOM	3W	
8OCUDP	11W	



	3T1*	4W
FAN	FAN module	2W
	FAN 4 working	13W
	FAN 8 working	26W

Physical and Environmental

Dimensions for 6U 433mm x264mm x 223.5mm (W/H/D)
 Temperature -20°C to 65°C

Note: Some of the plug-in cards do not support full emperature range. Please refer to specifications of individual cards.

Humidity 0-95%RH (non-condensing)
 Mounting Desk-top stackable, 19/23 inch rack mountable
 MTBF 748 years

Certifications

EMI/EMC EN55022 Class A, EN55024
 FCC Part 15 Class A,
 Safety IEC60950-1, IEC 61850-3, IEEE 1613

Note for IEC 61850-3 and IEEE1613:

- (1) The certification only applies to HX9500-R with 48Vdc/150W power module
- (2) The magento card does not support IEC 61850-3 and IEEE 1613
- (3) Use shielding cable with the following modules:

- RS232-X.50 module
- DTE of Conference module
- Input Port of Dry Contact module
- RS232 X.50-8 module
- SNMP of XCU
- Console port of XCU
- Input Port of Dry Contact B module

Standards Compliance

ITU-T G.707, G.7041, G.7042, G.775, G.783, G.806, G.823, G.747, X.86, G.664,
 ANSI T1.105, T1.107
 IEEE 802.1q (VLAN), 802.1w (RSTP), 802.1s(MSTP), 802.1ad (stack VLAN),
 802.3x (flow control), 802.1p (QoS), 802.1AX

Note for IEC 61850-3 and IEEE1613:

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- DTE of Conference module
- Input Port of Dry Contact module
- RS232 X.50-8 module
- SNMP of XCU
- Console port of XCU
- Input Port of Dry Contact B module

* Future option
 Subject to change without notice



CXR 17 Rue de l'Ornette 28410 Abondant France

T +33 (0) 237 62 87 90 contact@cxr.com

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The information contained in this document is not contractual. CXR is evolving its products. Specifications may change