CXR-HX9400R PTN/SDH/SONET ADM/TM

Supporting PTN, SDH & PDH
CHPA Chassis
CCPA Controller Card

Features

- 6U height, full front access (ETSI) shelf support up to 2.5G Mbps backplane
- SDH/SONET VCn/VTn Cross-Connect Capacity: 15Gbps bidirectional non-blocking
- PTN (CE and MPLS-TP) Switching Capacity: 100Gbps bidirectional non-blocking
- Hot-swappable cross-connect modules, tributary modules and power modules
- Temperature-controlled fan tray
- Aggregate cross-connect modules (controller modules)
  - Up to STM-1/4/16 (OC-3/12/48) aggregate lines with software configuration (CCPA)
- Tributary modules: 8 tributary slots
  - Two ports STM-1/4 (OC-3/12) or One port STM-4 (OC-12) module
  - Three ports E3/T3 module
  - 16/32/63 ports E1/T1 tributary module
  - One port STM-16 (OC-48)
  - 8GE tributary module with L2 switch
  - PTN10G module (3*10G or 8*1G ports)
  - PTNext (One 10G or Ten 1G ports)
- Power Modules
  - DC module (-36 to -72 Vdc) 500W
  - Dual power (1+ 1) protection
- Protection
  - Controller cross-connect unit (CCPA) protection, MSP (1+1), SNCP/UPSR Ring

- Tributary protection
  - E1/T1: Card/Port (1:1) using Y-box, Line (1+1)
  - E3/T3: Line (1+1)
  - B155/622: MSP, SNCP/UPSR
  - B2G5 : MSP
  - Ethernet : Card protection
  - PTN Switch Fabric 1:1
- Network Protection
  - MSP 1+1
  - SNCP/UPSR
  - Ethernet Ring Protection (ERPS G.8032)
  - Link Aggregation (Inter and Intra board)
  - LSP Linear Protection (1+1/1:1) sub 50ms
- External/Internal/Line timing source with SSM
  - SyncE
  - IEEE 1588
  - TDM clocks
- TM, ADM, and cross-connect
- Full cross-connect at VC11/VC12/VC3/VC4 levels
- Support framed and unframed VC4-4 and VC4-4c
- External/Internal/Line timing source with SSM
- Ethernet supports GFP, LAPS, VCAT, BCP, LCAS and non-LCAS
- Management
  - Console port, VT100 menu-driven
  - SNMP port: Both v1 and v3 supported
  - Telnet, SSH and Radius
  - Centralized management with CXR's eMS/iNMS over DCC channel
  - CXR-iNET GUI Element Management System
  - TMN management (CXR-iNMS) with full FCAPS and end-to-end circuit management
- RoHS compliant

Description

The CXR-HX9400R is a standards-compliant high density SDH/SONET/PTN ADM/TM with a full T1/E1 cross-connect rack system.

The HX9400R has full add and drop capability according to the figures below:
- 1 STM-16 tributaries
- 4 STM-4 tributaries
- 16 STM-1 tributaries
- 24 E3/T3 tributaries
- 504 E1/T1 tributaries
- 64 10/100/1000M Ethernet EoS tributaries
- 6 10GbE and 16 1GbE tributaries
- 1 10GbE or 10 1 GbE (PTNext) tributaries

With up to 4 STM-1/4/16 (OC-3/12/48) aggregate interfaces on cross-connect modules and 16 STM-1 (OC-3) interfaces on tributaries, the CXR-HX9400R offers the service provider a versatile protection scheme including SNCP (UPSR), and MSP (1+1) protection for network topology.

With the PTN10G interface card, the HX9400R can transport SDH/SONET over PSN network. With HX9400R as a gateway between SDH/SONET and PTN, existing SDH/SONET network users will be able to migrate from SDH/SONET/PDH to PTN network smoothly and seamlessly.

All interfaces are fully compliant with the relevant ETSI standards and ITU recommendations. The CXR-HX9400R provides powerful Operation, Administration, Maintenance and Provisioning (OAM&P) functionality, including fault management, performance monitoring, configuration management, and network security management. Through a console port, LAN port and DCC channel, OAM&P can be achieved both locally and remotely via SNMP or menu-driven interfaces.
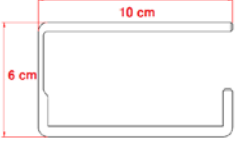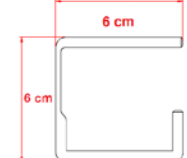
The CXR-HX9400R provides a complete set of operation interfaces that are consistent with the Telecommunication Management Network (TMN) concept (ITU Recommendation M.30, G.784) for SDH/SONET Network Element/Operations System (NE/OS), NE/NE, and NE/Craft communications. Users can easily operate the CXR-HX9400R locally or remotely for centralized management.

Ordering Information

To specify options, choose from list below:

Note:
1.   Modules that do not operate in the temperature range from -20 to 65°C are marked in orange.

Model	Description	Notes
Main Unit		
HX9400R-PTN-CHPA-6U	6U height Rack chassis for HX9400R-PTN without CPU and power modules	
CPU Modules and Supporting Plug-in Modules		
HX9400R-PTN-CC16	CPU module with cross-connect unit and two STM-1/4/16 (OC-3/12/48) interfaces without SFP (mini-GBIC) optical modules	• Order two for redundancy • Please order SFP modules separately from SFP optical modules brochure • Use with HX9400-R-PTN-CHPA
HX9400R-PTN-CC4	CPU module with cross-connect unit and two STM-1/4/16 (OC-3/12) interfaces without SFP (mini-GBIC) optical modules	• Order two for redundancy • Please order SFP modules separately from SFP optical modules brochure • Use with HX9400-R-PTN-CHPA
HX9400R-PTN-CB	Connector Board	• One required for each chassis
HX9400R-PTN-FAN	Fan Tray with temperature-controlled board	• One required for each chassis
HX9x00R-FILTER-CBL10	Air Filter Rack with cable management for HX9400R, 2U (88mm), air filter included	• The cable management ring is 10 cm in length.
HX9x00R-FILTER-CBL06	Air Filter Rack with cable management for HX9400R, 2U (88mm), air filter included	• The cable management ring is 6 cm in length.
<mark>HX9x00R-FILTER</mark>	Air Filter to fit HX9400R- FILRCMA	
Feature Activation License		
HX9400R-CCPA-LCTLIC	Feature activation license for H9400R-CCPA-G controller card to support LCT Graphical Configuration Software for PTN application	● CXR-LCT software is purchased separately
HX9400R-CCPA-S16LIC	Feature activation license for HX9400R-PTN-CC4 controller to support STM-16 (OC-48)	● Used with HX9400R-PTN-CC4 controller
HX9400R-CCPA-L3LIC	Feature activation license for HX9400-R-CCPA-G and H X 9400R-PTN-CC4 controllers to support L3 routing function.	● Used with HX9400R-PTN-CC16/HX9400R-CC4 and HX9400-R-PTN10G

Tributary Plug-in Modules

HX9400R-16E1/T1	16 E1(120 ohm) or 16 T1 software programmable interface plug-in module	• Order two for redundancy
HX9400R-32E1/T1	32 E1(120 ohm) or 32 T1 software programmable interface plug-in module	• Order two for redundancy
HX9400R-63E1/T1	63 E1(120 ohm) or 63 T1 software programmable interface plug-in module	• Order two for redundancy
HX9400R-16E1/T1-75	16 E1(75 ohm) interface plug-in module	• Order two for redundancy
HX9400R-32E1/T1-75	32 E1(75 ohm) interface plug-in module	• Order two for redundancy
HX9400R-63E1/T1-75	63 E1(75 ohm) interface plug-in module	• Order two for redundancy
HX9400R-ADSTM1/4	STM-1/4 (OC-3/12) software programmable interface plug-in module without SFP (mini-GBIC) optical modules	• Order two for redundancy
HX9400R-SW-4G-4S-4	Eight GbE software configurable interface plug-in module with L2 switch, use 622Mb/s backplane on all slots	For STM-4 (622M) bandwidth.
HX9400R-SW-4G-4S-16	Eight GbE software configurable interface plug-in module with L2 switch. Use 2.5Gb/s backplane on slots 3 & 4 only	For STM-16 (2.5G) bandwidth on slot 3&4 with use CC16 controller card
HX9400R-3DSE3	3 T3 or 3 E3 software programmable interface plug-in modules Operating temperature: -5 to 65°C	• Order two for redundancy
HX9400R-3DSE3-M13	3 T3 or 3 E3 software programmable interface plug-in modules with M13 /Mx3 function for T3 interface only Operating temperature: -5 to 65°C	• Order two for redundancy
HX9400R-TRIB-STM16	B2G5, STM-16/OC-48 software configurable interface plug-in module without SFP (mini-GBIC) optical modules	• SFP optical modules are not included. Please order SFP modules separately. • Order two for redundancy.
HX9400R-PTN10G	MPLS-TP plug-in module with 3x10G SFP+ ports and 8xGE SFP ports, without SFP (mini-GBIC) optical modules	• This card can only be used in the HX9400R-PTN-CHPA-6U and HX9400R-PTN-CC16
HX9400R-PTNext	MPLS-TP plug-in module with 1 x 10GbE or 10 x GbE SFP ports, without SFP (mini- GBIC) optical modules	• Used only with PTN10G

Accessories

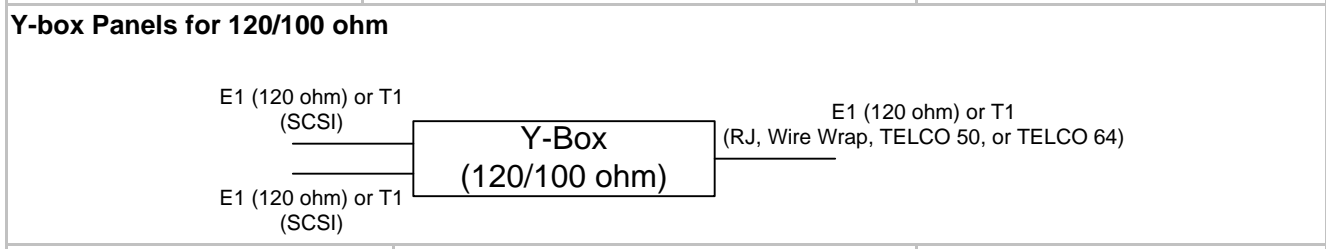| **SFP Optical Modules**	
Please place your order using the codes listed in the separate SFP Optical Module Brochure. **Note:** Non-CXR SFP modules are not guaranteed to work with our equipments. It is strongly recommended to buy CXR-logo SFP modules.	
User's Manual		
HX9400R-MANUAL-E	Printed HX9400R English manual	
HX9400R-MANUEL-F	Printed HX9400R French manual	
Power Modules		
HX9400R-DC48-500	Single -48Vdc (-40 to -72Vdc) power module supports up to 500W	• For redundancy purposes, ordering a second plug-in module will provide dual power
Blank Panels		
HX9400R-PAN-PW	Blank panel for power supply slots	
HX9400R-PAN	Blank panel for other slots	
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	· This power adaptor is only for HX9500R-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 without cable. Add 1 SCSI cable 432x44x23mm (WxHxD)	· Use with 16/32/63TE HS tributary modules · This panel can also be used in the CXR-HX9400R.
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.
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.

Y-box Panels for 120/100 ohm

E1 (120 ohm) or T1 (SCSI)

E1 (120 ohm) or T1 (RJ, Wire Wrap, TELCO 50, or TELCO 64)

Y-Box (120/100 ohm)

E1 (120 ohm) or T1 (SCSI)

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	
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	Use with CXR-HX9500-R-32TE or CXR-HX9400-R-63TE
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

CXR-HX9400R SDH/SONET ADM/TM Product Specifications
Supporting PTN, SDH & PDH

Max. Number of Cross-Connect Modules
4 STM-1/4/16 (OC-3/12/48) aggregate lines

Max. Number of Tributary Modules for STM1/4/16 (OC3/12/48) Cross-Connect Module
4 STM-4 (OC-12) tributaries
16 STM-1 (OC-3) tributaries
24 E3/T3 tributaries
504 E1/T1 tributaries
64 10/100M Ethernet EoS tributaries
6 10GbE or 20 * 1GbE (PTNext) Tributaries

Support SFP and SFP+ optical modules
Waevelength	1310nm or 1550nm for Transmission mode, SFP, Bidi or Dual-direction fiber / Single mode

STM-16(OC-48) Cross Connect Matrix Card (CCPA)

Total Ports	2
Data Rate	STM-1/4/16 (OC-3/12/48)
Wavelength	1310nm or 1550nm
	SFP, Bidi or Dual-directional fiber
	Single mode
Line Code	NRZ after scrambling
Connector Type	SFP LC connector
Application Code	S-16.1 or L-16.1 or L-16.2 or S-4.1 or L-4.1 or L-4.2, or S-1.1 or L-1.1 or L-1.2,

STM-16(OC-48) Interface Card (B2G5)

Total Ports	1
Data Rate	2.5Gbps
Wavelength	1310nm or 1550nm
	SFP, Bidi or Dual-directional fiber
	Single mode
Line Code	NRZ after scrambling
Connector Type	SFP LC connector
Application Code	S-16.1 or L-16.1 or L-16.2
Jitter	ITU-T G.825

Note: MSP 1+1 can be activated only when two B2G5 cards are mounted onto Slots 3 and 4, respectively.

STM-4(OC-12) Interface Card (B16)

Total Ports	1
Data Rate	STM-4(OC-12)
Wavelength	1310nm or 1550nm
	SFP, Bidi or Dual-directional fiber
	Single mode
Line Code	NRZ after scrambling
Connector Type	SFP LC connector
Application Code	S-4.1 or L-4.1 or L-4.2
Jitter	ITU-T G.825

STM-1(OC-3) Interface Card (B16 / CCPA)

Total Ports	2
Data Rate	STM-1(OC-3)
Wavelength	1310nm or 1550nm
	SFP, Bidi or Dual-directional fiber
Line Code	NRZ after scrambling
Connector Type	SFP LC connector
Application Code	S-4.1 or L-4.1 or L-4.2
Jitter	ITU-T G.825

SFP Module Characteristics (Please refer to SFP optical module brochure for detail)

E1 Interface

Line Rate	2.048 Mbps ± 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/120Ω 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		

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 One connector for 16 ports Two connectors for 32 ports Four connectors for 63 ports
Output Mask	Bellcore GR-499-core		

E3 Interface

Line Rate	34.368 Mbps ± 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 to 65°C

T3 interface

Line Rate	44.736 Mbps ± 20ppm	Jitter	ITU G.824
Line Code	B3ZS	Framing	Unframed, M13/Mx3 (unframed E1/T1), G.747
Input Signal	ITU G.703	Impedance	75 ohm coax
Output Signal	ITU G.703	Connector	BNC connector
Output Mask	Bellcore GR-499-core		

PTN 10G Interface Card (PTN10G/PTNext)

PTN10G card GE Interface

Port number	8		
Connector	SFP	Line Code	Scrambled NRZ

PTN10G card 10 GE Interface

Port number	3
Connector	SFP+

PTNext card 10GE/1GE Interface

Port number	10 x 1GE or 1 x 10GE

CoSQoS

Eight priority queues

	Scheduling –Strict Priority, Weighted Round Robin with hierarchy
	Ingress policing per service
	Egress policing 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)
Wavelength	WRED (Weighted Random Early Detection) for congestion management
Ethernet	1310 nm or 1550 nm, Single-mode
MPLS-TP	Any Ethernet port can be configured as NNI (MPLS port) or UNI (Ethernet service port)
	VPWS and VPLS
	CEP and SAToP

Standards Compliance

IEEE		RFC (IETF)	
802.1ad	Tag Stacking (Q-in-Q)	2131 & 2132	DHCP
802.3ag	Ethernet OAM	6378	MPLS-TP Linear Protection
802.3ah	Ethernet in the First Mile		
1588 v2	Precision Time Protocol		
ITU			
G8113.2	MPLS-TP OAM	G.8031	ELPS
Y1731	Ethernet OAM	G.8032	ERPS

Fast Ethernet Interface

Line Rate	10/100M bps	Mapping	n x VC12, n x VC3 or n x VC4
Layer2 Protocol	RSTP (802.1W),	Connector	RJ45
	VLAN (802.1Q, 802.1P)		
	Flow Control (802.3X)		
	MSTP (802.1S)		
	IGMP Snooping		
	QoS		
Process Protocol	VCAT, GFP(G.7041), LAPS, BCP, LCAS(G.7042) and non-LCAS		

Gigabit Ethernet Interface

Line Rate	10/100/1000Mbps	Mapping	n x VC12, n x VC3 or n x VC4
Layer2 Protocol	RSTP (802.1W),	Connector	RJ45
	VLAN (802.1Q, 802.1P)		
	Flow Control (802.3X)		
	MSTP (802.1S)		
	IGMP Snooping		
	QoS		
Process Protocol	VCAT, GFP(G.7041), LAPS, BCP, LCAS(G.7042) and non-LCAS		

PTN10G Interface Card (PTN10G/PTNext)

PTN10G Card GE Interface

Port number	8		
Connector	SFP	Line Code	Scrambled NRZ

10G Interface

Port number	3
Connector	SFP+

QoS

	Eight priority queues
	Scheduling –Strict Priority, Weighted Round Robin with hierarchy
	Ingress policing per service
	Egress policing 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 (Weighted Random Early Detection) for congestion management
	1310 nm or 1550 nm, Single-mode
	Any Ethernet port can be configured as NNI (MPLS port) or UNI (Ethernet service port) VPWS and VPLS, CEP and SAToP

Standards Compliance

IEEE		RFC (IETF)	
802.1ad	Tag Stacking (Q-in-Q)	2131 & 2132	DHCP
802.3ag	Ethernet OAM	6378	MPLS-TP Linear Protection
802.3ah	Ethernet in the First Mile		
1588 v2	Precision Time Protocol		
ITU			
G8113.2	MPLS-TP OAM	G.8031	ELPS
Y1731	Ethernet OAM	G.8032	ERPS

Fast/Gigabit Ethernet Over SDH/SONET Interface Card (8GES4SWA)

Line Rate	10/100/1000Mbps
Layer2 Protocol	RSTP (802.1W),
	VLAN (802.1Q, 802.1P)
	Flow Control (802.3X)
	MSTP (802.1S)
	IGMP Snooping
	QoS

Gigabit Ethernet(GbE) Interface

Number of Port	2 (Port3 and Port4)
Speed	10/100/1000 BaseT
Function	Rx power low alarm
Connector	LC for optical GbE

Gigabit Ethernet Function

Line Rate	10/100/1000 Mbps	Mapping	n x VC12, n x VC3 or n x VC4
Layer2 Protocol	RSTP (802.1W),	Multiplexing	G.707
	VLAN (802.1Q, 802.1P)		
	Flow Control (802.3X)		
	MSTP (802.1S)		
	IGMP Snooping		
	QoS		
Process Protocol	VCAT, GFP(G.7041), LAPS,		
	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/CoS	Eight priority queues		
	Packet classification based on the 802.1p user priority, IPV4 ToS (DiffServ)		
	The scheduling algorithm of the priority queue follows either Strictly Priority or Weighted Round-Robin (WRR).		

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
	SyncE (over Ethernet interface on PTN10G)
Clock Output	1 external output (E1 for STM-1/4, T1 for OC-3/12)
	1 ToD/PPS

Management Interface

LED	Multi colors
Console	Electrical: RS232, DCE
	Connector: DB9, female
	User interface: Menu driven VT-100
Telnet	
SNMP	SNMPv1, RFC1213
OSS interface	10/100BaseT FE (IEEE 802.3u)
NE/NE interface	DCC/HDLC/PPP/Ethernet type II, In-band E1

Alarm Input/Output

Inputs

Ports	4	Activation current	3 mA
Internal resistance	1K	Deactivation current	1.5 mA
Connectors	RJ45		

Outputs

Ports	4	Maximum switching voltage	110 V DC, 125 V AC

Initial insul. resist.	Min. 100M ohm (at 500Vdc)
Connectors	RJ45

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)
Alarm History	

	System Alarm			Alarm Cut Off, Power Loss/Uneqp, Fan Fail, Fan Module Uneqp, RBC 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
	SDH/SONET Line Alarm	SDH	Line	PI-LOS, RS-LOF, RS-TIM, RS-BIP UAS, MS-SD, MS-SF, MS-AIS, MS-RDI, MS-BIP UAS, MS-REI UAS
			Ho-Path	AU-LOP, AU-AIS, HP-SD, HP-SF, HP-TIM, HP-UNEQ, HP-PLM, HP-RDI-S, HP-RDI-C, HP-RDI-P, HP-BIP UAS, HP-REI UAS, LOM
			Lo-Path	TU-LOP, TU-AIS, LP-SD, LP-SF,
		SONET	Line	LOS-PI, LOF-S, TIM-S, BIP-S UAS, SD-L, SF-L, AIS-L, RDI-L , BIP-L UAS, REI-L UAS
			STS-Path	LOP-P, AIS-P, SD-P, SF-P, TIM-P, UNEQ-P, PLM- P, RDI-S-P, RDI-C-P, RDI-P-P, BIP-P UAS, REI-P UAS, LOM
			VT-Path	LOP-V, AIS-V, SD-V, SF-V
			VT-Path	LOP-V, AIS-V, SD-V, SF-V
Alarm Queue	Contains up to 300 alarm records of latest alarm types, alarm severity, date and time.			

Alarm Input/Output

Inputs

Ports	4	Activation current	3 mA
Internal resistance	1K	Deactivation current	1.5 mA
Connectors	RJ45	Initial insulation resistance	Min. 100M ohm (at 500Vdc)

Outputs

Ports	4	Maximum switching voltage	110 V DC, 125 V AC

Power

DC module	-48Vdc (-40 to -72Vdc) , 500W

Physical and Environmental

Dimensions for 6U	433 x 264 x 223.5mm (WxHxD)
Dimension for Air Filter Rack A with cable management	433 x 88 x 223.5mm (WxHxD)
Dimension for Air Flow Guide Rack	433 x 44 x 223.5mm (WxHxD)
Dimension for Y-Box	432 x 44 x 100 mm (WxHxD)
Dimension for Conversion Panel	RJ connector: 432 x 44 x 23mm (WxHxD)
	WW connector: 432 x 44 x 40mm (WxHxD)
	BNC connector: 432 x66 x 53mm (WxHxD)
Temperature	-20 to 65°C (operating)
	-30 to 70°C (storage)

Note: Some of the plug-in cards do not operate in exactly the same temperature range as HX9400R. Please refer to the specs of individual cards.

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

Standards Compliance

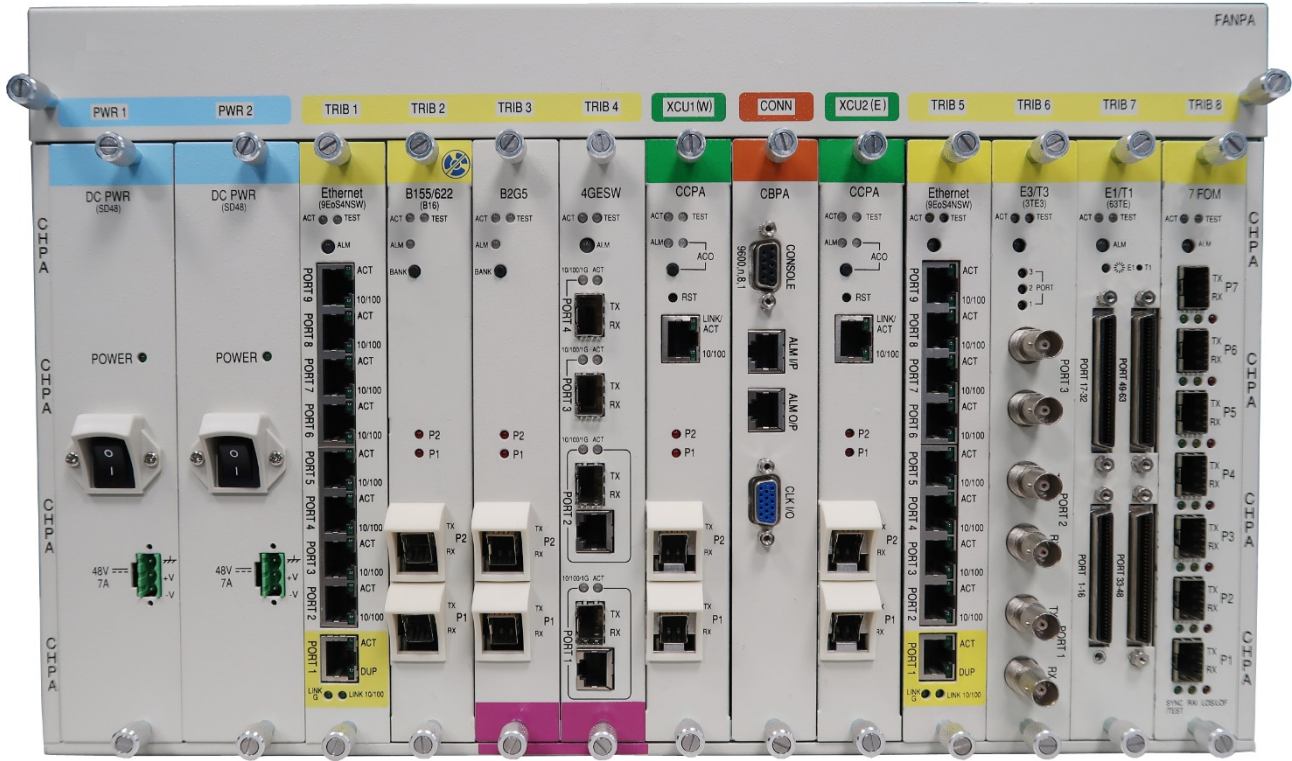|	
ITU-T	G.703, G.707, G.751, G.747, G.7041, G.7042, G.775, G.783, G.806, G.813, G.823, G.824, G.826, G.841, G.747, X.86, G.664, PWE3
ANSI	T1.105, T1.107
IEEE	802.1q (VLAN), 802.1w (RSTP), 802.1s(MSTP), 802.1ad (stack VLAN), 802.3x (flow control), 802.3u, 802.1p (QoS)
MEF	8 CESoETH

Certification

EMC	FCC Part 15 Subpart B, Class A; EN 55022, Class A; EN55024; EN300 386
Safety	IEC60950-1/EN 60-950-1

CXR-HX9400R Front Panel

Tributary Module: Backplane Capacity

TRIB 1	TRIB 2	TRIB 3	TRIB 4	TRIB 5~8
		4 x STM1 or 16 x STM1	4 x STM1 or 16 x STM1	4 x STM1
4 x STM1	4 x STM1			
		1 x 2.5G		

CXR-HX9400R Card Type and Capacity Reference Table

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

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

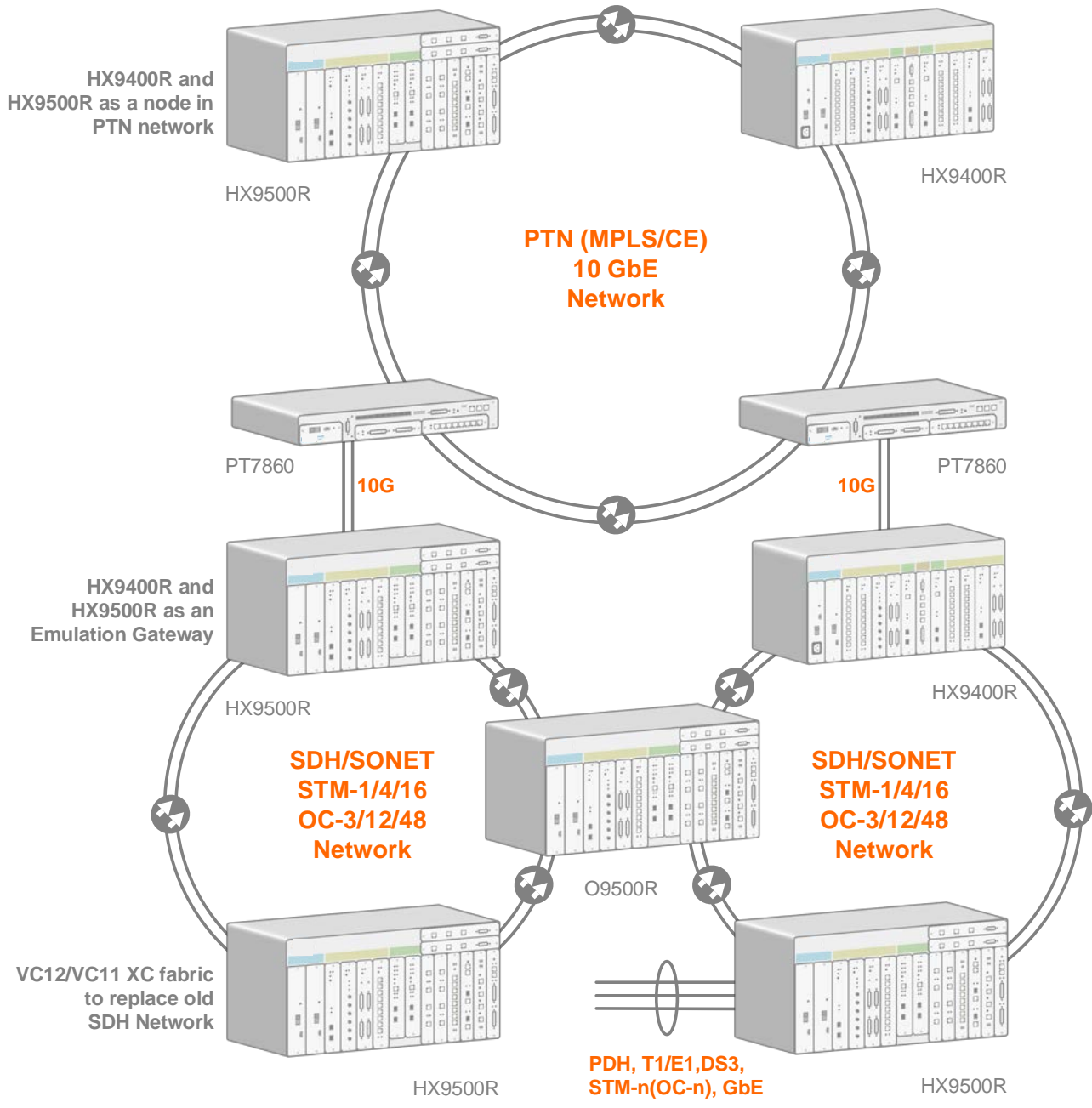| SLOTS	TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU1(W)	CONNECTOR	XCU2(E)	TRIB 5	TRIB 6	TRIB7	TRIB 8
GLOBAL PAYLOAD SDH	4 X 155M	N/A	4 X 155M	N/A	2 x 2.5G		2 x 2.5G	4 X 155M	N/A	4 X 155M	N/A
	2 x 155M	2 x 155M	2 x 155M	2 x 155M				2 x 155M	2 x 155M	2 x 155M	2 x 155M
	4 X 155M	N/A	16 x 155M	N/A				4 X 155M	N/A	4 X 155M	N/A
	2 x 155M	2 x 155M	16 x 155M	N/A				2 x 155M	2 x 155M	2 x 155M	2 x 155M
Tributary (Plug-in Modules)											
Link without MSP	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)
	STM-4	N/A	STM-4	N/A	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-4	N/A	STM-4	N/A
Link with MSP (1+1) See Note 1	STM-1 (2 ports)	STM-1 (2 ports) (B)	STM-1 (2 ports)	STM-1 (2 ports) (B)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports) (B)	STM-1 (2 ports)	STM-1 (2 ports) (B)
	STM-4	STM-4 (B)	STM-4	STM-4 (B)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-4	STM-4 (B)	STM-4	STM-4 (B)
Max 504 E1 (Single)	63 E1	63 E1	63 E1	63 E1				63 E1	63 E1	63 E1	63 E1
Max 252 E1 (Protection)	63 E1	(B)	63 E1	63 E1 (B)				63 E1	(B)	63 E1	63 E1 (B)
Max. 24 E3 (Single)	3 E3	3 E3	3 E3	3 E3				3 E3	3 E3	3 E3	3 E3
Max 12 E3 (Protection)	3 E3	(B)	3 E3	3 E3 (B)				3 E3	(B)	3 E3	3 E3 (B)
8GES16SW (Single)	N/A	N/A	8GES16SW Note1	N/A Note1				N/A	N/A	N/A	N/A
8GES16SW (Protection)	N/A	N/A	8GES16SW	(B)				N/A	N/A	N/A	N/A
8GES4SWA (Single)	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps				8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps
8GES4SWA (Protection)	8 x 10/100/1000 Mbps	(B)	8 x 10/100/1000 Mbps	(B)				8 x 10/100/1000 Mbps	(B)	8 x 10/100/1000 Mbps	(B)
B2G5 (Single)	N/A	N/A	B2G5 Note1	N/A Note1				N/A	N/A	N/A	N/A
B2G5 (Protection)	N/A	N/A	B2G5	(B)				N/A	N/A	N/A	N/A
PTN10G (Single)	N/A	N/A	3 x 10G or 8 x 1G	N/A				N/A	N/A	N/A	N/A
PTN10G (Protection)	N/A	N/A	3 x 10G or 8 x 1G	(B)				N/A	N/A	N/A	N/A
PTNext	10 x 1G	10 x 1G									

(B) signifies backup/protection

Note 1: The B2G5 module is only applicable to HX9400R's tributary slot 3 and 4. The CHPA backplane support up to 2.5G Mbps mapping bandwidth.

Mode 2 Bandwidth Allocation

SLOTS	TRIB 1	TRIB 2	TRIB 3	TRIB 4	XCU1(W)	CONNECTOR	XCU2(E)	TRIB 5	TRIB 6	TRIB7	TRIB 8
GLOBAL PAYLOAD SDH	4 X 155M	4 X 155M	4 X 155M	4 X 155M	2 x 2.5G		2 x 2.5G	4 X 155M	4 X 155M	4 X 155M	4 X 155M
Tributary (Plug-in Modules)											
Link without MSP	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)	STM-1 (2 ports)
	STM-4	STM-4	STM-4	STM-4	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-4	STM-4	STM-4	STM-4
Link with MSP (1+1) See Note 1	STM-1 (2 ports)	(B)	STM-1 (2 ports)	(B)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-1 (2 ports)	(B)	STM-1 (2 ports)	(B)
	STM-4	(B)	STM-4	(B)	STM-1/4/16 (2 ports)		STM-1/4/16 (2 ports)	STM-4	STM-4 (B)	STM-4	(B)
Max 504 E1 (Single)	63 E1	63 E1	63 E1	63 E1				63 E1	63 E1	63 E1	63 E1
Max 252 E1 (Protection)	63 E1	(B)	63 E1	(B)				63 E1	(B)	63 E1	(B)
Max. 24 E3 (Single)	3 E3	3 E3	3 E3	3 E3				3 E3	3 E3	3 E3	3 E3
Max 12 E3 (Protection)	3 E3	(B)	3 E3	(B)				3 E3	(B)	3 E3	(B)
8GES4SWA (Single)	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps				8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps	8 x 10/100/1000 Mbps
8GES4SWA (Protection)	8 x 10/100/1000 Mbps	(B)	8 x 10/100/1000 Mbps	(B)				8 x 10/100/1000 Mbps	(B)	8 x 10/100/1000 Mbps	(B)

Applications

HX9400R 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, HX9500R 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).

HX9400R and HX9500R as a node in PTN network

HX9500R

HX9400R

PTN (MPLS/CE) 10 GbE Network

PT7860

PT7860

10G

10G

HX9400R and HX9500R as an Emulation Gateway

HX9500R

HX9400R

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

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

O9500R

VC12/VC11 XC fabric to replace old SDH Network

HX9500R

PDH, T1/E1,DS3, STM-n(OC-n), GbE

HX9500R