

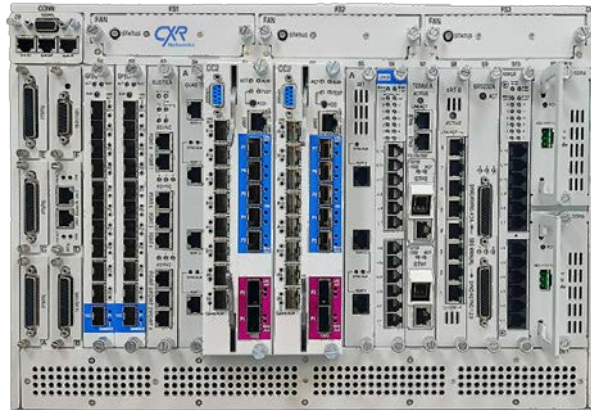


HX9800R-PTN

QUICKSTART

MPLS/CE PACKET

TRANSPORT NETWORK



ETSI Front View of HX9800R-PTN

Description

HX9800R-PTN supports both MPLS-TP and Carrier Ethernet (EPL, EVPL, EPLAN, EVC defined in MEF) for packet transportation. In addition to native Ethernet transport, HX9800R-PTN can be used as the gateway for PDH and SDH/SONET networks to enter PSNs using Circuit Emulation and Encapsulation technologies. Encapsulation technologies include TDMoE, TDMoIP, and TDMoMPLS. Circuit Emulation include CESoPSN (NxDSO/64K), SAToP (Unframed E1/T1), and CEP (SDH/SONET paths). Pseudowires make grooming and multiplexing DS0, E1/T1, and SDH/SONET paths easier, and service integrity can also be monitored and protected via packet network protection schemes.

One HX9800R-PTN with core switching bandwidth up to 400Gbps supports 100GE, 40GE, 10GE and 1GE along with additional TDM interfaces, including STM-n/OC-n, E1/T1, and a rich variety of low-speed DSO interfaces. The system is a perfect combination of PTN/CE, SDH, and PDH technologies.

HX9800R-PTN provides high availability and reliability required by Carrier, Power Utility, Military, Government and Transportation applications by supporting MPLS-TP LSP 1:1/1+1 protection and ERPS, with protection switching time <50ms. Ethernet and MPLS section and end-to-end OAM are also provided for monitoring service integrity and performance. The HX9800R-PTN is 7U in height, and its powerful functions enable customers to provision a service-grooming hub, ring, or mesh 10G packet network with ultimate ease.

Features

Mechanical and Electrical

- 7U height, 19" width ETSI unit (front access)
- Power supply: hot swappable DC, dual for redundancy
- Operating Temperature: -10 °C to 55 °C

System Capacity

- Up to 2 x 100GE/40GE ports
- Up to 30 x 10GE
- Up to 56 x 1GE
- Up to 100 x FE Base-T
- Up to 320 x E1/T1 ports
- Up to 160 x DS3 ports
- Up to 68 x STM-1 ports
- Up to 34 x STM-4 ports
- Up to 8 x STM-16 ports

MPLS-TP

- Any Ethernet port can be configured as NNI (MPLS port) or UNI (Ethernet service port)
- Bi-directional LSP
- Static LSP/PW provisioning via NMS
- Ethernet (VPWS, VPLS, H-VPLS) and TDM (CESoPSN, CEP, and SAToP) services
- MPLS-TP OAM and QoS
- TDM PW Support per card:
 - 32TE1 card: up to 256 pseudowires
 - B16 card: up to 1024 pseudowires

Carrier Ethernet

- L2 Switching/Bridging
- STP, RSTP, MSTP
- Port based VLAN and port isolation
- VLAN Stacking (Q-in-Q)
- CE OAM
 - CFM: Ethernet Service OAM (802.1ag/Y1731)
 - EFM: Ethernet Link OAM (802.3ah)
- Flow Control
- Link Aggregation Control Protocol (LACP)
- Jumbo Frame (MTU) = 9600
- EPL, EVPL, EP-LAN, EPV-LAN, EP-Tree
- E-Access: EPL-Access, EPVL-Access

Network Protection

- MPLS-TP
 - LSP 1+1/1:1
 - LSP E2E protection switching < 50ms
 - PW Redundancy
 - Based on TP OAM for fault detection
- CE
 - ERPS Ring (G.8032) Protection
 - ELPS (G.8031) Linear Protection
- SDH/SONET
 - STM-n/OC-n MSP 1+1 Protection

TDM Pseudowire Services

- Circuit Emulation
 - DS0 (64K timeslots): CES & multiframe PW
 - Unframed E1/T1: SAToP PW
 - VC-3/4/11/12, VT-1.5/2, STS-1/3: CEP PW
- PDH Timing recovery: ACR/DCR/System
- ACR/DCR support
- SDH Circuit Emulation over Packet (CEP)
- Encapsulation
 - PW/LSP (TDM over MPLS-TP),
 - "Dry martini", MEF 8 (TDM over Ethernet),
 - TDM over IP
- DS0 cross-connection
 - Two-way FE1(N*DS0) to FE1/VC12/STM1 cross-connection
 - Two-way FE1(N*DS0) to FE1(N*DS0) cross-connection

Ethernet Pseudowire Services

- E-Line, E-LAN, E-Tree services as defined by MEF 9 and 14 and using VPWS/VPLS*
- Native Ethernet packets supported
- Encapsulation: PW/LSP (MPLS-TP), VLAN tagging (1Q), VLAN double tagging (Q-in-Q)

VPLS

- VPLS bridging
- H-VPLS bridging
- 128K MAC addresses
- 2K VPLS instances per device
- Split horizon to prevent forwarding loops

CoS/QoS

- 8 Priority Queues
- Scheduling: Strict Priority, WRR with Hierarchy
- Ingress Policing & Egress Shaping per service
- CIR / PIR (EIR) 2-rate-3-color
- MPLS: TC/EXP-Inferred-PSC (Per Hop Behavior Scheduling Class) LSP

Timing

- SSM quality level compatible
- IEEE 1588 v2 (via SyncE only)
 - PTP Clocks: Ordinary/Boundary/Transparent
 - ToD (Time of day)
 - 1-PPS (One Pulse per second) output interface
 - G.8265.1 Profile (Frequency Synchronization)
- SyncE
 - Synchronous Ethernet from all built-in and plug-in GbE, 10GbE ports
 - ITU-T Ethernet Synchronous Message Channel (ESMC)
- Stratum 3 timing
- TDM line clock: E1/T1 and STM/OC ports
- External clock input and output (2 Mbps / 2 MHz)

* Future option

Management

- Fully manageable via SNMP (v1, v2, v3)
- Fully manageable via CLI
 - Serial port
 - SSH, Telnet via Ethernet
- GbE Interface in-bands
- Account Security
 - Two types of privileges: Operator (read only) and Administrator (read and write)
 - Radius Client and 802.1x Authentication
- Upload/Download NE configuration
- Syslog, NTP
- SNMP Port 1:1 Protection
- Console 1+1 Protection

Network Security

- MACSec (Media Access Control Security)
 - IEEE 802.1AE MACsec
 - AES-128-CMAC or AES-256-CMAC
 - Authentication using Certificate or Pre-Shared Keys (PSK)
 - Switch-to-Switch (static CAK) mode
 - Switch-to-Host (dynamic CAK) mode*
- IPSec (Internet Protocol Security)*
 - IPSec/IKE VPN tunnel for Control-plane
 - IKEv1/IKEv2 support
 - Support encryption algorithms: AES128, AES256
 - Support integrity algorithms – md5, sha1, sha256
 - Password – (PSK) based and certificate-(pubkey) based keys

L3

- VRF without multicast protocols
- ARP, Ping, Trace route
- VRRP
- Static Route
- RIP v1/v2
- OSPF v2
- Routing among Physical Ethernet ports, VLAN virtual port (VLAN routing), and PW ports.
- 32 Sub interfaces
- IGMP v2/v3
- PIM-SM
- NTP server/client

*Future option

Ordering Information

Note 1: RoHS compliant units are identified by the letter **G** appearing at the end of the ordering code.

Note 2: S3~S6 are 10GE slots, while S1, S2, and S7~S10 are 1GE slots.

Ordering Code	Description	Notes
Main Unit		
CXR-HX9800R-PTN-CHA- G	7U height rack chassis for HX9800R-PTN without CPU, power, connector board, fan and plug-in cards. The chassis includes a heat buffer and cable guide on the bottom.	Please order CPU, power, connector, fan and tributary cards separately
Connector Board		
CXR-HX9800R-PTN-CBA- G	1x DB15 for TOD/PPS 1x RJ45 for CLK I/O (2x IN & 2x OUT for 2M/E1) 1x RJ45 for ALARM I/P (4 alarm Inputs) 1x RJ45 for ALARM O/P (4 alarm outputs)	- Please order one per system - Only usable with CXR-HX9800R-PTN-CHA- G chassis
CPU Module		
CXR-HX9800R-PTN-CC2- G	Controller/CPU module for HX9800R-PTN chassis with RS232 console port. It supports 400 Gbps core switching bandwidth and up to 396Gbps I/O bandwidth with full-duplex at wire-speed. This module also supports built-in line interfaces including: <ul style="list-style-type: none"> - 5 x 10GE SFP+ ports - 8 x 1GE SFP ports - 2 x 100GE/40GE ports if activation license purchased (CXR-HX9800R-PTN-CC2-100G-LIC) 	- Please order two for redundancy protection. - Please order SFP optical modules separately. See separate SFP module brochure - The 10GE port supports dual-rate 1GE/10GE SFP+ Optical - The 1GE port supports dual-rate FE/1GE SFP Optical.
CXR-HX9800R-PTN-CC2-LITE- G	Controller/CPU module for HX9800R-PTN chassis with RS232 console port. It supports 400Gbps core switching bandwidth and up to 396Gbps I/O bandwidth with full-duplex at wire-speed. This module also supports built-in line interfaces including: <ul style="list-style-type: none"> - 2 x 10GE SFP+ ports - 4 x 1GE SFP ports - 2 x 100GE/40GE ports if activation license purchased (CXR-HX9800R-PTN-CC2-100G-LIC) 	- Please order two for redundancy protection. - Please order SFP optical modules separately. See separate SFP module brochure - The 10GE ports support dual-rate 1GE/10GE SFP+ Optical - The 1GE ports support dual-rate FE/1GE SFP Optical.
Port Activation License		
CXR-HX9800R-PTN-CC2-100G-LIC	100G/40G port activation license on single HX9800R-PTN controller.	- Used with CXR-HX9800R-PTN-CC2- G and CXR-HX9800R-PTN-CC2-LITE- G controller. - For CC2 controller, one license will activate both 100GE/40GE ports on single controller. - For CC2 controller redundancy, two licenses shall be purchased. - Please also purchase one CXR-ACC-CAB-QSFP100G-100-QSFP100G-AOC- G cable for redundancy facilitation

High Speed or High Density Tributary Modules (Select 1 to 10 cards from High Speed Tributary Modules list below)

Ordering Code	Description	Notes
CXR-HX9800R-PTN-TE1-3	32-port E1(120 ohm) or 32-port T1 software	Please order separately for



2CEM- G	programmable plug-in module with SCSI interfaces. Used for T1/E1 CEM over PTN.	conversion panels and cables listed in below tables.
CXR-HX9800R-PTN-TE1-1 6CEM- G	16-port E1(120 ohm) or 16-port T1 software programmable plug-in module with SCSI interfaces. Used for T1/E1 CEM over PTN.	Please order separately for conversion panels and cables listed in below tables.
CXR-HX9800R-PTN-GFEO - G	10 x 1G or 1 x 10G Ethernet SFP Optical Interface Card (if working in CC2/CHA 10GE slots) 10 x FE SFP Optical Interface Card (if working in CC2/CHA 1GE slots)	Please order SFP optical modules separately. See separate SFP module brochure
CXR-HX9800R-PTN-XGEO - G	9 x 10G Ethernet Port SFP Optical Interface	<ul style="list-style-type: none"> - Please order SFP optical modules separately. See separate SFP module brochure. - Order 2 x AOC cables for each XGEO card: CXR-ACC-CAB-QSFP100G-100-QSFP100G-AOC-G.
CXR-HX9800R-PTN-GFET- G	10 x 1000/100/10Mbps Ethernet Twist-Pair RJ45 if working in CC2/CHA 10GE slots 10 x 100/10Mbps Twist-Pair RJ45 if working in CC2/CHA 1GE slots	
CXR-HX9800R-PTN-POE- G	8 x 1000/100/10Mbps Ethernet Twist-Pair w/ POE+ RJ45 if working in CC2/CHA 10GE slots 8 x 100/10Mbps Twist-Pair w/ POE+ RJ45 if working in CC2/CHA 1GE slots	
CXR-HX9800R-PTN-B2G5- 1CEM-L- G *	If working in CC2/CHA 10GE slots , it supports One STM-16 or Four STM-4/1 interfaces without SFP (mini-GBIC) optical module. If working in CC2/CHA 1GE slots , it supports One STM-4 or Four STM-1 interfaces without SFP (mini-GBIC) optical module. The STM-n can be software configure as OC-3n for SONET application.	Please order SFP optical modules separately. See separate SFP module brochure
CXR-HX9800R-PTN-B2G5- 2CEM-L- G *	Circuit Emulation for 2 x STM16 or 8 x STM-4/1 Channelized Line Interface card. Two STM-16 or Eight STM-4/1 interfaces without SFP (mini-GBIC) optical modules. It has a total card capacity of 2x STM-16/OC-48 and a total system capacity of 8 x STM-16/OC-48. The STM-n can be software configured as OC-3n for SONET application.	<ul style="list-style-type: none"> - Please order SFP optical modules separately. See separate SFP module brochure - Applicable to 10GE slots only
CXR-HX9800R-PTN-B2G5- 1EoSCEM- G *	Ethernet over SDH/SoNET with 1 x STM-16/1 x OC-48 worth traffic over CEM. Operating temperature: -10 °C to 55 °C. The STM-n can be software configured as OC-3n for SONET application.	<ul style="list-style-type: none"> - Facility card working in conjunction with B2G5-1CEM-L or B2G5-2CEM-L card - Applicable to 10GE slots only

* Future option

Low Speed Tributary Modules (Select 1 to 10 cards from Low Speed Tributary Modules list below)

Ordering Code	Description	Note
CXR-HX9800R-PTN-12FXOA- typ-G	12-channel FXOA plug-in card with 600/900 Impedance, Battery Reverse and Loop Start. Without Ground Start and Metering Pulse. Used with 12 RJ11.	For typ option, please refer to the table below for detail information.
CXR-HX9800R-PTN-12FXOA- GS-typ-G	12-channel FXOA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start and [Ground Start]. Used with 12 RJ11.	
CXR-HX9800R-PTN-12FXSA- sn-pt-yp-G	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start and PLAR. Without Ground Start and Metering Pulse. Used with 12 RJ11.	12FXSA-GMP includes all FXS card functions For sn option, please refer to the table below for detail information
CXR-HX9800R-PTN-12FXSA- P-sn-pt-yp-G	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start, PLAR and [PLAR bit programmable]. Without Ground Start and Metering Pulse. Used with 12 RJ11.	pta = power type. For pta option, please refer to the table below for detail information
CXR-HX9800R-PTN-12FXSA- M-sn- pta-yp-G	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start, PLAR and [Metering Pulse]. Used with 12 RJ11.	Please use with 100-240Vac or \pm 48Vdc powered main units.
CXR-HX9800R-PTN-12FXSA- MPP- sn-pt-yp-G	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start, PLAR, [PLAR bit programmable] and [Metering Pulse]. Used with 12 RJ11.	
CXR-HX9800R-PTN-12FXSA- GS- sn-pt-yp-G	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start, PLAR and [Ground Start]. Used with 12 RJ11.	12FXSA-GMP includes all FXS card functions pta = power type.
CXR-HX9800R-PTN-12FXSA- GM-sn-pt-yp-G	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start, PLAR, [Ground Start] and [Metering Pulse]. Used with 12 RJ11.	For sn, pt, and typ options, please refer to the table below for detail information.
CXR-HX9800R-PTN-12FXSA- GMP-sn-pt-yp-G	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start, PLAR, [PLAR bit programmable], [Ground Start] and [Metering Pulse]. Used with 12 RJ11.	Please use with 100-240Vac or \pm 48Vdc powered main units.
CXR-HX9800R-PTN-4E1- cc-G	4-channel E1 plug-in card	For cc option, please refer to the table below for detail information
CXR-HX9800R-PTN-4T1- G	4-channel T1 plug-in card	

CXR-HX9800R-PTN-6UDTEA- G	<p>6-port universal data interface card that supports three software configurable modes:</p> <p>Port 1 to 4: two DB44 connectors</p> <p>Port 5 to 6: two RJ48 connectors</p> <p>Mode 1:</p> <p>Port 1 to 4: RS232/RS422/X.21, Async/Sync 64kbps and subrate with V.110 encoding</p> <p>Port 5 to 6: RS232 for ASYNC only</p> <p>Mode 2:</p> <p>Port 1 to 4: X.21/RS422 SYNC N*64k (N=1~32)</p> <p>Port 5 to 6: Disabled</p> <p>Mode 3:</p> <p>Port 1 to 3: X.21/RS422 SYNC N*64k, (N=1~32).</p> <p>Port 4: X.21/RS422 SYNC, N*64k, (N=1~20).</p> <p>Port 5 to 6: RS232 N*64k (N=1~6) oversampling for ASYNC data.</p> <p>Mode 4:</p> <p>Port 1 to 4: RS232/RS422/X.21/V.35/V.36/EIA530 SYNC 38.4K and subrate</p> <p>Port 5 to 6: Disabled</p> <p>Mode 5:</p> <p>Port 1 to 4: X.21/RS449/RS422/RS232/V.35/V.36/EIA530 SYNC N*64k (N=1~32)</p> <p>Port 5 to 6: Disabled</p>	<p>No conversion cable is included. Please order conversion cable separately from below table.</p> <p>Six conversion cable types are available:</p> <ul style="list-style-type: none"> - CXR-ACC-CAB-DB44M-100-2D B25F-VB - CXR-ACC-CAB-DB44M-100-2D B15F-VB - CXR-ACC-CAB-DB44M-100-1D B15F-1DB25F-VB - CXR-ACC-CAB-DB44M-100-2M 34F-VB - CXR-ACC-CAB-DB44M-100-2D B37F-VB - CXR-ACC-CAB-DB44M-100-1D B37F-1M34F-VB
CXR-HX9800R-PTN-8RS232-RJ- G	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	
CXR-HX9800R-PTN-8RS232-DB- G	8-port RS232 plug-in card with X.50 subrate multiplexing scheme and X.54 encoding, with 2 RJ48 connectors and 2 DB44 connectors for Async and Sync ports	Two conversion cables are included (DB44 connector to two DB25 and one DB9 connector; (CXR-ACC-CAB-DB44M-100-2DB25F-1DB09F-DB).
CXR-HX9800R-PTN-6RS232A-RJ- G	6-port RS232 card with V.110 encoding, with 6 RJ48 connectors for 6 RS232 Async ports	
CXR-HX9800R-PTN-6RS232A-DB- G	6-port RS232 card with V.110 encoding, with 2 DB44 connectors for Async and Sync ports	Two conversion cables are included, DB44 connector to two DB25 and one DB9 connectors. (CXR-ACC-CAB-DB44M-100-2DB25F-1DB09F-DB)
CXR-HX9800R-PTN-6CDA- cdm-G	6-channel G.703 Interface at 64 Kbps data rate. Per port configurable for Co-directional or Contra-directional interfaces.	For cdm option, please refer to the table below for detail information.
CXR-HX9800R-PTN-8DBRA-RJ- G	8-channel data bridge plug-in card, with 8 RJ48 connectors for 8 data bridge Async ports	

CXR-HX9800R-PTN-8DBRA-D B-G	8-channel data bridge plug-in card, with 2 RJ48 connectors and 2DB44 connectors for 8 data bridge Async ports	Two conversion cables are included (DB44 connector to two DB25 and one DB9 connector; (CXR-ACC-CAB-DB44M-100-2DB25F-1DB09F-DB).
CXR-HX9800R-PTN-8DCC-G	8-channel dry contact type A plug-in card with maximum voltage 100 Vdc or 250 Vac	
CXR-HX9800R-PTN-8DCB-G	8-channel dry contact type B plug-in card with maximum voltage 220 Vdc or 250 Vac	
CXR-HX9800R-PTN-4C37-LS FOM-G	4-channel C37.94 plug-in card	Please replace the LSFOM field with options in the table below.
CXR-HX9800R-PTN-RTB-G	8-LAN port/64 WAN ports router/bridge plug-in card	
CXR-HX9800R-PTN-8EMA-x-p t-tyt-G	8-channel 2W/4W E&MA plug-in card. Used with 8 RJ45 connectors or 1 Telco 64 connector.	pt = power type For x , pt and tyt options, please refer to the table below for detail information

Mini Plug-in Modules (Select 1 to 6 cards from list below)

Ordering Code	Description	Notes
Transportation		
CXR-HX9800R-PTN-S1T1-G	1-channel T1 interface card	
CXR-HX9800R-PTN-S1E75-G	1-channel of E1 plug-in card w/ 75 ohm	
CXR-HX9800R-PTN-S1E120-G	1-channel of E1 plug-in card w/ 120 ohm	
CXR-HX9800R-PTN-SM4T1-G	Mini Quad T1 plug-in card	Includes a three meter conversion cable (CXR-ACC-CAB-DB25M-300-4RJ48M)
CXR-HX9800R-PTN-SM4E75-G	Mini Quad E1 plug-in card with 75 ohm	Includes a three meter conversion cable (CXR-ACC-CAB-DB25M-300-8BNM)
CXR-HX9800R-PTN-SM4E120-G	Mini Quad E1 plug-in card with 120 ohm	Includes a three meter conversion cable (CXR-ACC-CAB-DB25M-300-4RJ48M)
CXR-HX9800R-PTN-SFOM-opt-G	Fiber Optical plug-in card	For opt option, please refer to the table below for detail information
Serial and Digital Access		
CXR-HX9800R-PTN-S1V35-G	1-channel V.35 plug-in card	
CXR-HX9800R-PTN-S1X21-G	1-channel X.21 plug-in card	
CXR-HX9800R-PTN-S1RS232-G	1-channel RS232 plug-in card	
CXR-HX9800R-PTN-S1ODP	1 port OCU DP Interface card	Limited Quantity Only non-RoHS compliant model available

Voice and Analog Access

CXR-HX9800R-PTN-SQEMA-wr-m-Tn-x-G	Jumper selectable: 2/4 WIRE; A/B side Quad E&M voice card, complied with IEEE1613 standard.	For -48Vdc power supply only. For wr , m , n , x option, please refer to the tables below for detail information. Includes a 0.6 meter conversion cable (CXR-ACC-CAB-DB44M-60-4RJ45M-G)
CXR-HX9800R-PTN-SQFXOA-x-G	Quad FXO voice plug-in card used with 4 RJ11	GS = Ground Start

CXR-HX9800R-PTN-SQFXOA- GS-x-G	Quad FXO with GS plug-in card used with 4 RJ11	For -48 Vdc and AC (100 to 240 Vac) power supply only. For x option, please refer to the table below for detail information.
CXR-HX9800R-PTN-SQFXSA- x-pt-G	Quad FXSA voice plug-in card	Jumper setting options: Loop Start, Ground Start (GS), Metering Pulse Transmit 12/16 KHz (MP). For x & pt option, please refer to the table below for detail information.
CXR-HX9800R-PTN-SQFXSA- M-x-pt-G	Quad FXSA with MP 16 KHz voice plug-in card	
CXR-HX9800R-PTN-SQFXSA- M12-x-pt-G	Quad FXSA with MP 12 KHz voice plug-in card used	Work with controller firmware v8.38.01 and up for software programmable signaling bits.
CXR-HX9800R-PTN-SQFXSA- GS-x-pt-G	Quad FXSA with GS plug-in card	
CXR-HX9800R-PTN-SQFXSA- GM-x-pt-G	Quad FXSA with GS and MP 16 KHz voice plug-in card	
CXR-HX9800R-PTN-SQMAGA- G	Quad channel magneto plug-in card	
Data Processing		
CXR-HX9800R-PTN-SECA- G	Echo canceller card	
CXR-HX9800R-PTN-SABRA- G	Analog Bridge Card for HX9800R-PTN	
Packet Access		
CXR-HX9800R-PTN-SRTA- G	2-LAN ports/64 WAN port router/bridge plug-in card	
Teleprotection Access		
CXR-HX9800R-PTN-SM1C37- LSFOM-G	1- channel C37.94 plug-in mini card	For LSFOM option, please refer to the table below for detail information

Accessories

Power Module		
CXR-HX9800R-PTN-SDA-G	Single -24 Vdc/-48 Vdc (-18 to -75 Vdc) power module	Pls order two for redundancy protection.
Power Cord		
CXR-ACC-PC-USA-G	AC power cord for Taiwan/America	⏏
CXR-ACC-PC-EU-G	AC power cord for Europe	⏏
CXR-ACC-PC-UK-G	AC power cord for UK	⏏
CXR-ACC-PC-AUS-G	AC power cord for Australia	⏏
CXR-ACC-PC-CH-G	AC power cord for China	⏏
Power Adaptor		
CXR-ACC-APA-320-G	320 Watt, AC (88~264VAC or 124~370VDC to DC (+48Vdc, 6.7A) adaptor for USA Working temperature: -30~+70° C	⏏
CXR-ACC-APE-320-G	320Watt, AC (88~264VAC or 124~370VDC to DC (+48Vdc, 6.7A) adaptor for Europe Working temperature: -30~+70° C	⏏
CXR-ACC-APU-320-G	320Watt, AC (88~264VAC or 124~370VDC) to DC (+48Vdc, 6.7A) adaptor for UK Working temperature: -30~+70° C	⏏
Mounting Ear		
19"/23" ear mounts	A pair of 19"/23" ear mounts is supplied as part of standard package.	For other sizes, please contact CXR
Conversion Panels		
CXR-ACC-P-1SCSI-16RJ-G	1u panel for one SCSI to 16 RJ connectors without cable 432x44x23mm (WxHxD)	For CXR-HX9800R-PTN-TE1-16CEM-G and CXR-HX9800R-PTN-TE1-32CEM-G
CXR-ACC-P-1SCSI-16WW-G	1u panel for one SCSI to 16 Wire Wrap connectors without cable 432x44x40mm (WxHxD)	For CXR-HX9800R-PTN-TE1-16CEM-G and CXR-HX9800R-PTN-TE1-32CEM-G
CXR-ACC-P-1SCSI-16BNC-G	1.5u panel for one SCSI to 16 BNC connectors without cable 432x66x53mm (WxHxD)	For CXR-HX9800R-PTN-TE1-16CEM-G and CXR-HX9800R-PTN-TE1-32CEM-G
Conversion Cable		
CXR-ACC-CAB-SCSI68M-200-1SCSI68M	SCSI68/ Male to one SCSI68/Male; Length 200 cm	Used for all Conversion Panels
Fan Module		
CXR-HX9800R-PTN-FAN-G	FAN module for chassis cooling	Please order 3 FAN modules per system
User's Manual		
CXR-HX9800R-PTN-UM	Optional paper copy of User's Manual for CXR-HX9800R-PTN-CHA controller. A CD version of the manual is already included as standard package.	
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 equipment. It is strongly recommended to buy CXR-logo SFP modules.		
CXR-ACC-CAB-QSFP40G-100-QSFP40G-AOC-G	40G QSFP+ AOC (Active Optical Cable) using multi-mode fiber with 850nm 4-channel bi-directional AOC supports 40Gbps aggregate data rate Maximum link length up to 1m by using OM3 MMF Length: 100 cm Operating Temperature: 0 ~ +70° C	
CXR-ACC-CAB-QSFP100G-100-QSFP100G-AOC-G	100G QSFP28 AOC (Active Optical Cable) using multi-mode fiber with 850nm 4-channel bi-directional AOC supports 100Gbps aggregate data rate Maximum link length up to 1m by using OM3 MMF Length: 100 cm	

	Operating Temperature: 0 ~ +70°C	
Blank Panels		
30.002958.A00LF	Blank Panel for Controller slot	
30.002744.A00LF	Blank Panel for Power Supply slot	
30.001027.A00LF	Blank Panel for Single slot 1~10	
30.002743.A00-G	Blank Panel for Mini slot A~F	

For 4E1 and 3E1 cards

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

cc =	Description	Note
RJ	RJ48C connector	
BNC	BNC connector	

For 12-channel FXSA 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 CXR

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

pta=	Description	Note
24	For HX9800R-PTN CHA chassis using SDA power module with ±24Vdc input power	
PWR	For HX9800R-PTN CHA chassis using SDA power module with ±48Vdc input power	

■ Where **typ** is used to select the connector type:

typ=	Description	Note
RJ	12 x RJ11	
TELCO	1 x Telco 64	

For 12FXOA card

■ Where **typ** is used to select the connector type:

typ=	Description	Note
RJ	12 x RJ11	
TELCO	1 x Telco 64	

For 4C37.94 card:

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

LSFOM	Description										Note
	Mode		Data Rate		Wave Length		Distance		Connector		
Code	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	
ZRATT	Z	1 x 8 Multi-mode	R	2 M	A	820nm	T	2km	T	ST connector	1 x 8 Separate transceiver & receiver

For FOM and 1FOMA card

■ Where **opt** is used to select optical module type (All optical modules are RoHS compliant):

opt =	Description	Note
NHB3S (was SAA)	Single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 30 km - S1.1	- Use dual fiber - Units delivered ITU-T G.957 application code
NHB5S (was SBB)	Single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 50 km - L1.1	- Use dual fiber - Units delivered ITU-T G.957 application code
NHB3F (was SCC)	Single optical module with dual uni-directional fiber, 1310 nm, FC optical connector, 30 km - S1.1	- Use dual fiber - Units delivered ITU-T G.957 application code
*NHC2S (was SDD)	Single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 20 km - S1.2	- Use dual fiber - Units delivered ITU-T G.957 application code * For the orders of the listed optical modules, please contact CXR.
NHCUS (was SEE)	Single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 100 km - L1.2	- Use dual fiber - Units delivered ITU-T G.957 application code
WHD2S (was SSM)	Single optical module with single bi-directional fiber (master), 1310 nm transmit and 1550 receive, SC optical connector, 30 km - S1.1/ S1.2	- 1310 nm from master to slave - Order SSM to use with SSS - Use 1 fiber - ITU-T G.957 application code
WHE2S (was SSS)	Single optical module with single bi-directional fiber (slave), 1310 nm receive and 1550 transmit, SC optical connector, 30 km - S1.1/ S1.2	- 1550 nm from slave to master - Order SSS to use with SSM - Use 1 fiber - ITU-T G.957 application code

* Future option

Note: For other special optical modules, please contact CXR

For QEMA card (Quad E&MA card):

■ where **wr** is used to select wire type:

wr =	Description	Notes
2w	2 wire	
4w	4 wire	

■ Where **m** is used to select QEM card signaling side (must select one):

m =	Description	Notes
B	B (carrier side) connects to A side.	
A	A (exchange side) connects to B side. A side M lead to B side M lead, A side E lead to B side E lead.	

■ Where **n** is used to select QEM card signaling type (must select one):

n =	Description	Notes
0	For voice transmission only.	Circuit Type doesn't matter.
1	Type I (Original) E&M Signaling Circuit	M lead provides discharge for the A side.
2	Type II Circuit. This design attempts to reduce ground noise by adding two leads: SB (Signal to Battery) and SG (Signal to Ground)	Reduced ground noise. Ground current is eliminated at the cost of two more wires per circuit.
3	Type III Circuit. The SG lead serves as a discharge for the M lead. Reduces delay caused by combination of (a) low current electronic detectors, and (b) long runs of the E and M leads.	Type III is rare because ground currents on the E return would cause noise
4	Type IV Circuit. Based on the Type 2 circuit. This E&M circuit provides symmetry.	
5	Type V Circuit. For applications where ground noise is not an issue. Based on the Type 2 circuit.	



For voice card (QEMA/QFXOA/QFXSA):

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

QEMA	E	Follows ETSI signaling bits	
	A	Follows ANSI signaling bits	
	S	Follows customer's special bits assignment	
QFXOA	A	Follows ANSI signaling bits	
	S	Follows customer's special bits assignment	
	E	Follows ETSI signaling bits	
	T	Trunk condition OFF-HOOK	
	AT	Follows ANSI signaling bits w/ trunk condition OFF-HOOK	
QFXSA	A	Follows ANSI signaling bits	
	E	Follows ETSI signaling bits	
	S	Follows customer's special bits assignment	

Note 1: For S (customer's special bit), please contact CXR

Note 2: If x is not selected from the table above, the default setting for signaling bits is ETSI and for trunk condition is ON-HOOK.

For QFXSA:

■ Where **pt** is used to select the power:

pt=	Description	Notes
24	For HX9800R-PTN with CHA chassis using SDA power module with ±24Vdc input power	
PWR	For HX9800R-PTN with CHA chassis using SDA power module with ±48Vdc input power	

For mini LS Optical module (mini C37.94):

■ 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	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	
ZRATT	Z	1 * 8 Multi-mode	R	2 M	A	820nm	T	2km	T	ST connector	1 * 8 Separate transceiver & receiver
QRATT	Q	1 * 9 Multi-mode	R	2 M	A	850nm	T	2km	T	ST connector	1 * 9
*NFB3T	N	1 x 9 Single mode	F	125 M	B	1310nm	3	30km	T	ST connector	
*QFBTT	Q	1 x 9 Multi-mode	F	125 M	B	1310nm	T	2km	T	ST connector	
*NHC2S	N	1 x 9 Single mode	H	155 M	C	1550nm	2	20km	S	SC connector	

* For the orders of the listed optical modules, please contact CXR



For 8EMA:

- Where **x** is used to select signaling bits type and special functions:

x =	Description	Notes
E	Follows ETSI signaling bits	Signaling bits setting is software configurable.
A	Follows ANSI signaling bits	
R	Reverse for ON-HOOK and OFF-HOOK signaling bits exchange	
AR	Follows ANSI signaling bits and reverse bit	

- Where **pt** is used to select the following functions:

pt=	Description	Notes
24	For HX9800R-PTN with CHA chassis using SDA power module with ± 24 Vdc input power	
PWR	For HX9800R-PTN with CHA chassis using SDA power module with ± 48 Vdc input power	
PWRIE1613	For HX9800R-PTN with CHA chassis using SDA power module with ± 48 Vdc input power, complied with IEEE1613 standard	

- Where **typ** is used to select the connector type:

typ=	Description	Notes
RJ	8 x RJ45	
TELCO	1 x Telco 64	

For 6CDA card

- Where **cdm** is used for co-directional/contra-directional mode selection. Must select one from table below.

cdm	Description
cc	Supports G.703 Contra-directional controlling (DCE) and Co-directional interface configuration
cs	Supports G.703 Contra-directional subordinate / Centralized (DTE) and Co-directional interface configuration
mixed	Supports G.703 Contra-directional controlling (DCE), Contra-directional subordinate / Centralized (DTE) and Co-directional interface configuration

Order Example:**Main unit:**

CXR-HX9800R-PTN-CHA-G x 1

CPU Main Switch

CXR-HX9800R-PTN-CC2-G x 2

Plug-in modules:

CXR-HX9800R-PTN-TE1-32CEM-G x 2

Power modules:

CXR-HX9800R-PTN-SDA-G x 2

Description:

1 7U height rack chassis for HX9800R-PTN without CPU, power, connector board, fan and plug-in cards;

2 Redundant CPU and 400Gbps L2/L2.5/L3 Switch card with 2 x 100/40GE, 5 x GE/10GE and 8 GE

2 32-port E1/T1 modules with SCSI interfaces for operating temperature: -10 °C to 55 °C;

2 -24 Vdc/-48 Vdc (-18 to -75 Vdc) power modules

CXR-HX9800R-PTN mPTN MPLS/CE Packet Transport Network Specifications

Physical/Electrical

Model	HX9800R-PTN-CHA	
Dimensions	7U, 442 x 308 x 223.5 mm (W x H x D)	
Power	Single -24 Vdc/-48 Vdc (-18 to -75 Vdc) power module	
Temperature	Operating	-10 to 55°C
	Storage	-30 to 70°C
Weight	Net Weight	
	Max. Weight	
Humidity	0-95%RH (non-condensing)	
Mounting	Desk-top stackable, 19/23 inch rack mountable	
Power Consumption		

Standard Compliance

RFC (IETF)		RFC (IETF)	
1042	Standard for the Transmission of IP Datagrams over IEEE 802 Networks	4842	Considerations for a Transport Profile
1305	Network Time Protocol (NTP) Version 3	5085	Pseudowire Virtual Circuit Connectivity Verification (VCCV)
2236	Internet Group Management Protocol, Version 2	5086	CESoPSN
2273	SNMPv3 Applications	5254	Requirements for Multi-Segment PWE3
2328	OSPF Version 2	5317	Multiprotocol Label Switching (MPLS)
2453	RIP Version 2	5462	MPLS Generic Associated Channel
2571	An Architecture for Describing SNMP Management Frameworks	5586	MPLS Label Stack Entry
2572	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	5601	MPLS Generic Associated Channel
2573	SNMP Applications	5602	Pseudowire (PW) Management Information Base (MIB)
2737	Entity MIB (Management Information Base) (Version 2)	5603	PW over MPLS PSN MIB
2865	Remote Authentication Dial-In User Service (RADIUS)	5604	Ethernet PW MIB
3031	Multiprotocol Label Switching Architecture	5654	Requirements OAM for MPLS-TP
3032	MPLS Label Stack Encoding	5659	An Architecture for Multi-Segment PWE3
3270	MPLS Support of differentiated Services	5710	Path Error Message Triggered MPLS and GMPLS LSP Reroutes
3376	Internet Group Management Protocol, Version 3	5718	An In-band Data Communication Network for MPLS-TP
3410	Introduction and Applicability Statements for Internet Standard Management Framework	5798	Virtual Router Redundancy Protocol VRRP Version 3 for IPv4 & IPv6
3411	An Architecture for Describing SNMP Management Frameworks	5860	Requirements for OAM in MPLS-TP
3412	Message Processing and Dispatching	5880	Bidirectional Forwarding Detection (BFD)
3413	SNMP Applications	5882	Generic Application of Bidirectional Forwarding Detection
3414	User-based Security Model	5884	BFD for MPLS Label Switched Paths
3415	View-based Access Control Model	5885	BFD for the Pseudowire VCCV
3417	Transport Mappings for the SNMP	5920	Security Framework for MPLS and GMPLS Networks
3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	5921	A Framework of MPLS in Transport Network
3768	Virtual Router Redundancy Protocol VRRPv2	5950	MPLS-TP Network Management Framework
3811	Definitions of Textual Conventions (TCs) for MPLS Management	5951	Network Management Requirements for MPLS-TP
3812	MPLS Traffic Engineering (TE) Management Information Base (MIB)	5960	MPLS-TP Data Plane Architecture
3813	MPLS Label Switching Router (LSR) Management Information Base (MIB)	6215	MPLS-TP User-to-Network and Network-to-Network Interfaces
3826	The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model	6370	MPLS Transport Profile(MPLS-TP) Identifier
3985	Pseudo Wire Emulation Edge-to-Edge Architecture	6371	OAM Framework for MPLS-Based Transport Networks
		6372	MPLS-TP Survivability Framework
		6373	MPLS-TP Control Plane Framework
		6374	Packet Loss and Delay Measurement for MPLS Networks
		6375	A Packet Loss and Delay Measurement Profile for MPLS-Based Transport Networks
		6378	MPLS-TP Linear Protection
		6426	On demand connectivity verification
		6427	MPLS Fault Management OAM

4115	A Differentiated Service Two-Rate, Three-Color Marker with Efficient Handling of in-Profile Traffic	6428 6478 6639	Proactive connectivity verification Pseudowire Status for Static Pseudowire MPLS-TP MIB-Based Management Overview
4379	Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures	6669	Overview of the OAM toolset for MPLS-Based Transport Networks
4385	Pseudowire Emulation Edge to Edge (PWE3) Encapsulation Methods for Transport of Ethernet over MPLS Use over an MPLS PSN	6941	MPLS Transport Profile (MPLS-TP) Security Framework
4448	SAToP (Structured Agnostic TDM over Packet Switched Networks) Networks Framework for L2VPNs (VPLS/VPWS)	7213 7276	MPLS Transport Profile (MPLS-TP) Next-Hop Ethernet Addressing An Overview of OAM
4553	Service Requirements for Layer 2 Provider-Provisioned Virtual Private Networks (QoS)	7331 826 854	Bidirectional Forwarding Detection (BFD) Management Information Base (MIB) Address Resolution Protocol (ARP) MIL STD 1782 Telnet Protocol Specification

ITU-T

G.8031	ELPS	
G.8032	ERPS	
G.8101	Terms and Definitions for MPLS Transport Profile	
G.811	Timing characteristics of primary reference clocks	
G.8110.1	Architecture of MPLS-TP Layer Network Interfaces for the MPLS-TP Transport Profile	
G.8112	layer Network MPLS-TP OAM	
G.8113.2	Characteristics of MPLS-TP Network Equipment Functional Blocks	
G.8121	Characteristics of MPLS-TP equipment functional blocks supporting ITU-T G.8113.2/Y.1372.2	
G.8121.2	MPLS-TP Linear Protection	
G.8131	Management aspects of the MPLS-TP network element	
G.8151	Time and phase synchronization aspects of packet networks	
G.8271	Timing characteristics of a synchronous Ethernet equipment slave clock	
G.8262	Timing and synchronization aspects in packet networks	
G.8261	Ethernet OAM	
Y.1731	Operations, administration and maintenance (OAM) functions and mechanisms for Ethernet-based networks	

IEEE

802.1d	STP
802.1p	Traffic Prioritization
802.1w	RSTP
802.1s	MSTP
802.1q	VLAN
802.1ab	Local and metropolitan area networks - Station and Media Access Control Connectivity Discovery
802.1ad	VLAN Tag Stacking (Q-in-Q)
802.1ag	Ethernet OAM (CFM)
802.1X	Local and Metropolitan Area Networks: Port-based
802.3	Carrier Sense Multiple Access with Collision Detection
802.3ab	Gigabit Ethernet over copper
802.3ad	Link Aggregation Control Protocol
802.3ae	10 Gigabit Ethernet
802.3ah	Ethernet in the First Mile (EFM)
802.3u	Type 100BASE-T MAC parameters, Physical Layer, MAUs, and Repeater for 100 Mb/s Operation
802.3x	Flow Control
802.3z	Gigabit Ethernet Standard over fiber (1000Base-SX/LX)
1588 v2	Precision Time Protocol (PTP)
1613	Environmental and Testing Requirements for communication Networking Devices installed in electric power substations

EMC/EMI

FCC15 Class A
EN 55032 Class A/EN 55035
EN 50121-4
IEC 61850-3
ANSI C63.4a-2017
ETSI EN 300386
ETSI ES 201468
ETSI EN 300 019-1-1, 1-2, 1-3, 2-1, 2-2, 2-3
IEC 61000-4-3
IEC 61000-4-4
IEC 61000-4-6
IEC 60068-2-1
IEC 60068-2-3
IEC 60068-2-52
IEC 60068-2-64

Safety

EN62368-1

MEF

8
9
14
MEF Carrier Ethernet (CE) 2.0 compliant for EPL (Ethernet Private Line), EVPL (Ethernet Virtual Private Line), EP-LAN (Ethernet Private LAN) , EVP-LAN (Ethernet Virtual Private LAN), EP-Tree (Ethernet Private Tree) and EVP-Tree (Ethernet Virtual Private Tree)

Environmental Protection Standards

2011/65/EU & (EU)2015/863

CC2 Controller Card

Controller card with up 400Gbps core switching capability.

100/40 Gigabit Ethernet (100GE/40GE) Interface ^{NOTE}	
QSFP28/QSFP+ Ports	2 x 100GE/40GE Selection of Rate: 100GE or 40GE and Selection of Module: QSFP28 for 100GE interfaces, and QSFP+ for 40GE Auto laser shutdown (ALS)
Direction	Duplex(half/full), auto-negotiation
10 Gigabit Ethernet (10GE) Interface	
SFP Ports	5 x 10GE Auto laser shutdown (ALS)
Speed	10Gbps/1Gbps
Direction	Duplex(half/full), auto-negotiation
Gigabit Ethernet (GE) Interface	
SFP Ports	8 x 1GE Auto laser shutdown (ALS)
Speed	1000Mbps/100Mbps
Direction	Duplex(half/full), auto-negotiation
WAN Transmission	All Ethernet interfaces on the CC2/CC2-Lite controller can be used as NNI and UNI (WAN and LAN)
Redundancy	To provide the redundancy of the 100GE/40GE interfaces, it is mandatory to interconnect the two CC2 by an 100GE/40GE connection. Then the two CC2 redundant controllers have only two ports of 100GE/40GE available to connect to external nodes

NOTE: Since there is NO backplane interconnection between the two Controllers (CC2) for 100GE/40GE interfaces, it is mandatory to interconnect the two CC2 via 100/40GE connection at the front panel to enable the 100GE/40GE interfaces in Controller Redundancy scenario. In such scenario, the two redundant controllers will have only two ports of 100GE/40GE available to connect to external nodes.

Ethernet Interfaces**GFEO Card**

Plug-in module with 10 x 1GE SFP or 1 x 10GE SFP+ ports for port extension of CC2.

LAN Gigabit Ethernet (GbE) Interface

SFP Ports	10 x 1GE SFP or 1 x 10GE SFP+ ports Auto laser shutdown (ALS)
Speed	100/1000 Mbps per port for 1G mode 10Gbps for 10G mode
Direction	duplex(half/full), auto-negotiation

Ethernet Function

GFEO is the port extension card for CC2 and its functions are the same as CC2.

GFET Card

Plug-in module with 10 x 10/100/1000 or 10 x 10/100 Ethernet Twist-Pair RJ45 ports.

LAN Gigabit Ethernet (GbE) Interface

Ports	10 x RJ45
Speed	10/100/1000 Mbps working in 10GE slots 10/100Mbps when working in 1GE slots

XGEO Card

Plug-in module with 9 x 10GE SFP ports for port extension of CC2.

LAN Gigabit Ethernet (GbE) Interface

SFP Ports	9 x 10GE SFP ports Auto laser shutdown (ALS)
Speed	10Gbps
Direction	duplex(half/full), auto-negotiation



WAN Transmission
 QSFP28 Ports 2 x 100GE
 Auto laser shutdown (ALS)
 Speed 100Gbps
 Direction duplex(half/full), auto-negotiation
 Ethernet Function
 XGEO is the port extension card for CC2 and its functions are the same as CC2.

SDH Interfaces

B2G5-1CEM-L Plug in module with 4 STM-n SFP slot interfaces without SFP (mini-G4/BIC) Optical modules for operating temperature: -20 °C to 65 °C.
 In CC2/CHA 10GE slots, it supports 1 STM-16 or 4 STM-4/1 interfaces
 In CC2/CHA 1GE slots, it supports 1 STM-4 or 4 STM-1
 With MSP 1+1 in the card or with 2 cards in the tributary group.
 The STM-n can be software configured as OC-3n for SONET application.

B2G5-2CEM-L Plug in module with 2 STM-16/4/1 plus 6 STM-4/1 and 3 STM1 interfaces without SFP (mini-GBIC) Optical modules
 In CC2/CHA 10GE slots, it supports:
 2 x STM-16 or
 1 x STM-16 + 4 x STM-4 or
 1 x STM-16 + 3 x STM-4 + 4 x STM-1 or
 7 x STM-4 + 4 x STM-1
 With MSP 1+1 in the card or with 2 cards in the tributary group.
 The STM-n can be software configured as OC-3n for SONET application.

B2G5-EoSoCEM-L Supporting the transport of Ethernet, from PWS or local UNI, over SDH/SONET from any xB2G5 cards and vice versa.
 In CC2/CHA 10GE slots, it supports up to one STM-16 worth of bandwidth with EoS.
 In CC2/CHA 1GE slots, it supports up to 3 STM-1 worth of bandwidth EoS.
 Up to 48 VCG supported for EoS services.

TE1-32/16CEM 16 or 32 port E1/T1 card, support the conversion TDM to emulation PW over Ethernet or MPLS-TP with 1 or 2 SCSI interfaces

Voice Cards

12FXSA/12FXOA Cards

Connector	Twelve RJ11 or one Telco64	
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	FXSA: -21 to +3 dB / 0.1dB step transmit & receive FXOA: -21 to +10 dB / 0.1dB step transmit & receive	
Signal/ Distortion	> 25dB with 1004 Hz, 0dBm input	
Frequency Response	\pm 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712	
Idle Channel Noise	Max. -65 dBm0p	
Variation of Gain	\pm 0.5dB	
12FXOA	Ringing REN	0.5B (AC)
	Detectable Ringing	25 Vrms
	Loop Resistance	\leq 1800 Ω
	DC Impedance (ON-HOOK)	> 1M Ω
	DC Impedance (OFF-HOOK)	235 Ω @ 25mA feed ; 90 Ω @ 100mA feed
12FXSA Loop Feed	-48Vdc with 25mA current limit per port Jumper Selectable: 25mA(default=25mA), 30mA, or 35mA(sn=S1)	
12FXSA Signalling	Normal / PLAR: Private Line Auto Ring down	



12FXSA 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
12FXSA Tone	Alarm Tone: 480Hz/620Hz/-24dBm Ring Back Tone: 440Hz/480Hz/-19dBm
12FXSA functions	Basic functions: Bettary Reverse, Loop Star, PLAR Optional functions: PLAR ON/PLAR bit programmable, Ground Start, and/or Metering 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.
- FXSA specification shown above support FXSA hardware version N and up.

QEMA Card

Connector	One 44-pin connector, adapter cable included for 4 RJ45 connectors.
Power	110-220Vac, \pm 48Vdc
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ -law, user selectable as a group
Impedance	Balanced 600 Ω or 900 Ω
Gain Adjustment (Per-port setting)	-10 to +7 dB / 0.1dB step for transmit (D/A) gain -10 to +14 dB / 0.1dB step for receive (A/D) gain
Gain Variation	\pm 0.5 dB at 0 dBm0 input
Frequency Response	\pm 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
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)
Longitudinal Balance	> 63dB
Longitudinal Conversion Loss	> 46dB
Total Distortion	> 35 dB at 0 dBm0 input
Idle Channel Noise	< -65 dBm0p
Wire Mode	2 wire and 4 wire
Signaling	Type I, Type II, Type III, Type IV, Type V, and also TO (Transmit Only)
M Lead Output Current	18 mA (maximum)
E Lead Sensor Current	0.3 mA (minimum)
EM Type Setting	Jump Selectable
Operational Temp.	0°C to +50°C
Relative Humidity	0% to 95%
Carrier Connection	Side A and side B setup by Jump

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.

QFXOA Card

Quad FXO voice card (4 FXO per plug-in)	
Connector	QFXOA: 1, 2, 3, or 4 FXO per RJ11 connector
Power for QFXOA	110-220Vac, -24Vdc, and -48Vdc
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 Rejection	55 dB
Loss Adjustment	0, 3, 6, or 9 dB transmit & receive
Signal/ Distortion	> 46dB with 1004 Hz, 0dBm input
Frequency Response	\pm 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
FXS Loop Feed	Supports line power with 25mA (default) current limit (30mA and 35mA, Jump selectable)
FXO	Ringing REN 0.5B (AC) Detectable Ringing 25 Vrms Loop Resistance \leq 1800 Ω DC impedance (ON-HOOK) > 1M Ω DC impedance(OFF-HOOK) 235 Ω @ 25mA feed 90 Ω @ 100mA feed

FXS Ringing	Supports 2 REN per port (1 REN = $6930\Omega + 8 \mu\text{F}$) 20 Hz, other frequencies: 16.7Hz, 25 Hz, 50Hz (Jump selectable) 78 Vrms (sine wave) (45 Vrms to 86 Vrms wide range by Resistor selectable) 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR
Metering Pulse	12KHz/ 16KHz <ul style="list-style-type: none"> Power: 10dBm Sensitivity: -27dBm (-21dBm to -45dBm by Resistor selectable)
Signaling	Loop Start, GND-Start, Metering Pulse (12KHz, 16KHz), DTMF, Dialing Pulse, PLAR, Battery Reverse (supports Line Reverse Signaling for Billing)

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.

QFXSA Card

Quad FXSA voice card (4 FXS per plug-in)

Connector	1, 2, 3, or 4 FXS per RJ11 connector
Power for QFXS	$\pm 48\text{Vdc}$
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ -law (user selectable)
AC impedance	Balanced 600 or 900 ohms (user selectable)
Longitudinal Rejection	55 dB
Gain Adjustment	-21 to +3 dB / 0.1 dB step for transmit (D/A) & receive (A/D) gain
Signal/ Distortion	> 46dB with 1004 Hz, 0dBm input
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
Loop Feed	$\pm 48\text{Vdc}$ with 25mA current limit per port Jumper selectable: 25mA, 30mA, 35mA
Ringing	Support 2 REN per port (1 REN = $6930\Omega + 8 \mu\text{F}$) 16.7Hz, 20Hz, 25Hz, 50Hz (user programmable) Default 78 Vrms (sine wave) (64 Vrms by jumper setting) 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR (user programmable)
Metering Pulse	12KHz/ 16KHz (2.4Vrm/1Vrm user programmable)
Signaling	Loop Start (Metering Pulse, DTMF, Dialing Pulse, PLAR), GND-Start (Tip Open, Ring GND), OOS Alarm, Battery Reverse

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.

QMAGA Card

Connector	RJ11 x 4
Power	110-220 Vac or ± 48 Vdc
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ -law, user selectable per card configurable
Impedance	Balanced 600 or 900 ohms (for magneto telephone impedance)
Longitudinal Conversion Loss	> 46dB
Gain Adjustment	-16 to +7 dB / 0.1dB step transmit gain (D-A) -16 to +13 dB/0.1dB step receive gain (A-D)
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 dBmOp

Signaling

Minimum Detectable Ringing Voltage	16 Vrms
Crank Detectable Across	L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND) per port software programmable
Crank Detected time	Valid crank: more than 250 ms Invalid crank: less than 160 ms
Ringing Generation	Voltage: 76 Vrms (sine wave) Frequency: 25Hz
Ring duration	Software configurable options: <ol style="list-style-type: none"> PLAR OFF (Continuous Mode) Ring duration depends on cranking time PLAR OFF (One-time) Mode Crank the phone for one time, and the ring duration of the far-end phone could be 0.7, 1.0, 1.5 or 2.0 sec

- 3. PLAR ON
When FXS phone off-hooked, the ring duration of the far-end magneto phone could be 0.7, 1.0, 1.5 or 2.0 sec

Ringing Send Across L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND)
 Signaling Turn Magneto Phone crank (Ringing across Tip and Ring or Tip and Ground)
 Signaling Bit A,B,C,D Programmable

- 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

Serial and Digital Access Interfaces

6UDTEA Card

Mode 1: Sub-Rate mode

DTE Interface (RS232)

Data Port	Up to 2		
MUX	Maximum 6 subrate port / 64Kbps		
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	RJ48-ASYNC (Port5, Port6)		
Alarm	Remote Alarm		
Loopback	RTS Loss		
	To-DTE		
Electrical Protocol	To-DS1 (To Line)		
	DCE		
	V.110		

DTE Interface (X.21/RS232/RS422)

Data Port	Up to 4		
MUX	Maximum 4 subrate port / 64Kbps		
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 (Port1, Port2), DB44 (Port3, Port4)		
Alarm	Remote Alarm		
Loopback	RTS Loss		
	To-DTE		
Electrical Protocol	To-DS1 (To Line)		
	DCE		
	V.110		

Mode 2: N*64K Mode

DTE Interface (X.21/RS232/V.35/V.36/EIA530/RS449)

Data Port	Up to 4 (Port 1 to 4)
Data Rate	Synchronous N*64kbps, N = 1 to 32 Asynchronous mode is not supported.
Connector	DB44 (Port 1, Port 2), DB44 (Port 3, Port 4)
Alarm	RTS Loss
Loopback	To-DTE
	To-DS1 (To Line)
Electrical	DCE

Note: When oversampling is enabled in MODE2, port 5 ~ 6 will be disabled.

Mode 3: Hybrid Mode

DTE Interface (X.21/RS232/V.35/V.36/EIA530/RS449)

Data Port	Up to 4 (Port 1 to 4)
-----------	-----------------------



Data Rate	Synchronous N*64kbps, N = 1 to 32 for port 1 ~ 3 ; N = 1 to 20 for port 4 Asynchronous mode is not supported.
Connector	DB44 (Port 1, Port 2), DB44 (Port 3, Port 4)
Alarm	RTS Loss
Loopback	To-DTE To-DS1 (To Line)
Electrical	DCE
<u>DTE Interface (RS232)</u>	
Data Port	Up to 2 (Port 5 and Port 6)
MUX	Maximum 2 oversampling port
Data Rate	No Synchronous mode supported Asynchronous 200, 300, 0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 57.6K, 115.2K, 128K
Connector	RJ48 (Port 5, Port 6)
Alarm	Remote Alarm RTS Loss
Loopback	To-DTE To-DS1 (To Line)
Electrical	DCE
Mode 4: Clock Pass Through	
<u>DTE Interface (X.21/RS449/RS422/RS232/V.35/V.36/EIA530)</u>	
Data Port	Up to 4 (Port 1 to 4)
Data Rate	Synchronous 0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 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: Port 5~6 are disabled in Mode 4.	
Mode 5: N x 64K with Local and Remote Loopback	
<u>DTE Interface (X.21/RS449/RS422/RS232/V.35/V.36/EIA530)</u>	
Data Port	Up to 4 (Port 1 to 4)
Data Rate	Synchronous N*64kbps, N = 1~32
Connector	DB44
Protection	DTE signal duplicated via Y-box and transported by working and protection cards
Alarm	RTS Loss, FPGA fail
Diagnostics	DTE Loopback: To-DTE, To-DS1 (To Line) Local and Remote Loopback (except for X.21 interface) V.54 standard BERT
Electrical	DCE
Note: Port 5~6 are disabled in Mode 5.	

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

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							
	1	2	3	4	5	6	7	8
Eight RJ48	Async/ Sync ^{Note 1}	Async/ Sync ^{Note 1}	Async	Async/ Sync ^{Note 1}	Async/ Sync ^{Note 1}	Async	Async	Async
Two DB44 + Two RJ48	Async/Sy nc	Async/Sync	Async	Async/Sync	Async/Sync	Async	Async	Async
Connector	Eight RJ48 (port 1 to port 8) DB44 (port1,port2,port3), DB44 (port4,port5,port6), RJ48 (port7) and RJ48(port8)							
Conversion Cable	A three-into-one conversion cable adapts the DB44 connector to 3 connectors (one DB9S and two DB25S)							
Electrical	RS232 Interface, DCE							

Note 1: Sync- with rate up to 19.2 Kbps achieved by oversampling at 64 Kbps



DTE Interface (RS232 with V.110 encoding, 6-port)

Data Port	Up to 6 port					
MUX	Maximum 6 substrate port / 64Kbps					
Protocol	Supports V.110					
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			
Card Type	Port Number					
	1	2	3	4	5	6
RJ48	Async	Async	Async	Async	Async	Async
DB44	Sync/Async	Sync/Async	Async	Sync/Async	Sync/Async	Async
Connector	DB44 (port1,port2,port3) DB44 (port4,port5,port6) or RJ48 (port 1 to Port 6 are 6RJ48)					
Alarm	Remote Alarm					
Loopback	RTS Loss					
	To-DTE					
Electrical	To-DS1 (To Line)					
	RS232 Interface, DCE					

6CDA Interface

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

DTE Interface (Data Bridge Card)

Data Port	Up to twelve 8-port data bridge card (each card supports up to 120 DS0 for data bridge)
Feature	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.

Data-Processing Interfaces**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		

Analog Bridge Card (ABRA)

Group	Up to 8 groups per card, 16 members per group
Analog Bridge Mode	Master/Slave Architecture Downstream : 2 to many Upstream : many to 2
Voice Conference Mode with CAS Signalling	Any-to-any conference bridge Up to 16 members in one conference group Silence detection/suppression



RS232 Data Bridge Mode	Master/Slave Architecture Downstream : 2 to many (up to 14 Slave units) Upstream : many to 2
Voice Protection Mode	One Master to two Slaves for 1+1 protection Analog signals only 42 protection groups
OCU-DP Data Bridge Mode (MJU Mode)	Master/Slave Architecture Downstream: 1 to many (up to 14 Slave units) Upstream: many to 1
PCM encoder/decoder	Compatible with ITU-T G.711 A-law/Mu-law coding.
LED Indicator	Multi-color indication

Echo Canceller Card

Echo Cancellation	64ms uni-directional, 64ms bi-directional and 128ms uni-directional
Channel	Up to 64 channels
Functions	- one way or bi-direction cancellation from PCM bus to ECA card - E1/T1 multichannel echo cancellation
PCM encoder/decoder	Compatible with ITU-T G.711 A-law/Mu-law coding.
LED Indicator	Multi-color indication
Compliant	ITU-T G.165 and ITU-T G.168-2000 and 2002

Transportation Interfaces**Network Line Interface - T1**

Line Rate	1.544 Mbps \pm 50 bps	Output Signal	DSX1
Line Code	AMI or B8ZS	Framing	D4/ESF (selectable)
Input Signal	ABAM cable length up to 655 feet	Connector	RJ48C

Network Line Interface - E1

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 - Mini 4E1

Line Rate	2.048 Mbps \pm 50 ppm	Framing	ITU G.704
Line Code	AMI or HDB3	Connector	DB25S
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 - Mini 4T1

Line Rate	1.544 Mbps \pm 32 ppm	Framing	D4/ESF
Line Code	AMI/B8ZS	Connector	DB25S
Input Signal	ITU G.703 DSX-1 0dB to -30dB w/ALBO	Output Signal	ITU G.703 DSX-1 w/o, -7.5, -15dB LBO ITU G.703 DSX-1 w/short (0-110, 110-220, 220-330, 330-440, 440-550, 550~660 feet)
Jitter	AT&T TR 62411	Pulse Template	AT&T TR 62411
Data Rate	n * (64) Kbps (n=1-24)		

DTE Interface (X.21)

Data Port	Up to nine 1-port DTE X.21 card
Data Rate	56 or 64 Kbps, n = 1 to 32
Connector	DB15

DTE Interface (V.35)

Data Port	Up to nine 1-port DTE V.35 card
Data Rate	56 or 64 Kbps, n = 1 to 32
Connector	DB25S (optional conversion cable DB25S to M34 connector)

DTE Interface (RS232)

Data Port	1-port RE232 card
Data Rate	56 or 64 Kbps *n, n=1 - 2



Mapping Any sequential time slots

1 Port OCU-DP Interface Card

Ports 1 Ports card
 Operating Modes 4-wire DDS or switched 56
 Dedicated Rates SYNC: 2.4, 4.8, 9.6, 19.2, 56 and 64k clear channel
 Conforms with AT&T Pub 41458
 OCU DP Operation Conforms with AT&T 62310 and ANSI T1.410
 Local Loop Signal Bipolar return to zero, 50% duty cycle
 Transmit Amplitude +/- 1.5 V (+/- 10%) peak, all rates except 9.6k
 +/- 0.75 V (+/- 10%) peak at 9.6k
 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
 Physical Interface 4-wire loop interface
 RJ45 modular connector
 Network to Loop Test Codes Zero code suppression, Idle
 Loop to Network Test Codes Zero code suppression, Idle, latch/non-latch, DSU loop-back

Fiber Optical Interface (FOM)

Source MLM Laser Line Code Scrambled NRZ
 Wavelength 1310 ± 50 nm, 1550 ± 40 nm Detector Type PIN-FET
 50 Km reach Protection Optional 1+1 APS

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

Optical Module	Fiber Direction	Wavelength (nm)	Connector	Distance (km)
NHB3S (was SAA)	Dual uni-directional	1310	SC (Subscriber Connector)	30
NHB5S (was SBB)	Dual uni-directional	1310	SC (Subscriber Connector)	50
NHB3F (was SCC)	Dual uni-directional	1310	FC (Fiber Connector)	30
*NHC2S (was SDD)	Dual uni-directional	1550	SC (Subscriber Connector)	20
SEE	Dual uni-directional	1550	SC (Subscriber Connector)	100
WHD2S (was SSM)	Single bi-directional (master)	1310/1550	SC (Subscriber Connector)	30
WHE2S (was SSS)	Single bi-directional (slave)	1550/1310	SC (Subscriber Connector)	30

NOTE: Other fiber optical options available on special order

* For the orders of the listed optical module, please contact CXR

Packet Access Interfaces

Router-A Interface

Number of Ports 2 LAN ports, Max. 64 WAN ports, Each WAN port has data rate n x 64K bps, 1 ≤ n ≤ 32 (≤ 4Mbps for total of all 64 WAN ports)
 Physical Interface 10/100 BaseT x 2
 Connector RJ45
 Routing Protocol RIP-I, RIP-II, OSPF, Static
 Supporting Protocols PPP (IPCP/BCP), MLPPP, HDLC, Frame Relay, and Cisco compatible HDLC, NAT/NAPT, DHCP
 Diagnostic Ping, Trace route
 QoS Rate limit

Teleprotection Access Interfaces

Mini C37.94 Card

820nm			
Ordering Code	Mode	Data Rate (Mb/s)	
ZRATT	1*8 Multi-Mode	2.048Mbps	
Wavelength (nm)	Distance (km)	Connector	
820	2	ST	
TX Power (dBm Peak)	RX Power (dBm Peak)	Note	



MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength	
-19.8	---	-12.8	792/820/865	---	---	---	---	50/125 μ m Fiber Cable
-16	---	-9		---	---	---		62.5/125 μ m Fiber Cable
---	---	---	---	-25.4	---	-9.2	792/820/865	Peak Optical Input Power Logic Level LOW

850nm

Ordering Code

QRATT

Wavelength (nm)

850

Mode

1*9 Multi-Mode

Distance (km)

2

Data Rate (Mb/s)

2.048Mbps

Connector

ST

TX Power (dBm Peak)				RX Power (dBm Peak)				Note
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength	
-23	---	-11	790/---/870	-32	---	-11	790/---/870	50/125 μ m Fiber Cable
-19	---	-11		-32	---	-11		62.5/125 μ m Fiber Cable

1310nm

Ordering Code

NFB3T

Wavelength (nm)

1310

Mode

1*9 Single-Mode

Distance (km)

30

Data Rate (Mb/s)

125Mbps

Connector

ST

TX Power (dBm)				RX Power (dBm)			
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength
-15	---	-8	1261/1310/1360	-34	---	0	1260/---/1610

1310nm

Ordering Code

QFBTT

Wavelength (nm)

1310

Mode

1*9 Multi-Mode

Distance (km)

2

Data Rate (Mb/s)

125M

Connector

ST

TX Power (dBm)				RX Power (dBm)				Note
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength	
-20	---	-14	1270/1310/1380	-32	---	8	1260/---/1610	Output Optical Power 62.5/125 μ m fiber
-23.5								Output Optical Power 50/125 μ m fiber

1550nm

Ordering Code

NHC2S

Wavelength (nm)

1550

Mode

1*9 Single-Mode

Distance (km)

20

Data Rate (Mb/s)

155Mbps

Connector

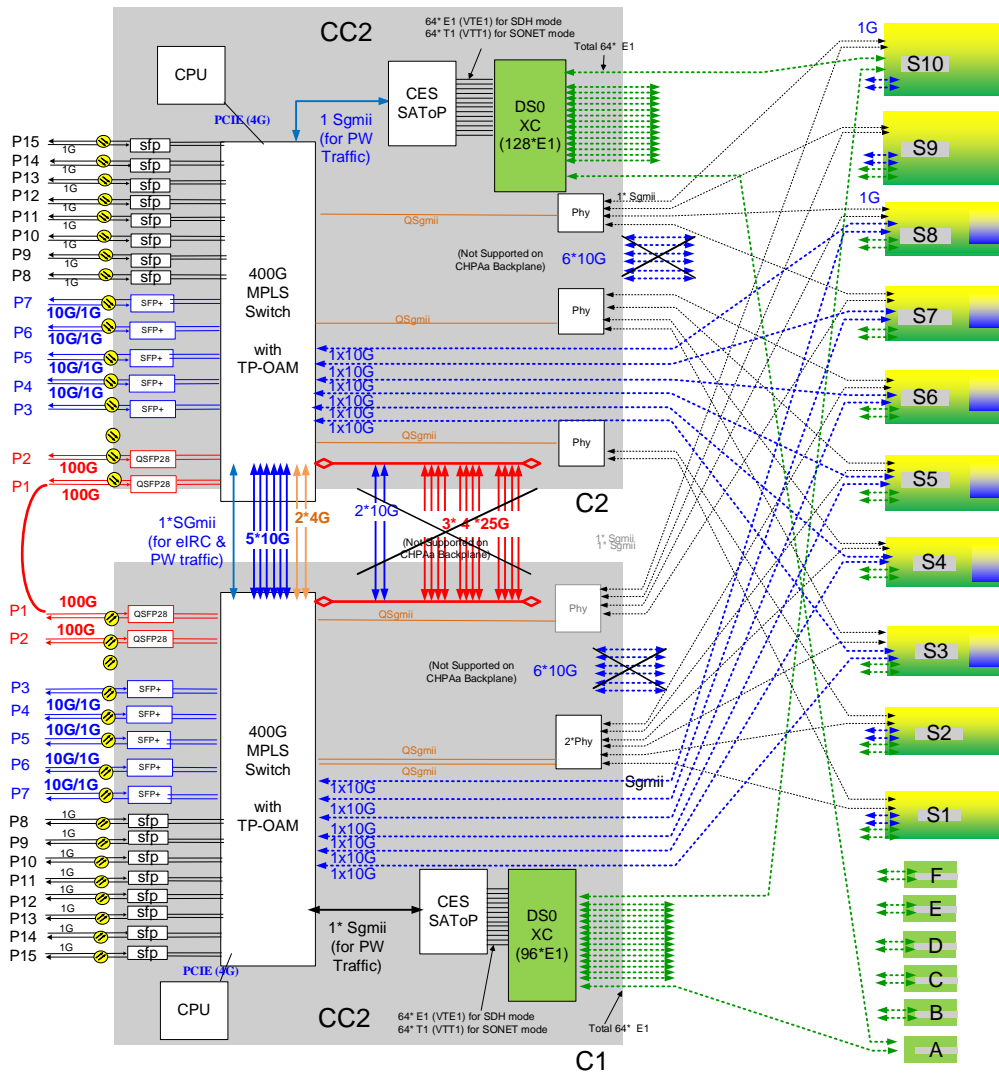
SC

TX Power (dBm)				RX Power (dBm)			
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength
-15	---	-18	1480/1530/1576	-34	---	0	1260/---/1610



Capacity

HX9800R-PTN with CC2 Backplane on CHA Chassis



3440 LS Line Cards (Full&Mini):
 E&M
 FXS
 FXO
 RS232
 RTB

PTN Yellow Cards (1G BP):
 32*E1/T1
 16*DS3
 1B2G5*
 GFEO*
 GFET*

PTN Blue Cards (10G BP):
 2B2G5
 GFEO*
 GFET*

New PTN Red Cards (0G BP):
 XGEO

Slot Organization

The central slots C1 and C2 support the CC2 MPLS-TP/CE switches.
 The mini-slots (Slots A ~ F) support the PDH interface cards and clock card only.
 All 10 slots from S1 to S10 support:

- PDH interfaces cards, n x 64Kbps of 4 E1 backplane
- 32 E1/T1 or 16 DS3 cards
- 10 x FE RJ45
- 4 STM-1 or 1 STM-4

The next table shows the HX9800R-PTN slots with supported cards.



Slot & Card Compatibility (HX9800R-PTN with CC2/CHA Chassis)

Slot \ Card	Mini Slot A-F	C1~C2	S9~S10 NOTE		S1~S2, S7~S8			S3, S4 S5, S6				System Total Capacity
	DS0 Bus		DS0 Full Slot	1G Bus	DS0 Full Slot	0G	1G Bus	DS0 Full Slot	0G	1G Bus	10G Bus	
CC2 (2*100G)	X	V	X		X			X				2 x 100GE + 10 x 10GE + 16 x GE
All Mini Slot Cards from AM3440-D/E	V	X	X		X			X				-
All Single Slot Cards from AM3440	X	X	V		V			V				-
32TE1	X	X	V		V			V				320 x E1/T1
16TE3	X	X	V		V			V				160 x DS3 / 160 x EC1
GFEO (10G BP) GFEO (1G BP)	X	X	X ^{Note}		V			V				4 x 10GE or 40 x GE/FE Optical 40 x FE Optical
GFET (10G BP) GFET (1G BP)	X	X	X ^{Note}		V			V				40 x 10/100/1000BaseT (RJ45) 40 x 10/100BaseT (RJ45)
B2G5-2CEM (10G BP) B2G5-1CEM (1G BP)	X	X	V		V			V				8 x STM-16, 32 x STM-4, or 68 x STM-1 6 x STM-4, or 24 x STM-1
XGEO	X	X	X ^{Note}		V			V				18 x 10GE

Note: Due to the # limitation of MAC addresses, S9 & S10 cannot support Ethernet Cards.

CXR

Rue de l'Ornette 28410 Abondant France

T +33 (0) 237 62 87 90

contact@cxr.com - www.cxr.com

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