

Version V1.4

HX9800R-PTN QuickStart

MPLS-CE PACKET TRANSPORT NETWORK



Front View 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 DSO, 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 DS0 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: -20 °C to 60 °C

System Capacity

- Up to 2 x 100GE/40GE ports
- Up to 34 x 10GE
- Up to 76 x 1GE
- Up to 64 x FE Base-T
- Up to 320 x E1/T1 ports
- Up to 160 x DS3 ports
- Up to 48 x STM-1 ports
- Up to 48 x STM-4 ports
- Up to 12 x STM-16 ports
- Up to 08 x POE++ ports
- Up to 590 Mpps Throughput

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),
 - 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*
- VPWS PW instances: 2K
- VLANs: 4094 maximum instances
- 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

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- 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 through TFTP*SFTP
- 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
- Storm Suppression
 - Broadcast, Multicast, Unknown Unicast or Known Unicast packets

L3

- VRF without multicast protocols
- ARP, Ping, Trace route
- VRRP
- Static Route
- RIP v1/v2
- OSPF v2
- Routing interfaces: 14,000~19,000
- Routing among Physical Ethernet ports, VLAN virtual port (VLAN routing), and PW ports.
- 32 Sub interfaces
- IGMP v2/v3
- PIM-SM
- NTP server/client



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 quide on the bottom.	Please order CPU, power, connector, fan and tributary cards separately
Connector Board		1
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 and CXR-HX9800R-PTN-CHB-FL-G
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: - 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. Please specify the mgmt option listed in the table below
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: 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. Please specify the mgmt option listed in the table below
Port Activation License		
CXR-HX9800R-PTN-CC2-100G-LIC	100G/40G port activation license on single HX9800R-PTN controller.	 Used with HX9800R-PTN-CC2-G and HX9800R-PTN-CC2-LITE-G controller. For CC2 controller, one license will activate all 100GE/40GE ports on single controller. For systems with CC2 controller redundancy, each CC2 requires its own license activation respectively. Please also purchase one CXR-ACC-CAB-QSFP100G-100- QSFP100G-AOC-G cable for redundancy facilitation
CXR-HX9800R-PTN -CC2-10G- LIC	License to activate ONE 10GE Port on single HX9800R-PTN CC2 controller.	 Used with HX9800R-PTN -CC2-LITE-G controller. One license will activate ONE additional 10GE port on single CC2 controller. For systems with CC2 redundancy, each CC2



		requires its own 10G port license activation respectively.
HX9800R-PTN -CC2-1G-LIC	License to activate ONE 1GE Port on single HX9800-CC2 controller.	 Used with one HX9800R-PTN -CC2-LITE-G controller.
		 One license will activate ONE additional 1GE port on single controller. For systems with CC2 redundancy, each CC2 requires its own 1GE port license activation respectively.
HX9800R-PTN -CC2-LCTLIC	Feature Activation License for LCT Graphical Configuration Software to support HX9800R-PTN -CC2- G and HX9800R-PTN -CC2-LITE- G controller card	 CXR-LCT Software is purchased separately.

• The code **mgmt** must be replaced by the following options. Please replace **mgmt** with your selection.

mgmt=	Description	Notes
LCT	LCT activation license included	Used with CXR-LCT Graphical Configuration Software for management
[blank]	Management via LCT disabled	If LCT is required in the future, it can still be activated via a feature activation license.

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-TE1-32CEM-G	32-port E1(120 ohm) or 32-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-TE1-16CEM-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 -TE1-32ToS- G*	32-port E1(120 ohm) or 32-port T1 software programmable plug-in module with SCSI interfaces. Used for T1/E1 TDM over SONET/SDH.	Please order separately for conversion panels and cables listed in below tables. This card is to be used together with CXR-HX9800R-PTNXCU* card.
CXR-HX9800R-PTN -TE1-16ToS- G*	16-port E1(120 ohm) or 16-port T1 software programmable plug-in module with SCSI interfaces. Used for T1/E1 TDM over SONET/SDH.	Please order separately for conversion panels and cables listed in below tables. This card is to be used together with CXR-HX9800R-PTN-XCU* card.
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 -GFEO-1XG-G*	1 x 10G Ethernet SFP Optical Interface card supporting one port of SFP+ up to 10GE	Please order SFP optical modules separately. See separate SFP module brochure
CXR-HX9800R-PTN -GFEO-10S-G*	10 x 1G Ethernet Optical Interface card supporting ten ports of SFP with up to 1GE	Please order SFP optical modules separately. See separate SFP module brochure
CXR-HX9800R-PTN -XGEO- G*	9 x 10G Ethernet Port SFP Optical Interface	 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-Q SFP100G-AOC- G .
CXR-HX9800R-PTN -GFE-8T- G*	8 x 1000/100/10Mbps Ethernet Twist-Pair RJ45 if working in CC2/CHA 10GE slot.	
	8 x 100/10Mbps FE Twist-Pair RJ45 if working in CC2/CHA 1GE slot.	
CXR-HX9800R-PTN -GFE-8POE1- G*	8 x 1000/100/10Mbps Ethernet Twist-Pair w/	With a total power limit of: - 150W (Per Card)
	slot and powered from the backplane.	
	8 x 100/10Mbps FE Twist-Pair w/ POE+ RJ45 if working in CC2/CHA 1GE slot and powered from the backplane.	
CXR-HX9800R-PTN	8 x 1000/100/10Mbps Ethernet Twist-Pair	With a total power limit of:
-GFE-8POE2-G*	W/	- 360W (Per Card)
	10GE slot and powered externally from front panel.	- 30W (Per Pon)
	8 x 100/10Mbps FE Twist-Pair w/ POE+	
	RJ45 if working in CC2/CHA 1GE slot and powered externally from front panel.	
CXR-HX9800R-PTN	8 x 1000/100/10Mbps Ethernet Twist-Pair	With a total power limit of:
-GFE-4POEP1- G *	W/	- 150W (Per Card)
	2/4/6/8) if working in CC2/CHA 10GE slot	
	and powered from the backplane.	
	8 x 100/10Mbps FE Twist-Pair RJ45 if	
	working in CC2/CHA 1GE slot and powered	
	from the backplane.	With a total power limit of:
-GFE-4POEP2- G *	w/	- 360W (Per Card)
	POE/POE+/POE++ RJ45 on 4 ports (Ports	- 90W (Per Port)
	and powered externally from front panel.	
	8 x 100/10Mbps FE Twist-Pair RJ45 if	
	working in CC2/CHA 1GE slot and powered externally from front panel.	
CXR-HX9800R-PTN -B2G5-1CEM-L- G *	Circuit Emulation for 1 x STM-16 or 4 x	Please order SFP optical modules separately. See separate SFP
	STM-4/-1 Channelized Line Interface card	module brochure
	If working in CC2/CHA 10GE slots, it	- Applicable to 10GE slots only
	supports One STM-16 or Four STM-4/1	
	interfaces without SFP (mini-GBIC) optical	
	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.	
	Circuit Emulation for Channelized 1 x	- Please order SFP optical modules
-B2G5-10EM-X-G	STM-16/1 x OC-48 from XCU card	module brochure
	The STM-n can be software configure as	- Applicable to 10GE slots only
	OC-3n for SONET application.	with CXR-HX9800R-PTN-XCU*



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	 Please order SFP optical modules separately. See separate SFP module brochure Applicable to 10GE slots only
	OC-3n for SONET application.	
CXR-HX9800R-PTN-B2G5-2CEM-X- G*	Circuit Emulation for Channelized 2 x STM-16/2 x OC-48 from XCU card The STM-n can be software configured as	 Applicable to 10GE slots only This card is to be used together with CXR-HX9800R-PTN-XCU* card
	OC-3n for SONET application.	
CXR-HX9800R-PTN-B2G5-1SL-X-G*	1 x STM-16 or 4 x STM-4/-1 SDH Line Interface card for XCU	 Please order SFP optical modules separately. See separate SFP module brochure
	One STM-16 or Four STM-4/1 interfaces without SFP (mini-GBIC) optical modules.	 This card is to be used together with CXR-HX9800R-PTN -XCU* card
CXR-HX9800R-PTN-B2G5-2SL-X-G*	2 x STM-16 or 8 x STM-4/-1 SDH/SONET Line Interface card for XCU.	Please order SFP optical modules separately. See separate SFP module brochure
	without SFP (mini-GBIC) optical modules.	 This card is to be used together with CXR-HX9800R-PTN -XCU* card
CXR-HX9800R-PTN-B2G5-1EoSoCE	Ethernet over SDH/SONET with 1 x STM-16/1 x OC-48 worth traffic over CEM.	 Facility card working in conjunction with B2G5-1CEM-L* or B2G5-2CEM-L* card
M-O		 Applicable to 10GE slots only
	Operating temperature: -20 °C to 60 °C.	
	Ethernet Over SDH/SONET with 1 x	- This card is to be used together
CXR-HX9800R-PTN-B2G5-1EoS-X-	STM-16/2 x OC-48 from XCU card.	with CXR-HX9800R-PTN -XCU* card
6	Operating temperature: -20 °C to 60 °C.	 Applicable to 10GE slots only
	ine SIM-n can be software configured as	
	OC-3n for SONET application.	
CXR-HX9800R-PTN-B2G5-2EoS-X-	Ethernet Over SDH/SONET with 2 x STM-16/2 x OC-48 from XCU card	 This card is to be used together with CXR-HX9800R-PTN -XCU* card
G	Operating temperature: -20 °C to 60 °C.	- Applicable to 10GE slots only
	The STM-n can be software configured as OC-3n for SONET application.	
CXR-HX9800R-PTN-B10G-1SL-X-G*	x STM-4/-1 Line Interface working with XCU card.	 Please order SFP optical modules separately. See separate SFP module brochure This card can only be used in Slot 9
	One STM-64 or Two STM-16 or Eight STM-4/1 interfaces without SFP (mini-GBIC) optical modules.	and Slot 10. - This card is to be used together with CXR-HX9800R-PTN -XCU* card
CXR-HX9800R-PTN -XCU- G*	SDH/SONET cross-connect card on a TDM-dedicated bus.	- Use two cards for redundancy exclusively in Slot 7 and Slot 8.
	Supports 816 VC3 x 816 VC3 and 4032 VC12 x 4032 VC12 external interface, 1 x STM-64 or 2 x STM-16 or 8 x STM-4/1.	

Networks

* 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-02-sn-pt a-typ-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
CXR-HX9800R-PTN-12FXSA-02-P -sn - pta-typ-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.	below for detail information pta = power type. For pta option, please refer to the table
CXR-HX9800R-PTN-12FXSA-02-M- sn- pta-typ-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 ±48Vdc powered main units.
CXR-HX9800R-PTN-12FXSA-02-MPP- sn-pta-typ-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-02-GS- sn-pta-typ-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
CXR-HX9800R-PTN-12FXSA-02-GM- s n-pta-typ-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.	<pre>pta= power type. For sn, pt, and typ options, please refer to the table below for detail information.</pre>
CXR-HX9800R-PTN-12FXSA-02-GMP- sn-pta-typ-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 ±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	6-port universal data interface card that supports three software configurable modes:	No conversion cable is included. Please order conversion cable separately from
	Port 1 to 4: two DB44 connectors	below table.
	Port 5 to 6: two RJ48 connectors	Six conversion cable types are available: - CXR-ACC-CAB-DB44M-100-2DB25F-
	Mode 1:	VB - CXR-ACC-CAB-DB44M-100-2DB15F-
	Port 1 to 4: RS232/RS422/X.21, Async/Sync 64kbps and subrate with V.110 encoding	VB - CXR-ACC-CAB-DB44M-100-1DB15F- 1DB25F-VB
	Port 5 to 6: RS232 for ASYNC only	- CXR-ACC-CAB-DB44M-100-2M34F-V B
	Mode 2:	- CXR-ACC-CAB-DB44M-100-2DB37F- VB
	Port 1 to 4: X.21/RS422 SYNC N*64k (N=1~32)	- CXR-ACC-CAB-DB44M-100-1DB37F- 1M34F-VB
	Port 5 to 6: Disabled	
	Mode 3:	
	Port 1 to 3: X.21/RS422 SYNC N*64k, (N=1~32).	
	Port 4: X.21/RS422 SYNC, N*64k, (N=1~20).	
	Port 5 to 6: RS232 N*64k (N=1~6) oversampling for ASYNC data.	
	Mode 4:	
	Port 1 to 4: RS232/RS422/X.21/V.35/V.36/EIA530 SYNC 38.4K and subrate	
	Port 5 to 6: Disabled	
	Mode 5:	
	Port 1 to 4: X.21/RS449/RS422/RS232/V.35/V.36/EIA5 30 SYNC N*64k (N=1~32) Port 5 to 6: Disabled	
CXR-HX9800R-PTN-8UDTEA- opm-G	8-port universal data interface card that supports RS232/RS422/RS485 full-duplex DCE interface which is software configurable Available option mode: Terminal Server, Omnibus, and Clock Pass Through	For opm option, please refer to the table below for detail information.
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- 1DB09E-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-DB- 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-LSFOM-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-pt-typ-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 typ options, please refer to the table below for detail information
CXR-HX9800R-PTN-ODP- typ*	8-channel OCU-DP plug-in module. Used with 8 RJ48S connectors.	Only non-RoHS compliant model available Limited Quantity
CXR-HX9800R-PTN-1FOMA- opt-G*	1FOMA Fiber Optical Interface with 1x9 optical port	For opt option, please refer to the table below for detail information.
CXR-HX9800R-PTN-12MAGA- typ-G*	12-channel Magneto plug-in module with ring across L1&GND and L1&L2. Software programmable. Used with 12 RJ11 connectors	For typ option, please refer to the table below for detail information
CXR-HX9800R-PTN-8SRU-DB-G	8-port SRU plug-in card with DS0B-5 subrate multiplexing scheme and DS0A encoding, with 2 RJ48 connectors and 2 DB44 connectors for Async and Sync ports	To use with this card (DB version), it is recommended to purchase two conversion cables (CXR-ACC-CAB-DB44M-100-2DB25F-1DB 09F-DB- G x 2)
CXR-HX9800R-PTN-8SRU-RJ- G	8-port SRU plug-in card with DS0B-5 subrate multiplexing scheme and DS0A encoding, with 8 RJ48 connectors for Async ports	

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 E1plug-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- 300-8BNCM)	
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-S3RS232a-G*	3-channel RS232 async/Sync, DCE/DTE	To use with 3RS232a interface card, it is	



	plug-in card	recommended to purchase a conversion cable (CXR-ACC-CAB-DB44M-150-2DB25F-DB9 F-DCE-G, or CXR-ACC-CAB-DB44M-150-2DB25F-DB9 F-DTE-G)
CXR-HX9800R-PTN-S10DP	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	Start (GS). Metering Pulse Transmit 12/16
CXR-HX9800R-PTN-SQFXSA-M- x-pt-	Quad FXSA with MP 16 KHz voice plug-in card	KHz (MP).
G		For x & pt option, please refer to the table
CXR-HX9800R-PTN-SQFXSA-M12- x-p	Quad FXSA with MP 12 KHz voice plug-in card used	Work with controller firmware v8.38.01 and
CXR-HX9800R-PTN-SQFXSA-GS- x-pt -	Quad FXSA with GS plug-in card	bits.
CXR-HX9800R-PTN-SQFXSA-GM- x-pt	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.			
CXR-HX9800R-SD-G*	Single -48 Vdc (-48 to -75 Vdc), 1000W, 21A power module	Pls order two for redundancy protection.			
Power Cord					
CXR-ACC-PC-USA-G	AC power cord for Taiwan/America	U.			
CXR-ACC-PC-EU-G	AC power cord for Europe	•			
CXR-ACC-PC-UK-G	AC power cord for UK	50 M			
CXR-ACC-PC-AUS-G	AC power cord for Australia	·			
CXR-ACC-PC-CH-G	AC power cord for China	<u> </u>			
Power Adaptor and Converte	r	•			
CXR-ACC-ACx-DC55-500W-G	500 Watts, AC (85 ~ 264Vac) to DC (+55Vdc, 10A) adaptor Working temperature: -30 to 70°C	Where x is used for selecting AC power plug type			
CXR-ACC-AC x -DC55-1000W- G*	1000 Watts, AC (85 ~ 264Vac) to DC (+55Vdc, 10A) adaptor Working temperature: -20 to 60°C	Where x is used for selecting AC power plug type			
CXR-ACC-DC130-DC55-500W -G	500Watt, DC (67.2~154Vdc) to DC (55Vdc, 10A) power converter Working temperature: -40 to +80°C	 Pls order two for redundancy protection. Pls order with CXR-ACC-PWRHOLDER-G 			
CXR-ACC-DC130-DC55-1000 W- G	1000Watt, DC (72~144Vdc) to DC (55Vdc, 20A) power converter Working temperature: -20 to +60°C	 Pls order two for redundancy protection. Pls order with CXR-ACC-PWRHOLDER-G 			
CXR-ACC-PWRHOLDER- G*	External Power Holder Frame holding up to 2 x External Power Adaptors/Converters	Please order one per chassis			
Conversion Panels					
CXR-ACC-P-1SCSI-16RJ- G	1u panel for one SCSI to 16 RJ connectors without cable	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-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			
Conversion Cable		CAR-HA9600R-P1N-TE1-32CEW-G			
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-HX9 version of the manual is already included as standa	800R-PTN-CHA controller. A CD rd package.			
SFP Optical Modules					
Please place your order using t Note : Non-CXR SFP modules a SFP modules.	he 5-digit alphanumeric codes listed in the separate are not guaranteed to work with our equipment. It is s	SFP Optical Module Brochure. trongly recommended to buy CXR-logo			
CXR-ACC-CAB-QSFP40G-10 0-QSFP40G-AOC-G CXR-ACC-CAB-QSEP100G-1	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 100G QSFP28 AOC (Active Optical Cable) using				



00-QSFP100G-AOC- G	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	

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	16-port 1u panel for one SCSI to 16 RJ connectors without cable 432x44x23mm (WxHxD)	Order One for CXR-HX9800R-PTN-TE1-16CEM-G Order Two for CXR-HX9800R-PTN-TE1-32CEM-G Please order Conversion Cable separately for connection between card and Conversion Panel.			
CXR-ACC-P-1SCSI-16WW-G	16-port 1u panel for one SCSI to 16 Wire Wrap connectors without cable 432x44x40mm (WxHxD)				
CXR-ACC-P-1SCSI-16BNC-G	16-port 1.5u panel for one SCSI to BNC connectors without cable 432x66x53mm (WxHxD)				
Conversion Cable					
CXR-ACC-CAB-SCSI68M-200-	SCSI68/ Male to one SCSI68/Male; Length 200 cm cable for connection between card and Conversion Panel.	Used for all Conversion Panels			
1SCSI68M					
CXR-ACC-CAB-DB44M-150-2 DB25F-DB9F-DCE-G	DSUB-44 pin/Male to two DSUB-25 pin/Female and one DSUB-9 pin/Female (8P8C) plug. Length:150cm	Used with CXR-HX9800R-PTN-S3RS232a- G plug-in card for DCE mode			
CXR-ACC-CAB-DB44M-150-2 DB25F-DB9F-DTE- G	DSUB-44 pin/Male to two DSUB-25 pin/Female and one DSUB-9 pin/Female (8P8C) plug. Length:150cm	Used with CXR-HX9800R-PTN-S3RS232a -G plug-in card for DTE mode			
CXR-ACC-CAB-DB44M-100- 2DB25F-VB	DSUB-44 pin/Male to two DSUB-25 pin/Female plug, Length:100cm	Used in V.35, V.36 and RS232 interfaces.			
CXR-ACC-CAB-DB44M-100- 2DB15F-VB	DSUB-44 pin/Male to two DSUB-15 pin/Female plug, Length:100cm	Used in X.21 interface.			
CXR-ACC-CAB-DB44M-100- 1DB15F-1DB25F-VB	DSUB-44 pin/Male to one DSUB-15 pin/Female plug + one DSUB-25 pin/Female plug, Length:100cm	Used in RS232, V.35 and X.21 interfaces.			
CXR-ACC-CAB-DB44M-100- 2M34F-VB	DSUB-44 pin/Male to two M34 pin/Female plug, Length:100cm	Used in V.35 interface.			
CXR-ACC-CAB-DB44M-100- 2DB37F-VB	DSUB-44 pin/Male to two DSUB-37 pin/Female plug, Length:100cm	Used in EIA530/RS449 and RS422 interfaces.			
CXR-ACC-CAB-DB44M-100-1 DB37F-1M34F-VB	DSUB-44 pin/Male to one DSUB-37 pin/Female plug + one M34 pin/Female plug, Length:100cm	Used in V.35, EIA530/RS449 and RS422 interfaces.			
CXR-ACC-CAB-DB44M-100-2 DB25F-1DB09F-DB- G	DSUB-44 pin/Male to two DSUB-25 pin/Female- one DSBU-9 pin/Female (8P8C) plug, Length:100cm	Use with CXR-QX3440-8SRU-DB- G plug-in card.			



For 4E1 card

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 L 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
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	

For 12FXOA card

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

typ=	Description	Note
RJ	12 x RJ11	

For 12MAGA card*

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

typ=	Description	Note
RJ	12 x RJ11	

For 8UDTEA card

Where opm is used to select 8U	DTEA functions					
opm	Description					
DCE	Support RS232/RS422/RS485 DCE interface which is software configurable					
TS	Support Terminal Server Function and DCE					
OMNI	Support Omnibus Function and DCE					
CPT	Support Clock Pass Through function and DCE					
TSOMNI	Support Terminal Server, Omnibus Function and DCE					
HD	Support RS232/RS422/RS485 DCE interface with Full- and Half-Duplex modes					
TSHD	Support Terminal Server Function and DCE with Full- and Half-Duplex modes					
OMNIHD	Support Omnibus Function and DCE with Full- and Half-Duplex modes					
TSOMNIHD	Support Terminal Server, Omnibus Function and DCE with Full- and Half-Duple;					
	modes					
Feature Activation License	Description					
HX9800-8UDTEA-TSLIC	Feature Activation License for CXR-HX9800R-PTN-8UDTEA card to support Terminal Server function					
HX9800-8UDTEA-OMNILIC	Feature Activation License for CXR-HX9800R-PTN-8UDTEA card to support Omnibus function					
HX9800-8UDTEA-CPTLIC	Feature Activation License for CXR-HX9800R-PTN-8UDTEA card to support Clock Pass Through function					
HX9800-8UDTEA-TSOMNILIC	Feature Activation License for CXR-HX9800R-PTN-8UDTEA card to support Terminal Server function and Omnibus function					
HX9800-8UDTEA-HDLIC	Feature Activation License for CXR-HX9800R-PTN-8UDTEA card to support Full- and Half-Duplex modes					



HX9800-8UDTEA-TSHDLIC	Feature Activation License for CXR-HX9800R-PTN-8UDTEA card to support Terminal Server function with Full- and Half-Duplex modes
HX9800-8UDTEA-OMNIHDLIC	Feature Activation License for CXR-HX9800R-PTN-8UDTEA card to support Omnibus function with Full- and Half-Duplex modes
HX9800-8UDTEA-TSOMNIHDLIC	Feature Activation License for CXR-HX9800R-PTN-8UDTEA card to support Terminal Server and Omnibus function with Full- and Half-Duplex modes

For 4C37.94 card:

Where **LSFOM** is to select **LS-F**iber **O**ptical **M**odule option, each module has 5 letters.

LSFOM	Description										
Code	Mode		Data Rate		Wa	Wave Length		Distance 0		onnector	Note
	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	
ZRATT	Z	1 x 8 Multi-mode	R	2 M	A	820nm	т	2km	т	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 – <i>L1.1</i>	 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 – <i>L1.2</i>	 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 – <i>S1.1/S1.2</i>	 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 - <i>S1.1/S1.2</i>	 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
В	B (carrier side) connects to A side.	
Α	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.	



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.	

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



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.

	E	Follows ETSI signaling bits	
QEMA	Α	Follows ANSI signaling bits	
	S	Follows customer's special bits assignment	
	Α	Follows ANSI signaling bits	
	S	Follows customer's special bits assignment	
	E	Follows ETSI signaling bits	
QFXOA	Т	Trunk condition OFF-HOOK	
	AT	Follows ANSI signaling bits w/ trunk condition OFF-HOOK	
	ST	Follows customer's special bits assignment w/ trunk condition OFF-HOOK	
QFXSA	Α	Follows ANSI signaling bits	
	Е	Follows ETSI signaling bits	
	S	Follows customer's special bits assignment	
Note 1: For S (cu	ıstomer's s	pecial 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
24	For HX9800R-PTN with CHA chassis using SDA power module
	with ±24Vdc input power
	For HX9800R-PTN with CHA chassis using SDA power module
PWR	with ±48Vdc input power

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

Where **LSFOM** is to select **LS-F**iber **O**ptical **M**odule option, each module has 5 letters.

LSFOM		Description									
		Mode	D	ata Rate	Wa	ve Length		Distance	C	onnector	Notes
Code	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	
ZRATT	Z	1 * 8 Multi-mode	R	2 M	A	820nm	т	2km	т	ST connector	1 * 8 Separate transceiver & receiver
QRATT	Q	1 * 9 Multi-mode	R	2 M	A	850nm	т	2km	Т	ST connector	
*NFB3T	N	1 x 9 Single mode	F	125 M	В	1310nm	3	30km	т	ST connector	1 * 0
*QFBTT	Q	1 x 9 Multi-mode	F	125 M	В	1310nm	т	2km	Т	ST connector	1 9
*NHC2S	N	1 x 9 Single mode	Н	155 M	С	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
Α	Follows ANSI signaling bits	configurable.
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 ±24Vdc input power	
PWR	For HX9800R-PTN with CHA chassis using SDA power module with $\pm 48 \text{Vdc}$ input power	
PWRIE1613	For HX9800R-PTN with CHA chassis using SDA power module with \pm 48Vdc 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
Iviaiii	um.

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	

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		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	-20 to 60°C
	Storage	-30 to 70°C
Weight	Net Weight	6kg (13.2lbs)
-	Max. Weight	18kg (39.7 lbs)
Humidity		0-90%RH (non-condensing)
Mounting		Desk-top stackable, 19/23 inch rack mountable

Power Consumption

Module Type	Module	Power Consumption per Card (Watt)
	CC2 (light loading	40
Controller	CC2 (full loading)	70
Connecter Board	Connector (CBA)	1
Likele en e e d	GFEO*	29
Hign-speed	B2G5-2CEM*	40
Flug-III Modules	TE1-32CEM*	6
	6CDA	2
	4E120*	3
	8EMA*	8
	12FXOA	5
	12FXSA	27
	12MAGA*	8
	6UDTEA	2
	8UDTEA	4
Low-Speed Plug-ir	16RS232*	1
Modules	8RS232*	3
	8DCC*	4
	8DCB*	4
	LSFOM/4C37.94	3
	RTB*	7
	ODP*	4
	1FOMA*	2
	QT1*	3
	QE1	3
	1-channel T1 interface card*	2
	1-channel of E1plug-in card w/ 75 ohm*	2
	1-channel of E1 plug-in card w/ 120 ohm*	2
	Mini Quad T1 plug-in card*	2
	Mini Quad E1 plug-in card with 75 ohm*	2
	Mini Quad E1 plug-in card with 120 ohm*	2
	Fiber Optical plug-in card*	2
Mini Plug-in	1-channel V.35 plug-in card*	1
Modules	1-channel X.21 plug-in card*	2
	1-channel RS232 plug-in card*	1
	3-channel RS232 async/Sync, DCE/DTE plug-in card*	7
	1 port OCU DP Interface card*	2
	QEMA*	2
	QFXSA*	1
	QFXO*	1
	QMAGA*	6



Module Type	Module	Power Consumption per Card (Watt)
	Echo Canceller Card*	2
	Analog Bridge Card*	2
	1- channel C37.94 plug-in mini card	2
Fan	FANA	3

Standard Compliance

RFC (IETF)	<u>onanoo</u>	RFC (IETF)	
826	Address Resolution Protocol (ARP)	4842	, Considerations for a Transport Profile
854	MIL STD 1782 Telnet Protocol Specification	5085	Pseudowire Virtual Circuit Connectivity
1042	Standard for the Transmission of IP		Verification (VCCV)
1012	Datagrams over IEEE 802 Networks	5086	CESOPSN
1112	IGMP V/1	5254	Requirements for Multi-Segment PWF3
1305	Network Time Protocol (NITP) Version 3	5217	Multiprotocol Label Switching (MPLS)
1303	Internet Group Management Protocol	5517	MPLS Conorio Accociated Channel
2230	Version 2	E460	MDLS Lobal Stack Entry
0070	VEISION Z	5402	MPLS Caparia Associated Chappel
2273	OODE Version 2	5560	NIFLS Generic Associated Channel
2328	OSPF Version 2	5601	Pseudowire (PW) Management Information
2453	RIP Version 2	5000	
25/1	An Architecture for Describing SiniviP	5602	
0570	Management Frameworks	5603	
2572	Message Processing and Dispatching for the	5654	Requirements OAM for MPLS-TP
	Simple Network Management Protocol	5659	An Architecture for Multi-Segment PWE3
	(SNMP)	5710	Path Error Message Triggered MPLS and
2573	SNMP Applications		GMPLS LSP Reroutes
2737	Entity MIB (Management Information Base)	5718	An In-band Data Communication Network for
	(Version 2)		MPLS-TP
2865	Remote Authentication Dial-In User Service	5798	Virtual Router Redundancy Protocol VRRP
	(RADIUS)		Version 3 for IPv4 & IPv6
3031	Multiprotocol Label Switching Architecture	5860	Requirements for OAM in MPLS-TP
3032	MPLS Label Stack Encoding	5880	Bidirectional Forwarding Detection (BFD)
3270	MPLS Support of differentiated Services	5882	Generic Application of Bidirectional
3376	Internet Group Management Protocol,		Forwarding Detection
	Version 3	5884	BFD for MPLS Label Switched Paths
3410	Introduction and Applicability Statements for	5885	BFD for the Pseudowire VCCV
	Internet Standard Management Framework	5920	Security Framework for MPLS and GMPLS
3411	An Architecture for Describing SNMP		Networks
	Management Frameworks	5921	A Framework of MPLS in Transport Network
3412	Message Processing and Dispatching	5950	MPLS-TP Network Management Framework
3413	SNMP Applications	5951	Network Management Requirements for
3414	User-based Security Model		MPLS-TP
3415	View-based Access Control Model	5960	MPLS-TP Data Plane Architecture
3417	Transport Mappings for the SNMP	6215	MPLS-TP User-to-Network and
3418	Management Information Base (MIB) for the	02.0	Network-to-Network Interfaces
0110	Simple Network Management Protocol	6291	Guidelines for the Use of the "OAM"
	(SNMP)	0201	Acronym in the IETE
3569	PIM-SSM PIM Source Specific Multicast	6370	MPLS Transport Profile(MPLS-TP) Identifier
3768	Virtual Router Redundancy Protocol	6371	OAM Framework for MPI S-Based Transport
5700		0071	Networks
3811	Definitions of Textual Conventions (TCs) for	6372	MPI S-TP Survivability Framework
3011	MDI S Management	6272	MPLS TP Control Plano Framowork
2012	MDLS Troffic Engineering (TE) Management	6274	Resket Loss and Delay Massurement for
3012	Information Boose (MID)	03/4	MDL S Networks
2042	MDLC Label Cwitching Deuter (LCD)	0075	MPLS Networks
3813	Menagement Information Dasa (MID)	6375	A Packet Loss and Delay Measurement
	Management Information Base (MIB)	0070	Profile for MPLS-Based Transport Networks
3826	The Advanced Encryption Standard (AES)	6378	MPLS-TP Linear Protection
	Cipher Algorithm in the SNMP User-based	6426	On demand connectivity verification
	Security Model	6427	MPLS Fault Management OAM
3985	Pseudo Wire Emulation Edge-to-Edge	6428	Proactive connectivity verification
	Architecture	6478	Pseudowire Status for Static Pseudowire
4115	A Differentiated Service Two-Rate,	6639	MPLS-TP MIB-Based Management
	Three-Color Marker with Efficient Handling of		Overview
	in-Profile Traffic	6669	Overview of the OAM toolset for MPLS-



4270	Detecting Multi Protocol Lobol Switched		Pagad Transport Natworks
4379	(MPLS) Data Plane Failures	6941	MPLS Transport Profile (MPLS-TP) Security
4385	Pseudowire Emulation Edge to Edge (PWE3)	7010	Framework
4440	Ethernet over MPLS Use over an MPLS PSN	1213	Next-Hop Ethernet Addressing
4553	SATOP (Structured Agnostic TDM over	7276	An Overview of OAM
4664	Packet Switched Networks) Networks	7331	Bidirectional Forwarding Detection (BFD)
4665	Service Requirements for Layer 2		
	Provider-Provisioned Virtual Private		
ITILT	Networks (QoS)	IEEE	
G.8031	ELPS	802.1d	STP
G.8032	ERPS	802.1p	Traffic Prioritization
G.8101	Terms and Definitions for MPLS Transport	802.1 w	RSTP
	Profile	802.1s	MSTP
G.811	Timing characteristics of primary reference	802.1q	VLAN
0.0110	Clocks	802.1ab	Local and metropolitan area networks -
G.8110	MPLS layer network architecture		Station and Media Access Control
G.8112	Interfaces for the MPI S-TP Transport Profile	802 1ad	VI AN Tag Stacking (Q-in-Q)
0.0112	laver Network	802.1ad	Ethernet OAM (CFM)
G.8113.2	MPLS-TP OAM	802.3	Carrier Sense Multiple Access with Collision
G.8121	Characteristics of MPLS-TP Network		Detection
	Equipment Functional Blocks	802.3ab	Gigabit Ethernet over copper
G.8121.2	Characteristics of MPLS-TP equipment	802.3ad	Link Aggregation Control Protocol
	TUNCTIONAL DIOCKS SUPPORTING ITU-T	802.3ae	10 Gigabit Ethernet Ethernet in the Eirst Mile (EEM)
G 8131	MPLS-TP Linear Protection	802.3an	Type 100BASE-T MAC parameters Physical
G.8151	Management aspects of the MPLS-TP	002.00	Laver, MAUs, and Repeater for 100 Mb/s
	network element		Operation
G.8271	Time and phase synchronization aspects of	802.3x	Flow Control
G 8262	packet networks	802.3z	Gigabit Ethernet Standard over fiber
0.0202	Ethernet equipment slave clock	1588 v2	Precision Time Protocol (PTP)
	Timing and synchronization aspects in	1613	Environmental and Testing Requirements for
	packet networks		communication Networking Devices installed
G.8261	Ethernet OAM		in electric power substations
Y.1731	Operations, administration and maintenance		
	(OAM) functions and mechanisms for		
	Ethernet-based networks	Safaty	
ENC/ENII ECC15 Class	Δ	ENECCES 1	
EN 55032 Cla	ss A/EN 55035	LIN02300-1	
EN 50121-4			
IEC 61850-3		MEE	
ANSI C63.4a-	2017	М ⊏Г 8	
ETSIES 2014	68	9	
IEC 60068-2-1	3	14	
IEC 60068-2-5	52	MEF Carr	ier Ethernet (CE) 2.0 compliant for EPL
IEC 60068-2-6	54	(Ethernet F	Private Line), EVPL (Ethernet Virtual Private
IEC 61000-4-3	3	Line), EP-	LAN (Ethernet Private LAN), EVP-LAN
IEC 61000-4-4	ł	(Etnernet V	VITUAI PRIVATE LAN), EP-Tree (Ethernet Private
IEC 61000-4-6	5	nee) and I	_vi -iiee (Luieiiiel viiluai Fiivale 11ee)
IEEEC37.90.2			
		Environme	ental Protection Standards
Surge		2011/65/El	J & (EU)2015/863
IEEEC37.90.1		2012/19/El	J (WEEE)

Computer Security FIPS 140-3



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 (10G	E) Interface
SFP Ports	5 x 10GE
	Auto laser shutdown (ALS)
Speed	10Gbps/1Gbps
Direction	Duplex(half/full), auto-negotiation
Gigabit Ethernet (GE) Int	terface
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
thornot Eurotion	

Ethernet Function

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

GFE (-POE1, -POE2, -4POEP and -8T) Card

Plug-in module with 8 x 10/100/1000 or 8 x 10/100 Ethernet Twist-Pair RJ45 ports.

LAN Gigabit Ethernet (GbE) Interface

Pons	6 X KJ45
Speed	8 x 1000/100/10Mbps Ethernet Twist-Pair w/ POE+ (in 10GE slots)
	8 x 1000/100/10Mbps Ethernet Twist-Pair w/o POE+ (in 10GE slots)
	8 x 100/10Mbps Twist-Pair w/ POE+ (in 1GE slots)
	8 x 100/10Mbps Twist-Pair w/o POE+ (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 Ports9 x 10GE SFP ports
Auto laser shutdown (ALS)Speed10GbpsDirectionduplex(half/full), auto-negotiationWAN Transmission

Networks

QSFP28 Ports	2 x 100GE
	Auto laser shutdown (ALS)
Speed	100Gbps
Direction	duplex(half/full), auto-negotiation
Ethernet Function	

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 transm	it & receive	
	FXOA: -21 to +10 dB / 0.1dB step trans	mit & 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	±0.5dB	// ->	
12FXOA	Ringing REN	0.5B (AC)	
	Detectable Ringing	25 Vrms	
	loop Resistance	≤ 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=25m	A), 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 All in-band signaling tone	Programable bit as 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.

Magneto Voice Card (12MAGA)*

Connector	Twelve RJ11
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	-21 to +7 dB / 0.1dB step transmit gain (D-A)
	-21 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 dBm0p
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 carnk: more than 250 ms Invalid crank: less than 160 ms
Ringing Generation	Voltage: 76 Vrms (sine wave) Frequency: 25Hz
Ring duration	Software configurable options: 1. PLAR OFF (Continuous Mode)

- PLAR OFF (Continuous Mode) Ring duration depends on cranking time
- PLAR OFF (One-time) Mode 2. 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 Per-port configurable

- 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

QEMA Card

Connector Power Alarm Conditioning Encoding Impedance Gain Adjustment (Per-port



One 44-pin connector, adapter cable included for 4 RJ45 connectors. 110-220Vac, ±48Vdc CGA busy after 2.5 seconds of LOS, LOF A-law or µ-law, user selectable as a group Balanced 600Ω or 900Ω -10 to +7 dB / 0.1dB step for transmit (D/A) gain

setting) Gain Variation	-10 to +14 dB / 0.1dB step for receive (A/D) gain ± 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 c	arried transparently by the digitizing process.
Customer is responsible for in-basic switch.	and signaling compatibility between a telephone and a switch, or between a PBX and a

QFXOA Card

Quad FXO voice card (4 I	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 LC	DS, LOF	
Encoding	A-law or µ-law, user selectable to	gether for all	
AC impedance	Balanced 600 or 900 ohms (selec	table 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	t	
Frequency Response	\pm 0.5 dB from 300 to 3400 Hz, co	pincide with ITU-T G.712	
FXS loop Feed	Supports line power with 25mA (c	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	= 6930Ω + 8 μF)	
	20 Hz, other frequencies: 16.7H	Iz, 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 s	sec off optional for PLAR	
Metering Pulse	12KHz/ 16KHz		
	 Power: 10dBm 		
	 Sensitivity: -27dBm (-21dBm 	to -45dBm by Resistor selectable)	
Signaling	loop Start, GND-Start, Metering F	Pulse (12KHz, 16KHz), DTMF, Dialing Pulse, PLAR,	
	Battery Reverse (supports Line R	everse 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 F	XS per plug-in)
Connector	1, 2, 3, or 4 FXS per RJ11 connector
Power for QFXS	±48Vdc
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	\pm 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
loop Feed	±48Vdc with 25mA current limit per port
	Jumper selectable: 25mA, 30mA, 35mA
	Jumper selectable: 25mA, 30mA, 35mA



Ringing	Support 2 REN per port (1 REN = $6930\Omega + 8 \mu$ F) 16.7Hz, 20Hz, 25Hz, 50Hz (user programmable) Default 78 Vrms (sine wave) (64 Vrms by jumper setting)		
Metering Pulse Signaling	2 sec on 4 sec on 2 s		
All in-band signaling tones a Customer is responsible for switch.	are carried transparently by the digitizing process. in-band signaling compatibility between a telephone and a switch, or between a PBX and a		
QMAGA Card			
Connector Power Alarm Conditioning Encoding Impedance Longitudinal Conversion Los Gain Adjustment	RJ11 x 4 110-220 Vac or ±48 Vdc CGA busy after 2.5 seconds of LOS, LOF A-law or μ-law, user selectable per card configurable Balanced 600 or 900 ohms (for magneto telephone impedance) ss > 46dB -16 to +7 dB / 0.1dB step transmit gain (D-A) -16 to +13 dB/0.1dB step receive gain (A-D) > 25dB with 1004 Hz odBm input		
Frequency Response	+ 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G 712		
Idle Channel Noise	Max. –65 dBm0p		
Signaling Minimum Detectable Ringin Crank Detectable Across Crank Detected time Ringing Generation Ring duration	 g Voltage 16 Vrms L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND) per port software programmable Valid crank: more than 250 ms Invalid crank: less than 160 ms Voltage: 76 Vrms (sine wave) Frequency: 25Hz Software configurable options: PLAR OFF (Continuous Mode) Ring duration depends on cranking time 5. PLAR OFF (One-time) Mode Crank the phone for one time, and the ring duration of the far-end phone 		
	 6. 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 Signaling Signaling Bit A,B,C,D Signaling is carried trar Use Magneto card defa Use Magneto card PLA	L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND) Turn Magneto Phone crank (Ringing across Tip and Ring or Tip and Ground) Programmable Insparently by the digitizing process. ault setting for communications between magneto telephones NR mode setting for communications between a magneto telephone and a regular telephone		

6UDTEA Card			
Mode 1: Sub-Ra	ate mode		
<u>DTE Interface (F</u> Data Port MUX	RS232) Up to 2 Maximum 6 subra	te port / 64Kbps	
Data Rate	Asynchronous	Mux mode Independent mode	0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K 0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K
	Synchronous	Mux mode Independent mode	0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 0.6K, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 48K, 64K





Connector	R 148-ASYNC (Port5	Port6)			
Alarm	Remote Alarm	, i onoj			
,	RTS Loss				
Loopback	To-DTE				
I.	To-DS1 (To Line)				
Electrical	DCE				
Protocol	V.110				
DTE Interface (X.2	1/RS232/RS422)				
Data Port	Up to 4				
MUX	Maximum 4 subrate p	port / 64Kbps			
Data Rate		Mux mode	0.6K 1.2K 2	4K 4 8K 9 6K	19.2K
Data Hato	Asynchronous	Independent mode	0.6K. 1.2K. 2.4	4K. 4.8K. 9.6K.	19.2K. 38.4K
	Synchronous	Mux mode	0.6K, 1.2K, 2.4	4K, 4.8K, 9.6K,	19.2K,
	Synchronous	Independent mode	0.6K, 1.2K, 2.4	4K, 4.8K, 9.6K,	19.2K, 38.4K, 48K, 64K
Connector	DB44 (Port1, Port2),	DB44 (Port3, Port4)			
Alarm	Remote Alarm				
l a anh a al-	RTS Loss				
соорраск	IU-DIE To-DS1 (To Lino)				
Electrical	DCE				
Protocol	V.110				
Mode 2: N*64K M	ode				
DTE Interface (X.2	1/RS232/V.35/V.36/E	<u>IA530/RS449)</u>			
Data Port	Up to 4 (Port 1 to 4)) khao Ni - 4 to 00			
Data Rate	Synchronous N°64	KDPS, N = 1 to 32			
Connector	DB/// (Port 1 Port 1	2) DB// (Port 3 Port /	1)		
Alarm	RTS Loss	2), DD++ (1 011 0, 1 011 -	•)		
Loopback	To-DTE				
	To-DS1 (To Line)				
Electrical	DCE				
Note: When overs	ampling is enabled in	MODE2, port 5 ~ 6 will	be disabled.		
Mode 3: Hybrid M	ode				
DIE Interface (X.2	<u>1/RS232/V.35/V.36/EI</u>	<u>IA530/RS449)</u>			
Data Poli Data Rate	Synchronous N*64kh	N = 1 to 32 for port	$1 - 3 \cdot N - 1 t$	to 20 for port 1	
Data Nate	Asynchronous mode	is not supported	$1 \sim 3, N = 10$	to 20 101 port 4	
Connector	DB44 (Port 1, Port 2)). DB44 (Port 3. Port 4)			
Alarm	RTS Loss	(, ,			
Loopback	To-DTE				
	To-DS1 (To Line)				
Electrical	DCE				
DTF Interface (PS	232)				
Data Port	Up to 2 (Port 5 and	Port 6)			
MUX	Maximum 2 oversar	mpling port			
Data Rate	No Synchronous mo	ode 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	5)			
Alarm	Remote Alarm				
Loophook					
LOOPDACK	TO-DIE				
Electrical					
	202				
Mode 4: Clock Pa	ss Through				
DTE Interface (X.2	1/RS449/RS422/RS2	32/V.35/V.36/EIA530)			
Data Port	Up to 4 (Port 1 to 4)				
Data Rate	Synchronous 0.6K, 1	1.2K, 2.4K, 4.8K, 9.6K,	19.2K, 38.4K		
Connector	DR44	n			
0011100101					



Alarm	LOLC, LOCH, CRE
Loopback	To-DTE, To-DS1 (To Line)
Electrical	DCE
Note: Port 5~6 a	re disabled in Mode 4.
Mode 5: N x 64K	with Local and Remote Loopback
DTE Interface (X.	<u>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 = $1 \sim 32$
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 a	re disabled in Mode 5.

8UDTEA Interface Card

RS232/RS422/RS485 Data Interface FunctionData Port8 port Universal DTE cardASYNC Data Rate200,300, 600, 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K, 128K bps by
oversamplingData InterfaceRS232, RS485, RS422ConnectorRJ48CInterfaceDCE only

Terminal Server Function

Data Port	8 port Terminal Server
ASYNC Data Rate	600, 1200, 2400, 4800, 9600, 19.2K, 38.4K bps
Data Interface	RS232, RS485, RS422
WAN	64 WANs per card
	Bandwidth for each WAN is N x 64Kbps; N=1 to 32
IP Address	Up to 8 remote IP Address per port, when role is client
Router Function	RIP-I, RIP-II, Static Route
Stop bit	1 bit, 1.5 bit and 2 bit software configurable
Parity bit	None, Odd, Even
data bit	5, 6, 7 and 8 bit.
Role	Server, Client
Data Buffer Size	1 to 2048 Byte
Data Buffer Time out	1 to 255 ms

Omnibus Function

Data Port	Eight ports per card
Asynchronous Data Rate	600, 1200, 2400, 4800, 9600, 19.2K, 38.4K bps
Data Interface	RS232, RS485, RS422
Synchronous	Not supported
Connector	RJ45C
Data Length	5, 6, 7, 8
Parity	None, Odd, Even
Stop Bit	1, 1.5, 2
Role	Master, Slave
Data Buffer Size	1~2048 Byte
Data Buffer Timeout	1~255 ms
Application	Daisy Chain, Star, Point to Multipoint

Clock Pass Through Function

Connector

Data PortEight ports per cardSynchronous Data Rate600, 1200, 2400, 4800, 9600, 19.2K, 38.4K bpsData InterfaceRS232

Networks

Application	RJ45C Pass through RS232 clock transparently for RADAR application
Flow Control Hardware (RS232 only)	Oversampling: RTS and DTR Active and Permanent Omnibus: RTS Active and Permanent
Software	Terminal Server: Enable and Disable
Loopback loopback function	To DTE loopback To Local loopback
LED Indicator Multi LED indicators	ACT: green-power on; red-alarm exist TS: green-mode is terminal server X.50 (Omni): green-mode is omnibus Over Sampling: green-mode is over sampling

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

Data Port MUX	Up to twelve 8-port RS232 cards Maximum 5 subrate port per 64K bps							
Data Rate	Asynchror	nous Mux Inde	k mode ependent m	0.6K, 1. ode 0.6K, 1.	2K, 2.4K, 4.8 2K, 2.4K, 4.8	K, 9.6K K, 9.6K, 19.2	K, 38.4K	
	Synchrone	ous Mux Inde	<mode ependent m</mode 	0.6K, 1. ode 0.6K, 1.	2K, 2.4K, 4.8 2K, 2.4K, 4.8	K, 9.6K K, 9.6K, 19.2	K, 38.4K, 4	8K, 64K
Card Type	Port Num	ber						
	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/Syn	c Async	Async/Sync	Async/Sync	Async	Async	Async
Connector	Eight RJ4 DB44 (por	8 (port 1 to rt1,port2,poi	port 8) ⁻ t3), DB44 (port4,port5,p	ort6), RJ48 (j	port7) and RJ	J48(port8)	
Conversion Cable	A three-int two DB25	A three-into-one conversion cable adapts the DB44 connector to 3 connecters (one DB9S and wo DB25S)						
Electrical	RS232 Int	terface, DCI	Ξ					

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

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

Data Port MUX	Up to twelve 8-port RS232 cards Maximum 5 subrate port per 64K bps							
Data Rate	Asynchro	nous Mux Inde	mode pendent m	0.6K, 1. ode 0.6K, 1.	2K, 2.4K, 4.8 2K, 2.4K, 4.8	K, 9.6K K, 9.6K, 19.2	K, 38.4K	
	Synchron	ous Mux Inde	mode pendent m	0.6K, 1. .ode 0.6K, 1	2K, 2.4K, 4.8 2K, 2.4K, 4.8	K, 9.6K K, 9.6K, 19.2	K, 38.4K, 4	8K, 64K
Card Type	Port Num	ber						
	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 RJ4	8 (port 1 to p	ort 8)					
	DB44 (po	rt1.port2.port	3). DB44 (port4.port5.p	ort6). RJ48 (port7) and R.	J48(port8)	
Conversion Cable	A three-in two DB25	A three-into-one conversion cable adapts the DB44 connector to 3 connecters (one DB9S and wo DB25S)						
Electrical	RS232 Int	terface, DCE						

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



DTE Interface (RS232 with V.110 encoding, 3-port)	*
---	---

Data Port MUX	Up to 3 ports Maximum 3 subra	te port / 64Kbps					
	Aavaabraaava	Mux mode	0.	6K, 1.2K, 2.4K, 4.8	K, 7.2K**	, 9.6K, 14.4K ^{**} , 19.2K	
	Asynchronous	Independent mode	0.	6K, 1.2K, 2.4K, 4.8	K, 7.2K**,	, 9.6K, 14.4K ^{**} , 19.2K, 38.4K	
Data Rate		Mux mode		0.6K, 1.2K, 2.4K, 4.8K, 7.2K ^{**} , 9.6K, 14.4K ^{**} , 19.2K			
	Synchronous	Independent mode	0. 64	6K, 1.2K, 2.4K, 4.8 IK	K, 7.2K ^{**} ,	, 9.6K, 14.4K ^{**} , 19.2K, 38.4K, 48K,	
Connector	DB44						
	Port Number						
DB44	1	2	2			3	
	Sync/Async	S	Sync/A	sync		Async	
Alarm	Remote Alarm						
Alaini	RTS Loss						
Leenheel	To-DTE (To Line)						
соорраск	To-DS1						
Electrical	RS232 Interface,	DCE or DTE					

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

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 ($N=1\sim20$)
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.

8SRU Interface

Data Port	Up to 8 ports							
Data Rate	Asynchronous	Mux mode		0.3K, 1.2K, 2.	4K, 4.8K,	9.6K, 14.4K,	19.2K, 28.8K	, 38.4K
		Independent	mode	0.3K, 1.2K, 2.	4K, 4.8K,	9.6K, 14.4K,	19.2K, 28.8K	, 38.4K
	Synchronous	Mux mode		2.4K, 4.8K, 9.	6K, 19.2K	, 28.8K, 38.4ł	K, 48K, 64K	
		Independent	mode	2.4K, 4.8K, 9.	6K, 19.2K	, 28.8K, 38.4ł	K, 48K, 64K	
Port Number	1	2	3	4	5	6	7	8



Card	Eight RJ48	Async	Async	Async	Async	Async	Async	Async	Async
Two DB44 + Two RJ48	Two DB44 +	Async/	Async/	Async	Async/	Async/	Async	Async	Async
	Two RJ48	Sync	Sync		Sync	Sync			
Conne	ctor	DB44 (port1, port2, port3), DB44 (port4, port5, port6), RJ48 (port7), RJ48 (port8)							
		Eight RJ48 (po	ort 1 to port a	8)					
Conve	rsion Cable	A three-into-one conversion cable adapts the DB44 connector to 3 connecters (one DB9S and two DB25S)							
Electri	cal	RS232 Interfa	ce. DCE						

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
Voice Conference Mode with CAS Signalling	Any-to-any conference bridge
	Up to 16 members in one conference group
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	Master/Slave Architecture
(MJU Mode)	Downstream: 1 to many (up to 14 Slave units)
PCM encoder/decoder LED Indicator	Compatible with ITU-T G.711 A-law/Mu-law coding. 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	$2.048 \text{ Mbps} \pm 50 \text{ ppm}$
Line Code	AMI or HDB3
Input Signal	ITU G.703
Output Signal	ITU G.703

Network Line Interface - Mini 4E1*

Line Rate $2.048 \text{ Mbps} \pm 50 \text{ ppm}$ Line Code AMI or HDB3 ITU G.703 Input Signal ITU G.703 Output Signal

Network Line Interface - Mini 4T1*

D4/ESF Line Rate 1.544 Mbps \pm 32 ppm Framing Line Code DB25S AMI/B8ZS Connector 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,

Framing

Connector

Electrical

Framing

Connector

Electrical

Jitter

Jitter

ITU G.704

ITU G.823

ITU G.704

ITU G.823

DB25S

BNC/RJ48C

75 ohm Coax/120 ohm twisted pair

75 ohm Coax/120 ohm twisted pair

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* F

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	0 to 43 dB loop loss at 72K & 56K
Range	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

OCU/DP Interface Card*

Ports Line Status Indicator Network Connector Electrical network connection **Transmit Source Impedance Receive Input Impedance**



8 Ports for each card Per Port 1 dual color LED; Red for LOS, Green for SYNC RJ48S Tip/Ring and Tip1/Ring1 135 Ohms +/- 20% 135 Ohms +/- 20%

Receiver Sensitivity/ Dynamic Range	0 to 43 dB loop loss at 72K & 56K
	0 to 34 all other rates Automatic line equalization
Pulse Amplitude	+/- 1.5 V (+/- 10%) peak, all rates except 9.6k
	+/- 0.75 V (+/- 10%) peak at 9.6k
	Bipolar Return to zero, 50% duty cycle
Sealing Current	Typically 16 mA DC
Operating Modes	4-wire DDS
	Switched 56 support is optional.
Circuit Rates	SYNC: 2.4, 4.8, 9.6, 19.2, 56, 72kbps (64k) clear channel
	Conforms with AT&T Pub 41458
Encoding and decoding rules	Use bipolar violation to indicate control information: Idle, out of service.
3	Zero substitution using unframed loops
Maintenance control	DSU Non-latching loop-back code (for 2.4, 4.8, 9.6, 19.2, 56k circuit
	rate)
	DSU Latching loop-back (TIP, LSC, LBE, FEV) code (for 72k circuit
	rate)
	Machine maintenance OCU/DP card operation:
	Payload loopback
	OCU loopback
	Local loopback
	Bi-directional loopback
	V.54 remote loopback code
Fault and Performance	Custom defined remote loopback code
	BERT test supports all ones, all zeros, 2047,511,63 pattern.
	LOS, OOS, ES, SES and UAS alarm.
	Current, last 96 registry and 7 days performance storage.
Environment	Operating Temperature: -20 - 65°C
	Storage Temperature: -30 - 70°C
	Humidity: Up to 90% RH non-condensing
Specification Standard	ANSI T1.410; AT&T Pub 62319, AT&T Pub 62310, ITU-T V.54

Fiber Optical Interface (SFOM)*

Source Wavelength	MLM Laser 1310 \pm 50 nm, 1550 \pm 4	0 nm	Line Code Detector Ty	ре	Scrambled NRZ PIN-FET	
50 Km reach			Protection		Optional 1+1 APS	
NOTE: Longer of	r shorter, 15 to 120Km, on spe	cial order.				
Optical Module	Fiber Direction	Waveler	ngth (nm)		Connector	Distance (km)
NHB3S (was SAA)	Dual uni-directional	1310		SC (Su	bscriber Connector)	30
NHB5S (was SBB)	Dual uni-directional	1310	:	SC (Su	bscriber Connector)	50
NHB3F (was SCC)	Dual uni-directional	1310		FC (Fik	per Connector)	30
`*NHC2S´ (was SDD)	Dual uni-directional	1550	:	SC (Su	bscriber Connector)	20
SEE	Dual uni-directional	1550	:	SC (Su	bscriber Connector)	100
WHD2S (was SSM)	Single bi-directional (master)	1310/	1550	SC (Su	bscriber Connector)	30
WHE2S (was SSS)	Single bi-directional (slave)	1550/	1310	SC (Si	ubscriber Connector)	30

NOTE: Other fiber optical options available on special order

* For the orders of the listed optical module, please contact us.

Packet Access Interfaces

Router-A Interface* Number of Ports

Physical Interface Connector 2 LAN ports, Max. 64 WAN ports, Each WAN port has data rate n x 64K bps, $1\le n\le 32$ ($\le 4Mbps$ for total of all 64 WAN ports 10/100 BaseT x 2 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

Fiber Optical Interface (1FOMA)*

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

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

Fiber Optical Interface Characteristics						
Optical Module	Fiber Direction	Wavelength (nm)	Connector/Interface	Distance (km)	Power (dB)	
NHB3S	Dual uni-directional	1310	SC/UPC	30	19	
(was SAA)						
NHB5S	Dual uni-directional	1310	SC/UPC	50	30	
(was SBB)						
NHB3F	Dual uni-directional	1310	FC/UPC	30	20	
(was SCC)						
*NHC2S	Dual uni-directional	1550	SC/UPC	20	12	
(was SDD)						
SEE	Dual uni-directional	1550	SC/UPC	100	30	
WHD2S	Single bi-directional	1310/1550	SC/UPC	30	20	
(was SSM)	(master)					
WHE2S	Single bi-directional	1550/1310	SC/UPC	30	20	
(was SSS)	(slave)					

NOTE: Other fiber optical options available on special order * For the orders of the listed optical module, please contact us.



Teleprotection Access Interfaces

C37.94 & Mini C37.94 Card

<u>ZRAT</u> Multi-N	/ulti-Mode, 2Mbps, 820nm, 2KM, ST/UPC connector													
		٦	Гх					R						
Power (dBm)			Wavelength (nm)			Power (dBm)			Wavelength (nm)			Note		
Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max			
-19.8	-	-12.8	792	820	865	-25.4		-9.2	792	820	865	50/125µm Fiber Cable		
-16		-9				-25.4		-9.2				62.5/125µm Fiber Cable		

<u>QRATT</u>

Multi-Mode, 2Mbps, 850nm, 2KM, ST/UPC connector

			Гх					R	x			
Power (dBm)			Wavelength (nm)			Power (dBm)			Wavelength (nm)			Note
Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	
-23		-11	790		870	-32		-11	790		870	50/125µm Fiber Cable
-19		-11				-32		-11				62.5/125µm Fiber Cable

<u>NRB2T</u> Single-Mode, 2Mbps, 1310nm, 20KM, ST/UPC connector

			Гх					R	x	Nata		
Power (dBm)			Wavelength (nm)			Power (dBm)			Wavelength (nm)			Note
Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	
-20		0	1261	1310	1360	-32		0	1260		1610	



Capacity



HX9800R-PTN with CC2 Backplane on CHA Chassis

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
- 8 x FE RJ45
- 4 STM-1 or1 STM-4

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



Slot	C1/ C2	Mini A∼D	S1/S2 Slot	S9/S10 Slot	S3~S8 Slot	HX9800 System Total Capacity
Card Backplane Bus		DS0 Bus	DS0 0 1G Full G Bus Slot	DS0 1G Full Bus Slot	DS0 0G 1G 10GBus Full Bus Slot	
CC2 (2*100G)	v	Na	Na	Na	Na	2 x 100G + 10 x 10GE +16 x GE
All Mini Cards from AM3440-D	Na	V	Na	Na	Na	-
All Full Cards from AM3440	Na	Na	V	V	V	-
B2G5-x	Na	Na	V@1GE	V@1GE	V@10GE	12 x STM-16/ 48 x STM-4/ 48 x STM-1
TE1-x	Na	Na	V@1GE	V@1GE	V@1GE	320 x E1/T1
GFEO	Na	Na	V@1GE	Na	V@10GE	6 x 10GE or 60 x GE or 80 x FE Optical
GFE-8T	Na	Na	V@1GE	Na	V@10GE	
GFE-8POE1 GFE-8POE2 GFE-4POEP	Na	Na	V@1GE	Na	V@10GE	48 x GE/FE BaseT (RJ45) 64 x FE BaseT (RJ45)
XGEO	Na	Na	V	Na	V	18 x 10GE

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

Note 1: Due to the number limitation of MAC addresses, S9 & S10 cannot support Ethernet Cards.

Note 2: V means supported via 8M PCM backplane V@1G means supported via 1GE backplane; V@10GE means supported via 10GE backplane. V means supported via Front Panel 100G connection.

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