Smart solutions for smart networks

Version V143

CXR-QX3440

Access DCS-MUX

Features

System Capacity

- Full frontal access (ETSI) Shelf, with 4 x mini slots and 12 x single slots for TDM N x 64K plug-in modules
- DACS (Digital Access Cross-Connect System) with full non-blocking nx64K (2048 x 2048 DS0) cross-connect support Dual controller, dual power with load sharing
- Up to 8 x GE SFP on QX3440-CCPB-8GEHSWA controller module, up to 16 x GE SFP with dual controllers
- Slot 1 and Slot 2 support TDM N x 64K plug-in modules and 8GEAa* high speed tributary module

Management

- Console, Telnet, Web GUI (optional) and Inband management support SNMP v.1 and v.3
- Compatible with a SNMP based GUI network management system and supported by CXR iNET and CXR iNMS
- Supports RADIUS authentication

MPLS-TP

- MPLS Transport Profile per RFC-5921
- Any Ethernet port can be configured as NNI (MPLS port) or UNI (Ethernet service port)
- Static MPLS LSP label provisioning via NMS
- Pseudo Wire (PW) to support
  - Ethernet Pseudo Wire(VPWS, VPLS, H-VPLS)
- MPLS-TP OAM
  - Section/LSP/PW TP-OAM using BFD (Per IEEE 8113.2)
- MPLS-TP QoS
  - 64K Granularity Rate Limit Per Flow
  - Ingress/Egress TC/EXP Class Mapping
  - TC/EXP Priority-based Queuing (8 Queues)
  - Tunnel Traffic Engineering CIR/PIR and CBS/PBS Policing/Shaping
  - PW Traffic Engineering CIR/PIR and CBS/PBS Policing/Shaping
  - WRED (Weighted Random Early Detection)
  - Strictly Priority / WRR

Carrier Ethernet (CE)

- L2 Switching/Bridging
- RSTP/MSTP (IEEE 802.1w/1s)
- VLAN 1Q 802.1q/ Q in Q8 802.1ad
- VLAN Operation: Stack/Switch/Strip
- Link Aggregation (802.3ad): Static/LACP

Ethernet 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)

L3 Routing*

- Static Route
- RIPv1 and RIPv2
- OSPFv2 and OSPFv3

VPLS

- VPLS bridging
- H-VPLS bridging
- 32K MAC addresses
- 2K VPLS instances per device
- Split horizon to prevent forwarding loops

Network Protections

- MPLS-TP
  - MPLS LSP 1+1/1:1
  - Dual-homing PW Protection
  - LSP E2E protection switching within sub 50ms

*Future Option

CXR Networks

- CE
  - ERPS Ring (G.8032) Protection
  - ELPS (G.8031) Linear Protection
- E1/T1/TDMoEA* 1+1 protection
- DS0 Level Nx64K circuit protection
- PDH ring protection, QE1/QT1, FOM, Mini QE1/QT1

PWE3 Services

- Ethernet over CE
  - Port-based and VLAN-based services
  - EPL, EVPL, EPLAN, EVPLAN, E-Tree services as defined by the MEF 9&14
  - Encapsulation: VLAN 802.1Q/802.1ad Q in Q
- Ethernet over MPLS
  - Port-based and VLAN-based services
  - VPWS, VPLS, H-VPLS services as defined by the MEF 9 and 14
  - Encapsulation: PW over MPLS-TP
- PDH over MPLS/CE/IP
  - Framed E1/T1:CESoPSN, and MEF8 for emulation of TDM circuits
  - Unframed E1/T1: SAToP PW
  - PDH Clock Recovery: ACR/System Clock per PW configurable

All the plug-in cards are hot-pluggable

Item	QX3440-CHPAa
Chassis	5U
# of Mini-slots	4
# of Single slots	12
Maximum E1/T1 Channels	64
Maximum GE Ports	32**
Pseudowire bundles	64
DS0 Cross-Connect Backplane Capacity	128Mbps
Packet Switching Capacity	33G**

Controller and Function

Function \ Controller	CCPB-8GEHSWa	CCPB-2GEa	CCPB-DCSa
DB9 console[Note]	√	√	√
Micro USB console	√	√	√

Note:

Both DB9 and micro USB console are available for QX3440-CCPB series controller, however only one of them will activate at a time.

* Future Option

** With Dual Controllers and two 8GEAa modules

Description

The CXR QX3440 product is Access DCS-MUX which supports multiplexing of various digital access interfaces into E1 or T1 lines for convenient transport and switching. The CXR QX3440 Access DCS-MUX provides access for a variety of TDM, packet, and voice interfaces detailed on the next page. These interfaces are compatible with other CXR products. The QX3440 can act as a mini DACS: one or more of the WAN ports can be used as a Drop & Insert function with fractional E1/T1 lines, which can be muxed into a full E1/T1 line.

The QX3440 controller module provides full non- blocking Nx64K cross-connect matrix up to 2048 DS0. System redundancy is available in dual controller and power modules, making it an excellent fit for critical applications. With QX3440-CCPB-8GEHSWA controller module, it supports both MPLS-TP and Carrier Ethernet functions as Packet Transport Network. In addition to the native Ethernet transport, the QX3440 can be used as the gateway of PDH into the PSN network using circuit emulation technologies. The TDM encapsulation technologies supported are TDMoE, and TDMoIP. In parallel, the Circuit Emulation supported are CESoPSN (Nx64K) and SAToP (Unframed E1/T1).

While 1+1 link protection is available for E1, T1, and TDMoEA* modules, path protection for end-to-end Nx64K circuit protection is available for 3E1/T1.

The QX3440 supports local control and diagnostics by using a VT-100 terminal connected to the console port. It supports Ethernet, Telnet, and SNMP, so that it can be controlled and diagnosed from remote ends. An in-band management channel with GUI is available as well.

CXR QX3440 has a number of plug-in slots in regular size and mini size. (Card size to slot compatibility is detailed on the next page.) Most of the plug-in cards have LED indications.

Controller Variants

Controllers	QX3440-CCPB-DCSa	QX3440-CCPB-2GEa	QX3440-CCPB-8GEHSWA
Feature	Common controller module, support cross-connect function. One USB console port, one DB9 console port and one RJ45 SNMP port.	Packet controller module, support cross-connect function, 2 x Combo GbE (SFP/RJ45) interfaces for TDMoE uplink, one USB console port, one DB9 console port and one RJ45 SNMP port. ● Supports SAToP, CESoPSN, and MEF-8 ● Up to 64 Pseudowires ● Supports SyncE	Packet controller module, support cross-connect function, 4 x GbE and 4 x FE/GbE SFP interface with built-in L2 switch, one USB console port, one DB9 console port and one RJ45 SNMP ● Supports SAToP, CESoPSN, and MEF-8 ● Up to 64 pseudowires. ● Supports SyncE
Switch	No	No	Yes
Ethernet Port	No	2	8
External Clock Input	2 from QX3440-CLKa or CLKb*	2 from QX3440-CLKa or CLKb*	2 from QX3440-CLKa or CLKb*
External Clock Output	1 from QX3440-CLKa or 2 from QX3440-CLKb*	1 from QX3440-CLKa or 2 from QX3440-CLKb*	1 from QX3440-CLKa or 2 from QX3440-CLKb*
Alarm Input	1 from QX3440-CLKa	1 from QX3440-CLKa	1 from QX3440-CLKa
Alarm Output	From QX3440-CLKa: 1 x Fuse Alarm 1 x System Alarm From QX3440-CLKb*:	From QX3440-CLKa: 1 x Fuse Alarm 1 x System Alarm From QX3440-CLKb*:	From QX3440-CLKa: 1 x Fuse Alarm 1 x System Alarm From QX3440-CLKb*:

	1 x Fuse Alarm 3 x Performance Alarm (Critical/Major/Minor)	1 x Fuse Alarm 3 x Performance Alarm (Critical/Major/Minor)	1 x Fuse Alarm 3 x Performance Alarm (Critical/Major/Minor)

CXR QX3440-CHPAa plug-in cards:

The mini-slot cards plug into the mini-slots of the QX3440-CHPAa. The single-slot cards plug into single slots.

Note: √ = Supported × = Not Supported * = Future Option (D)= Discontinued

Low-Speed Tributary Modules	Plug-in cards \ Controller	QX3440-CCPB-DCSa	QX3440-CCPB-2GEa	QX3440-CCPB-8GEHSWA
Single-Slot	**Transportation**			
	3-channel E1	√	√	√
	3-channel T1	√	√	√
	4-channel E1	√	√	√
	4-channel T1	√	√	√
	4-channel TDMoEA	√*	√*	√*
	1FOMA	√	√	√
	2-channel G.SHDSL (2 pairs) w/o line power	√	√	√
	4-channel G.SHDSL (1 pair) w/o line power	√	√	√
	Serial and Digital Access			
	6-channel UDTEA	√	√	√
	8-channel UDTEA	√	√	√
	6-channel RS232 with V.110 encoding (D)	√	√	√
	8-channel RS232 with X.50 subrate	√	√	√
	8-channel Subrate Data Unit (8SRU)	√	√	√
	6-channel G.703 Co-Directional (6CDA)	√*	√*	√*
	8-channel OCU-DP	√	√	√
	Voice and Analog Access			
	8-channel 2W/4W E&M (8EMA)	√	√	√
	12-channel FXS (12FXSA)	√	√	√
	12-channel FXO (12FXOA)	√	√	√
	12-channel Magneto (12MAGA)	√	√	√
	Data Processing			
	8-channel Dry Contact I/O Type (D)	√	√	√
	8-channel Dry Contact I/O Type B	√	√	√

	8-channel Dry Contact I/O Type C	√	√	√
	8-channel Data Bridge	√	√	√
	Packet Access			
	8-LAN-port/ 64-WAN-port Router-B	√	√	√
	Teleprotection Access			
	4-channel low speed optical (C37.94)	√	√	√
	4-channel low speed optical (SFP port)	√	√	√
Dual-Slot	**Teleprotection Access**			
	Transfer Trip card (TTA)	√	√	√
Mini-Slot	**Transportation**			
	1-channel E1 (Single E1 interface) with 75ohm	√	√	√
	1-channel E1 (Single E1 interface) with 120ohm	√	√	√
	1-channel T1 (Single T1 interface)	√	√	√
	Mini Quad E1 (Four E1 interfaces) with 75ohm	√	√	√
	Mini Quad E1 (Four E1 interfaces) with 120ohm	√	√	√
	Mini Quad T1 (Four T1 interfaces)	√	√	√
	Fiber Optical Interface	√	√	√
	Serial and Digital Access			
	1-channel X.21	√	√	√
	1-channel V.35	√	√	√
	1-channel RS232	√	√	√
	3-channel RS232	√	√	√
	1-channel OCU-DP	√	√	√
	1-channel G.703 Co-Directional	√	√	√
	Voice and Analog Access			
	Quad E&M (QEMA)	√	√	√
	QFXSA (Four FXS voice interface)	√	√	√
	QFXO (Four FXO voice interface) (D)	√	√	√
	QFXOA (Four FXO voice interfaces)	√	√	√
	QMAGA (Four magneto voice interfaces)	√*	√*	√*
	Data Processing			
	Echo Canceller card	√	√	√
	Analog Bridge card	√	√	√
	2-LAN port/64 WAN port Router-A	√	√	√
	Teleprotection Access			
	LS Optical M1C37 Card	√	√	√
	Clock and Alarm Module			

	CLKa card	√	√	√
	CLKb card*	√*	√*	√*
	CLKc card*	√*	√*	√*

High -Speed Tributary Modules	Controller / Plug-in cards	QX3440-CCPB-DCSa	QX3440-CCPB-2GEa	QX3440-CCPB-8GEHSWA
Single-Slot	**Packet Access**			
	8 GbE Interface card*	×	×	√*

Ordering Information

To specify options, choose from the list below:
Note: All units are RoHS compliant.

*Future Option

Ordering Code	Description	Note
Main Unit		
CXR QX3440-CHPAa	5U height rack chassis for QX3440 without CPU, power and plug-in cards	• 19”/23” ear mount included. • Works with QX3440-CCPB-8GEHSWA, QX3440-CCPB-2GEa and QX3440-CCPB-DCSa controllers.
CPU Module		
QX3440-CCPB-**OPT**-**mgmt**	Controller module supporting cross-connect function. One USB console port, one DB9 console port and one RJ45 SNMP port on board.	• Works with CXR QX3440-CHPAa, QX3440-C-CHPCa and QX3440-D-CHPDa. • For **mgmt** option, please refer to the following table for detailed information. • For Clock IN/OUT and Alarm IN/OUT, please purchase one QX3440-CLKa or CLKb* module. • Order two for redundancy.
■ Where **OPT** is used to select the controller modules. ***MUST*** select one from the below list.		
8GEHSWa	Packet controller module, support cross-connect function, 4 x GbE SFP and 4 x FE/GbE SFP interfaces with built-in L2 switch and one RJ45 SNMP. • Supports MPLS-TP and CE functions • Supports SAToP, CESoPSN, and MEF-8 formats for TDMoE uplink, up to 64 pseudowires. Supports SyncE	• Work with QX3440-CHPAa chassis. • Be sure to use with 48Vdc power supply • If the operating temperature is higher than 50°C, a fan module is essential. Please purchase an additional QX3440-FAN in this case.
2GEa	Packet controller module, support cross-connect function, 2 x Combo GbE (SFP/RJ45) interfaces for TDMoE uplink, one DB9 console port, one Micro USB console port and one RJ45 SNMP port. • Supports SAToP, CESoPSN, and MEF-8 • Up to 64 Pseudowires • Supports SyncE	• Work with QX3440-CHPAa, QX3440-C-CHPCa and QX3440-D-CHPDa chassis.
DCSa	Common controller module, support cross-connect function, one DB9 console port, one Micro USB console port and one RJ45 SNMP port.	• Work with QX3440-CHPAa, QX3440-C-CHPCa and QX3440-D-CHPDa chassis.
■ Where **mgmt** is used to select the following functions. Please replace **mgmt** with your selection, or leave it blank for nothing.		
mgmt=	**Description**	**Note**
LCT	QX3440-LCT activation license	Used with CXR-LCT Graphical Configuration Software for TDM

Ordering Code	Description	Note
		application.
web[NOTE]	Web GUI configuration activation license	Used with QX3440-CCPB-8GEHSWA, QX3440-CCPB-2GEa and QX3440-CCPB-DCSa controllers.
[blank]	No configuration tool for management	If the above configuration tool is required in the future, it can be activated by a *Feature Activation License (see below table)*.

Feature Activation License		
QX3440-LCTLIC	Feature Activation License for QX3440 CPU card to support LCT Graphical Configuration Software for TDM application	Used with CXR-LCT Software
QX3440-WEBLIC	Feature Activation License for QX3440 CPU card to support Web GUI Configuration function	Used with QX3440-CCPB-8GEHSWA, QX3440-CCPB-2GEa and QX3440-CCPB-DCSa controllers.
QX3440-CCPB-8GEHSWA-PDHPWHLLIC-16*	Feature Activation License for QX3440-CCPB-8GEHSWA controller card to support 1+1 Hitless Protection for TDM PW application. Calculated on a per-bundle basis with a total of 16 bundles.	• The order will not be processed if the total number of supported bundles exceeds 128. • Order extra license if the required bundles are more than 16.

NOTE: **web** is used to identify if the controller is featured with web GUI configuration. The plug-in modules can be configured on the web GUI includes:

Controller Card/Interface	QX3440-CCPB-DCSa	QX3440-CCPB-2GEa	QX3440-CCPB-8GEHSWA
Mini Plug-in Module			
M4E1	√	√	√
CLKa	√	√	√
ABRA	√	√	√
3RS232a	√	√	√
ECA	√	√	√
Single Slot Plug-in Module			
12FXOA	√	√	√
12FXSA	√	√	√
4E1	√	√	√
6RS232	√	√	√
8EMA	√	√	√
12Magneto	√	√	√
8UDTEA	√	√	√

√ = Supported

Mini Plug-in Module (Select 1 to 4 cards from list below)

Transportation

Ordering Code	Description	Note
QX3440-E75	1-channel of E1plug-in card w/ 75 ohm	
QX3440-E120	1-channel of E1 plug-in card w/ 120 ohm	
QX3440-T1	1-channel T1 plug-in card	
QX3440-M4T1	Mini Quad T1 plug-in card	Includes a three-meter conversion cable (CXR-ACC-CAB-DB25M-300-4RJ48M).
QX3440-M4E75	Mini Quad E1 plug-in card with 75 ohm	• Includes a three-meter conversion cable (CXR-ACC-CAB-DB25M-300-8BNCM or CXR-ACC-CAB-DB25M-300-8BNCF). • Please specify the required cable, otherwise the CXR-ACC-CAB-DB25M-300-8BNCM cable will be shipped.
QX3440-M4E120	Mini Quad E1 plug-in card with 120 ohm	Includes a three-meter conversion cable (CXR-ACC-CAB-DB25M-300-4RJ48M)

Ordering Code	Description	Note
QX3440-FOM-**opt**	Fiber Optical plug-in card	For **opt** option, please refer to the table below for detail information

■ 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 your CXR sales representative.
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

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

Serial and Digital Access

Ordering Code	Description	Note
QX3440-1X21	1-channel X.21 plug-in card	
QX3440-1RS232	1-channel RS232 plug-in card	
QX3440-1V35	1-channel V.35 plug-in card	
QX3440-3RS232a	3-channel RS232 async/Sync, DCE/DTE plug-in card	To use with 3RS232a interface card, it is recommended to purchase a conversion cable (CXR-ACC-CAB-DB44M-150-2DB25F-DB9F-DCE, or CXR-ACC-CAB-DB44M-150-2DB25M-DB9M-DTE)
QX3440-1CD	1-channel G.703 Co-Directional Interface at 64 Kbps data rate	
QX3440-1ODP	1 port OCU-DP Interface card	Only non-RoHS compliant model available **Limited Quantity**

Voice and Analog Access

Ordering Code	Description	Note
QX3440-QEMA-**wr**-**m**-T**n**-**x**	Jumper selectable: 2/4 WIRE; A/B side Quad E&M voice card, complied with IEEE1613 standard.	• Not applicable to ±24Vdc powered main units. • For **wr, m, n, x** option, please refer to the table below for detail information • Includes a 0.6 meter conversion cable (CXR-ACC-CAB-DB44M-60-4RJ45M)

■ Where **wr** is used to select QEM card wire type (must select one):

wr =	Description	Note
2w	2 wire	
4w	4 wire	

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

m =	Description	Note
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**	**Note**
O	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 **x** is used to select all of voice card signaling bits. If this option is not required, omit the **x** field in the ordering code.

x =	**Description**	**Note**
A	Follows ANSI signaling bits	• Jumper selectable for all channels. • If **x** is not selected from the table, the default setting for signaling bits is ETSI and for trunk condition is ON-HOOK. • For S (customer's special bit), please contact your nearest CXR sales representative.
E	Follows ETSI signaling bits	
S	Follows customer's special bits assignments	

Ordering Code	**Description**	**Note**
QX3440-QMAGA*	Quad channel magneto plug-in module with ring across L1&GND and L1&L2. Software programmable.	Not applicable to ±24Vdc powered main units.
QX3440-QFXOA	Quad FXO voice plug-in card used with 4 RJ11	• Not applicable to ±24 Vdc powered main units. • GS = Ground Start
QX3440-QFXOAS	Quad FXO with GS plug-in card used with 4 RJ11	

Ordering Code	**Description**	**Note**
QX3440-QFXSA-**x**-**pt**	Quad FXSA voice card	• Jumper setting options: Loop Start, Ground Start (GS), Metering Pulse Transmit 12/16 KHz (MP) • For **x** and **pt** options, please refer to the table below for detail information
QX3440-QFXSA-M-**x**-**pt**	Quad FXSA with MP 16KHz voice card	
QX3440-QFXSA-M12-**x**-**pt**	Quad FXSA with MP 12KHz voice card	
QX3440-QFXSAS-**x**-**pt**	Quad FXSA with GS	
QX3440-QFXSAM-**x**-**pt**	Quad FXSA with GS and MP 16KHz voice card	

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

x =	**Description**	**Note**
A	Follows ANSI signaling bits	• This option applies to controller version v8.36.XX and before. • For S (customer's special bit), please contact your nearest CXR sales representative. • If **x** is not selected from the table, the default setting for signaling bits is ETSI and for trunk condition is ON-HOOK.
E	Follows ETSI signaling bits	
S	Follows customer's special bits assignment	

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

pt=	**Description**	**Note**
24	For QX3440-CHPAa using SDPA power module with ±24Vdc input power	For CHPAa only
PWR	For QX3440-CHPAa using SDPA power module with ±48Vdc input power or SDP125 power module with ±125Vdc input power.	

Data Processing

Ordering Code	**Description**	**Note**

QX3440-ECA	Echo canceller plug-in card	
CXR QX3440BRA	Analog voice bridging plug-in card	

Packet Access

Ordering Code	Description	Note
QX3440-RTA	2-LAN ports/64 WAN port router/bridge plug-in card	

Teleprotection Access

Ordering Code	Description	Note
QX3440-M1C37-**LSFOM**	1- channel C37.94 plug-in mini card	

■ Where **LSFOM** is to select **LS**-**F**iber **O**ptical **M**odule option, please replace **LSFOM** with your selection.

LSFOM Code	Description									
	Mode		Data Rate		Wave Length		Distance		Connector/ Interface	
	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
ZRATT	Z	Multi-mode	R	2M	A	820nm	T	2km	T	ST/UPC
QRATT	Q	Multi-mode	R	2M	A	850nm	T	2km	T	ST/UPC
NRB2T	N	Single mode	R	2M	B	1310nm	2	20km	T	ST/UPC

Clock and Alarm

Ordering Code	Description	Note
QX3440-CLKa	CLKa Mini Slot plug-in card. - Clock in x2, clock out x1 - Alarm in x1, Alarm out x2	Work with QX3440-CHPAa and QX3440-C-CHPCa chassis.
QX3440-CLKb*	CLKb Mini Slot plug-in card. - Fuse ALM x1 - Critical ALM x1, MJR ALM x1, MIN ALM x1 - Clock in x2, clock out x2	Work with QX3440-CHPAa and QX3440-C-CHPCa chassis.
QX3440-CLKc*	CLKc Mini Slot plug-in card. - For 1588 CLK in/out (1 x TOD, 1PPS in/out, and 1 x BITS in/out)	Work with QX3440-CCPB-8GEHSWA controller in QX3440-CHPAa chassis.

*Future Option

Low-Speed Single Slot Plug-in Module

Transportation

Ordering Code	Description	Note
QX3440-3E1-**cc**	3-channel E1 plug-in card with DS0 (64K bps) SNCP circuit level protection Note: DS0 SNCP circuit level protection only support E1 frame mode	For **cc** option, please refer to the table below for detail information
QX3440-4E1-**cc**	4-channel E1 plug-in card	For **cc** option, please refer to the table below for detail information

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

cc =	Description	Note
RJ	RJ48C connector	
BNC	BNC connector	

Ordering Code	Description	Note
QX3440-3T1	3-channel T1 Interface	
QX3440-4T1	4-channel T1 plug-in card	
QX3440-2GH	2-channel G.SHDSL plug-in card (2 pair)	
QX3440-4GH	4-channel G.SHDSL plug-in card (1 pair)	
QX3440-TDMoEA-PPM*	TDMoEA card with 2 GbE combo interfaces and 2 Ethernet interfaces (10/100/1000BaseT) plug-in module Support G.823 Traffic SFP optical module is not included.	Please order separately for SFP optical modules from SFP optical brochure.

Ordering Code	Description	Note
QX3440-1FOMA-**opt**	1FOMA Fiber Optical Interface with 1x9 optical port	For **opt** option, please refer to the table below for detail information.

■ 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 your Loop sales representative.
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

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

Serial and Digital Access

Ordering Code	Description	Note
QX3440-6CDA-**cdm***	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.

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

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

Ordering Code	Description	Note
QX3440-8UDTEA-**opm**	8-port universal data interface card that supports RS232/RS422/RS485 full-duplex DCE interface which is software configurable	For **opm** option, please refer to the table below for detail information.

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

opm =	Description	Note
DCE	Support RS232/RS422/RS485 DCE interface which is software configurable	If an option mode is required in the future, it can be activated by a *Feature Activation License (see below*
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	*table).*
HD	Support RS232/RS422/RS485 DCE interface with Full- and Half-Duplex modes	
TSHD	Support Terminal Server Function and DCE with Full- and Half-Duplex modes	
OMNIHD	Support Omnibus Function and DCE with Full- and Half-Duplex modes	
TSOMNIHD	Support Terminal Server, Omnibus Function and DCE with Full- and Half-Duplex modes	
FULL	Support Terminal Server, Omnibus Function, Clock Pass Through and DCE with Full- and Half-Duplex modes	

Feature Activation License	Description
QX3440-8UDTEA-TSLIC	Feature Activation License for QX3440 8UDTE card to support Terminal Server function
QX3440-8UDTEA-OMNILIC	Feature Activation License for QX3440 8UDTE card to support Omnibus function
QX3440-8UDTEA-CPTLIC	Feature Activation License for QX3440 8UDTE card to support Clock Pass Through function
QX3440-8UDTEA-TSOMNLIC	Feature Activation License for QX3440 8UDTE card to support Terminal Server function and Omnibus function
QX3440-8UDTEA-HDLIC	Feature Activation License for QX3440 8UDTE card to support Full- and Half-Duplex modes
QX3440-8UDTEA-TSHDLIC	Feature Activation License for QX3440 8UDTE card to support Terminal Server function with Full- and Half-Duplex modes
QX3440-8UDTEA-OMNIHDLIC	Feature Activation License for QX3440 8UDTE card to support Omnibus function with Full- and Half-Duplex modes
QX3440-8UDTEA-TSOMNIHDLIC	Feature Activation License for QX3440 8UDTE card to support Terminal Server function and Omnibus function with Full- and Half-Duplex modes
QX3440-8UDTEA-FULLLIC	Feature Activation License for QX3440 8UDTE card to support Terminal Server, Omnibus and Clock Pass Through functions with Full- and Half-Duplex modes

Ordering Code	Description	Note
QX3440-ODP-**typ**	8-channel OCU-DP plug-in card. Used with 8 RJ48S connectors or 1 Telco 64 connector.	Only **non-RoHS** compliant model available **Limited Quantity**

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

typ =	Description	Note
RJ	8 x RJ48S	
TELCO	1 x Telco 64 Connector	

Ordering Code	Description	Note
QX3440-6UDTEA	Universal data interface card with software configurable modes for • Up to 6-port sub 64K RS232 with V.110, or • Up to 4-port Nx64K X.21/RS232/RS422/V.35/V.36/ EIA530/RS449 Port 1 to 4: two DB44 connectors Port 5 to 6: two RJ48 connectors	Conversion cables are NOT included. Please order conversion cable separately for different DTE interfaces from below. • CXR-ACC-CAB-DB44M-100-2DB25F-VB • CXR-ACC-CAB-DB44M-100-2DB15F-VB • CXR-ACC-CAB-DB44M-100-1DB15F-1DB25F-VB • CXR-ACC-CAB-DB44M-100-2M34F-VB • CXR-ACC-CAB-DB44M-100-2DB37F-VB • CXR-ACC-CAB-DB44M-100-1DB37F-1M34F-VB
QX3440-8RS232-RJ	8-port RS232 plug-in card with X.50 subrate multiplexing scheme and X.54 encoding, with 8 RJ48 connectors for 8 RS232 Async ports	
QX3440-8RS232-DB	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).

QX3440-8SRU-DB	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-1DB09F-DB x 2**)**
QX3440-8SRU-RJ	8-port SRU plug-in card with DS0B-5 subrate multiplexing scheme and DS0A encoding, with 8 RJ48 connectors for Async ports	

Voice and Analog Access

Ordering Code	Description	Note
QX3440-8EMA-**x-pt-typ**	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

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

x =	Description	Note
E	Follows ETSI signaling bits	• Jumper selectable for all channels. • If **x** is not selected from the table, the default setting for signaling bits is ETSI and for trunk condition is ON-HOOK. • For S (customer's special bit), please contact your nearest CXR sales representative.
A	Follows ANSI signaling bits	
R	Reverse for ON-HOOK and OFF-HOOK signaling bits exchange	
AR	Follows ANSI signaling bits and reverse bit	
S	Follows customer's special bit or function assignment	
S4	Disable the function of the test button	
S5	Forcing all ports to be OFF-HOOK when an alarm occurs	
S6	Forcing all ports to be ON-HOOK when an alarm occurs	

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

pt=	Description	Note
24	For QX3440-CHPAa using SDPA power module with ±24Vdc input power	For CHPAa chassis only
PWR	For QX3440-CHPAa using SDPA power module with ±48Vdc input power or using SDP125 power module with ±125Vdc input power	
PWRIE1613	For QX3440-CHPAa using SDPA power module with ±48Vdc input power, complied with IEEE1613 standard	

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

typ=	Description	Note
RJ	8 x RJ45	
TELCO	1 x Telco 64 Connector	

Ordering Code	Description	Note
QX3440-12FXSA-02-**sn-pta-typ**	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 connectors or 1 Telco 64 connector.	• 12FXSAMP includes all FXS card functions • **pta**= power type. • **typ**= connector type • For **sn, pta**, and **typ** options, please refer to the table below for detail information. • Please use with 100-240Vac or ± 48Vdc powered main units.
QX3440-12FXSA-02-P-**sn-pta-typ**	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 connectors or 1 Telco 64 connector.	
QX3440-12FXSA-02-M-**sn-pta-typ**	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start, PLAR and [Metering Pulse]. Used with 12 RJ11 connectors or 1 Telco 64 connector.	
QX3440-12FXSA-02-MPP-**sn-pta-typ**	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 connectors or 1 Telco 64 connector.	
QX3440-12FXSA-02S- **sn-pta-**	12-channel FXSA plug-in card with 600/900	

typ	Impedance, Battery Reverse, Loop Start, PLAR and [Ground Start]. Used with 12 RJ11 connectors or 1 Telco 64 connector.	
QX3440-12FXSA-02M-**sn-pta-typ**	12-channel FXSA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start, PLAR, [Ground Start] and [Metering Pulse]. Used with 12 RJ11 connectors or 1 Telco 64 connector.	
QX3440-12FXSA-02MP- **sn-pta-typ**	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 connectors or 1 Telco 64 connector.	

■ 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	• If **sn** is not selected from the table, the default setting will be FXS Loop Feed = -48 Vdc with 25 mA current limit; alarm tone enable; normal ring • For **sn** (special function), please contact your nearest CXR sales representative.
S1	FXS Loop Feed = -48 Vdc with 35 mA current limit	
S4	Remove alarm tone	
S5	Double ring tone transmit	

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

pta=	**Description**	**Note**
24	For QX3440-CHPAa using SDPA power module with ±24Vdc input power	For CHPAa chassis only
PWR	For QX3440-CHPAa using SDPA power module with ±48Vdc input power or using SDP125 power module with ±125Vdc input power	

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

typ=	**Description**	**Note**
RJ	12 x RJ11	
TELCO*	1 x Telco 64 Connector	The TELCO connector type is currently a future option for QX3440-12FXSA-02 series cards.

Ordering Code	**Description**	**Note**
QX3440-12FXOA-**typ**	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 connectors or 1 Telco 64 connector.	For **typ** option, please refer to the table below for detail information.
QX3440-12FXOAS-**typ**	12-channel FXOA plug-in card with 600/900 Impedance, Battery Reverse, Loop Start and [Ground Start]. Used with 12 RJ11 connectors or 1 Telco 64 connector.	
QX3440-12MAGA-**typ**	12-channel Magneto plug-in module with ring across L1&GND and L1&L2. Software programmable. Used with 12 RJ11 connectors or 1 Telco 64 connector.	• Not applicable to ±24Vdc powered main units. • For **typ** option, please refer to the table below for detail information

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

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

Data Processing

Ordering Code	Description	Note
QX3440-8DCB	8-channel dry contact type B plug-in card with maximum voltage 220 Vdc or 250 Vac	
QX3440-8DCC	8-channel dry contact type C plug-in card with maximum voltage 100 Vdc or 250 Vac	
QX3440-8DBRA-RJ	8-channel data bridge plug-in card, with 8 RJ48 connectors for 8 data bridge Async ports	
QX3440-8DBRA-DB	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).

Packet Access

Ordering Code	Description	Note
QX3440-RTB	8-LAN ports/64 WAN ports router/bridge plug-in card	

Teleprotection Access

Ordering Code	Description	Note
QX3440-4C37-**LSFOM**	4-channel C37.94 plug-in card	

■ Where **LSFOM** is to select **LS**-**F**iber **O**ptical **M**odule option, please replace **LSFOM** with your selection.

LSFOM Code	Description										Note
	Mode		Data Rate		Wave Length		Distance		Connector/ Interface		
	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	
ZRATT	Z	Multi-mode	R	2 M	A	820nm	T	2km	T	ST/UPC	
QRATT	Q	Multi-mode	R	2 M	A	850nm	T	2km	T	ST/UPC	
NRB2T	N	Single-mode	R	2 M	B	1310nm	2	20km	T	ST/UPC	
T	Single mode, 1310nm, Tx_min -13dBm, Rx_max -30dBm, SC type connector. Works with Toshiba teleprotection device in direct mode.										Must use 3 x DS0
S	Single mode,1310nm, Tx_min -14dBm, Rx_max -36dBm, ST type connector Works with SEL teleprotection device in direct mode.										Must use 8 x DS0
GE	Single mode, 1310nm, Tx_min -15dBm, Rx_max -34dBm, ST type connector. Works with GE teleprotection device in direct mode.										Must use 12 x DS0
I	Single mode, 1310nm, Tx_min -5dBm, Rx_max -30dBm, SC type connector. Works with Ingeteam teleprotection device in direct mode.										Must use 3 x DS0

Ordering Code	Description	Note
QX3440-4C37SFPA	4-channel C37.94 plug-in card (SFP port)	Without SFP, SFP must be ordered separately.

Low-Speed Dual Slot Plug-in Module

Teleprotection Access

Ordering Code	Description	Note
QX3440-TTA-**pwr**	Dual slot transfer trip plug-in module for QX3440-A/C. Four ports for DTT input and output.	For **pwr** option, please refer to the table below for detailed information.

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

pwr=	Description	Note
24*	Complied with 24/48V voltage	

Ordering Code	Description	Note
48	Complied with 48/125V voltage	
125*	Complied with 125/250V voltage	

*Future Option

High-Speed Single Slot Plug-in Module

Packet Access

Ordering Code	Description	Note
QX3440-8GEAa-**typ***	High-Speed Plug-in Module 8 GbE interface plug-in module with 10/100/1000BaseT RJ45 or SFP housing.	• Applicable to Slot 1~2 of **QX3440-CHPAa** chassis and works **with QX3440-CCPB-8GEHSWA** controller. • SFP optical module is not included. Please order separately for SFP optical modules from SFP optical brochure.

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

typ=	Description	Note
RJ	8 x 10/100/1000BaseT RJ45	
SFP	8 x SFP optical ports (SFP not included)	

*Future Option

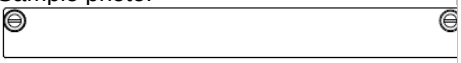
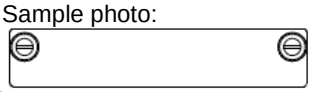
Accessories

Ordering Code	Description	Note
Power Module		
QX3440-SDPA	Single -24Vdc/-48Vdc (-18 to -75 Vdc) power module	 Order 2 single DC for redundancy
QX3440-SDP125	Single -125 Vdc (-80 to -150 Vdc) Power Module	 Order 2 single DC for redundancy
Power Adaptor		
CXR-ACC-AC**x**-DC48-320W	320 Watts, AC (88 ~ 264Vac or 124~370Vdc to dc (+48Vdc, 6.7A) adaptor Working temperature: -30 to 70°C	

■ Where **x** is used for selecting AC power plug type:

x =	Description	Note
A	adaptor power plug type for USA and Taiwan	
E	adaptor power plug type for Europe	
U	adaptor power plug type for UK	

Fan Tray		
QX3440-FAN	Fan tray	Power supplied from rear of chassis.
Air Flow Guide Rack & Cable Management		
QX3440-CMA	Cable Management for QX3440, 1U (44mm) with 10cm ring	
FXO Box		
QX3440-FXO BOX	Support FXO Interface Battery Feed	Non-RoHS compliant
Conversion Cables		
CXR-ACC-CAB-DB25M-100-8BNCM	DB25/Male to eight BNC/Male cable; Length: 100 cm	Use with QX3440-M4E75 plug-in card.
CXR-ACC-CAB-DB25M-100-8BNCF	DB25/Male to eight BNC/Female cable; Length: 100 cm	Use with QX3440-M4E75 plug-in card.
CXR-ACC-CAB-DB25M-300-8BNCM	DB25/Male to eight BNC/Male cable; Length: 300 cm	Use with QX3440-M4E75 plug-in card.
CXR-ACC-CAB-DB25M-300-8BNCF	DB25/Male to eight BNC/Female cable; Length: 300 cm	Use with QX3440-M4E75 plug-in card.
CXR-ACC-CAB-DB25M-100-4RJ48M	DB25/Male to four RJ48C/Male cable; Length: 100 cm	Use with QX3440-M4E120 plug-in card.
CXR-ACC-CAB-DB25M-300-4RJ48M	DB25/Male to four RJ48C/Male cable; Length: 300 cm	Use with QX3440-M4E120 plug-in card and QX3440-M4T1 plug-in card.
CXR-ACC-CAB-DB44M-100-2DB25F-1DB09F-DB	DSUB-44 pin/Male to two DSUB-25 pin/Female- one DSBU-9 pin/Female plug, Length:100cm	Use with QX3440-8RS232-DB, QX3440-8DBRA-DB, QX3440-6RS232A-DB (Discontinued) and QX3440-8SRU-DB* plug-in card.
CXR-ACC-CAB-DB25M-30-1M34F	DSUB-25pin/Male to M34/Female V.35 Conversion cable Length: 30 cm	Use with QX3440-1V35 plug-in card.
CXR-ACC-CAB-DB44M-100-2DB25F-VB	DSUB-44 pin/Male to two DSUB-25 pin/Female plug, Length:100cm	Use with QX3440-6UDTEA V.35 and RS232 interfaces.

CXR-ACC-CAB-DB44M-100-2DB15F-VB	DSUB-44 pin/Male to two DSUB-15 pin/Female plug, Length:100cm	Use with QX3440-6UDTEA 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	Use with QX3440-6UDTEA 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	Use with QX3440-6UDTEA V.35 interface.
CXR-ACC-CAB-DB44M-100-2DB37F-VB	DSUB-44 pin/Male to two DSUB-37 pin/Female plug, Length:100cm	Use with QX3440-6UDTEA EIA530/RS449 and RS422 interfaces.
CXR-ACC-CAB-DB44M-100-1DB37F-1M34F-VB	DSUB-44 pin/Male to one DSUB-37 pin/Female plug + one M34 pin/Female plug, Length:100cm	Use with QX3440-6UDTEA V.35, EIA530/RS449 and RS422 interfaces.
CXR-ACC-CAB-DB44M-60-4RJ45M	DSUB-44pin/Male to four RJ45 Male (8P8C) conversion cable. Length: 60 cm	Used with QEMA plug-in card.
CXR-ACC-CAB-1SCM-200-1LCF	One SC/Male to one LC/Female fiber optic adaptor cable. Length: 200 cm	Used with QX3440-4C37-**T**.
CXR-ACC-CAB-DB44M-150-2DB25F-DB9F-DCE	DSUB-44 pin/Male to two DSUB-25 pin/Female and one DSUB-9 pin/Female plug. Length:150cm	Used with QX3440-3RS232a and QX3440-S3RS232a plug-in card for DCE mode.
CXR-ACC-CAB-DB44M-150-2DB25M-DB9M-DTE	DSUB-44 pin/Male to two DSUB-25 pin/Male and one DSUB-9 pin/Male plug. Length:150cm	Used with QX3440-3RS232a and QX3440-S3RS232a plug-in card for DTE mode.
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 your nearest CXR sales representative.
User’s Manual		
QX3440-CCPB-UMS	User’s Manual (optional, paper copy). A CD version of the manual is already included as standard equipment.	For QX3440-CCPB-8GEHSWA controller.
QX3440-CCPB-UMG	User’s Manual (optional, paper copy). A CD version of the manual is already included as standard equipment.	For QX3440-CCPB-2GEa controller.
QX3440-CCPB-UMD	User’s Manual (optional, paper copy). A CD version of the manual is already included as standard equipment.	For QX3440-CCPB-DCSa controller.
Y-Box		
CXR-VV-B	1 for 1 protection Y-Box with BNC connectors (For 4 E1 ports)	Used with 4E1/M4E1 (75ohm).
CXR-VV-R	1 for 1 protection Y-Box with RJ48C connectors (For 16 E1 ports)	Used with 4E1/M4E1 (120ohm).
CXR-VV-T	1 for 1 protection Y-Box with RJ48C connectors (For 16 T1 ports)	Used with 4T1/M4T1.
Blank Panels		
30.002744.A00	Blank Panel for Power Supply Slot Panel Size: 103.7 x 43.8 mm (L x W)	Use in QX3440-CHPAa chassis. Sample photo: 
30.002743.A00	Blank Panel for Controller Slot Panel Size: 211.5 x 29.9 mm (L x W)	Use in QX3440-CHPAa chassis. Sample photo: 
30.001027.A00	Blank Panel for Slot 1-12 Panel Size: 211.5 x 27.8 mm (L x W)	Use in QX3440-CHPAa chassis. Sample photo: 
30.001030.A00	Blank Panel for mini Slot A-D Panel Size: 103.7 x 20.15 mm (L x W)	Use in QX3440-CHPAa chassis. Sample photo: 
SFP Optical Modules		

Please place your order using the 5-digit alphanumeric codes listed in the separate SFP Optical Module Brochure.

Feature Activation License		
QX3440-ERINGLIC	Feature Activation License for QX3440 CPU card to support framed E1 PDH-Ring function	Used with 4E1, M4E75, M4E120 and FOM.
QX3440-TRINGLIC	Feature Activation License for QX3440 CPU card to support framed T1 PDH-Ring function	Used with 4T1.

Ordering Examples

CXR QX3440-CHPAa, QX3440-CCPB-8GEHSWA, QX3440-SDPA, QX3440-3RS232a, QX3440-8GEAa-SFP:
For QX3440-A-CHPA type-a chassis with a CPU card, a single -48 Vdc power module, a 3-port RS232 interface with DB44 connector, and an 8-port GbE interface plug-in module with SFP housing.

QX3440 Access DCS-MUX Product Specifications

QX3440-CCPB-8GEHSWA Controller

Number of GE Ports	8 SFP
Speed	4 ports 1000Mbps and 4 ports 100/1000Mbps
Operating Temperature	-20~55°C

Ethernet Function

Basic Features	Dual rate SFP with autodetection Ping function contained ARP

Circuit Emulation

Concurrent PW	Up to 64
SAToP	Unframed E1/T1 packets
CESoPSN	Fractional E1/T1 (N x DS0) packets
Clock Source	Internal, Line Interface, External (E1/T1/2048 KHz from CLKa/CLKb*/CLKc* module, 1PPS/TOD from CLKc*), Adaptive Clock Recovery for Pseudowires, SyncE
Alarm Relay	Max. Current: 1A for 24VDC, 0.625A for 48VDC Fuse alarm, performance alarm from CLKa/CLKb* module

Encapsulation

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

QoS

Eight priority queues
Scheduling – Strict Priority, Weighted Round Robin with hierarchy
Ingress policing per service
Egress shaping per service
CIR / PIR (EIR) Two-rate, three-color. (committed information rate, peak or expected information rate)
E-LSP: EXP-Inferred PSC (Per Hop Behavior Scheduling Class), LSP (label switching path)
WRED for congestion management. (weighted random early detection)

Management

Console	DB9S(DCE), female, RS232 connector Micro USB connector User Interface: Menu driven VT-100
Ethernet	GE port, Connector: RJ45 SNMPv1/v3, Telnet/SSH, support Radius client function Web GUI support (optional)
Inband Management	Inband 64 Kbps, support HDLC/PPP

System Configuration Parameters

Active Configuration, Stored Configuration, and Default Configuration (Stored in Non-volatile Memory)
Configuration Upload/Download through TFTP/SFTP

Performance Monitor

Performance Registers	Last 24 hours performance in 15 minute intervals and last 7 days in 24 hour summaries
Separate Registers	Network, user, and remote site
Performance Reports	Reports include E1 Bursty Errored Second, Severe Errored Second, Degraded Minutes. Also available in Statistics (%)
Alarm Queue	To record the latest alarm type, location, date and time
Threshold	Bursty Seconds, Severely Errored Second, Degraded Minutes

Diagnostics

Loopback	E1/T1 interface (Line Loopback, Payload Loopback, Local Loopback), DTE Loopback (DTE-to-DTE, DTE to Line)
Test Pattern	For Controller: 2^{20}-1, 2^{15}-1, 2^{11}-1, 2^{9}-1, and 4-byte user define pattern

Front Panel

Controller LED Indicators	Power, ACTIVE, ALARM

Standards Compliance

IEEE

802.1d	STP
802.1w	RSTP
802.1s	MSTP

RFC (IETF)

2131 & 2132	DHCP*
6378	MPLS-TP Linear Protection
1058	RIPv1*

802.1q	VLAN	1389	RIPv2*
802.1ad	Tag Stacking (Q-in-Q)	2328	OSPFv2*
802.3ag	Ethernet OAM	5340	OSPFv3*
802.3ah	Ethernet in the First Mile	3895	Pseudowire End-to-end Emulation (PWE3)
1588 v2*	Precision Time Protocol		

ITU

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

*Future Option

QX3440-CCPB-2GEa Controller

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

Ethernet Function

Basic Features	MDI/MDIX for 10/100/1000M BaseT auto-sensing Ping function contained ARP

Pseudowire

Concurrent PW	Up to 64
Encapsulation Format	SAToP, CESoPSN, MEF-8 (CESoETH)
QoS	User configurable 802.1p CoS, ToS in outoing IP frame

Clock Source

Internal, Line Interface, External (E1/T1/2048 KHz from CLKa/CLKb* module), Adaptive Clock Recovery for Pseudowires, SyncE

Alarm Relay

Max. Current: 1A for 24VDC, 0.625A for 48VDC
Fuse alarm, performance alarm from CLKa/CLKb* module

Management

Console	DB9S(DCE), female, RS232 connector Micro USB connector User Interface: Menu driven VT-100
Ethernet	2 Combo (RJ45 & SFP) GbE port SNMPv1/v3, Telnet/SSH, support Radius client function Web GUI support (optional)
Inband Management	Inband 64 Kbps, support HDLC/PPP

System Configuration Parameters Active Configuration, Stored Configuration, and Default Configuration (Stored in Non-volatile Memory)
Configuration Upload/Download through TFTP/SFTP

Performance Monitor

Performance Registers	Last 24 hours performance in 15 minute intervals and last 7 days in 24 hour summaries
Separate Registers	Network, user, and remote site
Performance Reports	Reports include E1 Bursty Errored Second, Severe Errored Second, Degraded Minutes. Also available in Statistics (%)
Alarm Queue	To record the latest alarm type, location, date and time
Threshold	Bursty Seconds, Severely Errored Second, Degraded Minutes

Diagnostics

Loopback	E1/T1 interface (Line Loopback, Payload Loopback, Local Loopback), DTE Loopback (DTE-to-DTE, DTE to Line)
Test Pattern	For Controller: 2^{20}-1, 2^{15}-1, 2^{11}-1, 2^{9}-1, and 4-byte user define pattern

Front Panel

Controller LED Indicators	Power, ACTIVE, ALARM

*Future Option

QX3440-CCPB-DCSa Controller

Clock Source	Internal, Line Interface, External (E1/T1/2048 KHz from CLKa/CLKb* module)
Alarm Relay	Max. Current: 1A for 24VDC, 0.625A for 48VDC Fuse alarm, performance alarm from CLKa/CLKb* module
Management	
Console	DB9S(DCE), female, RS232 connector Micro USB connector User Interface: Menu driven VT-100
Ethernet	RJ45 port SNMPv1/v3, Telnet/SSH Web GUI support (optional)
Inband Management	Inband 64 Kbps, support HDLC/PPP
System Configuration Parameters	Active Configuration, Stored Configuration, and Default Configuration (Stored in Non-volatile Memory) Configuration Upload/Download through TFTP/SFTP
Performance Monitor	
Performance Registers	Last 24 hours performance in 15 minute intervals and last 7 days in 24 hour summaries
Separate Registers	Network, user, and remote site
Performance Reports	Reports include E1 Bursty Errored Second, Severe Errored Second, Degraded Minutes. Also available in Statistics (%)
Alarm Queue	To record the latest alarm type, location, date and time
Threshold	Bursty Seconds, Severely Errored Second, Degraded Minutes
Diagnostics	
Loopback	E1/T1 interface (Line Loopback, Payload Loopback, Local Loopback), DTE Loopback (DTE-to-DTE, DTE to Line)
Test Pattern	For Controller: 2^{20}-1, 2^{15}-1, 2^{11}-1, 2^{9}-1, and 4-byte user define pattern
Front Panel	
Controller LED Indicators	Power, ACTIVE, ALARM

*Future Option

Physical /Electrical

Model		QX3440-CHPAa
Dimensions		442 x 222.5 x 223.5 mm (W×H×D)
Power		Single/ Dual -24Vdc/-48 Vdc: -18 to -75 Vdc, 150 Watts max. Single/ Dual -125 Vdc: -80 to -150 Vdc, 250 Watts max.
Temperature	Operating	-20 to 65°C
	Storage	-30 to 70°C
Weight	Net Weight	5.0Kg (11.02lbs)
	Max. Weight	10.0 Kg (22.05lbs)
Humidity		0-95%RH (non-condensing)
Mounting		Desk-top stackable, 19” /23” rack mountable
Power Consumption		Max 110 Watts

Certification

EMI/EMC	EN55032 Class A, EN55035, BS EN55032 Class A, BS EN55035, FCC Part 15 Class A, FCC Part 68, CS-03
Safety	EN62368-1, BS EN 62368-1, UL 62368-1
UL94 Flame Class	UL94V-0

Compliance

ITU G.703, G.704, G.706, G.732, G.736, G.823, G.826, G.711, G.712, G.775, O.151, Q552, Q553, V.11, V.28, V.54
IETF SNMP v.3 (RFC2571~2575), ITU-T Rec.G.821, ITU-T Rec.G.827

CXR-VV Y-BOX

LINE

Connector	BNC or RJ48C
Port Number	For Y-BOX with BNC connectors: 4 line ports For Y-BOX with RJ48C connectors: 16 line ports

Protection	For Y-BOX with BNC connectors: support 2 Quad E1 or 2 mini Quad E1(75ohm) plug-in cards, 4 active E1, 4 standby E1 For Y-BOX with RJ48C connectors: support 8 Quad E1 or 8 mini Quad E1(120ohm) plug-in cards, 16 active E1, 16 standby E1 For Y-BOX with RJ48C connectors: support 8 Quad T1 or 8 mini Quad T1 plug-in cards, 16 active T1, 16 standby T1

Mechanical

Height	44.5 mm/ 1.75 in
Width	432 mm/ 17 in
Depth	100 mm/ 3.9 in

Transportation Cards

Network Line Interface - T1

Line Rate	1.544 Mbps ± 32ppm	Output Signal	DSX1w/0, -7.5, -15 dB LBO
Line Code	AMI or B8ZS	Framing	ESF, ESF&T1.403, G.802, D4
Input Signal	DSX-1 0 dB to -30 dB w/ALBO	Connector	RJ48C

Network Line Interface - E1

Line Rate	2.048 Mbps ± 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 ± 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 ± 32 ppm	Framing	ESF, ESF&T1.403, None, D4
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)		

Network Line Interface - 3E1

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

Network Line Interface - 3T1

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

Network Line Interface - 4E1

Line Rate	2.048 Mbps ± 50 ppm	Framing	ITU G.704
Line Code	AMI or HDB3	Connector	BNC/RJ48C

Input Signal	ITU G.703	Electrical	75 ohm Coax/120 ohm twisted pair
Output Signal	ITU G.703	Jitter	ITU G.823

Network Line Interface - 4T1

Line Rate	1.544 Mbps ± 32 ppm	Output Signal	DSX1w/0, -7.5, -15 dB LBO
Line Code	AMI or B8ZS	Framing	ESF, ESF&T1.403, None, D4
Input Signal	DSX-1 0 dB to -30 dB w/ALBO	Connector	RJ48C

Fiber Optical Interface (FOM, 1FOM-A)

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/ Interface	Distance (km)	Power (dB)
NHB3S (was SAA)	Dual uni-direction	1310	SC/UPC	30	19
NHB5S (was SBB)	Dual uni-direction	1310	SC/UPC	50	30
NHB3F (was SCC)	Dual uni-direction	1310	FC/UPC	30	20
^NHC2S (was SDD)	Dual uni-direction	1550	SC/UPC	20	12
NHCUS (was SEE)	Dual uni-direction	1550	SC/UPC	100	30
WHD2S (was SSM)	Single bi-direction (master)	1310/1550	SC/UPC	30	20
WHE2S (was SSS)	Single bi-direction (slave)	1310/1550	SC/UPC	30	20

NOTE: Other fiber optical options available on special order

^ For the orders of the listed optical module, please contact your CXR sales representative.

*TDMoEA**

Combo Gigabit Ethernet (GbE) Interface

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

Gigabit Ethernet (GbE) Interface

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

Ethernet Function

Basic Features	MDI/MDIX for 10/100/1000M BaseT auto-sensing Ping function contained ARP
Packet Transparency	Packet transparency support for all types of packet types including IEEE 802.1q VLAN and 802.1ad (Q-in-Q)
QoS	User configurable 802.1p CoS, ToS in outoing IP frame
Traffic Control	Ingress packet Rate limiting buckets per port for Ethernet port Supporting Rate-based and Priority-based rate limiting for LAN port Granularity: a. From 64 Kbps to 1 Mbps in increments of 64 Kbps b. From 1 Mbps to 100 Mbps in increments of 1 Mbps c. From 100 Mbps to 1000 Mbps in increments of 10Mbps Pause frame issued when the traffic exceeding the limited rate before packet dropped following IEEE802.3X
Link Aggregation	WAN supports Link Aggregation

Jitter & Wander

PPM: per G.823 Traffic

Standards Compliance

IEEE		**IETF**	
802.1d	MAC Table Learning and STP	RFC2236	IGMP Snooping v2*
802.1p	Priority Code Point		
802.1q	VLAN	RFC2495	E1/T1 OAM
802.1s	MSTP*		
802.1w	RSTP		
802.1ad	Tag Stacking (Q-in-Q)	RFC 4553	SAToP
802.3ad	Link Aggregation	RFC 5086	CESoPSN
		ITU	
MEF		G.823/G.824	Traffic Interface
8	CESoETH		

Certifications

EMC	EN55022 Class A, EN50024, FCC Part 15 Subpart B Class A
Safety	EN60950-1(CE)

* Future Option

G.SHDSL Line Interface

Number of Ports	2 or 4
Data Rate for 4-channel G.shdsl	n x 64Kbps (n= 3 to 32)
Data Rate for 2-channel G.shdsl	n x 64Kbps (n= 3 to 16)
Line Code	16-TCPAM, full duplex with adaptive echo cancellation
Connector	RJ45
Electrical	Unconditioned 19-26 AWG twisted pair
Sealing Current	Max. 20 MA source current
Clock Source	From System, Line
Diagnostic Test	G.SHDSL Loopback: To-LINE, To-bus BERT: QRSS

Packet Access

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

Router-B Interface

Number of Ports	8 LAN ports, Max. 64 WAN ports. Each WAN port has data rate n x 64K bps, 1≤ n ≤32 (≤ 8Mbps for total of all 64 WAN ports
Physical Interface	10/100 BaseT x 8
Connector	RJ45
Routing protocol	RIP-I, RIP-II, OSPF, Static
Supporting Protocols	PPP (IPCP/BCP), MLPPP, HDLC, Frame Relay, and Cisco compatible HDLC, NAT/NAPT, DHCP
Diagnostic	Ping, Trace route
QoS	Rate limit, Policy based Diffserv/DSCP
VLAN Q-in-Q	IEEE 802.1ad

Serial and Digital Access

DTE Interface (X.21)

Data Port	1 port
Data Rate	56 or 64 Kbps, n = 1 to 32

Connector	DB15S

DTE Interface (V.35)

Data Port	1 port
Data Rate	56 or 64 Kbps, n = 1 to 32
Connector	DB25S (optional conversion cable DB25S to M34 connector)

DTE Interface (RS232/V.24)

Data Port	1 port
Data Rate	56 or 64 Kbps *n, n=1 - 2
Mapping	Any sequential time slots

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

Data Port	Up to 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/Sync	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 connecters (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, 3-port)

Data Port	Up to 3 ports				
MUX	Maximum 3 subrate port / 64Kbps				
Data Rate	Asynchronous	Mux mode	0.6K, 1.2K, 2.4K, 4.8K, 7.2K**, 9.6K, 14.4K**, 19.2K		
		Independent mode	0.6K, 1.2K, 2.4K, 4.8K, 7.2K**, 9.6K, 14.4K**, 19.2K, 38.4K		
	Synchronous	Mux mode	0.6K, 1.2K, 2.4K, 4.8K, 7.2K**, 9.6K, 14.4K**, 19.2K		
		Independent mode	0.6K, 1.2K, 2.4K, 4.8K, 7.2K**, 9.6K, 14.4K**, 19.2K, 38.4K, 48K, 64K		
Connector	DB44				
	Port Number				
DB44	1		2		3
	Sync/Async		Sync/Async		Async
Alarm	Remote Alarm RTS Loss				
Loopback	To-DTE (To Line) To-DS1				
Electrical	RS232 Interface, DCE or DTE				

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

Sub Rate Data (8SRU)

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, 38.4K, 48K, 64K
		Independent mode	2.4K, 4.8K, 9.6K, 19.2K, 28.8K, 38.4K, 48K, 64K

	Port Number	1	2	3	4	5	6	7	8
Card Type	Eight RJ48	Async	Async	Async	Async	Async	Async	Async	Async
	Two DB44 + Two RJ48	Async/ Sync	Async/ Sync	Async	Async/ Sync	Async/ Sync	Async	Async	Async

Connector DB44 (port1, port2, port3), DB44 (port4, port5, port6), RJ48 (port7), RJ48 (port8)
Eight RJ48 (port 1 to port 8)

Conversion Cable A three-into-one conversion cable adapts the DB44 connector to 3 connecters (one DB9S and two DB25S)

Electrical RS232 Interface, DCE

*Future Option

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 RTS Loss		
Loopback	To-DTE To-DS1 (To Line)		
Electrical	DCE		
Protocol	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 RTS Loss		
Loopback	To-DTE To-DS1 (To Line)		
Electrical	DCE		
Protocol	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

DTE Interface (RS232)

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

DTE Interface (X.21/RS449/RS422/RS232/V.35/V.36/EIA530)

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

DTE Interface (X.21/RS449/RS422/RS232/V.35/V.36/EIA530)

Data Port	Up to 4 (Port 1 to 4)
Data Rate	Synchronous N*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.

8UDTEA Card

RS232/RS422/RS485 Data Interface Function

Data Port	8 port Universal DTE card
ASYNC Data Rate	200,300, 600, 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K, 128K bps by oversampling
Data Interface	RS232, RS485, RS422
Connector	RJ48C
Interface	DCE 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	
Data Port	Eight ports per card
Synchronous Data Rate	600, 1200, 2400, 4800, 9600, 19.2K, 38.4K bps
Data Interface	RS232
Connector	RJ45C
Application	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

OCU DP Interface Card

Number of Ports	1 port
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, out of service, UMC, MOS, TC, ABS, channel loopback, OCU and DSU loop-back
Loop to Network Test Codes	Zero code suppression, Idle

8 Port OCU-DP Interface Card

Number of Ports	8 ports

Connector	Eight RJ48S or one Telco 64
Line Status Indicator	Per Port 1 dual color LED; Red for LOS, Green for SYNC
Electrical Network Connection	Tip/Ring and Tip1/Ring1
Transmit Source Impedance	135 Ohms +/-20%
Receive Input Imdednace	135 Ohms +/-20%
Receiver Sensitivity	0 to 43 dB loop loss at 72K & 56K
Dynamic Range	0 to 34 all other rates Automatic line equalization
Pulse Amplitude	+/- 1.5V (+/-10%) peak, all rates except 9.6K +/-0.75 (+/-10%) peak at 9.6K Bipolar Return to zero, 50 duty cycle
Sealing Current	Typically 16mA DC
Operating Modes	4-wire DDS Switched 56 support is optional
Circuit Rates	SYNC: 2.4, 4.8, 9.6, 19.2, 56, 72 kbps (64k) clear channel Conforms with AT&T Pub 41458
Encoding and decoding rules	Use bipolar violation to indicate control information: Idle, out of service, Zero Subsitution 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 Custom defined remote loopback code BERT test support all ones, all zeros, 2047,511,63 pattern.
Fault and Performance	LOS, OOS, ES, SES and UAS alarm. Current, last 96 registry and 7 days performance storage.
Enviroment	Operating: 0-50°C Storage: -25-75°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

*6CDA G.703 Interface Card**

Data Port	6 ports
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

1CD G.703 Co-directional

Data Port	1 port
Interface	ITU G.703 64 Kbps co-directional interface
Connector	120ohm, RJ48
Line Distance	Up to 500 meters
Loopback	DTE Payload Loopback, Local Loopback

Data Processing

Dry Contact Type B Interface

Inputs -	
8-channel	2-port per card, 4-pair per port
Connector	RJ45
Internal Resistance	100 K
Activation Current	3 ma
Deactivation Current	1.5 ma
Allowable Current	4 ma

Outputs -	
8-channel	8-pair per card
Connector	Screw type
Initial Insulation Resistance	Min. 1000M ohm (at 500 Vdc)
Max. Current	2A
Max. Voltage	220 Vdc, 250 Vac

Dry Contact Type C 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	1 K	Initial Insulation Resistance	Min. 100M ohm (at 500 Vdc)
Activation Current	3 ma	Max. Current	5A
Deactivation Current	1.5 ma	Max. Voltage	100 Vdc, 250 Vac
Allowable Current	4 ma	Short-circuit Current	5A
Input port	Provide 3.3V output		
Latency (from input to output)	10ms		

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

ABRA Card

Analog Bridge Mode	Group: up to 8 groups per card Master/Slave Architecture Downstream: 2 to many (up to 14 Slave units) Upstream: many to 2
Voice Conference Hotline Mode with CAS Signaling	Group: up to 8 groups per card Any-to-any conference bridge Up to 16 members in one conference group Silence detection/suppression
RS232 Data Bridge Mode	Group: up to 8 groups per card Master/Slave Architecture Downstream : 2 to many (up to 14 Slave units) Upstream: many to 2
OCU-DP Data Bridge Mode (MJU)	Group: up to 4 groups per card Master/Slave Architecture Downstream: 1 to many (up to 14 Slave units) Upstream: many to 1
Voice Protection Mode	Group: up to 42 groups per card One Master to two Slaves for 1+1 protection Analog signals only
PCM encoder/decoder	Compatible with ITU-T G.711 A-law/Mu-law coding
LED Indicator	Multi-color indication
1:1 Card Protection[NOTE]	Dual-card redundancy

Note: Supported by QX3440-CCB controller FW v11.14.02, CCPA controller FW v12.05.01, CCPB-2GEa controller FW v23.02.01, CCPB-DCSa controller FW V.13.05.01, CCPB-8GEHSWa controller FW v33.01.01 and up.

Data Bridge Card

Data Port	Up to 8 ports (each card supports up to 128 DS0 for data bridge function without protection)
Connector	8 RJ48C or 2 RJ48C + 2 DB44
Feature	20 end points per multi-drop circuit into a 56K or 64K channel (1 DS0) Each port supports bridge function to N remote Trib. Site (N=1 to 20)
Data Rate	Asynchronous: Support to receive 1200 to 19200 bps asynchronous data via oversampling channel
Bridge function	one port with one DS0 to many (Maximum is 20 for remote Tributary data box)
Protection	1+1 on adjacent ports, adjacent cards, or on different chassis Virtual Port 1 to Virtual Port 4 (1 to 128 1+1 port

DS0):

Virtual Port 1 to Virtual Port 3 (1 to 96 DS0): 1+1 card

Virtual Port 1 to Virtual Port 3 (1 to 96 DS0): Chassis+site

Note: Each virtual port supports up to 32 DS0

Teleprotection Access

C37.94 Interface

SFP modules for **QX3440-4C37-LSFOM** and **QX3440-M1C37-LSFOM**

ZRATT

Multi-Mode, 2Mbps, 820nm, 2KM, ST/UPC connector

Tx						Rx						Note
Power (dBm)			Wavelength (nm)			Power (dBm)			Wavelength (nm)			
Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	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

QRATT

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

Tx						Rx						Note
Power (dBm)			Wavelength (nm)			Power (dBm)			Wavelength (nm)			
Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
-23	--	-11	790	--	870	-32	--	-11	790	--	870	50/125µm Fiber Cable
-19	--	-11				-32	--	-11				62.5/125µm Fiber Cable

NRB2T

Single-Mode, 2Mbps, 1310nm, 20KM, ST/UPC connector

Tx						Rx						Note
Power (dBm)			Wavelength (nm)			Power (dBm)			Wavelength (nm)			
Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
-20	--	0	1261	1310	1360	-32	--	0	1260	--	1610	

SFP modules for **QX3440-4C37SFPA**

MRPTD

Multi-Mode, 2Mbps, 850nm, 2KM, LC connector with DDM

Tx						Rx						Note
Power (dBm)			Wavelength (nm)			Power (dBm)			Wavelength (nm)			
Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
-23	--	-11	830	850	860	-32	--	-8	790	--	870	50/125µm Fiber Cable

-19	--	-11										62.5/125µm Fiber Cable

PRB2D

Single-Mode, 2Mbps, 1310nm, 20KM, LC connector with DDM

Tx						Rx						Note
Power (dBm)			Wavelength (nm)			Power (dBm)			Wavelength (nm)			
Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
-19	--	-11	1290	1310	1350	-32	--	-8	1260	--	1360	

Transfer Trip Card

Input

Number of channels	4-channel : 4 pairs per card
Input Connector	Screw type
Voltage Range	48/125V type

Output

Number of Channels	4-Channel: 4 pairs per card
Output Connector	Screw type
Max Current	30A (200ms per C37.90)
Max Voltage	280 Vdc
Operation time	3ms

Alarm Relay

Maximum continuous current	1A (inductive)
Maximum breaking current	1A (resistive)
Maximum open circuit voltage	280 Vdc
Maximum operation time	15ms

Environmental

Operating temperature	-20°C to +60°C
Humidity	5 - 95% non-condensing

Isolation

ANSI	ANSI C37.90.1 SWC

EMI/RFI

ANSI	ANSI C37.90.2

Voice and Analog Access

Voice Card (QEMA)

Connector	One 44-pin connector, adaptor cable included for 4 RJ45 connectors.
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 or 900 Ω
Gain Adjustment (Per-port setting)	-10 to +7 dB / 0.1dB step for transmit (D/A) gain
Gain Variation	± 0.5 dB at 0 dBm0 input
Frequency Response	± 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 TO (Transmission Only)
M Lead Output Current	18 mA (maximum)
E Lead Sensor Current	
EM Type Setting	

Relative Humidity	0.3 mA (minimum)
Carrier Connection	Jump Selectable
	0% to 95%
	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.

Voice Card (8EMA)

Connector	Eight RJ45 or One Telco 64
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ-law, user selectable together for all
Impedance	Balanced 600 or 900 ohms
Gain Adjustment (Per-port setting)	-16 to +7 dB / 0.1dB step for transmit (D/A) gain
	-16 to +14 dB / 0.1dB step for receive (A/D) gain
I/O Power Range	A/D Analog input level: -66 dBm (0.00039 Vrms) ~ + 3 dBm (1.09 Vrms)
	D/A Analog output level: -66 dBm (0.00039 Vrms) ~ + 4 dBm (1.22 Vrms)
Gain Variation	±0.5 dB at 0 dBm0 input
Frequency Response	±0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
Longitudinal Conversion Loss	> 46dB
Total Distortion	＞ 35 dB at 0 dBm0 input
Idle Noise	＜ -65 dBm0p
Carrier Connection	Side A (exchange side) and Side B (carrier side) setup by side switch
Idle Channel Noise	Max. –65 dBm0p
Wire Mode	2 wire and 4 wire per card software programmable
Signaling	Type 1, Type 2, Type 3, Type 4, and Type 5, Transmit only (programmable)
Modems	Full compatibility with V.90 modems

- 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 (old crank-handle hot-line telephones), MRD (Manual Ring Down) Voice Card*

Connector	RJ11 x 4
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ-law, user selectable together for all
Impedance	Balanced 600 or 900 ohms (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 dBm0p
Signaling	
Minimum Detectable Ringing Voltage	16 Vrms
Crank Detectable Across	L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND)
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:
	1. PLAR OFF
	Continuous
	Ring duration depends on cranking time
	One Time
	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
	2. 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	Programable

- Signaling is carried transparently by the digitizing process.
- Use Magneto card default setting (PLAR OFF) for communications between magneto telephones
- Use Magneto card PLAR ON mode setting for communications between a magneto telephone and a regular telephone
- PLAR stands for *Private Line Auto Ring down.*

12 MAGA (old crank-handle hot-line telephones), MRD (Manual Ring Down) Voice Card

Connector	RJ11 x 12 or Telco64 x 1
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) Ring duration depends on cranking time 2. 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	Programable

- Signaling is carried transparently by the digitizing process.
- Use Magneto card default setting for communications between magneto telephones
- Use Magneto card PLAR mode setting for communications between a magneto telephone and a regular telephone

Voice Card (QFXOA)

Connector	Four RJ11 connector	
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF	
Encoding	A-law or μ-law, user selectable together for all	
AC Impedance	Balanced 600 or 900 ohms (selectable together for all)	
Longitudinal Conversion Loss	> 46dB	
Gain Adjustment	-15 to +10 dB / 0.1dB step transmit & receive	
Signal/ Distortion	> 25dB with 1004 Hz, 0dBm input	
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712	
Idle Channel Noise	Max. –65 dBm0p	
Variation of Gain	±0.5dB	
FXO	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
Signaling Bit A,B,C,D	Per-port configurable	

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

Voice Card (QFXSA)

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

Connector	1, 2, 3, or 4 FXS per RJ11 connector
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	±48Vdc with 25mA current limit per port Jumper Selectable: 25mA, 30mA, 35mA
Ringing	Support 2 REN per port (1 REN = 6930Ω + 8 μF) 16.7Hz, 20Hz, 25 Hz, 50Hz (user programmable) 64 / 78 Vrms by jumper setting (Default is 78 Vrms) 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.

Voice Card (12FXSA, 12FXOA)

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	FXS: -21 to +3 dB / 0.1dB step transmit & receive FXO: -21 to +10 dB / 0.1dB step transmit & receive	
Signal/ Distortion	> 25dB with 1004 Hz, 0dBm input	
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712	
Idle Channel Noise	Max. –65 dBm0p	
Variation of Gain	±0.5dB	
FXO	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
FXO Signaling Bit A,B,C,D	Per-port configurable	
FXS Loop Feed	-48Vdc with 25mA current limit per port Jumper Selectable: 25mA(default=25mA), 30mA, or 35mA(sn=S1)	
FXS Signalling	Normal / PLAR: Private Line Auto Ring down	
FXS Ringing	1 REN at 5K meters per port 16.7Hz, 20Hz, 25Hz, 50Hz, user selectable for all ports Jumper selectable: 64, 76, and 85 Vrms (triangle wave), (default= 76 Vrms for Ring Voltage) 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR ON	
FXS Tone	Alarm Tone: 480Hz/620Hz/-24dBm Ring Back Tone: 440Hz/480Hz/-19dBm	
FXS functions	Basic functions: Battery Reverse, Loop Start, 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.
- FXS specification shown above support FXS hardware version N and up.

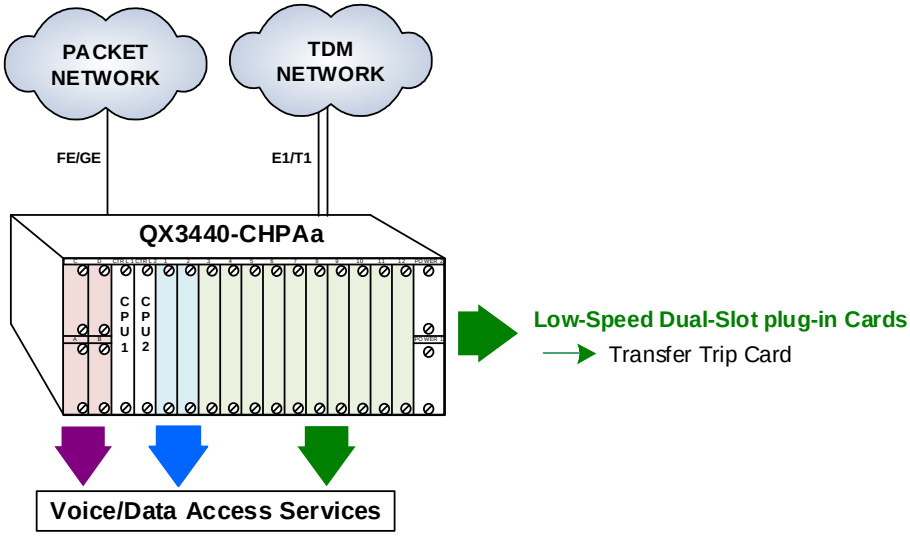
Clock and Alarm

CLKa Card Specifications

Clock Input (CLK1_In, CLK2_In)	2.048Mbps, 1.544Mbps, 2048KHz
Clock Output (CLK1_Out)	2.048Mbps, 1.544Mbps, 2048KHz
Alarm Output (Fuse, SYS_ALM)	Max. Current: 1A for 24VDC, 0.625A for 48VDC Fuse alarm, System alarm
LED Indicator	Multi-color LED indication

Application Illustrations

QX3440 Uplink/Downlink



Mini-Slot plug-in Cards

- 1 - channel E1
- 1 - channel T1
- Mini Quad E1
- Mini Quad T1
- 2-LAN port/64-WAN port Router (RTA)
- 1 - channel Fiber Optical Interface
- 1 - channel DTE (1X.21, 1V.35, 1RS232)
- 1 - channel G.703 Co-Directional
- 3 - channel RS232
- 1 - channel OCU-DP
- ECA
- ABRA
- QMAGA*
- QFXOA
- QFXSA
- QEMA
- M1C37
- CLKa
- CLKb*
- CLKc*

High-Speed Single-Slot plug-in Cards

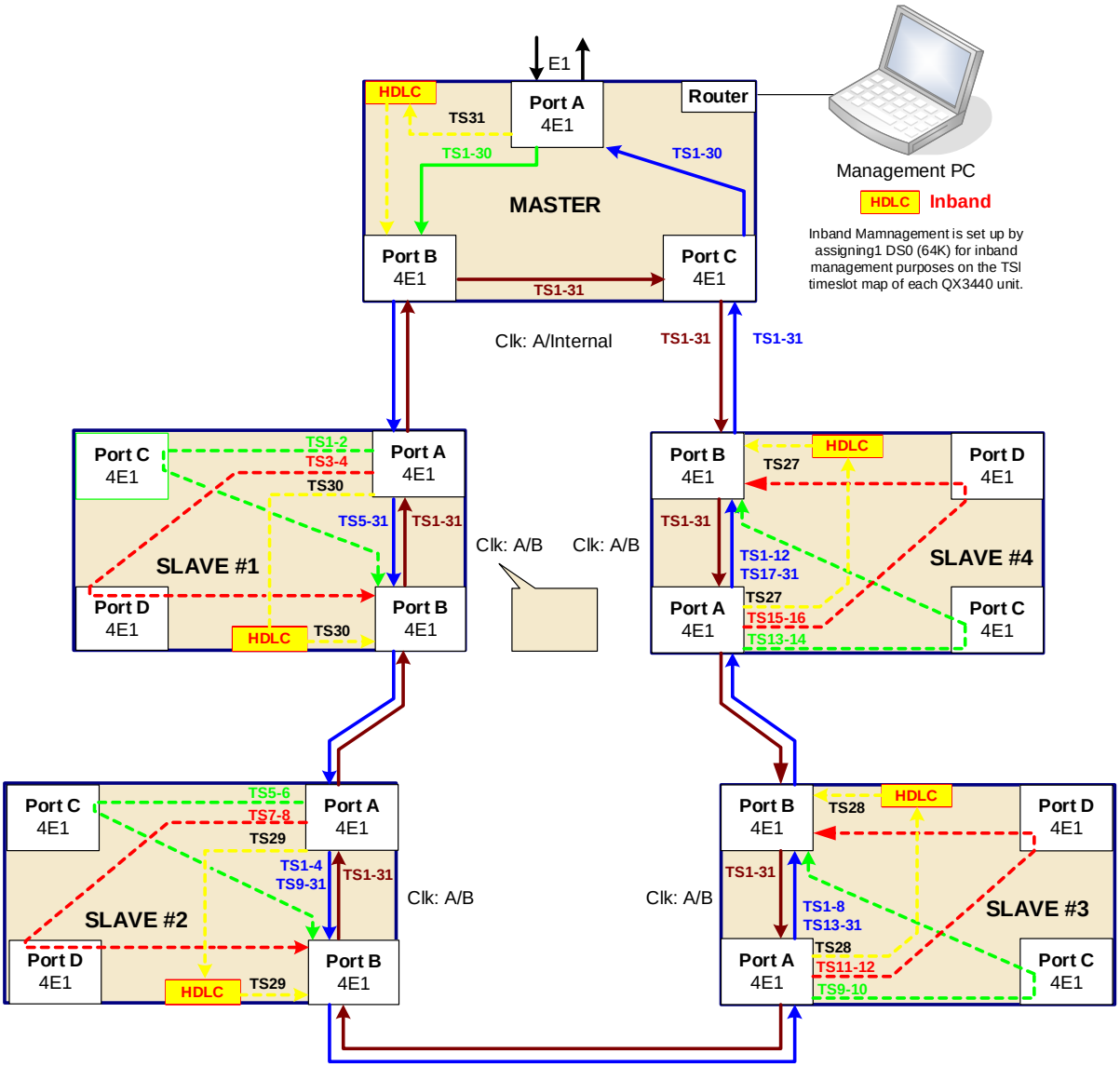
- 8 GbE interface plug-in module*

Low-Speed Single-Slot plug-in Cards

- 3 - channel E1
- 3 - channel T1
- 4 - channel E1
- 4 - channel T1
- 4 - channel C37.94
- 4 - channel C37.94 (SFP port)
- 2 - channel G.SHDSL w/o line power
- 4 - channel G SHDSL w/o line power
- 4 - channel TDM over Ethernet (TDMoEA)*
- 8 - channel Dry Contact I/O type B
- 8 - channel Dry Contact I/O type C
- 8 - channel Data Bridge
- 8 - channel OCU DP
- 8 - channel 2W/4W E&MA
- 12 - channel FXSA
- 12 - channel FXOA
- 12 - channel Magneto
- 8 - channel RS232 with X.50 subrate (8RS232)
- 8 - channel Subrate Data Unit (8SRU)
- 8 - channel Universal DTE (8UDTEA)
- 6 - channel Universal DTE (6UDTEA)
- 6 - channel G.703 at 64 Kbps (6CDA)*
- 6 - channel RS232 with V.110 encoding (6RS232A) (D)
- 8 - LAN - port / 64 - WAN - port Router (RTB)
- 1 - channel Fiber Optical Interface (1FOMA)

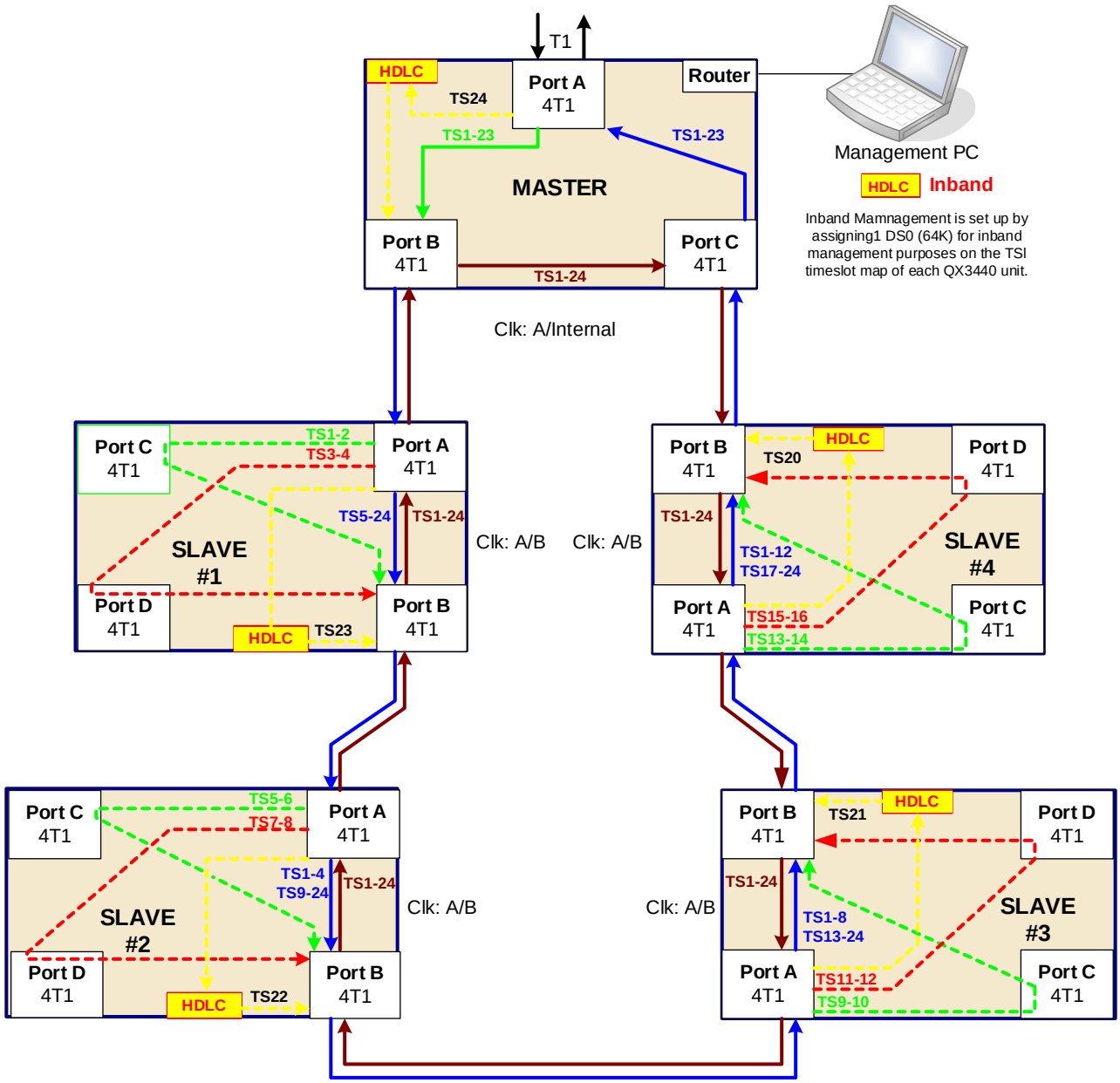
*Future option
(D) Discontinued

ULSR Ring Application (E1)

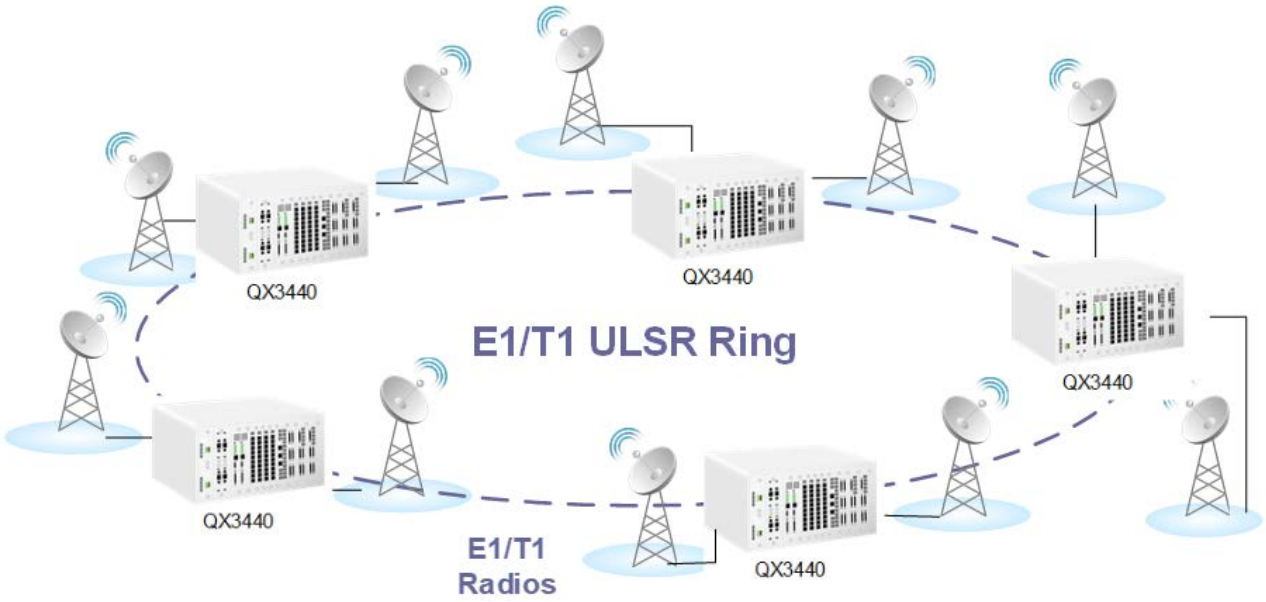


Note: ULSR ring does not suport E1 unframed mode. Users must use E1 framed mode to set up a ULSR ring.

ULSR Ring Application (T1)



QX3440 ULSR Ring Application through E1/T1 Radio



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