

# QX 3440 HIGH DENSITY MULTIPLEXER/CROSS-CONNECT

## QX3440 & QX3340-S

- **DACS** (Digital Access Cross-connect System) with full DS0 non blocking cross-connect with up to 128 or 56Mbps
- Up to 64E1 or T1 WAN or 28E1 or T1 WAN ports for QX3440 or QX3440-S
- Full modular system:
  - 2 slots controller CPU,
  - 2 slots power supplies ,
  - 4 mini slots
  - 12 (or 3 slots for -S)
- Redundant CPU, power, E1 with hot swappable cards.

### E1/T1 Protection:

- 1+1 with adjacent card
- PDH ULSR E1 ring
- PDH SNCP ring
- Circuit protection with external Y-Box

### 1/2 slot plug-in card types:

- ◇ E1/E1: G703,G704,E1-CAS
- ◇ 4E1/T1: G703 or CAS
- ◇ 4 E1 Fiber optic
- ◇ E1 ATM/Frame Relay
- ◇ Router/Bridge 2 10/100baseT
- ◇ 1 X21 or V35 or RS530

### 1 slot DTE plug-in card types:

- ◇ 4 E1 or T1
- ◇ 3 E1 or 3 T1 SNCP
- ◇ 8 G.703 at 64 Kbps
- ◇ 4 G.SHDSL (n\*64K) 2W
- ◇ 2 G.SHDSL (n\*64K) 4W
- ◇ 8 voices 2W/4W E&M
- ◇ 12 voices FXS
- ◇ 12 voices FXO
- ◇ 12 voice with Magneto
- ◇ 8 Dry contact IN & OUT
- ◇ Router/Bridge and 8 ports switch
- ◇ Conference RS/E&M/FXS
- ◇ 8-channel RS232
- ◇ 8 Dry contacts
- ◇ 1 or 4 C37.94
- ◇ TDMoE w 2 combo WAN



## ACCESS MUX CROSS CONNECT



QX3440-S

The 5U chassis **QX3440** is a 64 E1 or T1 Multiplexer that can combine various digital access interfaces into multiples E1 or T1 lines for convenient transport and switching.

12 DTE slots provide access for a variety of interfaces, including G.SHDSL, IDSL, RS232, V.35, V36, RS422, RS485, E&M, FXS, and FXO.

Up to 128Mbps or 64 x 31 TS could be cross-connected in this devices.

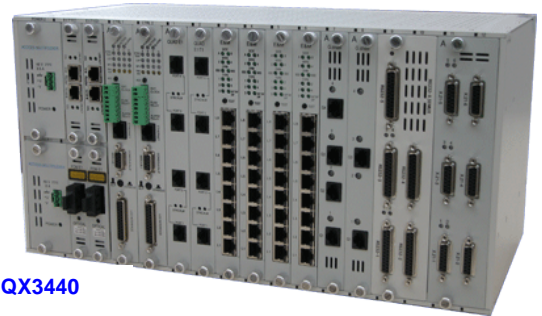
The 2,5U **QX3440-S** chassis use the same card and provide 28 E1 or 56Mbps of cross-connect.

This unit is a full cross connect or DACS for Telco or large infrastructure in utilities, transport and defense.

### Dual slot DTE plug-in card types:

- ◇ 6-channel X.21
- ◇ 6-channel V.35
- ◇ 6-channel V.36
- ◇ 6-channel EIA530
- ◇ 5-channel RS232 w. X.50 sub rate
- ◇ 24-channel FXS
- ◇ 24-channel FXO
- ◇ 24-channel Magneto

	QX3440	QX3440-S
<b>Multiplexer Cross-Connect</b>	128Mbps	56Mbps
<b>Nb long slots</b>	12	3
<b>Nb mini slots</b>	4	4
<b>Max E1/T1 ports</b>	64	28



QX3440

The **QX3440 / QX3440-S** support for all of this E1 or T1 WAN the non blocking features of Multiplexing, Drop & Insert, cross-connect, Broadcasting and Multicasting, at E1 or TS level.

The **QX3440 / QX3440-S** support the protections: (1+1) in Bus card, the PDH ULSR Ring up to 16E1 and 16 different rings and the PDH SNCP protection at the TS level over large networks.

Redundancy is available in dual CPU controller and power supply options, making it an excellent fit for critical applications. And, though the chassis does not contain and has no need for fan cooling, a fan tray is available.

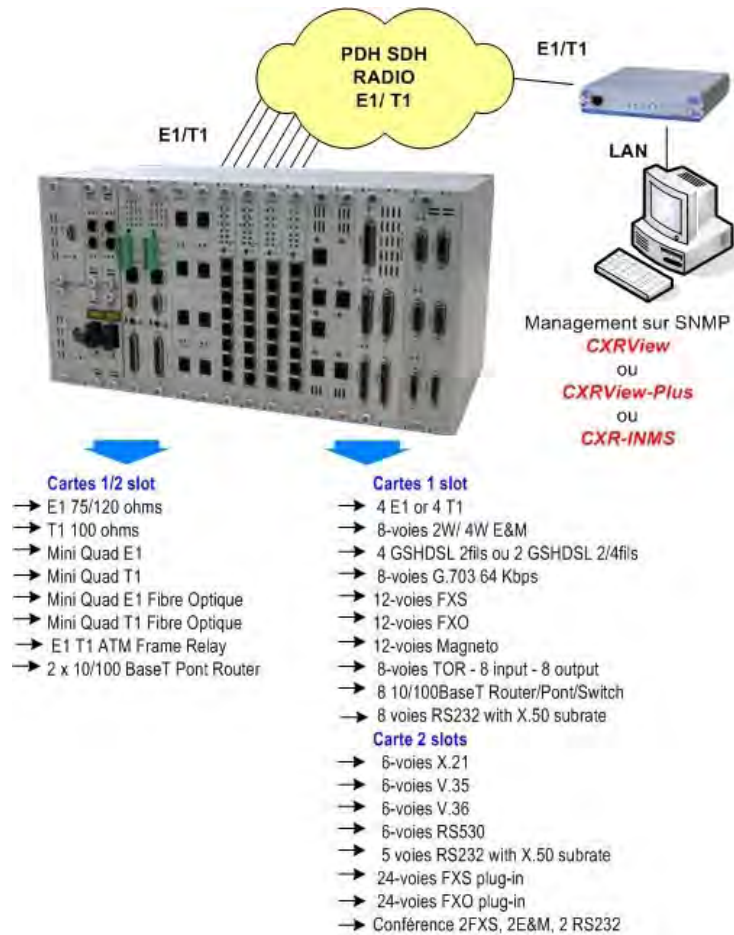
The router/bridge and router/bridge with switch support VLAN, VLAN tagging, and level 3 static/RIP1/RP2/OSPF routing protocol.

The **QX3440** supports local control and diagnostics by using an external 2-line by 40-character LCD display and keypads, or by using a VT-100 terminal connected to the console port. The QX 3440 also supports Ethernet, SLIP, Telnet, and SNMP, so that it can be controlled and diagnosed from remote locations as well. An in-band management channel and CXRView with GUI are available. In addition to the LCD display, there is one status LED for each BdB, G.SHDSL, V.xx, RS422/RS485 or RS232 interface and 4 LEDs for each of the E1 or T1 lines.

The **QX3440** consists of a rugged chassis made from reinforced aluminum, giving this equipment a more durable structure and a longer physical life.

# ORDERING INFORMATION

Chassis and cards	Description	Notes	
QX3440	5U 19" Main unit chassis without CPU, power, E1/T1 card, 128 Mbps	Deliver with rack mount 19" and 23"	
QX3440-S	2.5U 19" Main unit chassis without CPU, power, E1/T1 card, 56 Mbps Don't support G.SHDSL power feeding card	Deliver with rack mount 19" and 23"	
QX3440-CPU	CPU card with cross-connect with E1 clock	2 for redundancy	
QX3440-CPU-4E1-RING	CPU card with cross-connect & E1 ring software 4E1 or 4FOM	2 for redundancy	
QX3440-CPU-T1	CPU card with cross-connect with T1 clock	2 for redundancy	
QX3440-E1	1 channel E1 interface, G703/G704/CAS		1/2 slot 4 slots available
QX3440-T1	1 channel T1 interface, G703/G704/CAS		
QX3440-MQE1-aa	4 channel E1 interface, G703/G704/CAS connector DB25, support ULSR-RING	aa=75 delivered with cable 75ohms 8 BNC aa=120 with cable 120 RJ45M	
QX3440-4E1FO-MM	4E1 Optical fiber interface, G703/G704/CAS/NonCAS, support ULSR-RING	Multi-Mode 2 km	
QX3440-4E1FO-SMxx	4E1 Optical fiber interface, G703/G704/CAS/NonCAS, support ULSR-RING	Single Mode 20, 50, 100, 120 km	
QX3440-RTA	Bridge/Router interface: 2 Ethernet ,64 WAN, maxi throughput 4Mbps	2 x 10/100BaseT	
QX3440-4E1-aa	4 channel E1 interface, G703/G704/CAS support ULSR-RING	aa= 75ohms (2 BNC) or 120ohms (RJ45)	1 slot Module 12 slots available
QX3440-3E1-aa	3 channel E1 interface, G703/G704/CAS support PDH-SNCP-RING	aa= 75ohms (2 BNC) or 120ohms (RJ45)	
QX3440-4T1	4 channel T1 interface, , G703/G704/CAS		
QX3440-8G703-64K	8 channel G703 interface at 64K data rate (J64)		
QX3440-10U or 6U	10 channel IDSL 56/64/112/128k	Remote modem BB3500 : X21, V34, G703 (J64)	
QX3440-4GSH	4 channel GSHDSL modem 2 wires	Remote modem MD42xx/MD44xx SH33xx and CopperLAN in 2 wire	
QX3440-2GSH	2 channel GHDSL modem 2 or 4 wires		
QX3440-8E&M	8 channel 2W/4W E&M plug in module		
QX3440-12FXS	12-channel FXS plug in module, w/600/900 impedance, Battery Reverse, PLAR	Without Ground start and metering pulse.	
QX3440-12FXO	12-channel FXO plug in module, w/600/900 impedance, Battery Reverse		
QX3440-12FXS-M	12-channel FXS plug in module, w/600/900 impedance, Battery Reverse, PLAR	With metering pulse.	
QX3440-12FXO-M	12-channel FXO plug in module, w/600/900 impedance, Battery Reverse		
QX3440-SW8RT	Bridge/Router with switch 8 ports 10/100BaseT switch ,64 WAN	Maxi throughput 8Mbps	
QX3440-TOR-8I-8O	8 channels Input and 8 channels output of Dry Relay contact		
QX3440-8RS232-A	8 RS232 RJ45F Interface asynchronous QX3440		
QX3440-8RS232-A4S	8 RS232 (2 RJ45+ 2 DB44F) asynchronous and 4 synchronous for QX3440	Include 2 cables DB44M to 2 DB25F+ 1DB9F	
QX3440-TDMoE	4 E1 TDMoIP/CESoE/SAToPSN, 2 WAN Combo GE, 2 LAN GE, clock 10 <sup>-7</sup>	For transport of payload	
QX3440-TDMoE-S	4 E1 TDMoIP/CESoE/SAToPSN, 2 WAN Combo GE, 2 LAN GE, clock 16 x 10 <sup>-9</sup>	For transport of payload and synchronization	
QX3440-6X21-DB25	6-channel X21/V11, n 64k, w/ DB15 adaptor		2 slots Module
QX3440-6V36-DB25	6-channel V36/RS422/RS485/X21-V11/V36, n 64k, w/ DB25 connector		
QX3440-24MAG-xx	24-channel Magneto plug in	xx = <b>1G</b> = L1 GND; <b>12</b> = L1 L2	
QX3440-24FXS	24-channel FXS plug in module, w/600/900 impedance, Battery Reverse, PLAR, w/ o Ground start and metering pulse.	Telco 50 points	
QX3440-24FXO	24-channel FXO plug in module, w/600/900 impedance, Battery Reverse, w/o Ground start and metering pulse.		
QX3440-PW150	Power supply module -36 to -72V 150 Watt for QX3440 only	Order 2 single DC for Dual DC application	
QX3440-PW150-24	Power supply module -12 to -36V 150 Watt for QX3440 only **** Don't support FXO/FXS		
QX3440-S-PW48	Power supply module -36 to -72V 100 Watt for QX3440-S only	Order 2 single DC for Dual DC application	
QX3440-S-PWAC	Power supply module AC 110/230V 150 Watt for QX3440-S only	Only ONE AC power supply	
QX3440-FAN	2 fan chassis 1 U	Power supplied by QX chassis	
QX3440-LCD	LCD screen	Optional	
QX3440-SW-4E1-RING	E1 ring software 4E1 or 4FOM (integrated in QX3440-CPU-4E1-RING)	Software Option	
999-355-031	V.35 DB25 to M34F DTE Cable		
999-355-030	V.35 DB25 to M34M DCE Cable		
PW-230AC-48-150-xx	Power supply 230Vca to -48Vcc 150W	Xx= Eur/UK/USA	
PROTEC-4E1	1 for 1 protection Y-Box with RJ48C connectors (4E1)		
PROTEC-16E1	1 for 1 protection Y-Box with RJ48C connectors (16E1)		



## QX 3440 QUAD E1/T1 MUX PRODUCT SPECIFICATIONS

### Network Line Interface - E1, MQE1, 4E1 and 3E1 card

Line Rate	2.048 Mbps $\pm$ 50 ppm	Framing	ITU G.704
Line Code	AMI or HDB3	Connector	BNC/RJ48C
Input Signal	ITU G.703 to -10dB	Electrical	75 ohm Coax/120 ohm twisted pair
Output Signal	ITU G.703	Jitter	ITU G.823

- E1, MQE1, 4E1 & 3E1 support 1+1 protection
- 4E1, MQE1 and FO 4E1 support ULSR protection
- 3E1 and future FO-3E1 support SNCP protection.

### Network Line Interface - T1 and 4T1

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

### Fiber Optical Interface

◇ 4 E1 or 4 T1	G703, G704, CAS or Non CAS
◇ Source	LED or MLM Laser
◇ Wavelength	Multimode 1310 & Singlemode 1310 +/- 50 nm; 1550 +/- 40 nm
◇ Power	-26 or -8 dBm
◇ Receiver Sensivity	-38 dBm at BER < 10 <sup>-10</sup>
◇ Data Rate	8 Mbps (4*2Mbps)
◇ Status report	Card type, loopback, LOS
◇ Management	Remote management via EOC channel
◇ System gain	30 dB
◇ Line code	Scrambled NRZ
◇ Detector type	PIN-FET
◇ Fiber type	Single 20km and multimode 2Km
◇ Connector	SC/PC
◇ Protection	PDH ULSR optical ring

# QX 3440 SERIAL INTERFACES - PRODUCT SPECIFICATIONS

## G.SHDSL Line Interface

- > Up to twelve 4-port G.SHDSL cards.
  - > Up to six cards with line power option, as the line power cards use two plug-in slots.
  - > Full duplex with adaptive echo cancellation MDSL line coding.
  - > Unconditioned 19-26 AWG twisted pair.
  - > Line rate: 272, 400, 528, 784, 1168, 1552, 2064, 2320 for data rates n x 64 Kbps.
- Compatible with CopperLAN and MD4200 in 2 wire mode  
Compatible with MD4400 in 4 wire mode.

## U Interface or BdB

- > Data Port Up to twelve 10-port or 6-port DTU cards
- > Type Full duplex with echo cancellation
- > Line Type Unconditioned twisted pair 19-26 AWG
- > Line Rate 56, 64, 112 or 128 Kbps
- > Line Coding 2B1Q
- > Connector RJ48C

## DTE Interface (V.35)

- > Data Port Up to six 6-port DTE V.35 cards
- > Data Rate n x 64 Kbps
- > Connector DB25S (optional conversion cable DB25S to M34 connector)

## DTE Interface (V.36/RS422/RS485/V35)

- > Data Port Up to six 6-port DTE V36/RS422/RS485/V35/ X21cards
- > Data Rate n x 64 Kbps, support asynchronous with over sampling
- > Connector DB25S (optional conversion cable DB25S to M34 connector)

## DTE Interface (X21)

- > Data Port Up to six 6-port DTE X21/V11 cards
- > Data Rate n x 64 Kbps
- > Connector DB15F

## DTE Interface (RS232-X.50 mux.) 5 ports card

- > Data Port Up to six 5-port RS232 cards with X.50 plug-in, subrate, with subrate mux
  - > MUX (a) 5 independent RS232, or (b) 5 subrate RS232 (X.50) muxed to 64K
  - > Data Rate Mode (a) 5 independent 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 48K , 64K SYNC  
RS232 : 1.2K, 2.4K, 4.8K, 9.6K, 19.2K ASYNC  
Mode (b) 5 mux together : 1.2K, 2.4K, 4.8K, 9.6K SYNC / 1.2K, 2.4K, 4.8K, 9.6K ASYNC
- NOTE:** Mode (a) and mode (b) cannot be muxed.
- > Connector DB25F
  - > Clock Internal, external (TTM) , Normal or Inverted

## DTE Interface (RS232-X.50 mux.) 8 ports card asynchronous QX3440-8RS232-A

- > Data Port Up to twelve 8-ports RS232 cards with X.50 plug-in, subrate, with subrate mux
- > Connector 8 RJ45

## DTE Interface (RS232-X.50 mux.) 8 ports card: 8 asynchronous and 4 synchronous QX3440-8RS232-A4S

- > Data Port Up to twelve 8-ports RS232 cards with X.50 plug-in, subrate, with subrate mux
- > Connector 2 RJ45 + 2 DB44F with 2 cable DB44M to 2 DB25F and 1 DB9F

## Dry Contact interface card

- Dry Contact Outputs 8 pairs per card with screw  
Insulation resistance 100M ohms.  
Support Normal Closed/Open,  
Max Current 5A, maxi voltage 100Vdc or 250Vac
- Dry Contact mode IP-Mode Collect data and send alarm to console ou TRAP to SNMP/CXRview over CPU  
IP-Mode Received order from console or SNMP/CXRview over CPU  
TDM-Mode transmit dry contact change over E1. Use 1 TS for 1 port or 4 contacts.
- Dry Contact Inputs 8 pairs per card : 2 port of 4 pairs , 2 RJ45  
Internal resistance of 1K,  
3mA for current activation, 1,5mA for current deactivation, maxi 4mA

# QX 3440 VOICE INTERFACES - PRODUCT SPECIFICATIONS

## Voice Card (8 E&M)

Connector	RJ45 connector
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or $\mu$ -law, user selectable together for all
Impedance	Balanced 600 or 900 ohms
Longitudinal Rejection	55 dB
Longitudinal Max	2.5 volts peak AC
Loss Adjustment	0, 3, 6, or 9 dB transmit & receive
Gain Adjustment	7 to -16 dB transmit & receive
Signal/Distortion	> 46dB with 1004 Hz, 0dBm input
Frequency Response	- 0.25 to -1 dB from 300 to 3400 Hz
Signaling	Type 1, Type 2, Type 3, Type 4, and Type 5, A side and B side

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.

E&M Signaling bits		E&M							
		M - Tx				E - Rx			
NOTE: * = Don't care.		A	B	C	D	A	B	C	D
Normal	IDLE - ON HOOK	0	0	0	1	0	0	*	*
	ACTIVE - OFF HOOK	1	1	0	1	1	1	*	*
A-Bit Invert	IDLE - ON HOOK	1	1	0	1	1	1	*	*
	ACTIVE - OFF HOOK	0	0	0	1	0	0	*	*

## Voice Card (12 FXS, 12 FXO)

Connector	RJ11
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or $\mu$ -law, user selectable together for all
Impedance	Balanced 600 or 900 ohms (selectable together for all)
Longitudinal Rejection	55 dB
Longitudinal Max	2.5 volts peak AC
Loss Adjustment	7 to -16 dB / 0.5 step transmit & receive
Signal/ Distortion	> 46dB with 1004 Hz, 0dBm input
Frequency Response	- 0.25 to -1 dB from 300 to 3400 Hz
FXS Loop Feed	Nominal - 48Vdc with 10mA current limit
FXO Ringing REN	0.1B (AC)
FXS Ringing	1REN at 5K meters per port 16.5Hz, 20Hz, 25Hz, 50Hz, user selectable for all 86 v rms (sine wave), 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR
Signaling	Metering pulse 12KHz, 16KHz, Metering level 0dBm, -24dBm
Signaling Bit	Programable

All in-band signaling tones are carried transparently by the digitizing process. 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.

Signaling bits FXS/FXO NOTE 1: * = Don't care. NOTE 2: INVERT means the 0 & 1 of the A-Bit are inverted.		FXS								FXO							
		Tx				Rx				Tx				Rx			
		A	B	C	D	PLAR OFF		PLAR ON		A	B	C	D	A	B	C	D
Normal	ON HOOK	0	1	0	1									0	*	*	*
	OFF HOOK	1	1	0	1									1	1	*	*
A-Bit Invert	ON HOOK	1	1	0	1									1	*	*	*
	OFF HOOK	0	1	0	1									0	1	*	*
Normal	NO RING					*	1	*	*	0	*	*	*	0	1	1	*
	RING					0	0	*	*	1	1	*	*	0	0	1	*
A-Bit Invert	NO RING					*	1	*	*	1	*	*	*	0	1	1	*
	RING					0	0	*	*	0	1	*	*	0	0	1	*
Normal Battery						*	*	*	0	*	*	*	0	*	*	*	0
Reverse Battery						*	*	*	1	*	*	*	1	*	*	*	1

## QX 3440 ROUTER/BRIDGE CARD - PRODUCT SPECIFICATIONS

### Router/Bridge (1/2 slot)

Number of ports	2 LAN ports, 64 WAN from 1 to 32 IT
Interface	2 * 10/100 BaseT
Connector	2 RJ45
Function	Bridge and Router
Routing Protocol	RIP-I, RIP-II, OSPF
VLAN	Transparent au VLAN or Tagging or VLAN mapping per IT
Protocols	TCP/IP, PPP, MLPPP, HDLC, HDLC Cisco, Frame Relay
Rates	N* 64K channelized over E1/T1 Maxi 2Mbps or 4Mbps en MLPPP
Function	Server et Relay DHCP, QoS
Protocol	Rapid Spanning Tree Protocoles 802.1w
Security	NAT, NAPT, Firewall
Management	Over the QX3440 or IN-Band over 1 TS or over Ethernet

### Router/Bridge with 8ports Swich (1 slot)

Number de ports	8 ports LAN, 64 WAN de 1 à 32 IT
Interface	8 * 10/100 BaseT
Connector	8 RJ45
Function	Pont , Router, Switch
Routing Protocol	RIP-I, RIP-II, OSPF
VLAN	Transparent au VLAN or Tagging or Mapping the VLAN per IT
Protocol	TCP/IP, PPP, MLPPP, HDLC, HDLC Cisco, Frame Relay
Rates	N* 64K channelized sur E1/T1 Maxi 2Mbps, 4Mbps or 8Mbps in MLPPP
Function	Server et Relay DHCP, QoS
Protocol	Rapid Spanning Tree Protocoles 802.1w
Security	NAT, NAPT, Firewall
Management	over QX3440 ou In-Band over 1 TS or over Ethernet

# QX 3440 SYSTEM - PRODUCT SPECIFICATIONS

## MAIN

### Front Panel

LED 1 per U/MDSL/V.35-interface, ACO, Power, SYNC/TEST, LOF, BPV, RAI/AIS

### Physical /Electrical

Dimensions **QX3440 5U - 19"** 482 x 225.5 x 220 mm (W x H x D)  
**QX3440-S 2.5U - 19"** 482 x 112,75 x 220 mm (W x H x D)

Power **QX3440** Single or Dual -48V DC (-36 to -72V) , 150 Watts max.  
 Single or Dual -24V DC (-12 to -36V) , 150 Watts max. Mix not permitted  
**QX3440-S** Single or Dual -48V DC (-36 to -72V) 100 Watts max  
 Single 110/230V AC 150 Watts max

Temperature 0-50 °C  
 Humidity 0-95%RH (non-condensing)  
 Mounting Desk-top stackable, 19" /23" rack mountable  
 Line Power Supply (For G.SHDSL card only) Available only with DC power.  
 (For G.SHDSL card only) 60 mA constant current source, selectable peak voltage of 190 Vdc

### Clock Source

- ◇ Internal, E1/T1 Line, External, SSM modes mainly used for Ring

### Alarm Relay

- ◇ Alarm Relay, Fuse alarm, and performance alarm

### System Configuration Parameters

- ◇ Active Configuration, Stored Configuration, and Default Configuration (Stored in Non-volatile Memory)

### Supervisor

- ◇ RS232, VT100 - front panel
- ◇ 10 Base-T, Ethernet, SNMP - front panel
- ◇ In-band 64 Kbps

### Performance Monitor

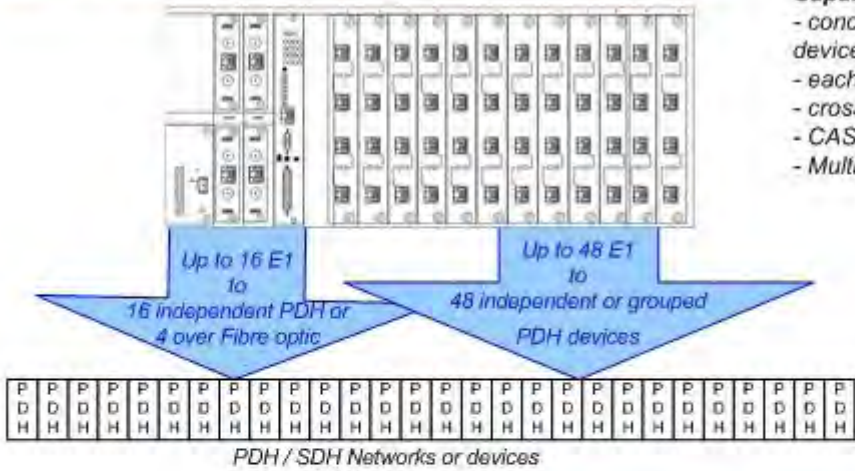
- ◇ Performance Registers Last 24 hours performance in 15 minutes interval and last 7 days in 24 hours summary
- ◇ Separate Registers 12 MDSL ports, network, user, and remote site
- ◇ Performance Reports Reports include MDSL port unsync Date & Time, Errored Second, Unavailable Second, E1 Bursty Errored Second, Severe Errored Second, Degraded Minutes, and Controlled Slip Second. Also available in Statistics (%).
- ◇ Alarm Queue Containing 40 alarm records which record the latest alarm type, location, and date & time
- ◇ Threshold Bursty Seconds, Severely Errored Second, Degraded Minutes

### Diagnostics Test Line

- ◇ Loopback E1/T1 interface (Line Loopback, Payload Loopback, Local Loopback)  
 MDSL interface (Payload Loopback, Local loopback)  
 U interface (Local Loopback, Payload Loopback)
- ◇ Test Pattern E1/T1 interface (215-1 PRBS, 3-in-24, 1-in-8, 2-in-8, 1:1 patterns)  
 U/MDSL/DTE interface (211-1 BERT)

# APPLICATION ILLUSTRATION

## Maximum E1 cross-connect as central node or A&D node



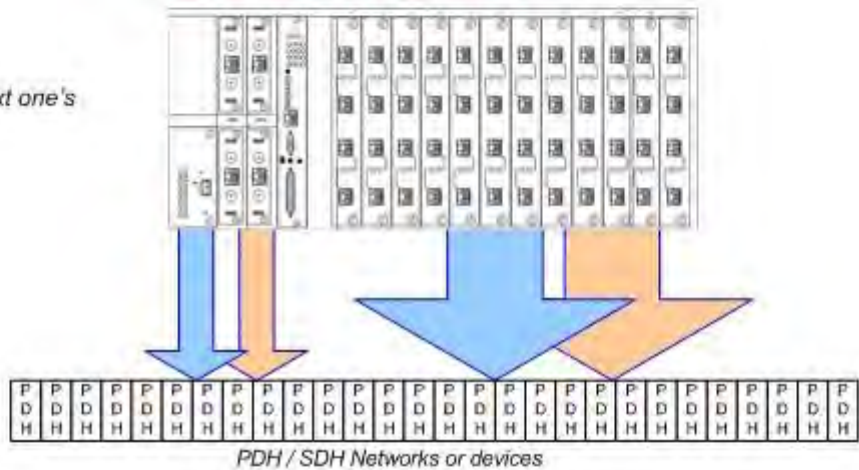
### Capabilities

- concentrate up to 64E1 from independent PDH devices or networks
- each E1 could be a network or tributary interface
- cross-connect any TS of E1 to any TS of other E1
- CAS duplication for voice application
- Multicasting or duplication of TS to x E1

## Maximum E1 protection 1 +1

### Capabilities

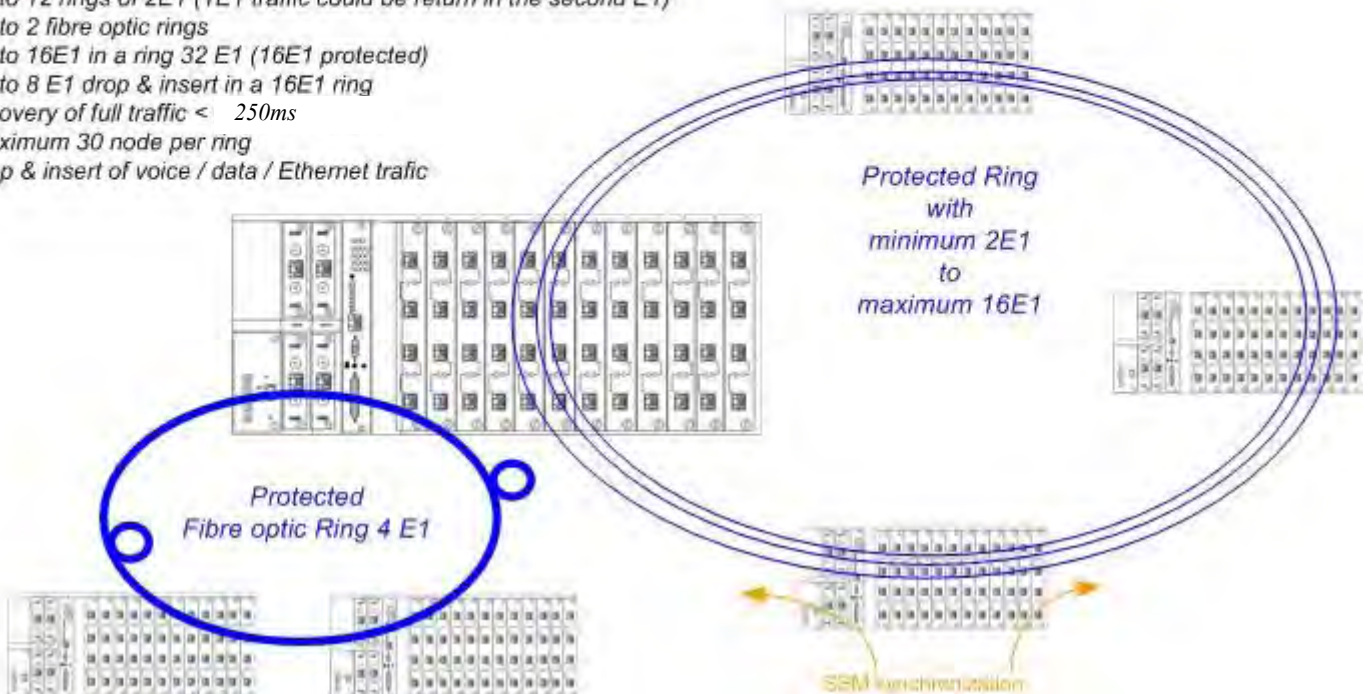
- 32 E1 Protected in 1 +1
- each card could be protected by the next one's



## Ring protection

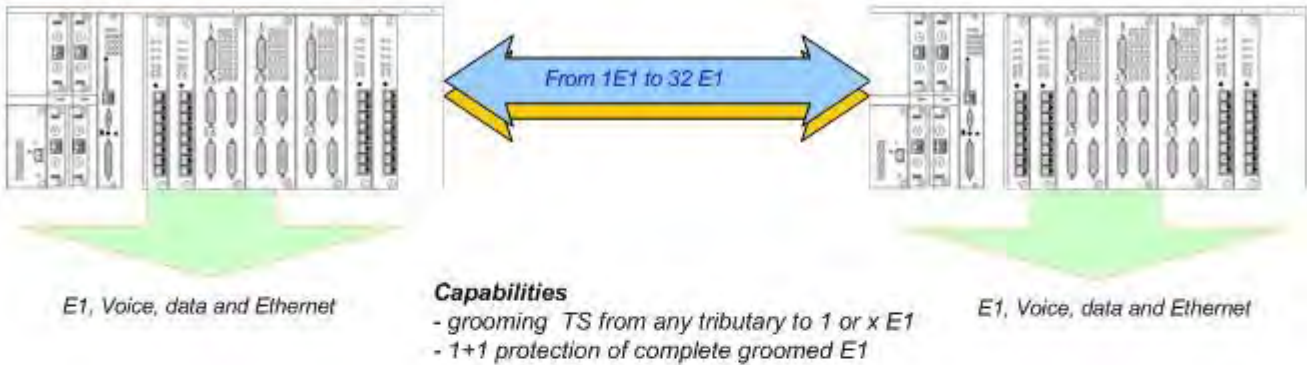
### Capabilities

- up to 12 rings of 2E1 (1E1 traffic could be return in the second E1)
- up to 2 fibre optic rings
- up to 16E1 in a ring 32 E1 (16E1 protected)
- up to 8 E1 drop & insert in a 16E1 ring
- recovery of full traffic < 250ms
- maximum 30 node per ring
- drop & insert of voice / data / Ethernet traffic

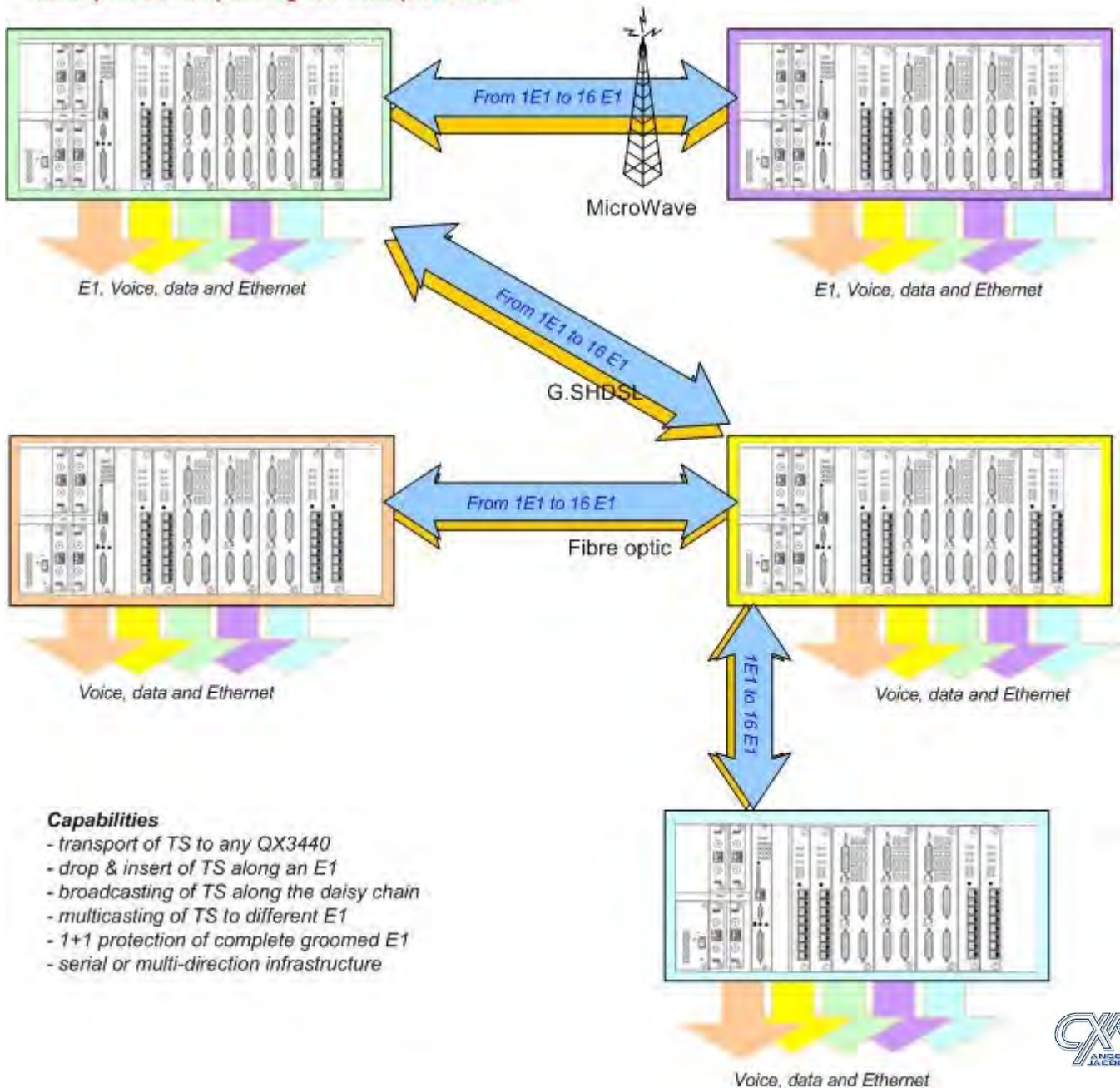


**Maximum E1 cross-connect as central node or A&D node**

**Point to point multiplexing**



**Multi-point multiplexing with drop & insert**



## SIGNAL PROTECTION

### MSP or 1+1 protection for Bus infrastructures for E1 or nxE1

This protection is working with unframed or framed E1 and will protect a full E1.

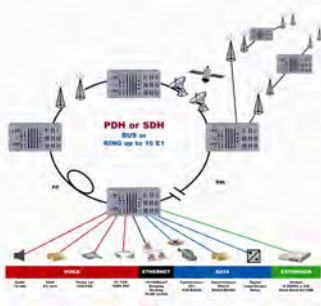
This mode of protection is supported by all E1 or T1 QX3440 cards (1E1, 4E1, MQE1, MQT1, 4E1, 3E1 and Fiber-optic QE1 or QT1).

This QX3440 system of protection can work face to all CXR multiplexer in 1+1 protection mode and face to several equipment from other vendor.

The Working card and Protection cards must be adjacent in the chassis.

The switching of interfaces is based on LOF, LOS , AIS or bad quality signal.

The QX3440 can support together many 1+1 protection toward different directions.



### PDH ULSR Ring protection for E1 or n x E1

This protection is working with framed E1 and will protect a full E1 or several E1 in parallel and in Ring infrastructure.

This mode of protection is supported by the 4E1, MQE1 and Fiber-optic QE1 card only but only with QX3440 equipment, even E1 can be forward over any E1 PDH/SDH equipment over a clear channel transmission.

The transmission is Unidirectional, then the Working path is using the one direction of the E1 ring pipe and the Protection path will use the reverse direction or the codirectional pair of the E1 pipe when the ring will be cut.

TS can be dropped and inserted at any node of the ring to create several “point to point connection” of x TS. The E1 ULSR ring can transport maximum 31 “point to point links” over the ring.

The switching of the protection is based on LOF, LOS , AIS or the bad quality signal.

A ULSR ring with QX3440 can support several E1 rings protection, but each QX3440 of this ring can also support other rings with other QX3440 independently.

### PDH SCNP protection for TS (64K) or n x TS

This protection mode is working with framed signal and will protect independently one TS (64kbps) or n TS. This SNCP protection is based on Ring infrastructure.

This protection is supported by the 3E1 and a future Fiber-optic 3E1 cards only.

This mode of protection can work with QX3440 only, but the E1 links can be forwarded over any PDH or SDH equipment in clear channel transmission.

The PDH SNCP protection can be set with Unidirectional or Bidirectional transmission.

The Working traffic and Protection traffic are always transmitted together over an E1 working path and an E1 protection path.

In case of interruption of the Working path the concerned QX3440 will generate AIS-TS in each protected TS, to order the switch on both end of the SNCP pipe.

This protection is very efficient and is avoiding the loss of data.

The QX3440 can support many TS ring protection between the same QX3440 or with other QX3440 toward different directions by using sometime the same E1 for some section of the rings.



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