CIP-6704A TDMoEthernet Solution

V2.6

Description

The **CIP-6704A TDMoEthernet** is an ideal solution for service providers to build their network and achieve a fast return on investment. Currently providers need to transport both TDM and Packet traffic. These can be achieved using the E1/FE1, T1/FT1 and Gigabit Ethernet tributary ports of the CIP-6704A.

The CIP-6704A device allows operators to transport and **Time Slot Cross Connect** E1/FE1, T1/FT1, E&M, X.21, RS232, V.35, EIA530, QFXSA or QFXO, G.703, C37.94 data stream with timing information over PSN (Packet Switched Network) via Pseudowire Protocol – SAToP/CESoPSN/MEF8. Another CIP-6704A converts the received packet stream back to original E1/FE1, T1/FT1, E&M, X.21, RS232, V.35, EIA530, QFXSA or QFXO, G.703, C37.94 data stream with original timing information. This allows cost-effective migration from existing legacy TDM networks to existing PSN**.**

For transport of TDM signals, the Jitter and Wander adheres to G.823/G.824 Traffic Interface.

Product Features

Mechanical and Electrical

- 1U height, 1/2 19” rack width. ANSI shelf.
- Power module
  - Up to two DC plug-in modules or Hybrid 100 to 240 Vac and -48 Vdc (-36 to -72 Vdc) coexist fixed power supply
- Temperature range from 0° to 75°C

Ethernet Interface

- Four Ethernet ports for WAN or LAN port by software configuration
  - Two Gigabit Ethernet (GbE) with 2 SFP housing
  - Two 10/100/1000 BaseT Ethernet
- IEEE 802.3ad Ethernet Link Aggregation*

Timing

- Internal/Line
- Adaptive Clock Recovery for TDM Pseudowires
  - Jitter and Wander conforms to G.823/824 for Traffic Interface
- SyncE

Management

- SNMPv1/v3
- DB-9 Console port with VT-100 menu
- Telnet and SSH v2
- iNET GUI

Tributary Interface

- Up to four T1/E1 ports per module with a max of 2 modules plus 2 T1/E1 on main board giving a maximum capacity of 10 T1/E1.
- Up to two single port DTE modules:
  - X.21 or RS232/V.24 or V.35 or EIA530
- Up to 2 voice modules:
  - Four ports E&M
  - Four ports FXS
  - Four ports FXO
- Up to 2 single ports modules for power utility:
  - G.703
  - C37.94

OAM

- E1/T1 OAM
  - RFC-2495: LOS, LOF, LCV*, RAI, AIS, FEBE*, BES, DM*, ES, SES, UAS and LOMF*

QoS

- Ingress Rate Limiting* per Ethernet port with 64kbps/1Mbps/10Mbps granularity
- Ethernet Network Level:
  - 3-bit Priority Code Point – PCP field within 802.1P/802.1Q Ethernet frame – CoS
  - 4 priority queues per port
- IP Network Level:
  - 6-bit DiffServ Code Point -DSCP field – ToS

L2 Switching

- VLAN
  - Maximum 4094 concurrent VLAN Groups
  - Support C-VLAN/S-VLAN tag adding and removing on Pseudowire
  - Support 802.1q Port-Based VLAN on Ethernet/SNMP Port
  - Support Q-in-Q
- Support 802.1d MAC Learning
- Support 803.3x Flow control* on input ports
- Support 802.1D STP, 802.1w RSTP, 802.1s MSTP*
- Support IGMP Snoopingv2 (RFC 2236)*
- Jumbo frame up to 10k bytes
- IS-IS Packet transparency*
- Scheduling Algorithm
  - Strict Priority (SP)
  - Weighted Round Robin (WRR)

Pseudowires

- TDM Pseudowires
  - Up to 16 concurrent pseudowires
  - 1 E1/T1 can support up to 16 pseudowires.
  - Pseudowire protocols
    - SAToP
    - CESoPSN
    - MEF-8 (CESoETH)
  - Packet Delay Variation Compensation Depth up to 256 ms

Diagnostics

- E1/T1 BERT & Loopback

Cross Connect Capability (CIP-6704A-DACS only)

- Support full non-blocking DS0 cross connect matrix between TDM interfaces and TDMoE Pseudowires
- Suitable for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications
- Auto A-law/μ-law conversion

* Future option

Model	CIP-6704A
# of fixed Mini-slots	2
Max. E1 ports	10
Max. T1 ports	10
Max. PWs	16
Cross-Connect Capacity	52 Mbps

Ordering Information

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

Main Unit

Model	Description
CIP-6704A-**aa-bb-cc-dd-pp1-pp2-opt1**	CIP-6704A with G.823/G.824 traffic interface, Two Gigabit Ethernet (GbE) with SFP housing Two 10/100/1000 BaseT Ethernet, 1 SNMP port
CIP-6704A-SyncE- **aa-bb-cc-dd-pp1-pp2**	CIP-6704A with G.823/G.824 traffic interface, Support Synchronous Ethernet, Two Gigabit Ethernet (GbE) with SFP housing Two 10/100/1000 BaseT Ethernet, 1 SNMP port

- Slot **aa** is used to select **E1/T1 Interface** on main board. If these modules are not required, leave this field blank.

aa	Description	Notes
E75	E1 75 ohm with RJ48C connector	RJ48 to BNC conversion cable for **E75** interface is not included. Please order conversion cable separately. CIP6704-RJ48M-2BNCF
E120	E1 120 ohm with RJ48C connector	
T1	T1 with RJ48C connector	

■ Slot **bb** is used to select **E1/T1 Interface** on main board. If these modules are not required, leave this field blank.

bb	Description	Notes
E75	E1 75 ohm with RJ48C connector	RJ48 to BNC conversion cable for **E75** interface is not included. Please order conversion cable separately. CIP6704-RJ48M-2BNCF
E120	E1 120 ohm with RJ48C connector	
T1	T1 with RJ48C connector	

■ Slots **cc** and **dd** are used to select **DTE, Voice, and E1/T1 Interfaces** on manufacturing option daughter board. If these modules are not required, leave these fields blank.

cc, dd	Description	Notes
X21	X.21 interface module with DB15 female connector	
RS232	RS232/V.24 interface module with DB25 female connector.	
QEMA	Quad E&M voice module, adapter cable included for 4 RJ45 connectors.	• Specify Type 1 to 5, 2/4W, side A/B
QFXSA	Quad FXSA voice module	
QFXSA-M	Quad FXSA with metering pulse 16KHz voice module	
QFXSA-M12	Quad FXSA with metering pulse 12KHz voice module	
QFXSA-GS	Quad FXSA with ground start voice module	
QFXSA-GM	Quad FXSA with ground start and metering pulse 16KHz voice module	
QFXO	Quad FXO voice module	
QFXO-M	Quad FXO with metering pulse 16KHz voice module	
QFXO-M12	Quad FXO with metering pulse 12KHz voice module	
QFXO-GS	Quad FXO with ground start voice module	
QFXO-GM	Quad FXO with ground start and metering pulse 16KHz voice module	
V35	V.35 interface module with DB25 female connector	
E530	EIA530 interface module with DB25 female connector	
T1	1 port T1 module	
E75	1 port E1 module (75 ohm with BNC connector)	
E120	1 port E1 module (120 ohm with RJ48 connector)	
M1C37	1- channel C37.94 interface module	
1ODP	1 OCU-DP interface module	
M4E75	Mini Quad E1 Interface with 75 ohm	Includes a three meter conversion cable (CIP6704-DB25M-8BNCM)
M4E120	Mini Quad E1 Interface with 120 ohm	Includes a three meter conversion cable (CIP6704-DB25M-4RJ48M)
CD	1-channel G.703 Interface at 64 Kbps data rate	

■ Where **pp1** is used to select **power module**. Must select one power module from the list below.

pp1	Description	Notes
P9	Hybrid 100 to 240 Vac and -48 Vdc (-36 to -72 Vdc) coexist fixed power supply	
SD48	Single -48Vdc power plug-in module (-42 to -56 Vdc)	

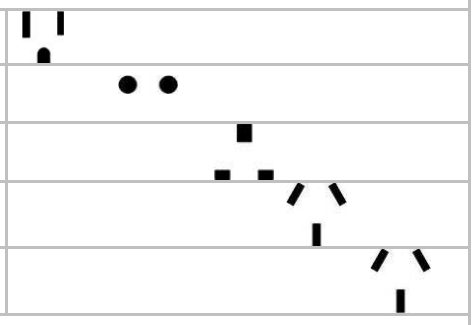
■ Where **pp2** is used to select **redundant DC power module**. Leave the field blank if redundant DC power module is not required, or fixed **SA** power module is selected in **pp1** option.

pp2	Description	Notes
SD48	Single -48Vdc power plug-in module (-42 to -56 Vdc)	• Order two DC power modules for redundancy. • **pp2** option is not available if **CIP-6704A-ACDCP9** power module is selected in **pp1** option

■ Where **opt1** is used to select **SyncE**. Leave the field blank if it is not required.

pp2	Description	Notes
SyncE	Support Synchronous Ethernet	

Accessories

Power Cord (All power cords are RoHS compliant)		
CIP-6704A-ACC-PC-USA	AC power cord for Taiwan/America	
CIP-6704A-ACC-PC-EU	AC power cord for Europe	
CIP-6704A-ACC-PC-UK	AC power cord for UK	
CIP-6704A-ACC-PC-AUS	AC power cord for Australia	
CIP-6704A-ACC-PC-CH	AC power cord for China	
Tray		
CIP-6704A-RM19	1U 19” Tray for rack mount (One tray for two base units; Tray depth:17cm) 23” Extension kit for 23” rack mount	
Blank Panels		
CIP-6704A-BP-DC	Blank panel for empty DC power slot	

Cable (All Cables are RoHS compliant.)	
CIP6704-DB25M-30-1M34F*	DB25 Male to M34 Female Conversion cable for V.35 module. Length: 30 cm
CIP6704-RJ48M-2BNCF	RJ48C Male to two BNC Female Conversion cable for E1 75ohm module. Length: 28 cm
CIP6704-2DB25F-1DB09F	DB44 Male to two DB25 Female and one DB9 Female conversion cable for Terminal server module. Length: 100 cm
CIP6704-DB44M-4RJ48M	DSUB-44pin/Male to RJ48 Male (8P8C) Plug * 4 extension cable for QEMA module. Length: 60 cm
Cip6704-DB25M-8BNCM	DB25/Male to eight BNC/Male cable; Length: 100 cm For Mini Quad E1 Interface with 75 ohm
CIP6704-DB25M-8BNCF	DB25/Male to eight BNC/Female cable; Length: 100 cm For Mini Quad E1 Interface with 75 ohm
CIP6704-DB25M-4RJ48M	DB25/Male to four RJ48C/Male (8P8C Plug) cable; Length: 100 cm Mini Quad E1 Interface with 120 ohm
CIP6704-DB25M-8BNCM	DB25/Male to eight BNC/Male cable; Length: 300 cm For Mini Quad E1 Interface with 75 ohm
CIP6704-DB25M-8BNCF	DB25/Male to eight BNC/Female cable; Length: 300 cm For Mini Quad E1 Interface with 75 ohm
User’s Manual	
CIP-6704A-UM	User’s Manual (optional, paper printed copy). An electronic version of the manual on a CD is included with every order.

CIP-6704A Product Specification

E1 Tributary Interface Module

Line Rate	2.048 Mbps ± 50 ppm
Line Code	HDB3 / AMI
Framing	ITU G.704 (CRC: on/off, CAS: on/off, unframed)
Output Signal	ITU G.703
Input Signal	ITU G.703
Jitter	ITU G.823
Connector	RJ48C

T1 Tributary Interface Module

Line Rate	1.544 Mbps ± 32 ppm
Line Code	AMI / B8ZS
Framing	D4 / ESF/ ESF&T1.403/ OFF (clear channel)
Output Signal	DS1
Input Signal	DS1
Pulse Template	Per AT&T TR 62411
Connector	RJ48C

Ethernet Interface (on board)

Number of Electrical Ports	2 ports with RJ45
Speed	10/100/1000 BaseT

Number of Optical Ports	2
Connector	SFP
Speed	100/1000-LX

Serial Tributary Interface

Type1	DCE, V.35 or EIA530 or X.21	
Line Rate:	Sync mode: V.35, EIA530 and X.21 N x 56 or 64 kbps, N = 1 to 32	
Interface/ Connector:	V.35	DB25S
	EIA530	DB25S
	X.21	DB15S
Type2	DCE, RS232/V.24	
Line Rate:	Sync mode: RS232: N x 56 or 64 kbps, N = 1 to 2	
Interface/ Connector:	RS232/V.24	DB25S

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 900ohms
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	0.3 mA (minimum)
EM Type Setting	Jump Selectable
Relative Humidity	0% to 95%
Carrier Connection	Side A and side B setup by Jump

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

Voice Card (QFXO)

Quad FXO voice card (4 FXO per plug-in)

Connector	1, 2, 3, or 4 FXO per 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 Rejection	55 dB	
Loss Adjustment	0, 3, 6, or 9 dB transmit & receive	
Signal/ Distortion	1.	> 46dB with 1004 Hz, 0dBm input
Frequency Response	2.	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
FXS Loop Feed	-48Vdc with 25mA current limit per port Jumper Selectable: 25mA, 30mA, 35mA	
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
FXS Ringing	Support 2 REN per port (1 REN = 6930Ω + 8 μF) 20 Hz, other frequencies: 16.7Hz, 25 Hz, 50Hz (Jump selectable) 78 Vrms (sine wave) (45 Vrms to 86 Vrms wide range by Resistor selectable) 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR	
Metering Pulse	12KHz/ 16KHz • Power: 10dBm • Sensitivity: -27dBm (-21dBm to -45dBm by Resistor selectable)	
Signaling	Loop Start, GND-Start, Metering Pulse (12KHz, 16KHz), DTMF, Dialing Pulse, PLAR, Battery Reverse (supports Line Reverse Signaling for Billing)	

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

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) Default 78 Vrms (sine wave) (64 Vrms by Jumper setting) 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR (user programmable)
Metering Pulse	12KHz/ 16KHz (2.4Vrm/1Vrm user programmable)
Signaling	Loop Start (Metering Pulse, DTMF, Dialing Pulse, PLAR), GND-Start (Tip Open, Ring GND), OOS Alarm, Battery Reverse

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

C37.94 Interface

820nm

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

TX Power (dBm Peak)				RX Power (dBm Peak)				Note
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength	
-19.8	---	-12.8	792/820/865	---	---	---	---	50/125 μm Fiber Cable
-16	---	-9		---	---	---		62.5/125 μm Fiber Cable
---	---	---	---	-25.4	---	-9.2	792/820/865	Peak Optical Input Power Logic Level LOW

Network Line Interface Mini Quad E1

Line Rate	2.048 Mbps ± 50 ppm	Framing	ITU G.704
Line Code	AMI or HDB3	Connector	DB25S
Input Signal	ITU G.703 to -10dB	Electrical	75 ohm Coax/120 ohm twisted pair
Output Signal	ITU G.703	Jitter	ITU G.823

Performance Store	Last 24 hours performance in 15-minute intervals and last 7 days in 24-hour summary line, user, and remote site
Performance Reports	Date & Time, Errored Second, Degraded Minutes, Unavailable Second, Bursty Errored Second, Severe Errored Second, Controlled Slip Second, and Loss of Frame Count
Alarm History	Date & Time, Alarm Type (i.e. Master Clock Loss, RAI, AIS, LOS, BPV, ES, CS), and Location (i.e. line, DTE)
Alarm Queue	Alarm records which record the latest alarm type, location, and date & time
Threshold	Bursty Seconds, Severely Errored Second, Degraded Minutes

Network Line Interface Mini Quad T1

Line Rate	1.544 Mbps ± 32 ppm	Framing	D4/ESF
Line Code	AMI/B8ZS	Connector	DB25S
Input Signal	ITU G.703 DSX-1 0dB to -30dB w/ALBO	Output Signal	ITU G.703 DSX-1 w/0, -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)		
Performance Store	Last 24 hours performance in 15-minute intervals and last 7 days in 24-hour summary line, user, and remote site		
Performance Reports	Errored Second, Unavailable Second, Bursty Errored Second, Severe Errored Second, Controlled Slip Second, and Loss of Frame Count		
Alarm History	Date & Time, Alarm Type (i.e.RAI, AIS, LOS, BPV, ES, CS), and Location (i.e. line, DTE)		
Alarm Queue	Alarm records which record the latest alarm type, date and time		
Threshold	Error Second, Severe Errored Second, Unavailable Seconds, and Control Slip Seconds		

OCU/DP Interface

Ports	8 Ports for each card
Line Status Indicator	Per Port 1 dual color LED; Red for LOS, Green for SYNC
Network Connector	RJ48S or Telco64
Electrical network connection	Tip/Ring and Tip1/Ring1
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 Automatic line equalization
Pulse Amplitude	+/- 1.5 V (+/- 10%) peak, all rates except 9.6k +/- 0.75 V (+/- 10%) peak at 9.6k Bipolar Return to zero, 50% duty cycle
Sealing Current	Typically 16 mA DC
Operating Modes	4-wire DDS Switched 56 support is optional.
Circuit Rates	SYNC: 2.4, 4.8, 9.6, 19.2, 56, 72kbps (64k) clear channel Conforms with AT&T Pub 41458
Encoding and decoding rules	Use bipolar violation to indicate control information: Idle, out of service, Zero substitution using unframed loops
Maintenance control	DSU Non-latching loop-back code (for 2.4, 4.8, 9.6, 19.2, 56k circuit rate) DSU Latching loop-back (TIP, LSC, LBE, FEV) code (for 72k circuit rate) Machine maintenance OCU/DP card operation: Payload loopback OCU loopback Local loopback Bi-directional loopback V.54 remote loopback code Custom defined remote loopback code
Fault and Performance	BERT test supports all ones, all zeros, 2047,511,63 pattern. LOS, OOS, ES, SES and UAS alarm. Current, last 96 registry and 7 days performance storage.
Environment	Operating Temperature: -20 - 65°C Storage Temperature: -30 - 70°C Humidity: Up to 90% RH non-condensing
Specification Standard	ANSI T1.410; AT&T Pub 62319, AT&T Pub 62310, ITU-T V.54

Management and Administration

Management ports	Console RS232 port and and NMS RJ45 port
Remote login	SSH v2, Telnet
SNMP	SNMP v1, v3
Support RADIUS checking login.	

Electrical

ISD48 Power Module	48 V (-42 to -56 Vdc)
P9 Power Module	Hybrid 100 to 240 Vac and -48 Vdc (-36 to -72 Vdc) coexist fixed power supply
SD125 Power Module*	Single 125Vdc power plug-in module
Power Consumption	< 15 W for 1U height

Physical and Environmental

Dimensions(W x H x D)	213 mm x 41 mm x 290 mm (8.39" x 1.61" x 11.42")
Temperature	0°C to +75°C
Humidity	0% to 95% RH (non-condensing)
Mounting	Desktop stackable, rack mount, wall mount
Cooling	It is fanless unit

Standards Compliance

IEEE

802.1d	MAC Table Learning and STP
802.1p	Priority Code Point
802.1q	VLAN
802.1s	MSTP*
802.1w	RSTP
802.1ad	Tag Stacking (Q-in-Q)
802.3ad	Link Aggregation*

MEF

8	CESoETH

IETF

RFC2236	IGMP Snooping v2*
RFC2495	E1/T1 OAM*
RFC 4553	SAToP
RFC 5086	CESoPSN

ITU

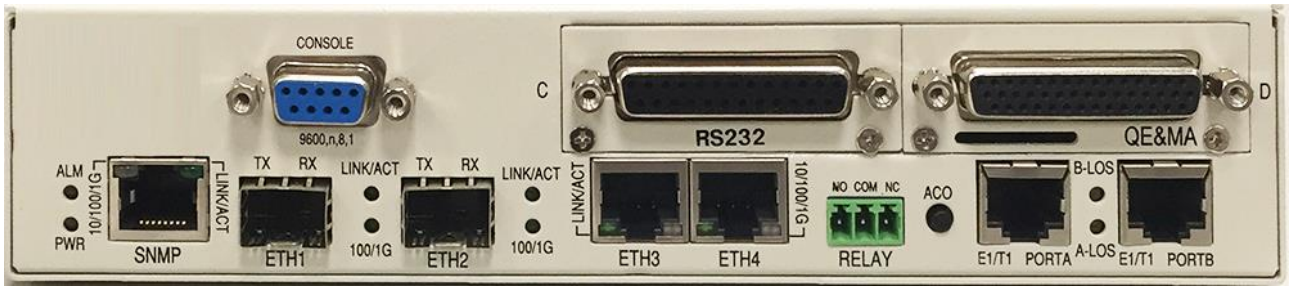
G.823/G.824	Traffic Interface

Certifications

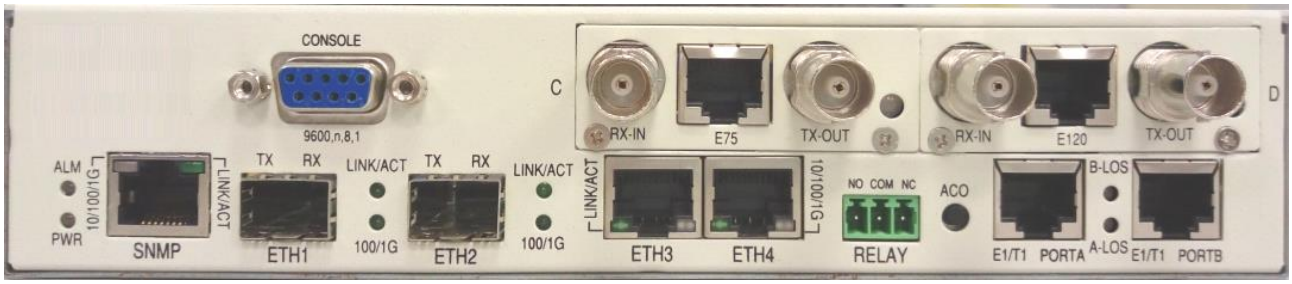
EMC	EN55022 Class A, EN50024, FCC Part 15 Subpart B Class A,
Safety	EN60950-1(CE), IEC 61850-3* only Compliance on power module ISD48 -48Vdc.

* Future option

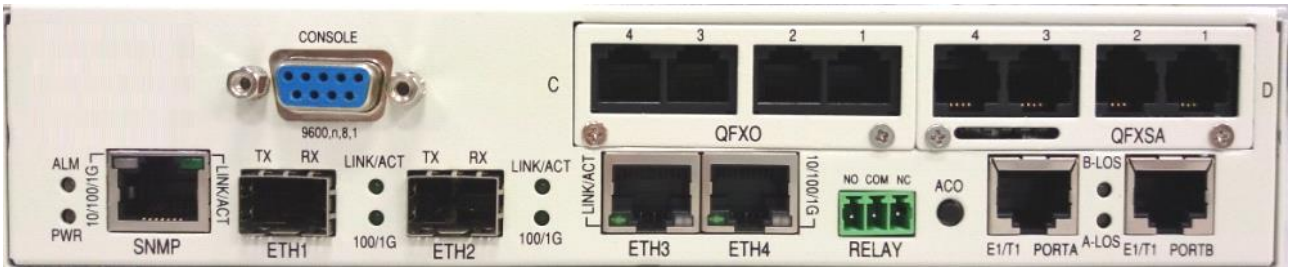
Panel Views



Front Panel View with 2 X E1/T1, 1 x RS232, 1 x QE&MA Tributary



Front Panel View with 2 X E1/T1, 2 FE1 Tributary

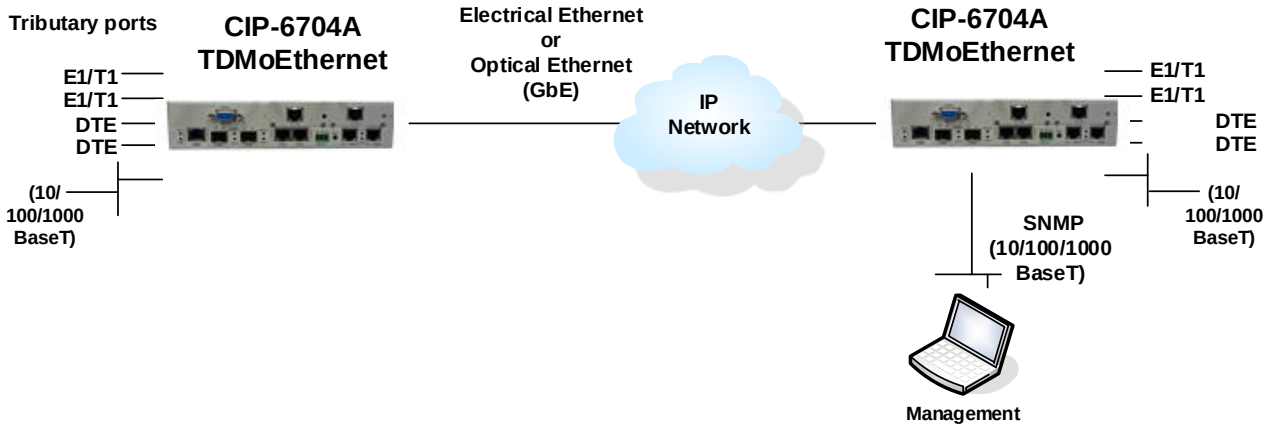


Front Panel View with QFXO & QFXSA Tributary

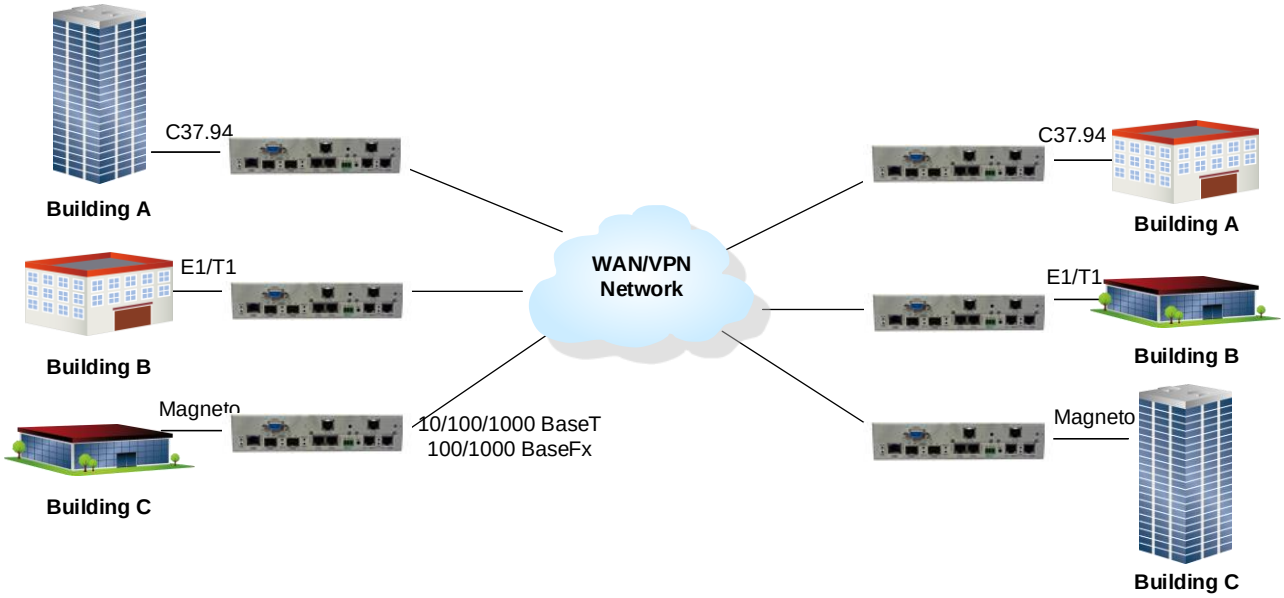
Rear Panel View with DC plug-in Power modules

Rear Panel View with P9 Power

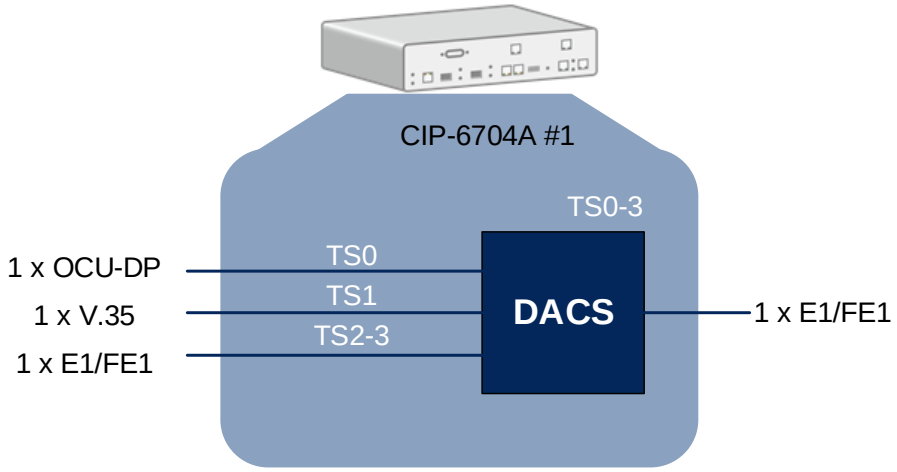
Application Illustrations



CIP-6704A Point-to-Point Application.



CIP-6704A on VPN Network



CIP-6704A on Digital Access Cross-Connect System (DACS)

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The information contained in this document is not contractual. CXR is evolving its products. Specifications may change without notice.