

# TDM Series

STM1/E1 Access Multiplexer  
E1 Access Multiplexer

TDM Over IP  
Ethernet over E1, Coaxial  
Ethernet Bridge



**NEW**

# iSAP1000

## STM1/E1 Multiplexer



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STM1/E1 access multiplexer

iSAP1000 is 1U 19" rack type STM-1/E1 terminal multiplexer which delivers traditional PDH services over SDH networks. iSAP1000 provides connectivity for up to 16E1. The product complies with SDH standards and interfaces with existing SDH backbones through a single or 1+1 protection STM-1 interface. iSAP1000 supports a variety of management access over console, Telnet and SNMP. iSAP1000 provides two Gigabit Combo ports (2-port 10/100/1000Base-T and 2-port 1000Base-X SFP slot) with 16x E1 or 2x STM-1 fiber interfaces. The two GE combo ports support Link aggregation, port based VLAN and 802.1Q VLAN function.

### Features

- Provides 2-port STM-1 fiber with 1+1 protection.
- Supports Internal clock and recovery clock modes
- Supports Single E1 fractional and unframed E1 service; Multiple E1, fractional E1
- Supports PCM31, FAS+CRC4, CRC self-test
- Supports HDLC/GFP bridge operation, 16x VCG with total 16 remote device, 16E1 Per VCG, MAX data rate 32Mbps Per VCG
- Supports 16E1 balanced RJ45 or unbalanced BNC connectors
- Maximum 220ms delay variance between E1 links
- Supports 2x GbE Combo ports
- Supports IEEE 802.1Q VLAN and QinQ, Link aggregation
- Fiber port support ALS(Auto Laser Shutdown) function
- Built-in BERT for performing local and remote loopback
- Supports Console, GUI, telnet and SNMP management
- Supports local and remote FTP/TFTP f/w upgrade
- Complies with ITU-T G.8040 standard

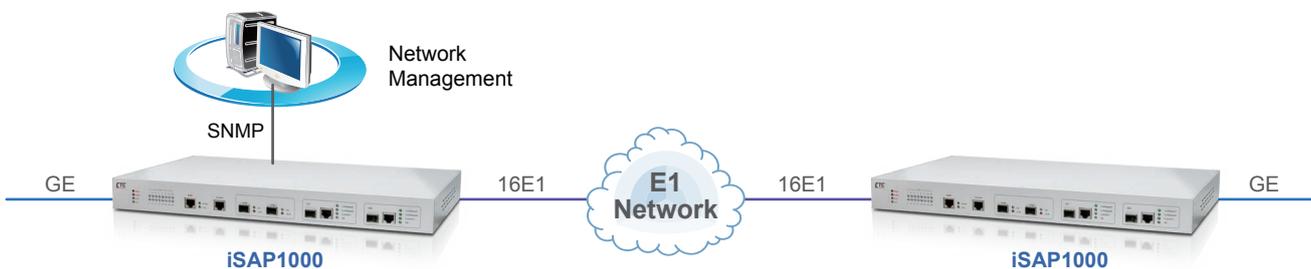
### Specifications

<b>Ethernet Interface</b>	Supports 2x GE combo ports Auto Negotiation, AUTO-MIDX, 10M/100M/1000M, Full/Half Duplex Connector : RJ45
<b>Optical Interface</b>	Supports 802.3x flow control 1000FX, SFP Connector : LC
<b>E1 Interface</b>	Supports 802.3x flow control Up to 16x E1(ITU-T G.703) Line Impedance : 75ΩBNC or 120ΩRJ45 Bit rate : 2048kbps±50ppm Line code : HDB3
<b>STM-1 Interface</b>	Supports 2x STM-1 optical fiber port with SFP slot Supports 1+1 optical fiber protection

<b>Management port</b>	One console port with RJ45 connector One SNMP Ethernet port with RJ45 connector
<b>LED Indicators</b>	SYS, PWR, PWR1, PWR2, GE(LNK/ACT, SD), E1(LOS, SYNC)
<b>Standards</b>	IEEE802.3 Ethernet, IEEE802.3u, IEEE802.3Z, IEEE802.3X, IEEE802.1Q, IEEE802.1ad, SNMPv1/v2c/v3, ITU-T G.703, ITU-T G.704, ITU-T G.823
<b>Dimensions</b>	310 x 440 x 44mm (D x W x H)
<b>Power</b>	AC: 90-265V, DC: -48V, Supports AC+AC, DC+DC, AC+DC
<b>Power Consumption</b>	<24W
<b>Temperature</b>	Operating: -5 ~ 50°C Humidity : ≤90% non-condensing

### Application

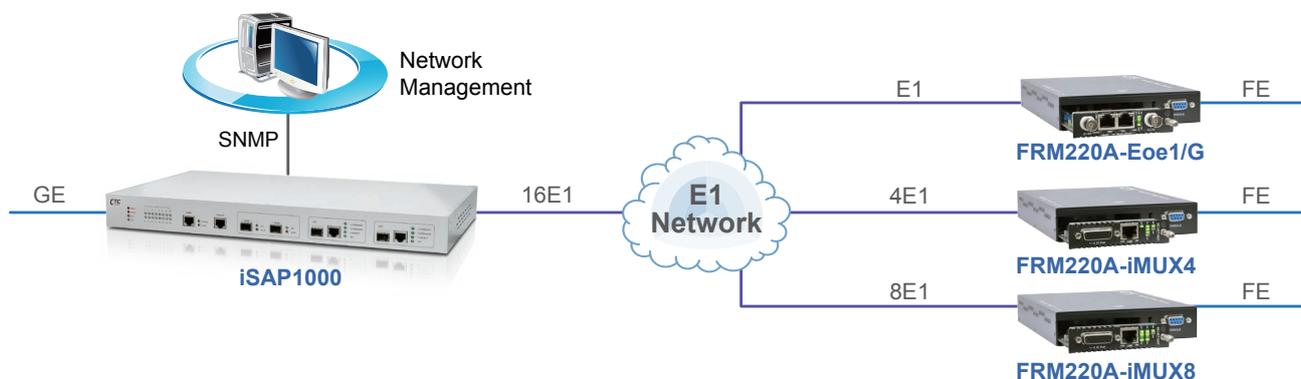
#### P to P, GE over 16E1 application



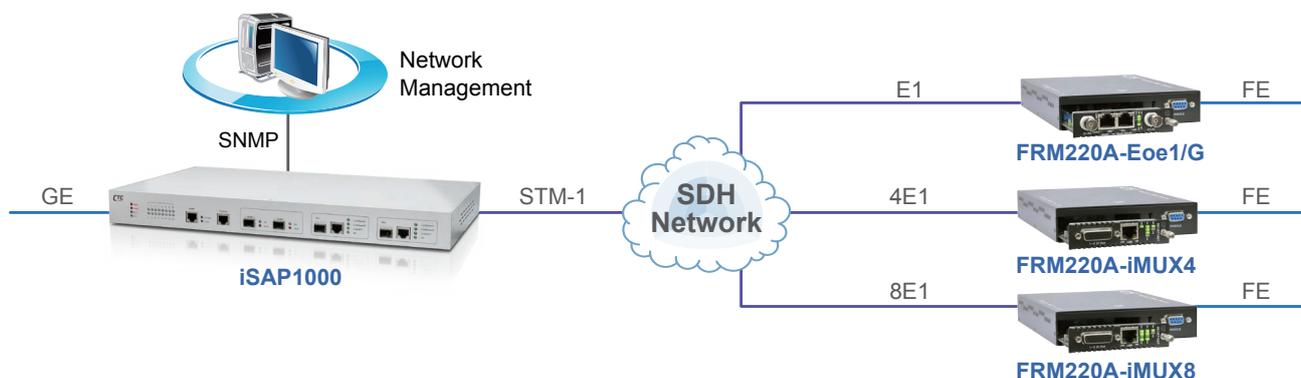
Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

## Application

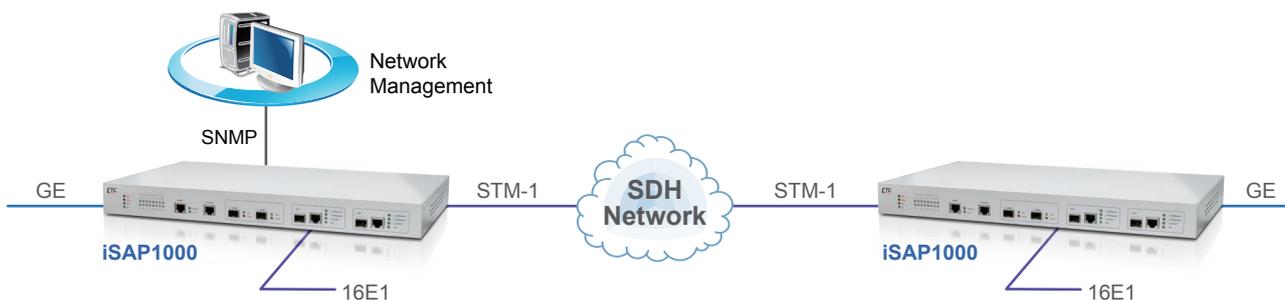
### Point to Multi-points 16E1 aggregation



### Point to multi-points 16E1 aggregation over STM-1



### GE + 16E1 over STM-1 Application



## Ordering Information

Model Name	Description
iSAP1000-16E1B-AD	2x GbE Combo over 16E1 BNC, P to P, 1U 19" Rack, AC+DC power
iSAP1000-16E1R-AD	2x GbE Combo over 16E1 RJ45, P to P, 1U 19" Rack, AC+DC power
iSAP1000-GE/16E1B-AD	2x GbE Combo over 16E1 BNC, P to M, 1U 19" Rack, AC+DC power
iSAP1000-GE/16E1R-AD	2x GbE Combo over 16E1 RJ45, P to M, 1U 19" Rack, AC+DC power
iSAP1000-GE/STM1-AD	2x GbE Combo over STM1, P to P, 1U 19" Rack, AC+DC power
iSAP1000-STM1B-AD	2x GbE Combo + 16E1 BNC over STM1, P to P, 1U 19" Rack, AC+DC power
iSAP1000-STM1R-AD	2x GbE Combo + 16E1 RJ45 over STM1, P to P, 1U 19" Rack, AC+DC power

Correcor      Power Type  
**iSAP 1000** -  -   
 Example: iSAP 1000 - 16E1B - AD

# iSAP5100

## 4.5U, Data, Ethernet, Voice STM1/ E1 Managed Multiplexer



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Managed STM1/E1  
access multiplexer

The iSAP5100 is a 4.5U 19" 18 slots rack type STM1 / E1 Time Division Multiplexer for fractional E1 network access, which is designed for non-stop operation. There are 18 slots available for hot-swappable iSAP5100 I/O cards. Two slots are provided for CPU Controller cards and two slots are provided for power supplies. Uplink supports STM1 fiber and E1 copper, two types of connection, maximum up to 144x E1 cross connect for Voice and Data. The iSAP5100 accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-36~72V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The iSAP5100 provides STM1 fiber and E1 copper uplink with a the maximum E1 support of up to 96 E1 channels with cross connection for Voice and Data or interface including RS232, V.35, G703/64K, FXS, FXO, ET100 and E&M.

### Interface Cards

Control card: 5100-MS-DM-96, 5100-MS-DM-155

E1 card: 5100-8E1, 5100-16E1

Power modules: 5100-AC240, 5100-DC240

I/O cards: 5100-RS232, 5100-RS232/C, 5100-G703/64K, 5100-V35, 5100-ET100, 5100-E&M, 5100-FXS, 5100-FXO

### Features

- Supports STM1 and E1 uplink
- Supports MAX. 144xE1 with full cross-connect ; Supports DSO cross-connect
- Supports 16 channel main E1 LTU card
- Supports E1 time slot broadcast function
- Modular design for voice IO card, supports 8-port FXO/FXS
- All modules and cards support hot-swapping
- Multi-Interface: DCE card types included Nx64k(V35) RS232 (Sync/Async), V.35 G703-64K, ET100, E&M, FXO, FXS...etc
- Supports console telnet, GUI and SNMP management
- Available types of power built-in : AC+AC, AC+DC, DC+DC
- Modular design, 4.5U 19", 18-slot for IO cards

### Specifications

5100-MS-DM-96	
Interface	10/100Base-TX Ethernet RJ45 port
Console	RS232
E1 Cross Connect	144xE1 Transparent cross connect , Supports E1 time slot mapping / broadcast function
CAS Cross Connect	Supports 16 time slot CAS follow voice time cross connect
5100-MS-DM-155	
Interface	Supports 1-port STM-1 155M SFP Slot on CPU card, CPU redundancy (1+1)
NMS	10/100Base-TX
Console	RS232
E1 Cross Connect	155M fiber to 63E1 and 144xE1 cross connect, supports E1 /time slot mapping/broadcast function
CAS Cross Connect	Supports time slot 16 CAS follow voice time cross connect
STM-1/E1 Drop/Insert	Supports STM-1 63E1*32TS to E1/IO slot 128E1*32TS connection
5100-8E1 / 5100-16E1	
Interface	Supports 8E1/16E1 interface
Line Impedance	120 / 75 ohms
Frame format	CAS (PCM30)/CCS (PCM31)
Connector	RJ45
5100-RS232	
Data rate	≤38.4kbps Async or 64/128kbps Sync
Ports	6-port
Interface	RS232
5100-V35	
Interface types	V.35
Connector	HD68F (female) with cable adapter
Line code	NRZ
Data rate	Nx64kbps

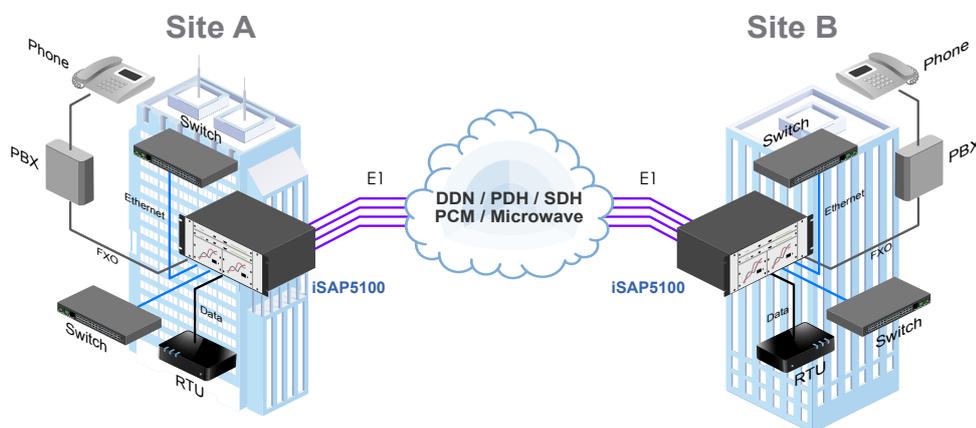
5100-RS232/C	
Data rate	9600bps, 19.2Kbps Sync/Async
Ports	6-port
Interface	RS232
5100-G.703/64K	
Data rate	64Kbps, Co-directional/Contra-directional and Centra-directional
Ports	4-port
Connector	RJ45
5100-ET100	
Standards	IEEE 802.3, 802.3u
MDI/MDIX	Auto
Data rate	10/100Mbps
Encapsulation	HDLC
Ports	4-port
Connector	RJ45
5100-E&M	
Loop current	25 mA, maximum 70mA
Ports	8-port
Connector	RJ45
5100-FXS	
ITU-T Standard	G.712/G.713/G.714
Line resistance	600Ω
Off-hook current	25mA
Line distance	2km
Ports	8-port
On-hook current	10mA+/-3mA
Effective Ring	Frequency: 25Hz Voltage: 75V, peak to peak110V MAX line resistance: 1500Ω
Connector	RJ45

5100-FXO	
ITU-T Standard	G.712, G.713, G.714
Line resistance	600Ω
Line distance	2km
Ports	8-port
Caller ID	Supports DTMF, FSK Standard
Connector	RJ45

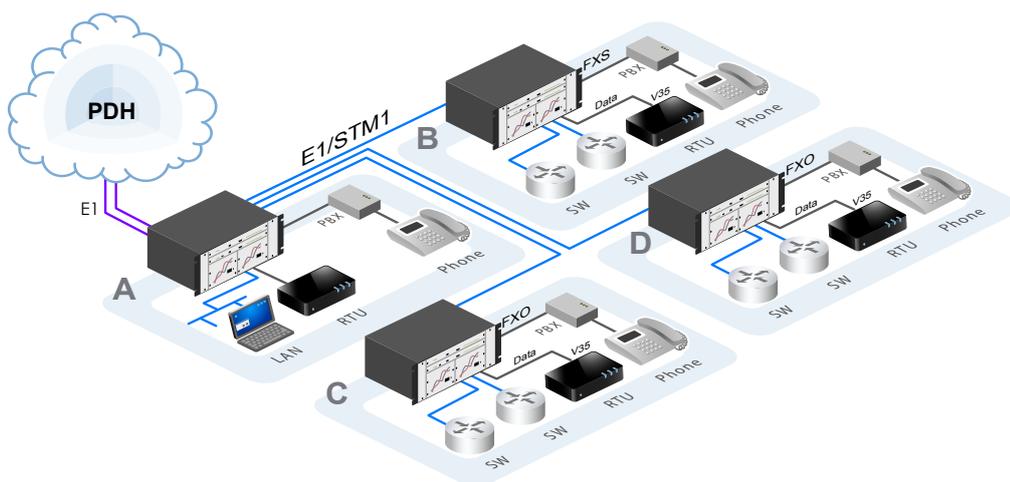
Electrical & Mechanical	
Dimensions	350 × 440 × 187 mm (D x W x H)
Environmental	Operating: 0~60°C Storage:-25~70°C Humidity: 10~90%, non-condensing
Power	AC 220V : 165~265V, 50~60Hz AC 110V, AC 220V : 90~265V,50~60Hz
Power Consumption	< 90W

## Application

### Connection with PBX (Private Branch Exchange)



### The extension and expansion of DDN (Distributed Data)



## Ordering Information

Model Name	Type	Description
iSAP5100-CH	Chassis	4.5U 19" 18-slot Chassis
iSAP5100/AC	Power	AC Power plug-in module (90 to 250 VAC)
iSAP5100/DC	Power	DC Power plug-in module (±36 to ±76 VDC)
iSAP5100-8E1R	Main E1 card	8 channels Main-E1 LTU card: Fractional E1 RJ45
iSAP5100-16E1R	Main E1 card	16 channels Main-E1 LTU card: Fractional E1 RJ45
iSAP5100-MS-DM-96	CPU-card	CPU card for 96x E1
iSAP5100-MS-DM-155	CPU-card	CPU card for STM-1
iSAP5100-FXO	Voice Card	8 channels FXO interface card
iSAP5100-FXS	Voice Card	8 channels FXS interface card
iSAP5100-E&M	Voice Card	8 channels 2/4 wires E&M voice interface card
iSAP5100-RS-232	RS-232 card	6 channels RS-232 interface card 38.4kbps, Low speed: 64kbps or 128kbps sync DEC
iSAP5100-RS-232C	RS-232 card	6 channels RS-232 (V.24) interface card, Low speed: 128kbps, 19.2kbps Async with Multi-Clock function
iSAP5100-ET100	FE Card	4 channels Ethernet (10/100Base-TX) interface card (v4.0)
iSAP5100-G.703/64K	G703/64K Card	4 channels G703 64K interface card (v4.0)
iSAP5100-V35	V.35Card	4 channels Nx64K V.35 card with DB68 to 4 x M34 cable

Chassis  
**iSAP5100** - □□  
 Example: iSAP5100 - CH

Card Type  
**iSAP5100** - □□□□  
 Example: iSAP5100 - 8E1R

# ERM-MUX-Plus

## 4U, E1 Multi-Service Multiplexer



The ERM-Mux / plus is a 4U 19(23)" 14-slot rack type E1 Time Division Multiplexer for Fractional E1 network access which is designed for non-stop operation. There are 10 slots available for hot-swappable ERM-Mux / plus-I/O cards. Two slots are provided for Mux-E1 cards, which may be configured for redundant 1+1 operation of the E1 lines, safe guarding against expensive network down time. Two slots are also available for CPU cards, with the second CPU card acting as a hot standby in case of primary card failure. Each Mux-E1 card may be linked to another ERM-Mux / plus Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ERM-Mux/plus optionally accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-48V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The ERM-Mux/plus provides all interface connections on the front panel. BNC and RJ-45 are used for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703-64K co-directional / contra-directional / center. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 6xRS-232, HP68F DCE port of I/O card to 4x V.35, RS-232, RS-530, RS-449, RS-422 and X.21 or 5x X.50 channels.

### Features

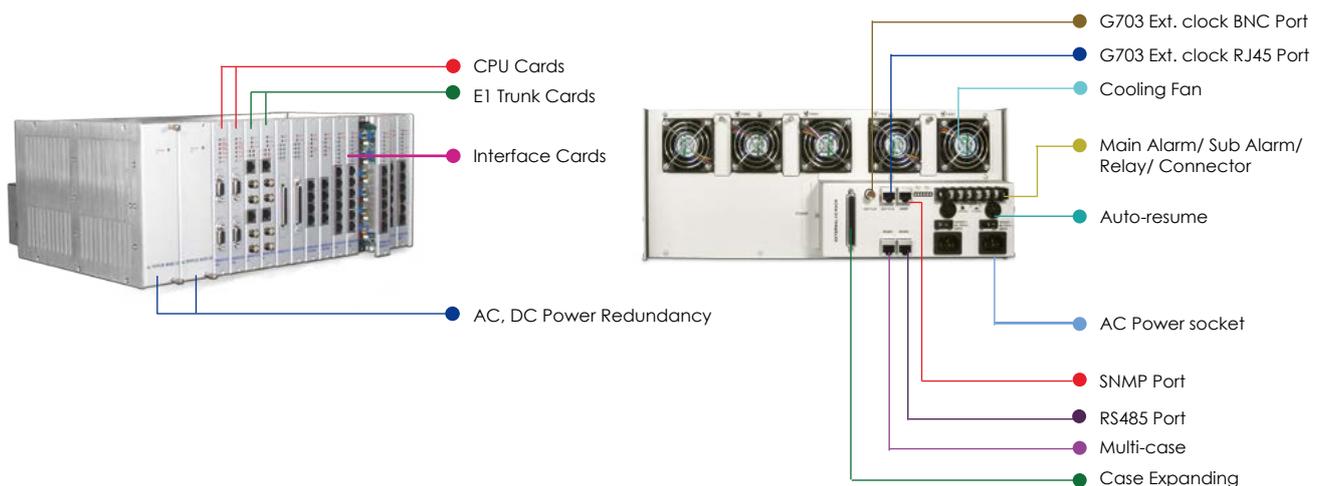
- CPU redundancy (1+1)
- E1 redundancy (1+1) and E1 card redundancy
- Power redundancy (1+1) [2AC, 2DC, AC+DC]
- DCE hot swappable card types
- Drop & Insert function
- Console, NMP,SNMP, management
- 4ch V.35 (nx64K)
- 4ch G.703 64K co-directional /contra-directional / center mode
- 2ch Ethernet bridge
- 6ch RS232
- 6ch FXS voice
- 6ch FXO voice
- 6ch E&M voice

### Specifications

Connectors	Console port (RJ45, RS232C)
Physical	WAN port RJ45 Jack (2-wire, 4-wire)
Specifications	Dimensions: 350 x 438 x 176mm (W x D x H)
Power Characteristics	Weight: 8kg (chassis+dual power+8 I/O cards) 0.45kg per card

Environmental	Operating 0°C ~ 60°C
Specifications	Storage 0°C ~ 70°C Relative humidity 0% ~ 90% non-condensing Predicted MTBF : 65,000 hrs (25°C)
Certification	CE

### ERM-Mux/plus overview



#### • 1+1 Redundant

The ERM-MUX/PLUS supports complete redundant functions for the electrical input service, the power module cards, CPU card and E1 card. The E1 backup provides 1+1 modes. All of these cards are capable of automatic switchover in case of failure. The system has complete warning and diagnostic functions for stable and reliable operation.

#### • Network Management

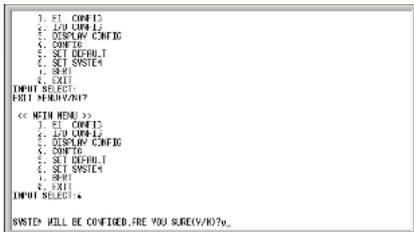
The ERM-MUX/PLUS supports SNMP and/or NMP GUI network management with local PC or via a dedicated timeslot from the E1 line. The NMP GUI can manage more ERM-MUX/PLUS equipment via the E1 network in-line or in nested structures. A console terminal mode is supported as well. When SNMP management mode is available and selected, remote Telnet is also available for management. ERM-MUX/Plus with SNMP option is also manageable under CTC Union's Smart View EMS.

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

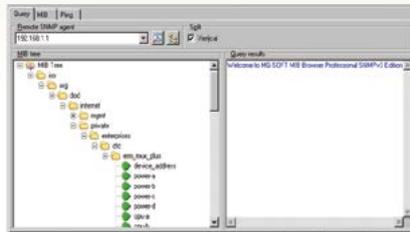
### ERM-Mux / Plus Management

The intelligent NMS provides the support that the network manager needs. It consists of three parts :

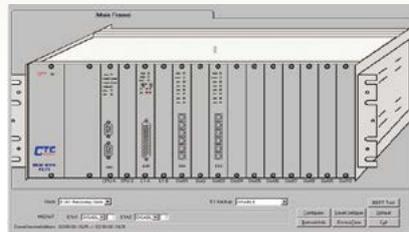
1. Terminal mode: Configuration by local RS-232 serial port; Maintenance & alarm.



2. MIB file SNMP: Configuration by RJ-45 10/100 Ethernet port; Complies with MIB-II standard.



3. GUI : Configuration by RJ-45 10/100 Ethernet port; Real time monitoring in Window® graphic mode.



#### • Cascade

RS-485 interface is used for cascading expansion rack, and are provided by RJ-45 x 2 connectors. DB62 connector for connecting backplane data to expansion rack.

#### • Power Redundancy

Power supply options for 110V AC, 220V AC or -48V DC, ensure maximum flexibility for central office installations. This equipment complies fully with all ITU-T standards for E1 transmissions. The modules are hot-swappable, capable of automatic switch over in case of module failure, stable, and reliable.

#### • Performance and BERT test

System supports performance monitoring and BERT test through NMP or Terminal console according RFC 1406 recommendation. CRC-4 and BPV monitoring: CURR ES / UAS , LONG ES / UAS. Loopback test and BERT test: display Rx error amounts, Error counts and Bit-error-rate. Test patterns: 2e9-1, 2e11-1 and 2e15-1. Error Insertions and rates: Single, 10e-1, 10e-2, 10e-3, 10e-4, 10e-5, 10e-6, 10e-7.

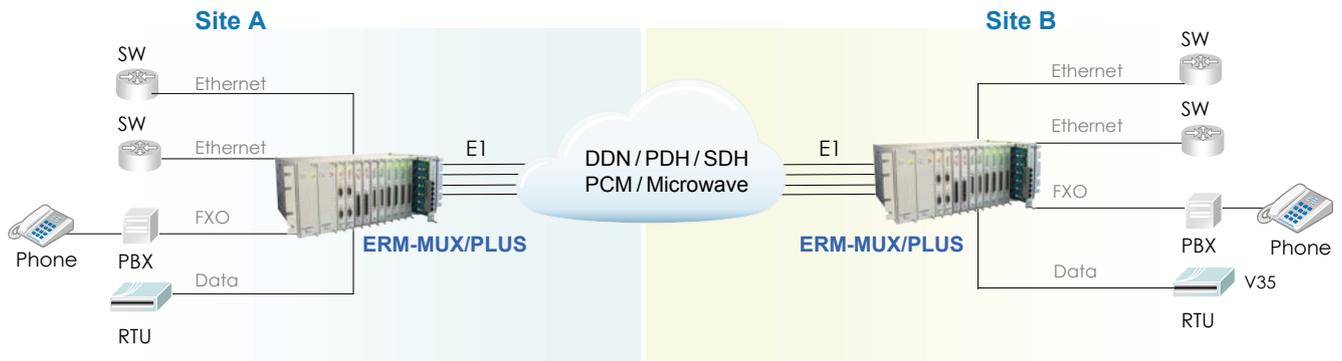
### Ordering Information

Model Name	Type	Description
ERM-MUX-PLUS/AA-CH	Chassis	4U 19" 14 slot Chassis for AC+AC power
ERM-MUX-PLUS/DD-CH	Chassis	4U 19" 14 slot Chassis for DC+DC power
ERM-MUX-PLUS/AD-CH	Chassis	4U 19" 14 slot Chassis for AC+DC power
ERM-MUX/AC	Power	AC Power plug-in module ( 90 to 250 VAC )
ERM-MUX/ACV	Power	AC Power plug-in module ( 90 to 250 VAC ) with Voice support
ERM-MUX/DC	Power	DC Power plug-in module ( ±36 to ±76 VDC )
ERM-MUX/DCV	Power	DC Power plug-in module ( ±36 to ±72 VDC ) with Voice support
ERM-MUX-PLUS/GUI	Management	GUI for ERM; support Windows 95, 98, 2000, XP
ERM-MUX-PLUS-2E1R	Card	2-Ch Main-E1 LTU card(V1.2); w/DB37M to 2xRJ45 cable
ERM-MUX-PLUS-2E1B	Card	2-Ch Main-E1 LTU card(V1.2); w/DB37M to 2xBNC cable
ERM-MUX-PLUS-8E1R	Card	8-Ch Main-E1 LTU card(V1.2); w/DB37M to 8xRJ45 cable
ERM-MUX-PLUS-8E1B	Card	8-Ch Main-E1 LTU card(V1.2); w/DB37M to 8xBNC cable
ERM-MUX-PLUS-CPU	Card	CPU card (V4.3) for NMP management
ERM-MUX-PLUS-SNMP	Card	SNMP card (V2.2) for NMP management
ERM-MUX-PLUS-FXO	Card	6-Ch FXO interface card(V2.1)
ERM-MUX-PLUS-FXS	Card	6-Ch FXS interface card(V4.1)
ERM-MUX-PLUS-E&M	Card	6-Ch 2/4 wires E&M voice interface card (V4.1) (Tx/Rx range -20dB ~ +8dB )
ERM-MUX-PLUS-E&M+	Card	6-Ch 2/4 wires E&M voice interface card (V4.1) (Tx range -12dB ~ +16dB, Rx range -20dB ~ +8dB)
ERM-MUX-PLUS-RS-232	Card	6-Ch RS-232 interface card, 64k/128kbps(Sync), 19.2k/38.4kbps(Async)
ERM-MUX-PLUS-ASYNC	Card	6-Ch RS-232 interface card, 9.6k/19.2kbps(Sync), 19.2k/38.4kbps(Async) with multi rate clock function.
ERM-MUX-PLUS-G64K	Card	4-Ch G.703 64k interface card (V4.0)
ERM-MUX-PLUS-HS-SERIAL	Card	4-Ch V.35/X.21/RS-449/RS-530 interface card
ERM-MUX-PLUS-RS485	Card	6-Ch RS-485 / RS-422 Interface card
ERM-MUX-PLUS-ET100	Card	2-Ch Ethernet(10/100Base-TX) interface card (V4.0)

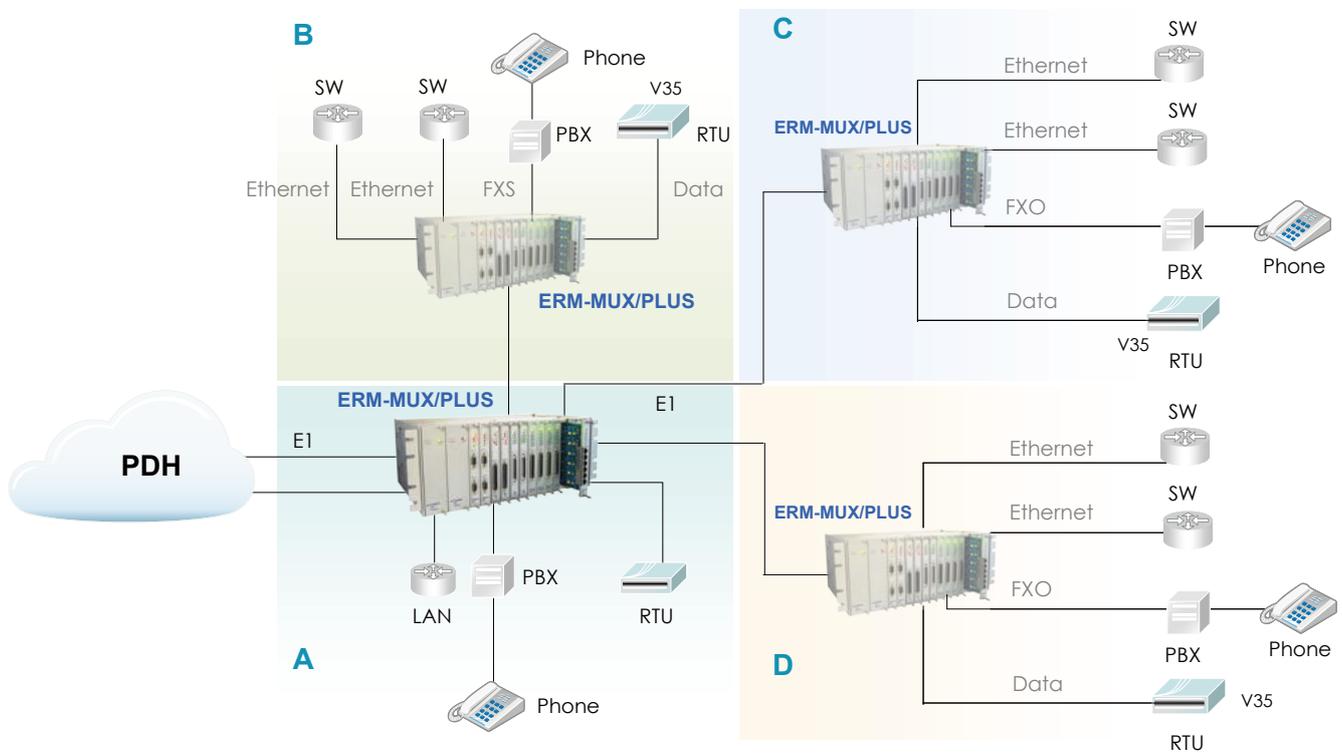
Card Type  
**ERM – MUX– PLUS –**   
 Example: ERM – MUX–PLUS – 2E1R

**Application**

**Connection with PBX (Private Branch Exchange)**



**The extension and expansion of DDN (Distributed Data)**



12 E1 Access Multiplexer

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## ERM-Mux / Plus-E1

### G.703 E1 Aggregate Card

The ERM-Mux/plus has two dedicated slots for installing E1 aggregate cards. Currently E1 cards are available with 2, 4 or 8E1 ports. In the backplane design of the ERM-Mux/plus, a maximum of 4 E1s can carry data to and from tributary (I/O) cards. One typical application could be to install two 4E1 cards in the chassis and have the cards act as one master and one hot-standby card for E1 redundancy. For other applications, an 8E1 card could be used to cross connect E1 timeslots prior to assignment to the four available backplane channels. Another application can use the 'extra' E1 aggregate channels for drop & insert (Sub-E1) rather than performing cross connection. It can quickly be seen that a large number of applications are possible with the ERM-Mux/plus's flexible design.

- Available in 2, 4, 8 E1 channels
- Supports PCM31 or PCM30 framing

- Path / Card Redundancy / Hot Swappable
- E1 timeslots can support cross-connect function
- E1 channel can act as Sub-E1 for drop & insert

#### Specifications

Frame format	CAS(PCM30) / CCS(PCM31) ; CRC on/off
Bit rate	2.048Mbps
Line codes	HDB3/AMI
Rx sensitivity	0 ~ -43dB
Tx driver	1.5km over 0.5mm E1 cable
Line impedance	75 ohms (unbalanced) 120 ohms (balanced)

Pulse amplitude	nominal 2.37V (75ohm) nominal 3.00V (120ohm)
Pulse shape	According to ITU-T G.703
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



## ERM-Mux / Plus-Data

### Nx64 Synchronous Serial Tributary Card

The ERM-Mux/plus Nx64 Serial Tributary Card provides V.35/ X.21/ RS-530/ RS-449 Synchronous data capability. Incorporating four separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. The single HD68 connector mates to a 1 to 4 cable that terminates to the required connector type. Four different cables provide connection to V.35's MB34, X.21's DB15, RS-530's DB25 or RS-449's DB37 female connectors. Please be sure to select the right cable for your application when ordering this card.

- Four independent Synchronous channels
- Nx64 setting from any E1 channel

- Each channel operates in native DCE mode
- Diagnostic loop backs & Hot Swappable
- LED indicators for Power, Alarm, RD/TD activity

#### Specifications

ITU-T and ANSI compliant Datacom interfaces	
Multiplexing Nx64K data onto E1 time-slot.	
Data speed	Nx64K(N=1 to 30, or 31)
Data access	RS-530, RS-449, V.35, X.21, supplied with corresponding interface cable

Access mode	DCE
Diagnostics	Local /Remote /Bi-directional Loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



## ERM-Mux / Plus-G64K

### G.703 64K Co-directional Tributary Card

The ERM-Mux/plus G64K Tributary Card provides 4 independent G.703 64Kbps Co-directional data channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors that conform to USOC RJ-48C standard wiring provide the G.703 connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These data channels may be linked to multiplexers, terminal equipment or satellite/micro-wave transmission equipment. In Co-directional signaling, the clock signals are recovered from the received G.703 data stream. Only Tx and Rx pairs or a total of 4 wires are required in 64Kbps co-directional transmission.

- 4 independent channels
- 1x64 setting from any E1 channel
- Transparent synchronous rate of 64kbps

- Co-directional clock recovered from Rx G.703
- Diagnostic loop backs / LED indicators for Power, Alarm, Tx/Rx activity / Hot Swappable

#### Specifications

ITU-T G.703, G.823 64kbps compliant interfaces	
Multiplexing 1x64K data onto E1 time-slot	
Data speed	64Kbps +/-100ppm
Data access	RJ-45 per USOC RJ-48C standard
Line code	Co-directional
Pulse shape	according to G.703

Transmit distance	600M or less (0.5~0.7mm TP)
Diagnostics	Local /Remote /Bi-directional Loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

# ERM-Mux / Plus-CPU

## CPU Control Card

CPUA and CPUB slots can insert two CPU modules that automatically work in redundant operation mode. CPU modules are responsible for all parameter setup from local PC or from the selected in-band E1 line. The setup of the ERM-MUX/Plus may be accomplished by:  
 Local PC connected by Ethernet to SNMP (can extend to multiple chassis with RS485 twisted-pair)  
 Local PC connected by serial NMP port to Windows® NMP GUI. E1 network connected to SNMP/NMP GUI. Local terminal console mode

- RS-232 port for dumb terminal at 9.6k, 8bit, no parity
- MIB file compliant to MIB-II ASN.1
- Firmware upgrade by TFTP
- Hot swappable



# ERM-Mux / Plus-ET100

## Fast Ethernet Bridge Tributary Card

The ERM-Mux/plus Ethernet Bridge Tributary Card provides Ethernet over E1 capability. Incorporating two separate channels, this transparent bridge supports industry standard HDLC encapsulation. The WAN data rate depends on the number of E1 timeslots assigned (Nx64). The front panel has two RJ-45 shielded connectors for connection of 10Base-T or 100Base-TX Ethernet and status LEDs for each channel to display link state, speed, duplex and activity. Rounding out each bridge channel are support for 256 MAC filter address learning table and 340 packets buffer to aid in handling LAN side burst traffic.

- Two independent Ethernet over E1 channels
- Utilizes HDLC WAN encapsulation
- MAC Address learning table with 5 minute aging
- Auto-MDIX and Auto-Negotiation & Hot Swappable

### Specifications

Standards	IEEE 802.3, IEEE802.3u
<b>Automatic address learning, aging and deletion after 5 min.</b>	
Throughput latency	1 frame
MDI / MDIX	Auto
Filtering	256 MAC address table
Buffer	340 packets

Encapsulation	HDLC
<b>10Base-T/100Base-TX, Full or half duplex</b>	
Packet sizes	64 ~ 1522 bytes
Temperature	0°C ~ 50°C
Humidity	5 ~ 95% (non-condensing)
MTFB	65,000 hrs



# ERM-Mux / Plus-RS485

## Asynchronous RS-485/422 Serial Tributary Card

The ERM-Mux/plus Asynchronous RS485/422 Serial Tributary Card provides six independent RS-485/ RS-422 data channel capability. Incorporating six separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. Each channel uses a pluggable 4-pin terminal block for connection one or two twisted pair wires. No cables are provided with this card. When connecting to RS-485, the channel supports 4-wire Full Duplex or 2-wire Half Duplex RS-485 transmissions for serial control or data acquisition.

- Six independent channels
- Nx64 setting from any E1 channel
- Transparent asynchronous rates up to 128kbps
- Diagnostic loop backs & Hot Swappable

### Specifications

Interface	RS-422 4 wire, RS485 4/2 wire
LEDs	RS-485/422 TD/RD, Power, Alarm
Baud Rate	Async mode <= 128K
Bit Error Rate	Less than 10 <sup>-10</sup>
Connector	4pin Terminal Block x 6

Duplex	Full / Half
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



# ERM-Mux / Plus-RS232

## RS232 Sync/Async Tributary Card

The ERM-Mux/plus Sync/Async RS232 Serial Tributary Card provides six independent RS-232 data channel capability. Incorporating six separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. The single DB62 connector mates to a 1 to 6 cable that terminates to DB25 female connectors. These serial data channels may be linked to leased line modems for further extension or connected to other data terminal or data acquisition devices. When configured for synchronous use, the data connectors carry both clock and data. For asynchronous use, the clock signals can be ignored.

- Six independent channels
- Nx64 setting from any E1 channel
- Transparent asynchronous rates up to 115.2kbps
- Synchronous 64 or 128Kbps, DCE mode
- Diagnostic loop backs & Hot Swappable
- LED indicators for Power, Alarm, RD/TD activity

### Specifications

<b>ITU-T V.24 compliant Datacom interfaces</b>	
<b>Multiplexing Nx64K data onto E1 time-slot</b>	
Data speed	Nx64K(N=1 to 2)
Data access	RS-232, supplied with corresponding interface cable
Access mode	DCE

Diagnostics	Local /Remote /Bi-directional Loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

# ERM-Mux / Plus-E&M

## E&M Voice Tributary Card

The ERM-Mux/plus E&M Voice Tributary Card provides six independent Ear & Mouth Voice channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors provide the voice connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These voice channels may be linked to PBX (Private Branch Exchange) to facilitate voice to voice connections. The channels support selection of Type 1~5, support 2 or 4 wire operation and have 0.5dB steps for signal attenuation. When using this card, an appropriate voice compatible power module must be used in the ERM-MUX/Plus.



- Six independent channels
- 2/4 wire independent setting
- 1x64 setting from any E1 channel

- E&M Signaling PBX trunks & Supports types I, II, III, IV or V
- Provides E line, M line, SB (battery) and SG (ground) lines
- G.711 Codec & Hot Swappable
- LED indicators for Power, Alarm, activity

### Specifications

Loop current	5~30 mA, maximum 70 mA
Return loss	300-600Hz >12dB (2W) 600-3400Hz >15dB (2W) 300-3400Hz >20dB (4W)
Group delay	@-10dBm0 <750uSec(2W) <600uSec(4W)
Total Distortion	according to ITU-T G.223

Channel crosstalk	< -65dB, 1020Hz@0dBm
Noise	< -65dBm0p weighted
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

# ERM-Mux / Plus-FXO

## FXO Voice Tributary Card

The ERM-Mux/plus FXO Voice Tributary Card provides six independent Foreign Exchange Office Voice channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors provide the voice connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These voice channels may be linked to PBX (Private Branch Exchange) or PSTN (Public Switched Telephone Network) to facilitate voice to voice connections. When using this card, an appropriate voice compatible power module must be used in the ERM-Mux/plus.



- Six independent channels
- 2 wire / G.711 Codec
- 1x64 setting from any E1 channel

- PCM30 R2 Signaling PSTN trunks
- Links PBX to PBX or extends POTS & Hot Swappable
- LED indicators for Power, Alarm, activity

### Specifications

On-hook DC resistance	> 100K Ohms
Ring AC resistance	> 7.5K Ohms
Ring power sensitivity	< 50mW
Off-hook DC resistance	< 300 Ohms
Max. Input Voltage	70VDC
Max. Input Current	150mA
Channel crosstalk	< -65dB, 1020Hz@0dBm

Noise	< -65dBm0p weighted
Return loss	300-600Hz >12dB (2W) 600-3400Hz >15dB (2W) 300-3400Hz >20dB (4W)
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

# ERM-Mux / Plus-FXS

## FXS Voice Tributary Card

The ERM-Mux/plus FXS Voice Tributary Card provides six independent Foreign Exchange Station Voice channel capability. These 6 channel tributary cards are designed for voice applications over E1. Typically, an FXS connects to a standard telephone set. The FXS needs to sense on-hook, off-hook or disconnected status. It also must be able to provide ring function to a telephone set and it must pass caller-ID information. In the ERM-Mux/plus point-to-point application, the FXS can connect to a remote FXO (Foreign Exchange Office) when deployed as an extension from PBX (Private Branch Exchange) or PSTN (Public Switched Telephone Network). It may also connect to a remote FXS, also for extension from PBX or as a direct 'hotline' voice connection. Individual Shielded RJ-45 connectors provide the voice connections. When using this card, an appropriate voice compatible power module must be used in the ERM-Mux/plus.



- Six independent channels
- 2 wire & G.711 Codec
- 1x64 setting from any E1 channel

- Provides ring function
- Supports caller-ID forwarding / PSTN extension or direct "Hot-line"
- Links telephone to telephone or extends POTS
- LED indicators for Power, Alarm, activity / Hot Swappable

### Specifications

Effective ring voltage	AC 75VRMS +/-15V@25Hz +/-3Hz, <10% THD
Ring voltage at 300mA load	>50VACRMS
Loop resistance	<1.8K Ohms, including 300 Ohms for telephone
On-hook current	10mA +/-3mA
Off-hook loop current	18-50mA
Channel crosstalk	< -65dB, 1020Hz@0dBm

Noise	< -65dBm0p weighted
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no component damage 220VRMS for 15 minutes; damage only local loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

# ETU02-MUX-Plus

## 1U, E1 Multi-Service Multiplexer



The ETU02-MUX/PLUS is a 1U 19(23)" 3 slot rack type E1 Time Division Multiplexer for Fractional E1 network access which provides an economic solution for central site or remote installations. There are 3 slots available for hot-swappable ETU02-MUX/PLUS-I/O cards. One front panel slot is provided for MUX-E1 card, which provides either single E1 main link or main E1 link plus a drop and insert sub-E1 port. The MUX-E1 card may be linked to another ETU02-MUX/PLUS or ERM-MUX/PLUS Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ETU02-MUX/PLUS optionally accommodates one power supplies, which may derive power from AC (110/220) or DC (-48V) power sources. The ETU02-MUX/PLUS provides BNC and RJ-45 for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703/64K Co-directional. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 4xRS-232 or HP68F DCE ports of I/O card to 2x V.35, RS-530, RS-449, RS-422 and X.21 channels.

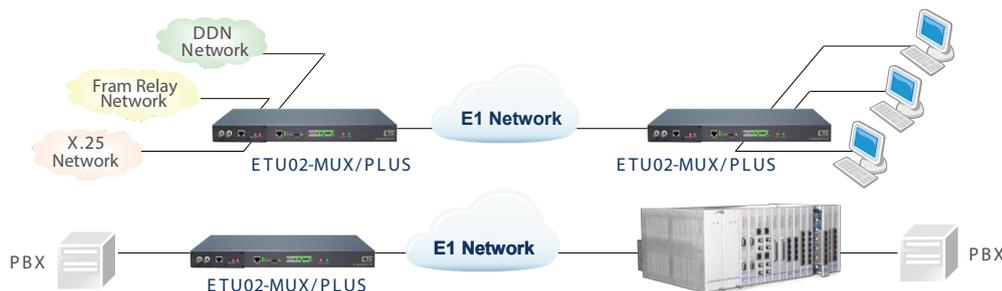
### Features

- 1U 19" 3-slot chassis
- Provides 3 slots, removable interfaces: V35, X21, RS530, RS449, RS232, G.703 Co-directional, Ethernet Bridge, FXO, FXS and E&M, 8-ch E1 DXC
- Optional drop and insert E1 port (Sub E1)
- Setup and Control via RS-232 terminal
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Optional SNMP management
- Digital cross connect solution up to 16E1

### Specifications

<b>Indications</b>	Power, Signal loss, Sync loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test	<b>Dimensions / Weight</b>	235 x 438 x 45mm (D x W x H) / 2.9kg
<b>Standard</b>	ITU-T G.703/G.704/G.706 & G.732, G823	<b>Temperature</b>	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
<b>Power / Consumption</b>	AC: 90 ~250V / 20W	<b>Humidity</b>	10 ~ 90% non-condensing
		<b>MTBF</b>	57,000 hrs

### Application



### FXO

- Provides 4 independent channels
- Connects directly to PSTN



#### Specifications

Connector	RJ-45*4
Impedance	600 ohms
Level Gain	On Tx side 0 dB On Rx side -3.5dB
Ring current impedance	> 7.5k ohms
Direct current resistance	< 300 ohms
Maximum direct current borne	> 70V

### G.703/64K co-directional card

- 2-channels, Co-directional 64K interface



#### Specifications

Interface types	G.703/64K, Co-directional
Connector	RJ45 x 2
Line code	ITU-T G.703/64K, Co-directional
Data rate	64kpbs±100ppm x 2 channels
Line impedance	120 ohms (balanced)
Frame mode	Unframed only

### 8E1-DXC

- 8 independent channels
- E1 P to P 64kbps transparent data cross connect
- Supports Broadcasting and E1 channel backup
- Maximum 2 card per chassis



#### Specifications

Connectors	BNC for unbalanced ; RJ-45 for balanced
Framing Format	Unframed / Framed CCS(PCM31) / CAS (PCM30)
CRC check	CRC4 on/off
Bit rate	2.048Mbps±0 ppm
Line code	AMI / HDB3
Line impedance	75 ohm(BNC) / 120 ohm(DB-15, RJ-45)

### FXS

- Provides 4 independent channels
- Connects to standard telephones



#### Specifications

Connector	RJ45 x 4
Impedance	600 ohms
Level Gain	On Tx side 0 dB; On Rx side -3.5dB
Ring current Output	75±15V
Frequency	25±3Hz
Feeding voltage	-48
Loop resistance	1800 ohms
Connecting distance	up to 4km
Wire Gauge	0.4mm
Feeding working current	20mA

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

## ET-100 Ethernet Bridge card

- 2 independent channels, Ethernet bridge interface 10/100Base-TX bridge Auto-Negotiation, Auto MDI/MDIX Forward 1522 bytes (Max.) packets Supports IEEE 802.1Q Tag VLAN pass thru Supports flow control (Pause)



### Specifications

#### LAN Specifications

Standard	Fully compliant with IEEE 802.3/802.3u
Connector	RJ-45x2, 10/100Base-TX, Auto-negotiation
Speed	10Base-T/100Base-TX, Full or half duplex
Frames	Supports 64 to 1522 byte packet lengths

#### WAN Specifications

Protocol	Synchronous HDLC
Rates	N*64 or N*56Kbps, up to 2048Kbps

## E1 and Sub E1 module

- Single E1 card supports both RJ45 and BNC connector
- Single E1 + Sub E1 card supports BNC connector
- Each E1 loop provides clock to be used as system clock source



SUB E1



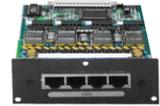
E1

### Specifications

Connectors	BNC for unbalanced ; RJ-45 for balanced
Framing Format	Unframed / Framed CCS (PCM31) / CAS (PCM30)
CRC check	CRC4 on/off
Bit rate	2.048Mbps±0 ppm
Line code	AMI / HDB3
Line impedance	75 ohm (BNC) / 120 ohm (DB-15, RJ-45)
Relative receive level	0 to -43dB
Transmitter driver reach	1.5Km
Pulse amplitude	Nominal 2.37V ±10% for 75ohm Nominal 3.00V ±10% for 120ohm
Zero amplitude	±0.1V
Transmit frequency	Internal timing ±30 ppm
Tracking	Recovery timing ±50 ppm
External	timing±100 ppm
Jitter performance	According to ITU-T G.823
Compliance	ITU G.703, G.704, G.706, G.732

## E&M

- BD/GD wires are for battery and ground detection
- E&M card provides 4 independent channels
- E&M interface provides 1 pair of E and 1 pair of M
- Each E&M can support Type I, II, III, IV or V
- Loop current range is normally 5-30mA, 70mA max
- Timeslot 16 complies with ITU-T G.711
- TX / RX attenuation (Range ±7.5dB), and 2 / 4 wire operation



### Specifications

Input level	0 to -16dB, in 0.5dB steps
Output level	0 to -16dB, in 0.5dB steps
Impedance	600 ohms, option
Return loss	2-wire 300-600Hz: >12dB 2-wire 600-3400Hz: >15dB 4-wire 300-3400Hz: >20dB
Group delay	2-wire @ -10dBm: < 750µ second 4-wire @ -10dBm: < 600µ second
Total distortion	According to ITU-T G223
Channel cross-talk	Not exceed -65dB, 1020Hz@0dBm
Out-of-band Signal attenuation	-25dBm@4.6~72KHz
Level not to exceed	-50dBm
Noise	<-65dBm
Interface connector	RJ-45*4

## RS-232 card

- 4-channels
- Data rate:  
Asynchronous mode ≤ 38.4Kbps (4-channels),  
Synchronous mode = 19.2/38.4/64/128Kbps



### Specifications

Interface type	RS-232
Connector	HD62F (female) with cable adapter
Line code	NRZ
Data rate	3.84kbps x 4ch or 64/128kbps x 4ch

## Nx64 card

- 2-channels , High speed data interface
- Data rate:  
N\*64kbps, where N=1 to 31 in CCS  
N=1 to 30 in CAS



### Specifications

Interface types	RS-530, X.21, V.35, RS-449, RS-232
Connector	HD68F (female) with cable adapter
Line code	NRZ
Data rate	Nx64kbps

## Ordering Information

Model Name	Type	Description
ETU02-MUX/Plus/AC	Chassis	1U 19" 3+1 slot Chassis with SNMP card and AC Power
ETU02-MUX/Plus/DC48	Chassis	1U 19" 3+1 slot Chassis with SNMP card and DC 48V Power
ETU02-MUX/Plus/DC24	Chassis	1U 19" 3+1 slot Chassis with SNMP card DC 24V Power
ETU/E1SUB	Card	Single E1 + Sub E1 card supports BNC connector
ETU/E1	Card	Single E1 card supports both RJ45 and BNC connector
ETU/N64	Card	2-Ch V.35/X.21/RS-449 Module, N X 64Kbps
ETU/232	Card	4-Ch RS-232 Module
ETU/232-C	Card	4-Ch RS-232 Module with Clock
ETU/ET100	Card	2-Ch 10/100Base-T Ethernet Module RJ-45
ETU/FXS	Card	4-Ch FXS Interface Module RJ-45
ETU/FXO	Card	4-Ch FXO Interface Module RJ-45
ETU/E&M	Card	4-Ch E&M Interface Module RJ-45
ETU/G64	Card	2-Ch G.703 64Kbps Co-directional Module RJ-45
ETU/8E1-DXC	Card	ETU/8E1-DXC is one type of card with two type of cables. BNC and RJ45
ETU/8E1-DXC-R	Cable	8-Ch E1 DXC card with 8-port RJ45 cable
ETU/8E1-DXC-B	Cable	8-Ch E1 DXC card with 8-port BNC cable

Power Type

ETU02 – MUX – Plus –

Example: ETU02 – MUX – Plus – AC

# ETU01A

## Single Port Modular E1 CSU/DSU with LCD and SNMP



The ETU01A single port stand-alone CSU/DSU provides our best digital access solution for E1 and Fractional E1 network services termination. A DTE device may be linked to an ETU01A at data rates of 56Kbps to 2048Kbps. The ETU01A features user replaceable dataport modules for a number of interface standards; including Ethernet bridge, router, V.35, X.21, RS-530, RS-449, G.703 64Kbps Co-directional and RS-232. The ETU01A supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via a menu driven RS-232 console port in conjunction with a standard terminal.

These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU01A provides optional SNMP (Simple Network Management Protocol), which allows the user to remotely control, diagnose and monitor the system using industry standard SNMP protocol, our proprietary MIB and any network management software.

### Features

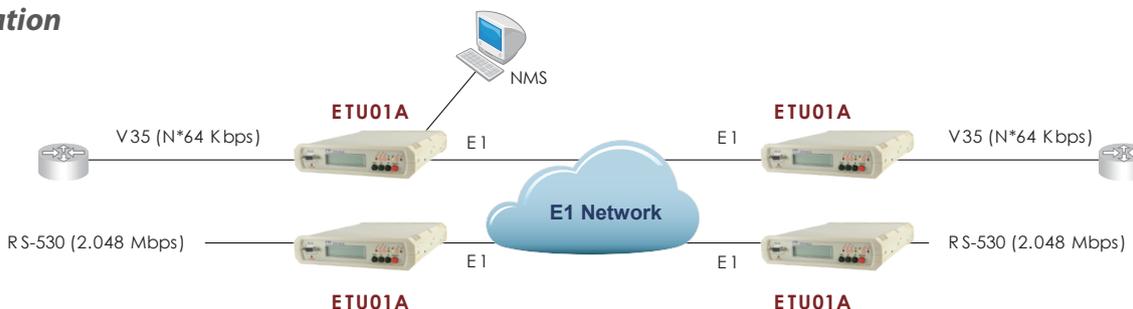
- Supports Fractional E1 and Unframed E1 service with EOC control
- Removable interfaces, support V.35, X.21, RS-530, RS-449, RS-232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Supports Console, Telnet and SNMP management
- Menu keys and LCD display
- SNMP V1, V2C, V3 supported
- Supported by Smart View EMS
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

### Specifications

<b>G.703 E1</b>	Framing	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	LCD display	16*2 character LCD with backlight
	Bit rate	N*56K or N*64Kbps, where N=1~31 in CCS or 1~30 in CAS
	Relative receive level	0 to -43dB
	Transmit level:	
	Pulse	Nominal 2.37V ±10% for 75ohm
	Amplitude	Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	Clock modes:	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE

<b>G.703 E1</b>	Clock mode 2	Receive clock to the sync and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
	<b>Diagnostics</b>	local loopback, Digital remote loopback, Test pattern
<b>Indicators</b>	LEDs (Power, TD, RD, Signal loss, Sync loss, Error and test)	
<b>Standards</b>	ITU-T G.703/G.704/G.706 & G.732	
<b>Power Input</b>	AC: 90-250VAC, DC: 18-72 VCD	
<b>Power Consumption</b>	10W	
<b>Dimensions</b>	250 x 195 x 45 mm (D x W x H)	
<b>Weight</b>	1.5kg	
<b>Temperature</b>	0 ~ 50°C (Operating), -1 ~ 70°C (Storage)	
<b>Humidity</b>	10 ~ 90% non-condensing	
<b>Certification</b>	CE, FCC, RoHS compliant	
<b>MTBF</b>	65,000 hrs	

### Application



### Ordering Information

Model Name	Type	Description
ETU01A/AC	Power	1U, 19/2", Data port to framed E1 with 100 ~240VAC
ETU01A/DC	Power	1U, 19/2", Data port to framed E1 with -48VDC

Power Type

ETU01A /

Example: ETU01A/AC

Interface Module	Description
ETU/TTU-V35	V.35 interface module
ETU/TTU-X21	X.21 interface module
ETU/TTU-530	RS-530 interface module
ETU/TTU-449	RS-449 interface module
ETU/TTU-232	RS-232 ASYN/SYNC interface module
ETU/TTU-G64	G.703 64Kbps co-directional interface module
ETU/TTU-NRZ	NRZ interface module ( 4 * BNC )
ETU/TTU-ET100	10/100 Base-Tx Ethernet E1 Bridge interface module
ETU/TTU-ET100R	10/100 Base-Tx Ethernet Routing interface module

Please refer to page 12-15



# ETU011

## Single Modular Port E1 CSU/DSU

The ETU011 stand-alone DSU/CSU is a digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The ETU011 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU011 packs the data channels into the E1 link in user-selected time slots. The unused time slots can insert IDLE code (in frame mode). The ETU011 front panel sports status LEDs for monitoring both the CSU and DSU conditions and push button switches for initiating local and remote loopback with integral BERT.

### Features

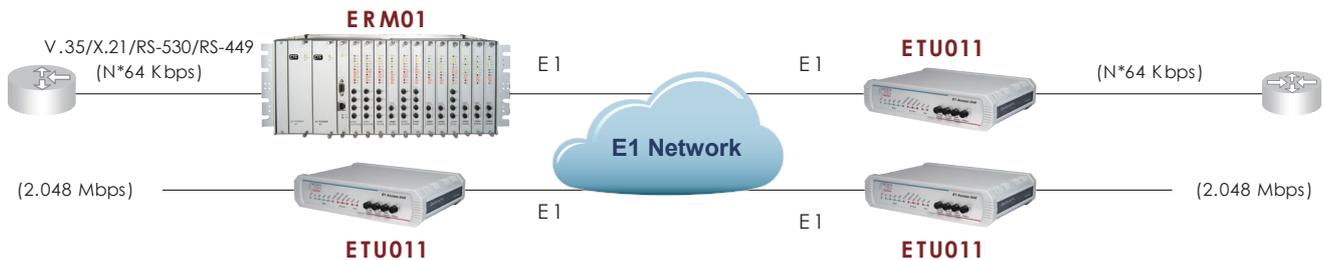
- Supports Fractional E1 and Unframed E1 service
- Removable interfaces, support V.35, X21, RS-530, RS-449, RS-232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection
- (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

### Specifications

<b>G.703 E1</b>	Framing	Framed CCS (PCM31) CAS (PCM30)/ Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	Bit rate	N*56K or N*64Kbps, where N=1~31 in CCS or N equal 1~30 in CAS
	Relative receive level	-43dB
	Transmit level:	
	Pulse	Nominal 2.37V ±10% for 75 ohm
	Amplitude	Nominal 3.00V ±10% for 120 ohm Zero amplitude ±0.1V
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	Clock modes:	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE

<b>G.703 E1</b>	Clock mode 2	Receive clock to the sync. and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
	<b>Indicators</b>	LEDs (Power, TD, RD, RTS, DCD, Signal loss, Sync loss, Alarm)
<b>Standards</b>	ITU-T G.703/G.704/G.706 & G.732	
<b>Power Input</b>	AC: 90-250VAC, DC: -18 ~ -75VDC	
<b>Power Consumption</b>	10W	
<b>Dimensions</b>	250 x 195 x 45 mm (D x W x H)	
<b>Weight</b>	0.51kg	
<b>Temperature</b>	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)	
<b>Humidity</b>	10 ~ 90% non-condensing	
<b>Certification</b>	CE, FCC, RoHS compliant	
<b>MTBF</b>	57,000 hrs	

### Application



### Ordering Information

Model Name	Type	Description
ETU011-AC	Power	1U, 19/2", Data port to framed E1 w/ built-in AC 90 ~ 250 VAC
ETU011-DC	Power	1U, 19/2", Data port to framed E1 w/ built-in DC -18 ~ -72 VDC
Interface Module	Description	
ETU/TTU-V35	V.35 interface module	
ETU/TTU-X21	X.21 interface module	
ETU/TTU-530	RS-530 interface module	
ETU/TTU-449	RS-449 interface module	
ETU/TTU-232	RS-232 ASYN/SYNC interface module	
ETU/TTU-G64	G.703 64Kbps co-directional interface module	
ETU/TTU-NRZ	NRZ interface module ( 4 * BNC )	
ETU/TTU-ET100	10/100 Base-TX Ethernet E1 Bridge interface module	
ETU/TTU-ET100R	10/100 Base-TX Ethernet Routing interface module	

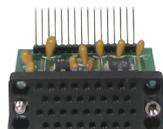
Please refer to page 12-15

Power Type  
**ETU011** -    
 Example: **ETU011** - AC

## Interface Module for ETU01A and ETU011

### ETU/TTU-V35

#### V.35 Interface



#### Features :

- Compliant with ITU-T V.35 standards
- Winchester type 34-pin MB34 M-Block female connector
- Synchronous data rate at Nx64 (where N=1 to 32)
- Data Communications Equipment interface electrically compatible to ITU-T V.11 (RS-422)

### ETU/TTU-232

#### RS-232 Interface



#### Features :

- Compliant with EIA RS-232-C (Unbalanced)
- Compatible to ITU-T V.24 25-pin D Sub female connector
- Synchronous data rate at 64 or 128Kb/s Asynchronous (transparent) at up to 19.2K or 38.4K Data Communications Equipment interface

### ETU/TTU-X21

#### X.21 Interface



#### Features :

- Compliant with ITU-T X.21 standard (Balanced)
- 15-pin D Sub female connector
- Synchronous data rate at Nx64 (where N=1 to 32)
- Data Communications Equipment interface electrically compatible to V.11

### ETU/TTU-530

#### RS-530 Interface



#### Features :

- Compliant with Category 1 EIA-530 (Balanced) 25-pin D Sub female connector
- Synchronous data rate at Nx64 (where N=1 to 32)
- Data Communications Equipment interface electrically compatible to RS-422

### ETU/TTU-NRZ

#### Non-Return to Zero Interface



#### Features :

- 4 BNC connectors: TxD, TxC, RxD and Rx C (Data&Clock)
- NRZ line coding Logic "1" 0V +/- 0.3V Logic "0" -1.5V +/- 0.3V
- Synchronous data rate Nx64 (where N=1 to 32)

### ETU/TTU-449

#### RS-449(V.36) Interface



#### Features :

- Compliant with EIA/TIA-530-A (Balanced)
- 37-pin D Sub female connector
- Synchronous data rate at Nx64 (where N=1 to 32)
- Data Communications Equipment interface electrically compatible to RS-422

### ETU/TTU-G64

#### G.703 64K

#### Co-directional Interface



#### Features :

- Pulse shape compliant with ITU-T G.703
- Clock frequency: 64KHz
- Pulse Amplitude: 1.0V
- Zero Amplitude: 0V
- Impedance: 120 Ohms
- 15-Pin D Sub connector
- Range: up to 800m with 24AWG

### ETU/TTU-ET100R

#### 10/100 Base-TX Ethernet Router



#### Features :

- Ethernet port IP Address/subnet mask
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco® HDLC WAN protocol encapsulation

### ETU/TTU-ET100

#### 10/100 Base-TX Ethernet Bridge



#### Features :

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension
- Transparent half / Full duplex support on WAN / LAN interface
- Provides Ethernet over E1 economically

## Ordering Information

Model Name	Description
ETU/TTU-V35	V.35 interface module
ETU/TTU-X21	X.21 interface module
ETU/TTU-530	RS-530 interface module
ETU/TTU-449	RS-449 interface module
ETU/TTU-232	RS-232 ASYN/SYNC interface module
ETU/TTU-G64	G.703 64Kbps co-directional interface module
ETU/TTU-NRZ	NRZ interface module ( 4 * BNC )
ETU/TTU-ET100	10/100Base-TX Ethernet E1 Bridge interface module
ETU/TTU-ET100R	10/100Base-TX Ethernet Routing interface module

Interface  
**ETU/TTU** – □□□  
 Example: ETU/TTU – V35



# ETU01-Plus

## Single V.35 Port E1 CSU/DSU

The ETU01-Plus stand-alone DSU/CSU is a digital access unit for Unframed E1 or Fractional E1 service. The ETU01-Plus data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU01-PLUS packs the data channels into the E1 link in user-selected time slots. The ETU01-Plus front panel sports status LEDs for monitoring the CSU and DSU conditions and pushbutton switches for initiating local and remote loopback with integral BERT. The ETU01-Plus features a fixed on-board V.35 interface.

### Features

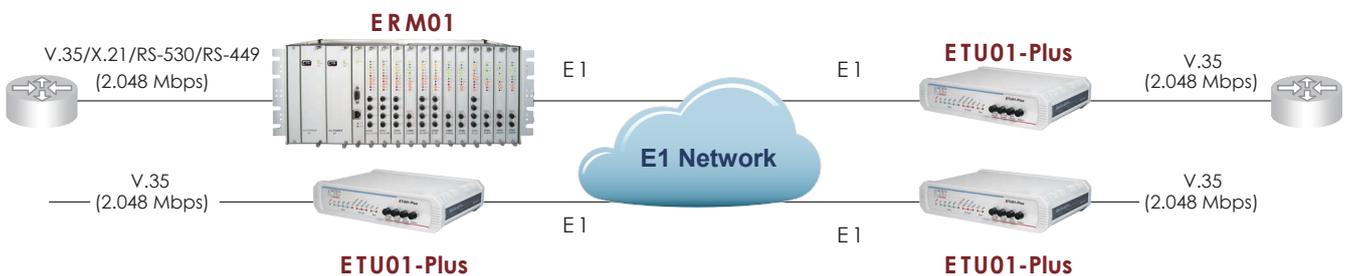
- Supports Fractional E1 and Unframed E1 service with EOC control
- Model with fixed V.35 interface for price critical applications
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback
- Fixed V.35 port with MB34F connector
- I/O connectors all located on rear panel

### Specifications

<b>G.703 E1</b>	Framing	Framed CCS (PCM31) CAS (PCM30)/ Unframed CRC4 on/off
	Line Code	AMI/ HDB3
	Data rate	N*56K or N*64Kbps, where N=1~31 in CCS or N equal 1~30 in CAS
	Relative receive level	-43dB
	<b>Transmit level:</b>	
	Pulse	Nominal 2.37V ±10% for 75 ohm
	Amplitude	Nominal 3.00V ±10% for 120 ohm Zero amplitude ±0.1V
	Jitter performance	According to ITU-T G.823
	Connectors	BNC(unbalanced), RJ-48(balanced)
	<b>Clock modes:</b>	
	Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
	Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE

<b>G.703 E1</b>	Clock mode 2	Receive clock to the sync. and transmit (DTE1) clock from the sync device
	Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
	Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
<b>Indications</b>	LEDs (Power, TD, RD, RTS, DCD, Signal loss, Sync loss, Alarm)	
<b>Standards</b>	ITU-T G.703/G.704/G.706 & G.732	
<b>Power Input</b>	AC: 90-250VAC , DC: -18 ~ -75 VDC	
<b>Power Consumption</b>	10W	
<b>Dimensions</b>	195 x 160 x 45 mm (D x W x H)	
<b>Weight</b>	0.51kg	
<b>Temperature</b>	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)	
<b>Humidity</b>	10 ~ 90% non-condensing	
<b>Certification</b>	CE, FCC, RoHS compliant	
<b>MTBF</b>	55,000 hrs	

### Application



### Ordering Information

Model Name	Type	Description
ETU01/Plus-AC	Power	1U, 19/2", Fixed V.35 port to framed E1 w/ built-in AC 90 ~ 250 VAC
ETU01/Plus-DC	Power	1U, 19/2", Fixed V.35 port to framed E1 w/ built-in DC -18 ~ -75 VDC

Power Type  
**ETU01/Plus** –    
 Example: ETU01/Plus – AC

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

# FTEC-100

## T1/E1 Cross Rate Converter



The FTEC-100 is a standalone T1 (US Standard), E1 (European Standard) converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. T1 and E1 signals with frames employ u-Law and A-Law encoding principles respectively and encode those analog signals into 64kbps digital data. The E1 interface supports CCS (PCM31) or CAS (PCM30) frames with or without CRC-4 and with HDB3 line coding. The T1 interface supports D4 or ESF frame formats with B8ZS or AMI line code. Multiple clock source selection provides maximum flexibility in connecting both T1 and E1. The clock source may be from the T1 recovery clock, from the E1 recovery clock, from the internal oscillator, from an external clock or via transparent timing. All setup controls can be performed via RS-232 console port and ASCII terminal. Tests and diagnostics can easily be performed. Diagnostics include T1 local/remote and E1 local/remote loop back

### Features

- Converts between T1 and E1 data and signaling
- Enable equipment to operate at T1 and E1 rates
- Support G.802 Annex B (T1 over E1)
- Configures A-law/ $\mu$ -law and signaling conversion
- Transparent conversion at 64kbps timeslot level
- Controlled slip for buffer over or under flow
- 24 timeslots of T1 Nx64 can be inserted into E1 Nx64, 30/CAS or 31/CCS timeslots

### Specifications

<b>E1 interface</b>	Framing	CAS/PCM30 or CCS/PCM31 selectable
	Bit rate	2.048Mbps
	Line Code	HDB3
	Line Impedance	75 ohm (BNC) / 120 ohm (RJ-45)
		Voice channel sample rule A-Law
	CRC check	CRC-4 enable/disable
	Pulse amplitude	Nominal 2.37V $\pm$ 10% for 75ohm, Nominal 3.00V $\pm$ 10% for 120ohm
	Zero amplitude	$\pm$ 0.1V
	Connector	RJ-45 and BNC pair
	<b>Specifications</b>	Framing
Bit rate		1.544Mbps
Line Code		B8ZS / AMI
Equalization		0 ~ 655 feet settable
CRC check		Voice channel sample rule $\mu$ -Law CRC-6 when ESF

<b>T1 interface</b>	Line Impedance	100 ohms
	Transmit Pulse level	3.0V $\pm$ 10%,
	Receive signal level	0 ~ -10dB
	Connector	RJ-45
<b>LEDs</b>	PWR, Sys, Test, T1/E1	
<b>Standards</b>	ITU-T G.703, G.704, G.706, G.823, G.824, ANSI T1.403	
<b>Power</b>	AC	100~240 V
	DC	36~72 V
<b>Power Consumption</b>	< 5W	
<b>Dimensions</b>	201 x 135 x 35 mm (D x W x H)	
<b>Weight</b>	130g	
<b>Temperature</b>	0 ~ 60°C (Operating), -10 ~ 70°C (Storage)	
<b>Humidity</b>	10 ~ 90% non-condensing	
<b>Certification</b>	CE, FCC, RoHS compliant	
<b>MTBF</b>	57,000 hrs	

### Application



### Ordering Information

Model Name	Description
<b>FTEC-100/AC</b>	E1/T1 Cross rate converter with RS232 console and built-in AC power
<b>FTEC-100/DC</b>	E1/T1 Cross rate converter with RS232 console and built-in DC power

Power Type  
**FTEC - 100** –    
 Example: FTEC - 100 – AC



# IPM-1SE/V35

## E1/V.35 over Ethernet Access Unit

IPM-1SE/V35 is designed as a multi-service access platform for PDH and V.35 over Ethernet applications. Structured/unstructured E1 and V.35 data can be mapped/de-mapped into/from Ethernet packets. An adaptive clock recovery method for Ingress PDH (PSN -> TDM) clock generation is implemented to support E1 (ITU-T G.824) Jitter performance.

### Cost-effective LAN deployment (PDH and V.35 over ethernet)

IPM-1SE/V35 provides cost-effective applications of traditional circuit-switched system over Ethernet. With IPM-1SE/V35, it is easy to interconnect with existing phone systems and V.35 over Ethernet that are used to carry data, voice and video.

### Transparent transmission

IPM-1SE/V35 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM, V.35 and Ethernet devices with lower network expense.

### Bypass international toll

With a pair of IPM-1SE/V35 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM telecommunications equipment.

### Features

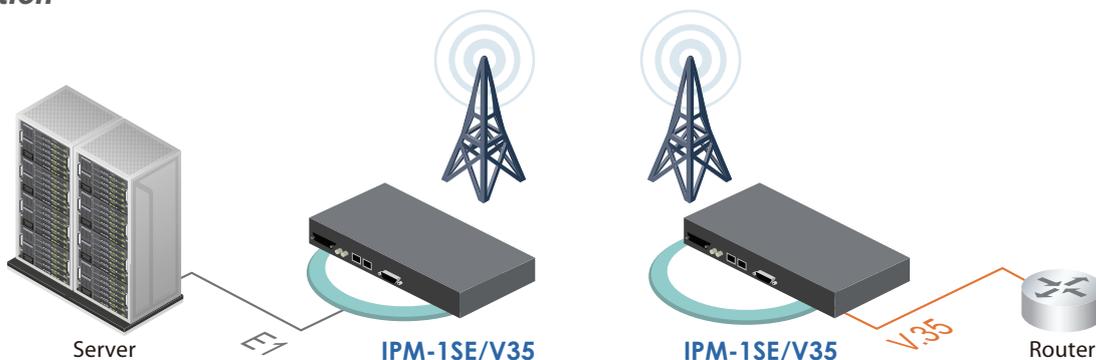
- Supports IEF T RFC4533 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8.
- One E1 NRZ Serial Interface with LOS/AIS detection.
- One V.35 (Nx64K) interface.
- Use Raw Encapsulation method for PDH payload over Ethernet packet.
- Supports Circuit Emulation Service over Ethernet (CESoE) transport over Ethernet networks.
- Comply with IEF T draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA.
- Supports both Point-to-Point and Point-to-Multipoint operation.
- Supports Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant to ITU-T G.824 (E1 Jitter Control).
- Configurable jitter buffer depth to compensate up to 40ms of Packet Delay Variation.
- Lost packets processing/compensation via PW (Pseudo Wire) control field Sequence Number.
- Provides Subscriber side data traffic bandwidth control to guarantee enough TDM payload bandwidth.
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM -> PSN).
- Configurable IEEE 802.3 DA/SA assignment.

### Specifications

<b>Line interface (CPE side)</b>	Port: One E1 (ITU-T G.703) and one V.35. Interface: RJ-48c (120 Ohm), BNC (75 Ohm) and M/34 female (V.35, DCE). E1 Line Coding: HDB3
<b>Ethernet interface (CPE/CO side)</b>	Port: two 100 Base-T Ethernet. One is for downlink and the other is for uplink Interface: RJ-45
<b>Dimensions</b>	44 x 370 x 215 mm (D x W x H)

<b>Power</b>	AC: 110 ~ 240V @ 47 ~ 65Hz DC: -72V ~ -36V
<b>Environment</b>	Ambient temperature: 0°C ~ 50°C (0°C ~ 65°C, optional) Storage temperature: 0°C ~ 85°C Relative humidity: 5 ~ 95% non condensing
<b>Management</b>	Console port (CLI) or SNMP-based / Web GUI management

### Application



### Ordering Information

Model Name	Description
IPM-1SE/V35-AD	E1/V35 over Ethernet access unit with AC+DC Power

**NEW**

# IPM-E1, IPM-4E1



## E1/4E1 over Ethernet Web Management

12  
TDM over IP

IPM-E1/4E1 is designed as a multi-service access platform for PDH over IP applications. E1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support E1 (ITU-T G.823) Jitter performance.

IPM-E1/4E1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-E1/4E1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-E1/4E1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-E1/4E1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

### Features

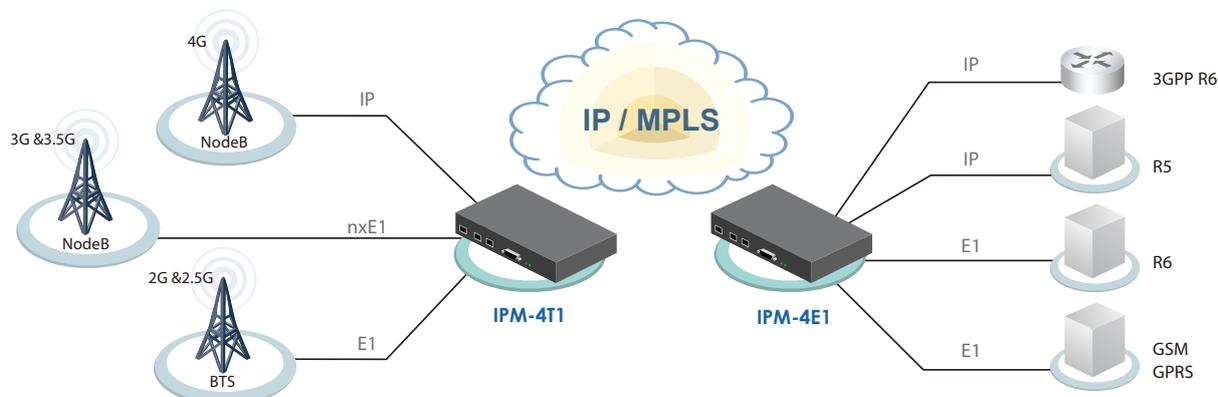
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- Use Raw Encapsulation method for PDH payload over Ethernet packet
- Supports Circuit Emulation Service over Ethernet networks
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation
- Supports Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant to ITU-T G.823 (E1 Jitter Control)
- Configurable jitter buffer depth to compensate PDV (Packet Delay Variation) with the flexible setting of 11ms, 23ms, 40ms, 75ms
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- Provide Subscriber side Data traffic bandwidth control to guarantee enough TDM payload bandwidth
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- Configurable IEEE 802.3 DA/SA assignment
- LED alarm display for E1 Power failure status
- E1 NRZ Serial Interface with LOS/AIS detection

### Specifications

<b>E1 Interface</b>	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	1 or 4-Port
	Data Rate	2.048Mbps ±50ppm
	Connector	RJ-48c for 120 ohm
	Line Coding	HDB3
<b>Ethernet Interface</b>	WAN Port	100 Base-TX Ethernet
	Interface	RJ-45
	LAN port	100 Bases-TX Ethernet
	Interface	RJ-45

<b>Dimensions</b>	125 x 320 x 44 mm (D x W x H)
<b>Power</b>	AC: 85 ~ 264V @ 47 ~ 63Hz
	DC: -72V ~ -36V
<b>Environment</b>	Ambient temperature: 0° ~ 50°
	Storage temperature: 0° ~ 85°
	Humidity: 5 ~ 95% non-condensing
<b>Management</b>	Console or Telnet / Web / SNMP management (via Ethernet)

### Application



### Ordering Information

Model Name	Description
IPM-E1-AD	E1 over Ethernet with built-in AC+DC Power
IPM-4E1-AD	4E1 over Ethernet with built-in AC+DC Power

Port Number Power Type  
**IPM** - □□□□ - □□  
 Example: IPM - 4E1 - AD

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

**NEW**



## IPM-T1, IPM-4T1

### T1/4T1 over Ethernet Web Management

IPM-T1/4T1 is designed as a multi-service access platform for PDH over IP applications. T1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support T1 (ITU-T G.824) Jitter performance.

IPM-T1/4T1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-T1/4T1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-T1/4T1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-T1/4T1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

### Features

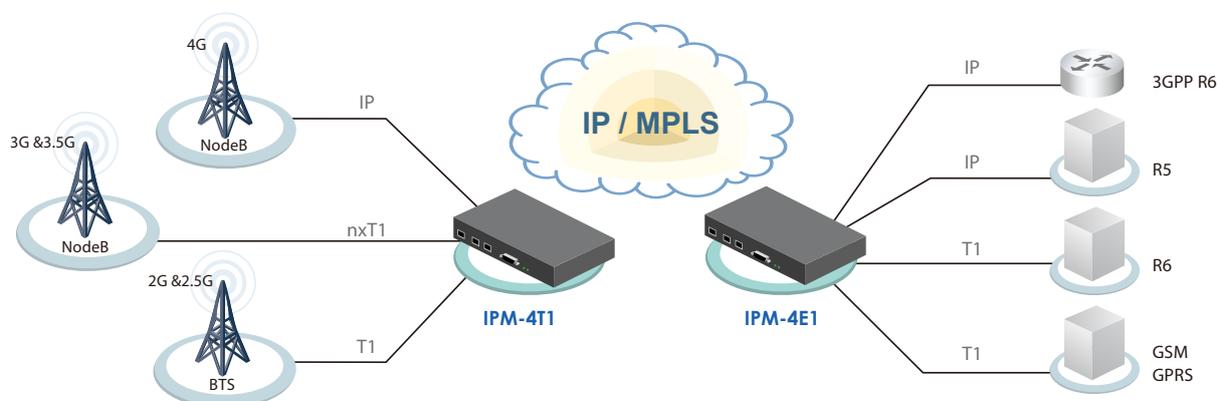
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- Use Raw Encapsulation method for PDH payload over Ethernet packet
- Supports Circuit Emulation Service over Ethernet networks
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation.
- Supports Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant to ITU-T G.824 (T1 Jitter Control)
- Configurable jitter buffer depth to compensate PDV (Packet Delay Variation) with the flexible setting of 11ms, 23ms, 40ms, 75ms
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- Provide Subscriber side Data traffic bandwidth control to guarantee enough TDM payload bandwidth
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- Configurable IEEE 802.3 DA/SA assignment
- LED alarm display for T1 Power failure status
- T1 NRZ Serial Interface with LOS/AIS detection

### Specifications

T1 Interface	Standards	TU-T G.703, G.704, ANSI T1.403
	Ports	1 or 4-Port
	Data Rate	1.544Mbps ±32ppm
	Connector	RJ-48c for 100 ohm
	Line Coding	B8ZS
Ethernet Interface	WAN Port	100 Base-TX Ethernet
	Interface	RJ-45
	LAN port	100 Bases-TX Ethernet
	Interface	RJ-45

Dimensions	125 x 320 x 44 mm (D x W x H)
Power	AC: 85 ~ 264V @ 47 ~ 63Hz
	DC: -72V ~ -36V
Environment	Ambient temperature: 0° ~ 50°
	Storage temperature: 0° ~ 85°
	Humidity: 5 ~ 95% non-condensing
Management	Console or Telnet / Web / SNMP management (via Ethernet)

### Application



### Ordering Information

Model Name	Description
IPM-T1-AD	T1 over Ethernet with built-in AC+DC Power
IPM-4T1-AD	4T1 over Ethernet with built-in AC+DC Power

Port Number Power Type  
**IPM** - □□□ - □□  
 Example: **IPM - 4T1 - AD**

**NEW**

# IPM-16E1

16x E1 over Ethernet  
Web Management



IPM-16E1 is designed as a multi-service access platform for PDH over IP applications. E1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support E1 (ITU-T G.823) Jitter performance.

IPM-16E1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-16E1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-16E1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-16E1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

## Features

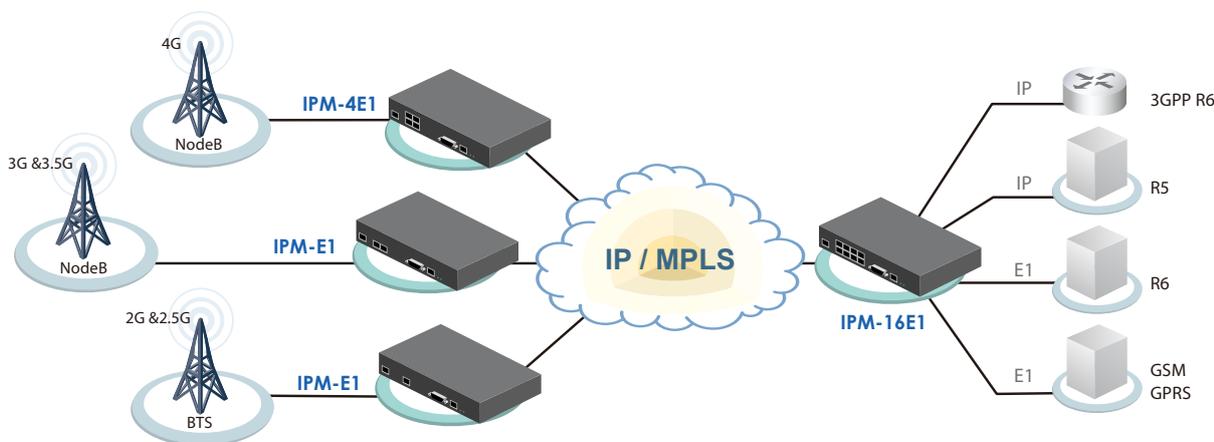
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- 16 x E1 NRZ Serial Interface with LOS/AIS detection
- Use Raw Encapsulation method for PDH payload over IP packet
- Supports Circuit Emulation Service over IPE
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation
- Configurable IEEE 802.3 DA/SA assignment
- Supports 16 independent Adaptive Clock recovery block for Ingress PDH (PSN->TDM) clock generation. Recovered clock jitter is compliant with ITU-T G.823 (E1 Jitter Control)
- Independent configurable jitter buffer depth to compensate up to 250ms of Packet Delay Variation
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- LED alarm display for E1 Power failure status

## Specifications

<b>E1 Interface</b>	Standards	ITU-T G.703, G.704, G.706, G.732
	Ports	16-Port
	Data Rate	2.048Mbps ±50ppm
	Connector	RJ-45 for 120 ohm
	Line Coding	HDB3
<b>Ethernet Interface</b>	WAN Port	1000Base-T
	Interface	RJ-45
<b>Dimensions</b>	268 x 290 x 44 mm (D x W x H)	

<b>Power</b>	AC:	85 ~ 264V @ 47 ~ 63Hz
	DC:	-72V ~ -36V
<b>Environment</b>	Ambient temperature:	0° ~ 50°
	Storage temperature:	0°~ 85°
	Humidity:	5 ~ 95% non-condensing
<b>Management</b>	Console port or Telnet/ Web / SNMP-based management via NMS port	

## Application



## Ordering Information

Model Name	Description
IPM-16E1-AD	16E1 over Ethernet with built-in AC+DC Power

Port Number      Power Type  
**IPM** - □□□□ - □□  
 Example: IPM - 16E1 - AD

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

**NEW**



# IPM-16T1

**16xT1 over Ethernet  
Web Management**

IPM-16T1 is designed as a multi-service access platform for PDH over IP applications. T1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN->TDM) clock generation is implemented to support T1 (ITU-T G.824) Jitter performance.

IPM-16T1 provides cost-effective applications of traditional circuit-switched system over IP. It is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-16T1 is capable of supporting 2G/3G/4G backhaul and provides smooth services. IPM-16T1 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM and IP devices with lower network expense. With a pair of IPM-16T1 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM equipment.

### Features

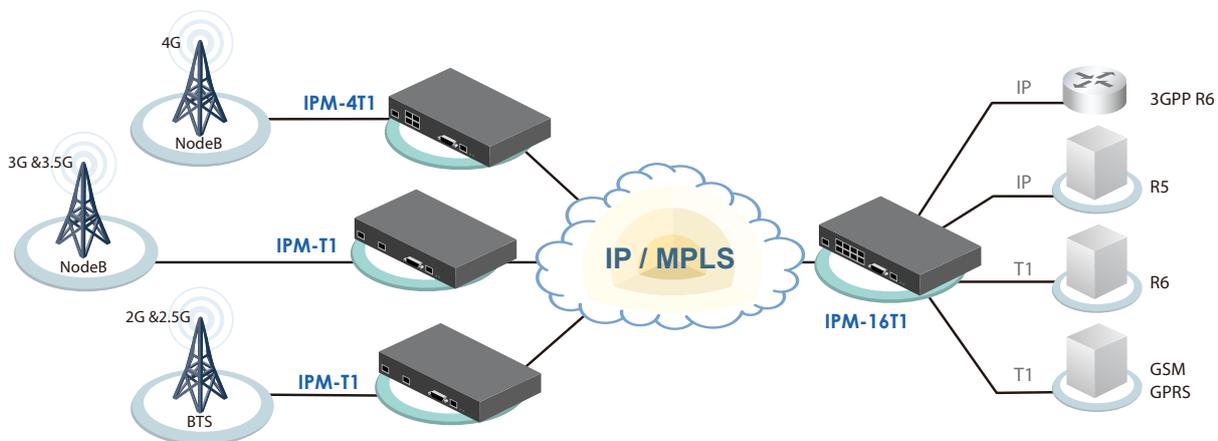
- Supports Web Management
- Supports IETF RFC4553 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8
- 16 x T1 NRZ Serial Interface with LOS/AIS detection
- Use Raw Encapsulation method for PDH payload over IP packet
- Supports Circuit Emulation Service over IPE
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA
- Supports both Point-to-Point and Point-to-Multipoint operation
- Configurable IEEE 802.3 DA/SA assignment
- Supports 16 independent Adaptive Clock recovery block for Ingress PDH (PSN->TDM) clock generation. Recovered clock jitter is compliant with ITU-T G.824 (T1 Jitter Control)
- Independent configurable jitter buffer depth to compensate up to 250ms of Packet Delay Variation
- Lost packets processing / compensation via PW (Pseudo Wire) control field Sequence Number
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM->PSN)
- LED alarm display for T1 Power failure status

### Specifications

<b>T1 Interface</b>	Standards	ITU-T G.703, G.704, ANSI T1.403
	Ports	16-Port
	Data Rate	1.544Mbps ±32ppm
	Connector	RJ-48c for 100 ohm
	Line Coding	B8ZS
<b>Ethernet Interface</b>	WAN Port	1000Base-T
	Interface	RJ-45
<b>Dimensions</b>	268 x 290 x 44 mm (D x W x H)	

<b>Power</b>	AC: 85 ~ 264V @ 47 ~ 63Hz
	DC: -72V ~ -36V
<b>Environment</b>	Ambient temperature: 0° ~ 50°
	Storage temperature: 0° ~ 85°
	Humidity: 5 ~ 95% non-condensing
<b>Management</b>	Console port or Telnet/ Web / SNMP-based management via NMS port

### Application



### Ordering Information

Model Name	Description
IPM-16T1-AD	16T1 over Ethernet with built-in AC+DC Power

Port Number      Power Type  
**IPM** - □□□□ - □□  
 Example: **IPM - 16T1 - AD**

Specifications & design are subject to change without prior notice. Please visit CTC Union website for more details.

# EOC-101-P

## Ethernet Extender with Power Feeding (Coaxial Cable)



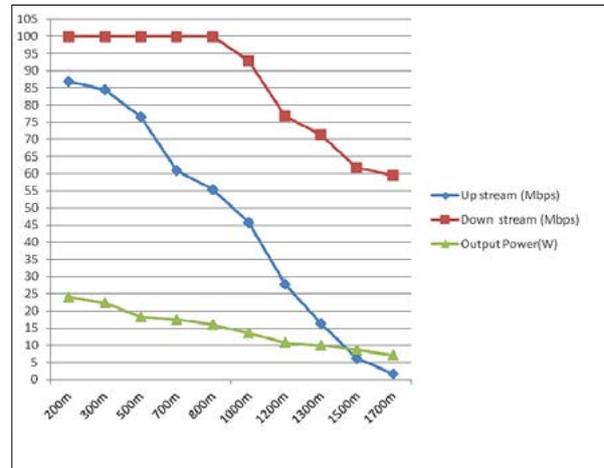
### Features

- Long transmission distance up to 1500 meters (Max.)
- Remote power feeding
- Simultaneous transmission of power and Ethernet data over coaxial cable
- High transmission bandwidth, support HD IP Camera 1080P/30fps
- High power transmission for long distance: 12W (DC12V /1A) @1000 Meters (EOC-101L-P)
- Complies with standard IEEE802.3 and IEEE802.3u

### Coaxial Cable Distance vs Speed and Power Feeding

Distance (meter)	300	500	700	1000	1200	1500
Up stream (Mbps)	76	69	55	41	25	5
Down stream (Mbps)	90	90	90	82	69	55
Output Power (W)	18	16	15	12	9.5	7.5

### Output Power and Bandwidth Efficiency (Based on RG-6)

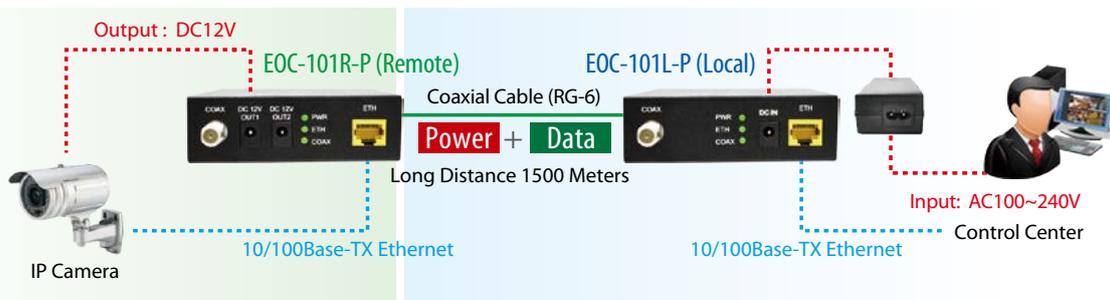


### Specifications

<b>Standards</b>	IEEE802.3 10Base-T IEEE802.3u 100Base-TX IEEE802.3x Flow Control for Ethernet
<b>Transmission Medium</b>	Coaxial Cable (RG-6 Drop cable)
<b>Remote Site Power Output</b>	2x DC 12V output, total 1A/12W @ 1000meters coaxial cable
<b>LED</b>	Power (Green) On: power on / Off : Power Off ETH LNK/ACT (Green) On: Ethernet Port Link / Flash : Data TX / RX Coax LNK/ACT (Green) On: Coaxial link / Fast Flash : Data TX/RX / Slow Flash : Standby for connection
<b>Power Consumption</b>	32.2W (12W Power feeding for IP Camera + EOC-101L-P + EOC-101R-P) @1000meter coaxial cable
<b>Power Input</b>	1x DC jack for power adapter (AC100~240V, 50/60Hz)

<b>Power Adapter</b>	Input AC100~ 240AC (50/60Hz) Output 63VDC , 0.8A
<b>Connectors</b>	Remote RJ-45x1, F-Type BNCx1, DC jack 12V output x2 Local RJ-45x1, F-Type BNCx1, DC jack 48V input x1
<b>Dimensions</b>	Remote 123.6 x 95 x 30mm (D x W x H) Local 123.6 x 95 x 30mm (D x W x H)
<b>Operation Temperature</b>	0 ~50°C
<b>Weight</b>	Total Net : 640g
<b>Humidity</b>	10% ~ 90% RH, non-condensing
<b>Protection</b>	Over current, Overvoltage Protection
<b>Certification</b>	CE / FCC Part 15 class B
<b>EMS protection</b>	EN61000-4-5 Surge level 3 Criteria B for coaxial cable , Ethernet and Power

### Application



### Ordering Information

Model Name	Description
EOC-101-P	Remote Power Feeding Ethernet Extender over Coaxial Cable ( Remote, Local )



# EOC-10A

## Gigabit Ethernet / CATV over Coax Modem

The EOC-10A is point-to-point EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100/1000Mbps Ethernet circuits up to 700 meters (2,296feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-10A will allow Ethernet connectivity in existing facilities or homes without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with absolutely no settings required. The EOC-10A is used in Coaxial cable systems to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable. The EOC-10A works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

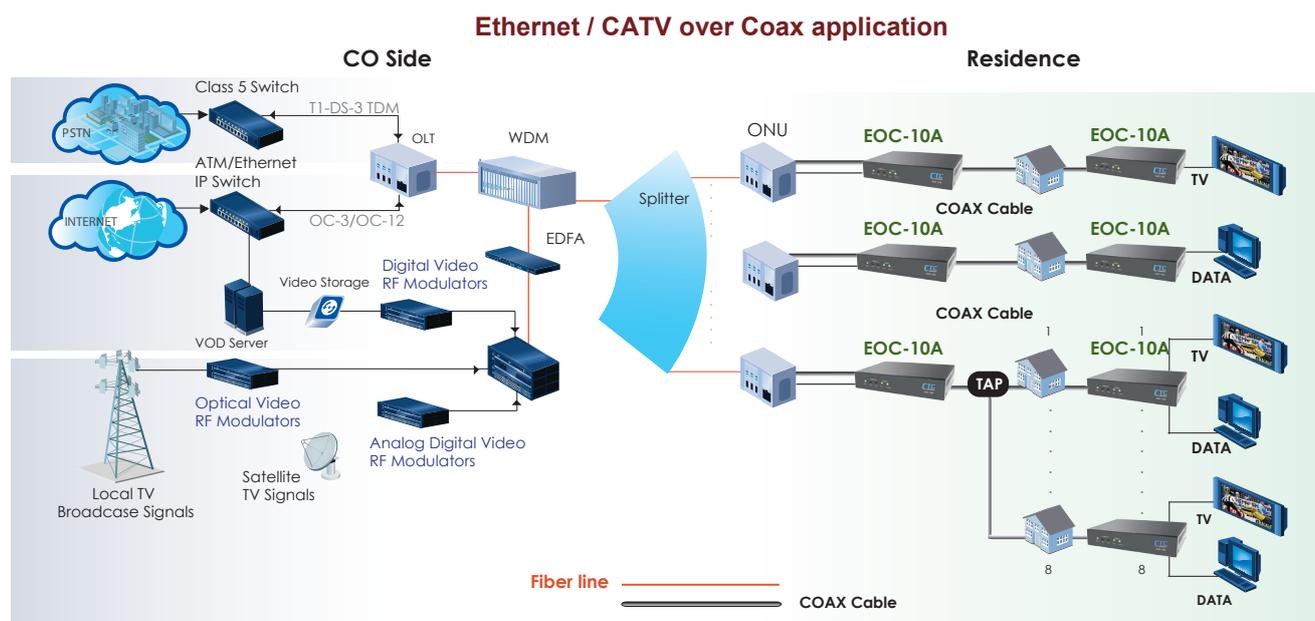
### Features

- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- 192Mbps @ up to 700 meters (2,296feet)
- 64Mbps @ 1.2Km (4,000feet)
- Supports point to point
- Supports point to multi-point up to 8 nodes over tap/splitter
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX
- Auto negotiation
- Plug and Play, no configuration required
- Status LEDs for simple monitoring

### Specifications

<b>Ethernet Interface</b>	Two 10/100/1000 Mbps, RJ45	<b>Standards</b>	IEEE802.3, IEEE802.3u, IEEE802.3ab, IEEE802.3x
<b>Coax Interface</b>	Two F-Type Female Coax Connectors, One for EoCNA, the other for TV/ CCD	<b>Power Input</b>	12VDC (via AC switching adapter)
<b>Protocol</b>	Transparent to higher layer protocols	<b>Power Consumption</b>	<4W
<b>Transmission Power and Spectrum</b>	0 dBm, 12~44 MHz	<b>Dimensions</b>	83 x 138 x28mm (D x W x H)
<b>Physical layer</b>	224Mbps maximum speed	<b>Weight</b>	0.33kg
<b>transmission speed and distance</b>	Up to 192Mbps@700 meters	<b>Temperature</b>	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
	Up to 64Mbps @ 1.2Km (-176dBm/Hz Noise Floor)	<b>Humidity</b>	10 ~ 90% non-condensing
<b>Indications</b>	LEDs (PWR, LAN Link/Act, Coax Link/Act, Sync)	<b>Certification</b>	CE, FCC, RoHS compliant
		<b>MTBF</b>	57,000 hrs

### Application



### Ordering Information

Model Name	Description
EOC-10A	CATV+2x10/100/1000-T over Coax Modem with AC Adapter

# Eoe1A

## Ethernet over E1 with SNMP Management



The Eoe1A is a Channel Service Unit for unframed ITU-T G.703 E1 that features a built-in Ethernet bridge. The CSU has a built-in Network Terminating Unit (NTU) and may connect to either 75 Ohm unbalanced, BNC connectors or to 120 Ohm balanced, unframed E1 via twisted pairs and a shielded RJ-45 connector. The Eoe1A Ethernet Bridge uses HDLC encapsulation to transport Ethernet packets across the WAN and supports 10/100 auto-negotiation or manual settings for 10M, 100M, Full or Half Duplex Ethernet. The Ethernet port also supports a standard auto-MDIX feature that will completely eliminate Ethernet cross-over cables or the guessing that is sometimes involved in choosing a cable when connecting to a HUB or a PC. The Eoe1A is very easy to configure by a menu driven serial console interface. SNMP and proprietary MIB add the ability to manage the Eoe1A centrally through third party network management software or via CTC Union's EMS management system.

### Features

- Supports 10/100Base-TX Ethernet over Unframed E1
- Automatic address learning, aging and deletion after 5 minutes
- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Forwarding and filtering rate at WAN speed with throughput latency of 1 frame
- Auto MDI / MDIX
- Real-time filtering with 256 MAC address table
- Supports Console, SNMP and Web management
- Adjustable pay load rates of: 10K, 32K, 64K, 128K, 256K, 512K, 1024K & 2048K

### Specifications

#### G.703 E1 Specifications

Framing	Unframed
Line code	AMI/ HDB3
Bit rate	2.048Mbps (clear channel)
Relative receive level	0 to -43dB
Transmit level	Pulse Nominal 2.37V ±10% for 75ohm Amplitude Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
Jitter performance	According to ITU-T G.823
Connector	BNC(unbalanced), RJ-48(balanced)
Clock modes	Clock mode 0: Receive & transmit clock (DCE1)(recovered) to the sync DTE Clock mode 1: Receive & transmit clock (DCE2)(internal oscillator) to the sync DTE

#### Diagnostics

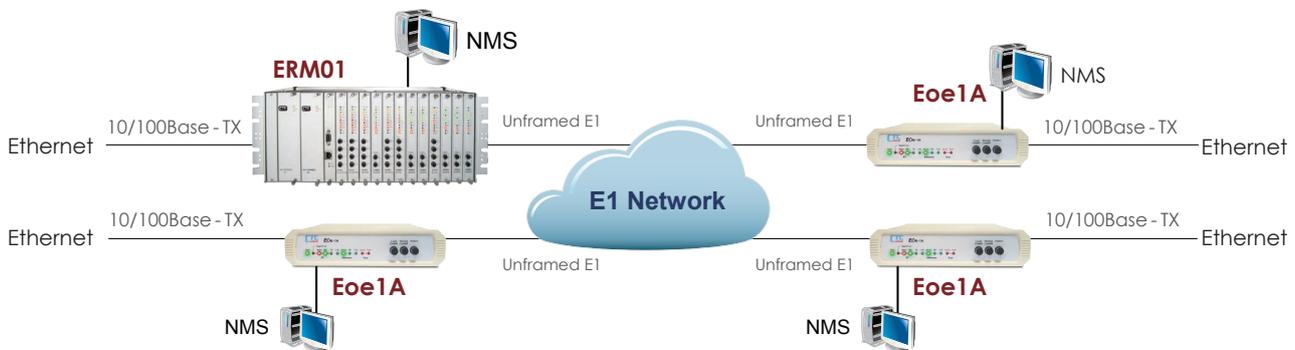
Test Switches	Digital local loopback, Analog local loopback, Digital local and remote loopback, 2047 Test pattern
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#### Ethernet Specifications

Connector	RJ-45
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Data Rate	10/100Mbps; Half Duplex / 20/ 200Mbps; Full duplex
Filtering & Forwarding	90,000 packets/sec
Delay	1 frame
Frame Buffer	340 frames
MAC Table	256 MAC address
Protocols	Synchronous HDLC
Indications	LEDs (Power, Signal Loss, Alarm, Link, TD, RD, 100, Full, Error, Error, Test)
Standards	ITU-T G.703, G.706 and G.732, IEEE 802.3/802.3u
Management	Console, Web, SNMP
Power Input	AC: 90-250VAC ; DC: 18-72 VCD
Power Consumption	20W
Dimensions	250 x 195 x 45mm (D x W x H)
Weight	1.5kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant
MTBF	57,000 hrs

### Application



### Ordering Information

Model Name	Description
Eoe1A/AC	1U half 19" Ethernet over unframed E1 SNMP with AC power (100 ~ 240 V)
Eoe1A/DC	1U half 19" Ethernet over unframed E1 SNMP with DC power ( 18 ~ 75 V)
Eoe1A/AD	1U half 19" Ethernet over unframed E1SNMP with AC (100~240V) and DC ( 18 ~ 75 V)

Power Type  
**Eoe1A** -    
 Example: Eoe1A - AD



# ET100A (V2)

## Ethernet to WAN (Synchronous) Bridge

The ET100A Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over bit stream type infrastructures. The built-in n x 64 (56)Kbps timing clock generator makes it easy to connect to other n x 64 (56)Kbps related data equipment. Several options of data interfaces, including V.35, RS-530, RS-449, RS-232, and X.21 make this unit's connection between 10Base-T or 100Base-TX LAN and various data port interfaces convenient.

### Features

- Protocol : Synchronous HDLC (ISO 13239), PPP, CISCO® HDLC
- 10Base-T or 100Base-TX Ethernet bridge
- Auto MDI/MDIX
- Supports IEEE 802.3x flow control
- Selectable data port : V.35, RS-530, RS-449, RS-232, X.21
- Transparent half / Full duplex support on WAN, LAN interface
- Nx64, Nx56 timing clock generator for Sync WAN link
- LEDs indication for LAN, WAN status

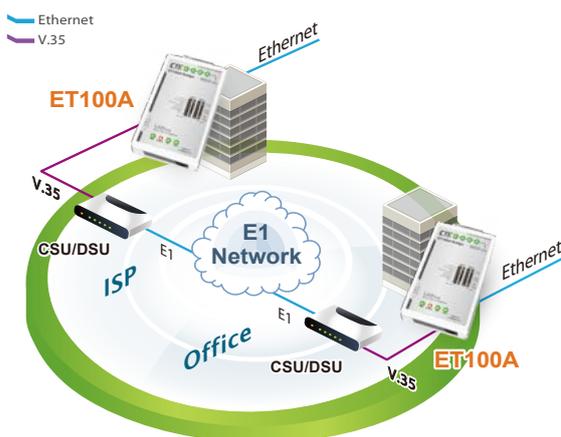
### Specifications

WAN	Interface:	Selectable RS-232(Sync), V.35, RS-530, RS-449, RS-232, X.21with Adapter Cable
	Protocol:	Synchronous PPP, HDLC (ISO 13239), CISCO® HDLC
	Connector:	DB25M
	Type:	DTE
	Configuration:	All Configuration by Dip switch (Protocol, interface, Clock mode, data rate)
	Data rate:	Nx56Kbps, Nx64Kbps RS-232 up to 128Kbps V.35, X21, RS-530, RS-449 up to 10Mbps
	Clock source:	Tx/Rx internal or external
	Handshake (DCD)	Follow CTS/RTS or Always On

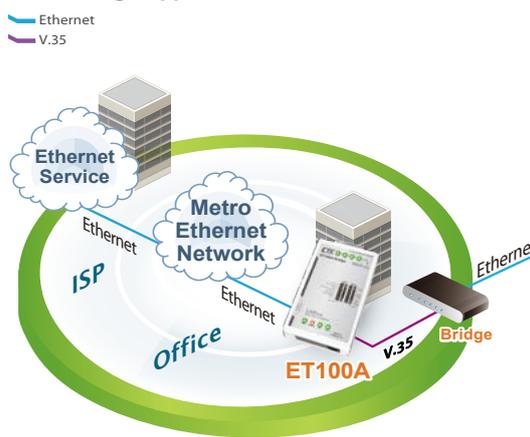
Indications	LEDs (PWR, WAN Rx/Tx, LAN Tx/Rx/Link/Err/Speed)
LAN	Compliant with IEEE 802.3, 802.3u, 802.3x
	Connector: RJ-45
	Speeds: 10/100Base-TX, Full/Half duplex Frames: Support 64 ~ 2044 byte packet lengths
Bridge Specifications	MAC Address learning, aging and deletion after 5 minutes 256 addresses MAC table, 1763 packet buffer
Power	12VDC
Power Consumption	< 5 W
Dimensions	135 x 79 x 25mm (D x W x H)
Weight	180g
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS compliant

### Application

#### Ethernet over TDM, Point to Point



#### HDLC Bridge Application



### Ordering Information

Model Name	Description
ET100A/V35M	Ethernet to V35 WAN Bridge with V.35 cable: DB25F to MB34M, 1 meter
ET100A/X21M	Ethernet to X21 WAN Bridge with X21 cable: DB25F to DB15M, 1 meter
ET100A/RS530M	Ethernet to RS530 WAN Bridge with RS530 cable: DB25F to DB25M, 1 meter
ET100A/RS449M	Ethernet to RS449 WAN Bridge with RS449 cable: DB25F to DB37M, 1 meter
ET100A/RS232M	Ethernet to RS232 WAN Bridge with RS232 cable: DB25F to DB25M, 1 meter