



G.703 Technology

*Overview of E1 Converters
(2,048 Mbit/s)*

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E1 FAMILY

G703 E1 Pack

Single Port E1 and Fractional E1 Access Unit

The **G703 E1-U/FE1/FE1-A Access Units** are single port access units for Unframed E1 or Fractional E1 services. Data Port rates are selectable via DIP-switches, for any multiple of 64Kbps up to 2048kbps (Fractional models only). User data is placed into the E1 frame, using only the required number of timeslots. Timeslot assignment is accomplished according to the Data Port speed and is selected by DIP-switches. The main E1 link may be clocked from the recovered receive clock (LBT), from the data port, or from an internal oscillator. The data channel interface is RS-530 standard. Adapter cables are available for V.35, X.21 and RS-449. The **G.703 E1-U/FE1/FE1-A's** DIP and slide switches, located on the side and front panels, provide for easy setup and control of all functions.

The **G703/FE1-A** model may be cascaded as an E1 Multiplexer. The unused channel timeslots will pass through E1/Rx to E1/Tx.



G703E1-U (Unframed)



G703FE1/FE1-A

Features

- LTU (Line Terminating Unit) built in unit.
- Single port access to E1 & Fractional E1 services.
- Interface conversion between G.703 and RS-530, RS-449 (V.36), X.21 or V.35.
- Data rate: DIP selectable sync Nx64Kbps to 2048Kbps. (FE1 and FE1-A only)
- Fully transparent signal conversion under unframed mode (2048Kbps).
- Clock Regeneration from incoming HDB3 data.
- Diagnostic Loopbacks both for G.703 and Data Port sides.
- All 1's monitor.
- Decoded data in NRZ form.
- Power: AC 110/230V 50/60Hz adapter to DC 9V
- Temp. range: 0°C to 50°C
- Humidity: 10% to 90% relative humidity, noncondensing.
- Dimensions: 19.2cm (L) x 10cm (W) x 2.4cm (H)
- Weight: 400g net

G.703 Interface Specifications

- **Type** Bidirectional (E1) 2048kbps.
- **Line** 4wire, 26-16AWG.
- **Range** Up to 1500 meter, 24AWG or better.
- **Impedance** RJ-45 120 ohm (balanced). BNC 75 ohm (unbalanced).
- **"Pulse" amplitude** 2.37V nominal for BNC, 75 ohm. 3.00V nominal for RJ-45, 120 ohm.
- **"Zero" amplitude** ±0.1V max.
- **Clock freq.** 2.048 MHz.
- **Freq. Tracking** ±50ppm.
- **Jitter** Complies with ITU-T G.823
- **Connector** RJ-45 or BNC.
- **Complies with** ITU G.703, G.704, G.706 and G.823.
- **Frame format** CAS/CCS, Unframe/Frame.
- **CRC check** CRC-4 enable/ disable.
- **Line code** HDB3.

Application



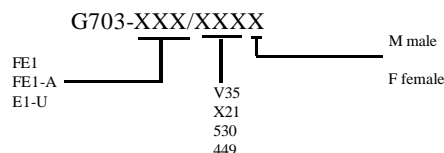
Data Port Interface Specifications

- **Type** RS-530/DB25 Standard or V.35, RS-449(V.36) or X.21 with adapter cable.
- **Data rate** 64kbps to 2.048Mbps.
- **Connector** DB25/F with adapter cable.
- **Line code** NRZ

LED Indicators

- **DTE** (green LED) Data port set to DTE mode.
- **DCE** (green LED) Data port set to DCE mode.
- **TD** (yellow LED) Transmit data.
- **RD** (yellow LED) Receive data.
- **TEST** (red LED) Loopback test mode.
- **ALARM** (red LED) Data loss, sync loss or Frame loss.
- **T-Clk Loss** (red LED) Transmit clock loss.
- **R-Clk Loss** (red LED) Receive signal loss.

Ordering Information



FE1	Fractional E1 (Nx64kbps).
FE1-A	Fractional E1, supports cascaded mode.
E1-U	E1, unframed only (2048kbps).

• Optional Cable	
V35	DB25-V35 Cable.
X21	DB25-DB15 Cable.
530	DB25-DB25 Cable.
449	DB25-DB37 Cable.

*Do not forget to order the required cable for the dataport of your equipment.

ETU01-U Standalone/Rack

Single Port Unframed E1 Access Unit



ETU01-U/AC-STD



ETU01-U/DC-STD

The **ETU01-U** is a single port access unit for Unframed E1 service. Two models, one supporting AC (90-250V) and one supporting DC (18-72V), are available.

The **ETU01-U** data channel supports a fixed transmission rate of 2.048Mbps, 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-U** packs the data channel into the E1 link using the entire E1 frame.

The **ETU01-U** has many types of user-replaceable data channel modules, which directly support the following interfaces: V.35, X.21, RS-530, 10BASE-T Ethernet Bridge, and 10/100BASE-T Ethernet Router. RS-449 is supported by means of an RS-530 to RS-449 adapter cable.

The **ETU01-U** fully meets all of the E1 specifications including ITU-T G.703 and G.823.

The **ETU01-U** features V.54 diagnostic capabilities for performing local loopback and remote digital loopback. The operator at either end of the line may test both the **ETU01-U** and the line in the digital loopback mode. The loopback is controlled by either a manual switch or by the DTE interface for V.35 and RS-530.

A front panel switch generates an internal 511 bit pseudo random test pattern, according to ITU-T, for direct end-to-end integrity testing. The Err indicator flashes for each bit error detected.

Multiple clock source selection provides maximum flexibility in connecting both the E1 and user data interface. The E1 link may be clocked from the recovered E1 receive clock, from the user data port, or from the internal oscillator.

Specifications

E1 LINK

- **Framing** Unframed
- **Bit rate** 2.048Mbps
- **Line code** AMI
HDB3
- **Line impedance** 75 ohm(BNC)
120 ohm(DB-15, RJ-45)
- **Relative receive level** 0 to -43dB
- **Transmit level**
 - **Pulse amplitude** Nominal 2.37V±10% for 75ohm
Nominal 3.00V±10% for 120ohm
 - **Zero amplitude** ±0.1V
- **Transmit frequency tracking**
 - **Internal timing** ±30 ppm
 - **Loopback timing** ±50 ppm
 - **External timing** ±100 ppm
- **Jitter performance** According to ITU-T G.823
- **Complies with** ITU-T G.703, G.706
and G.732.
- **Interface connectors** 15-pin, D-type female
BNC
RJ-45

ETU01-U

User Data Channels

- **Interfaces types**
 - V.35
 - X.21
 - RS-530
 - RS-449 (via adapter cable)
 - 10BASE-T Ethernet Bridge
 - 10/100BASE-TX Router

- **Interface connectors**
 - V.35 interface 34 pin, female
 - X.21 interface 15 pin, D-type female
 - RS-530 interface 25 pin, D-type female
 - RS-449 interface 37 pin, D-type male(via adapter cable)
 - 10BASE-T I/F RJ-45, straight and crossed
 - 10/100BASE RJ-45, straight

- **Line code** NRZ (except Bridge and Router)

- **Data rate** 2048 kbps

- **Clock modes**
 - Clock mode 0 (DCE1)
 - Receive and transmit clock (recovered) to the synchronous DTE
 - Clock mode 1 (DCE2)
 - Receive and transmit clock (internal oscillator) to the synchronous DTE
 - Clock mode 2 (DTE1)
 - Receive clock to the synchronous, and transmit clock from the synchronous device
 - Clock mode 3 (DTE2)
 - Receive and transmit clock from the Synchronous DCE (from ETC and ERC pin)
 - Clock mode 4 (DTE3)
 - Receive and transmit clock from the Synchronous DCE (all from ETC pin)

- **Control signals**
 - CTS constantly ON
 - DSR constantly ON, except during test loops
 - DCD constantly ON or follows RTS, except during signal loss

Physical

- **Height:** 45mm
- **Width:** 195mm
- **Depth:** 255mm
- **Weight:** 1.5kg

Environment

- **Temperature** 0-50°C / 32-122°F
- **Humidity** 0 to 90% non-condensing

Test switches/Diagnostics

- Digital local loopback
- Analog local loopback
- Digital remote loopback
- Test pattern

Power Supply (model dependant)

- **Voltage** 90 to 250 VAC autorange +18 to +72VDC
- **Frequency** 47 to 63Hz (AC)
- **Consumption** 20 Watts
- **Fuse** 0.1A SB for AC
0.5A SB for DC

Ordering Information

- **ETU01-U Unframed E1, no dataport
- ETU01-U/AC-STD AC type, no data port
- ETU01-U/DC-STD DC type, no data port

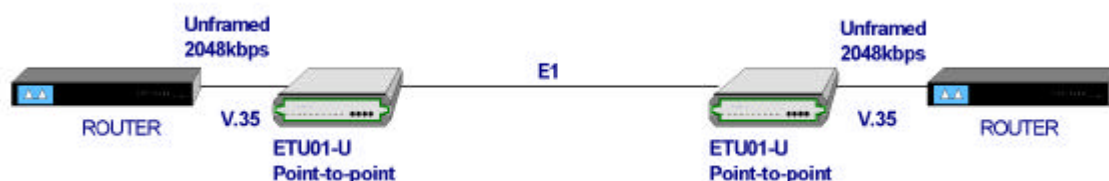
Optional Interface Modules

- 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-530 interface module plus RS-449 cable adapter
- ETU/TTU-ET10 10 Base-T Ethernet Bridge
- ETU/TTU-ET10R 10/100Base-T Ethernet Router

Order information examples (includes I/F module)

- ETU01-U/AC/V35 AC type, V.35 Interface port
- ETU01-U/AC/X21 AC type, X.21 Interface port
- ETU01-U/DC/530 DC type, RS-530 Interface port
- ETU01-U/DC/ET10 DC type, Ethernet Bridge

Application



ETU01-A Standalone/Rack

Single Port Fractional E1 Access Unit



The **ETU01-A** provides an economic digital access solution for E1 and Fractional E1 network services. A DTE device may be linked to an **ETU01-A** at data rates of 56Kbps to 2048Kbps. The **ETU01-A** features user replaceable dataport modules for a number of interface standards including V.35, X.21, RS-530, RS-449, and RS-232. The **ETU01-A** supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via an 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 **ETU01-A** provides optional SNMP (Simple Network Management Protocol), which allow the user to remotely control, diagnose and monitor the system.

Features

- Integrates High Speed Data and E1 link with an intelligent E1/ Fractional E1 Access Unit.
- Data Interface: V.35, RS-530, X.21, RS-449, RS-232, G.703 64 codirectional, 10Base-T Ethernet, voice, and NRZ/ BNC.
- Selectable data rates: Nx64Kbps, Nx56Kbps
- Setup and Control via front Panel with LCD display or ASCII terminal.
- Supports SNMP Network Management System (optional).
- Complies with ITU G.703, G.704, G.706, G.736, G.823.
- IDLE Code:00-FF by user setting
- N56K every seven bits followed by one (1)

G.703 Interface Specifications

- **Framing** Unframe/ Frame
CCS(PCM31)/ CAS(PCM30)
CRC4 ON/OFF
- **Bit rate** 2048Kbps
- **Line Code** AMI
HDB3
- **Line impedance** 75 ohm
120 ohm
- **Relative receive level** 0 to -43dB
- **Transmit level**
Pulse amplitude Nominal 2.37V ±10% for 75 ohm
Nominal 3.00V ±10% for 120 ohm
±0.1V
Zero amplitude
- **Transmit frequency tracking**
Internal timing ±30 ppm
Loopback timing ±50 ppm
External timing ±100 ppm
- **Jitter performance** According to ITU-T G.823
- **Complies with** ITU-T G.703, G.704, G.706
G.736, ETSI ETS 300 420 and G.732
- **Interface connectors** 15 pin, D-type female
BNC x 2, RJ-45 (SNMP)
- **Return loss** 12dB for 51-102K HZ
18dB for 102-2048K HZ
14dB for 2048-3072K HZ
- **Surge Protection** DC Sparkover Voltage: 230±20%
Impulse Sparkover Voltage:
650 V max(1kv/μs)

Application



Data Port Interface Module Options

Type	Interface	Connector
V35	V.35 interface	MB 34F
X21	X.21 interface	DB15F
530	RS-530 interface	DB25F
449	RS-449 interface	DB25F to DB37 cable
232	RS-232 interface	DB25F
G703	G.703/ 64K	DB25F
ET10	10Base-T	RJ-45
ET10R	10/100Base-TX	RJ-45
NRZ	NRZ/ BNC	(4) BNC (female)

Front Panel

- **Setup & Control**
- **Key PAD** 4 operation keys
- **LCD display** 16 x 2 characters
- **LED status display** 8 status LEDs
(Power, E1, DTE and Diagnostics)

Diagnostic Tests

- **Alarm LED** Sync Loss, Signal Loss, Alarm (AIS, MRAl, RAJ), TD, RD, Error, Test.
- **Loopback** Line loopback
Payload loopback
Local loopback
DTE loopback
- **BERT Test patterns** 511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4 test patterns

Environment

- **Temp** 0°C to 50°C/ 32°F to 122°F
- **Humidity** 0 to 90 % non-condensing

Ordering Information

- **Optional SNMP Module** Simple Network Management Protocol
- **Example ETU01A/XX-DC** XX=I/F module type from above table with universal DC power supply

E1 FAMILY

ETU/TTU I/F Modules

E1/T1 DSU/CSU
E1 FAMILY



Connection: V.35/MB34F connector
Speed: Fractional E1 (N64/N56)
Model: ETU/TTU-V35

Connection: RS-530/DB25F connector
Speed: Fractional E1 (N64/N56)
Model: ETU/TTU-530



Connection: RS-530/DB25F/RS-449M(F)
additional Cable
Speed: Fractional E1 (N64/N56)
Model: ETU/TTU-449



Connection: X.21/DB15F connector
Speed: Fractional E1 (N64/N56)
Model: ETU/TTU-X21



Connection: DB15F connector
G.703/64K bps Codirectional
Speed: Fractional E1 (N64/N56)
Model: ETU/TTU-G64



Connection: RS-232/DB25F connector
RS232 Sync(Async)
128Kbps(19.2Kbps)
Model: ETU/TTU-232



Connection: RJ-45x2
10Base-T (Ethernet Bridge)
Speed: Fractional E1
Model: ETU/TTU-ET10



Connection: BNC(x4) NRZ
Speed: Fractional E1
Model: ETU/TTU-NRZ

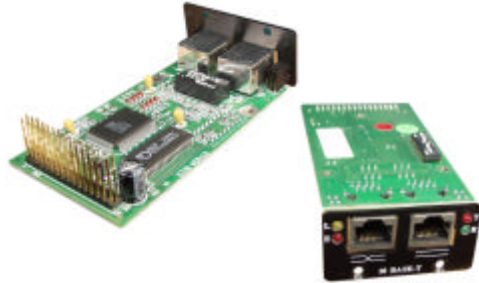


Connection: RJ-45
Speed: Fractional E1
Model: ETU/TTU-ET10R

ET10 Bridge Interface

ETU/TTU Series Interface Modules

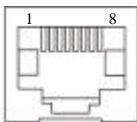
When the *ETU* or *TTU Series* is ordered with an *ET10 Interface*, the unit is not only a access unit for E1, but also becomes a high performance WAN bridge for 10BaseT Ethernet extension. The ET10 bridge module is a high performance, self-learning Ethernet bridge.



Features

- High performance bridge for 10Base-T Ethernet extension.
- Fully compatible with IEEE 802.3.
- Automatic TP polarity reversal.
- 15,000 frames per second filtering and forwarding rate.
- 256 frame buffer
- 10,000 MAC address LAN table
- Automatic LAN table learning and aging
- Enhanced "Tiny Gram" compression.

The physical interface for *ET10* is a pair of RJ-45 connectors, with the pin assignment as follows:



Normal	Crossover
1.Tx+	1.Rx+
2.Tx-	2.Rx-
3.Rx+	3.Tx+
6.Rx-	6.Tx-

LED Indicators

STATE	Indication
ON	Receive data
ON	Transmit data
ON	Error
OFF	Link

DIP Switch Settings

DIP/NO.	STATE	STATE
1	ON	ID, factory default
2	ON	
3	ON	
4	OFF	
5	ON	
6	ON	Enable Filter
	OFF	Disable Filter
7	ON	Disable Compression
	OFF	Enable Compression
8	ON	Half Duplex Ethernet
	OFF	Full Duplex Ethernet

E1/T1 Repeater Pack

Repeater Series

The **ETR01** and **ETR04** are E1/T1 long-haul, OSI Layer One repeaters. The compact design, low cost, and easy operation make the ETR an excellent choice for E1 or T1 link extension. The **ETR01** provides a simple 1 pair (Tx/Rx) in, 1 pair (Tx/Rx) out repeater interface, while the **ETR04** provides a 1 (Rx) in, 4 (Tx) out interface. Setup is extremely simple. Just select the proper termination impedance from the three position slide switch (75 or 120 Ohm for E1 or 100 Ohm for T1) and then select the proper line code (AMI or B8ZS for T1, HDB3 for E1).



Features

- Fully integrated transceivers for long-haul T1 or E1 interface.
- Selectable E1 75Ω, E1 120Ω or T1 100Ω line impedance.
- Selectable line codes; AMI, B8ZS, or HDB3
- Fully complies with: ANSI T1.403 and T1.408; ITU I.431, G.703, G.736, G.775 and G.823; ETSI 300-166 and 300-233; and AT&T Pub 62411.
- Receiver sensitivity; fully restores the received signal after transmission through a cable with attenuation of 0 to 36dB @ 772KHz or 0 to 43dB @ 1024KHz.

Specifications

E1 LINK

- **Bit Rate** 2.048Mbps
- **Line Code** AMI
HDB3
- **Line Impedance** 75Ω (unbalanced)
120Ω (balanced)
- **Receive Level** 0 to -43dB
- **Pulse Amplitude** 2.37V±10% @ 75Ω
3.00V±10% @ 120Ω
- **Zero Amplitude** ±0.1V
- **I/F Connectors** RJ-45 (for ETR01)
BNC (for ETR01-BNC)

T1 LINK

- **Bit Rate** 1.544Mbps
- **Line Code** AMI
B8ZS
- **Line Impedance** 100Ω
- **Receive Level** 0 to -36dB
- **Pulse Amplitude** 3.00V±10% @ 100Ω
- **Zero Amplitude** ±0.1V
- **I/F Connector** RJ-45

Indicators

ETR01 (-BNC)

PWR	Red	Power on
IN1	Red	In 1 Signal Loss
IN2	Red	In 2 Signal Loss

ETR04

PWR	Red	Power on
IN	Red	In Signal Loss

Ordering Information

ETR01

one RJ-45 to one RJ-45 connector, 2 in 2 out

ETR04

one RJ-45 to four RJ-45 connector, 1 in 4 out

ETR01-BNC

one pair BNC in, one pair BNC out

Application



ETU02A-MUX Standalone

Fractional E1, 2 or 4 Port Multiplexer

The **ETU02A-MUX** provides an economic multiplexing solution for Fractional E1 network services. Up to four DTE devices may be linked to an **ETU02A-MUX** at data rates of 56Kbps to 1992Kbps.

The **ETU02A-MUX** supports local control and diagnostics via an RS-232 Craft port connected to a standard serial terminal. This feature enables users to easily configure the unit, execute the in-service diagnostics and monitor the network status.



ETU02A-MUX.2, 2 data port
ETU02A-MUX.4, 4 data port

G.703 Interface Specifications

- **Framing** Unframe/Frame
CCS(PCM31)/CAS(PCM30)
CRC-4 ON/OFF
- **Bit rate** 2.048Mbps
- **Line Code** AMI or HDB3 selectable
- **Line impedance** 75 or 120 Ohms selectable
- **Relative receive level** 0 to -43dB
- **"Pulse" amplitude** Nominal 2.37V±10%
for 75 ohm
Nominal 3.00V±10%
for 120 ohm
- **"Zero" amplitude** ±0.1V
- **Transmit frequency tracking**
Internal timing ±30 ppm
Loopback timing ±50 ppm
External timing ±100 ppm
- **Jitter performance** According to ITU G.823
- **Complies with** ITU G.703, G.704, G.706 and G.732
- **I/F Connectors** DB15F, BNC (x2)

Data Port Specifications

- **Number of Ports** 2 or 4 Data PORTS (DCE)
- **Interface types and connections**
V.35 interface DB25M to MB34F cable (optional)
X.21 interface DB25M to DB15F cable (optional)
RS-530 interface DB25F direct connection
RS-449 interface DB25M to DB37F cable (optional)
RS-232 interface DB25F direct connection
- **Line code** NRZ
- **Data rate** N x 56kbps or N x 64kbps
Where N equal 1 to 31 in CCS
And N equal 1 to 30 in CAS
- **Control signals** CTS constantly ON
DSR constantly ON,
except during test loops
DCD constantly ON,
except during signal loss
- **Time slot allocation** User defined

Application



Features

- Integrates High Speed Data and E1 link (optional Sub-E1) with an intelligent Fractional Access Unit.
- Supports either two or four Data channels.
- Supports optional Sub-E1 I/F.
- Data Interface: Fixed DB25F (RS-530/232) utilizing hardware and software configuration and cable solution for V.35, RS-530, and X.21.
- Selectable data rates: N x 56Kbps, N x 64Kbps
- Setup and Control via DB9F RS-232 terminal port.
- Complies with ITU-T G.703, G.704, G.706, G.732, G.823.

Front Panel

- **LED status display** 17 status LEDs (Power, Main E1, DTEs, and Diagnostics)
- **RS-232, DB9F** Craft port: 9600,8,N,1

Diagnostic Tests

- **Loopback** Local loopback, Payload loopback, Remote loopback, DTE loopback
- **Test pattern** 511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3 in 24, 1 in 16, 1 in 8, 1 in 4

Environment

- **Temp** 0°C to 50°C/ 32°-122°F
- **Humidity** 0 to 90% non-condensing

Optional Interface Cables

- **E1 Sublink** E1 Link Card (module)
- **H6-EXT** RS-530 Extension cable
- **V35CON2-F** V.35 adapter cable (female)
- **X21-DCE/F** X.21 adapter cable (female)
- **449CON-M** RS-449 adapter cable (male)
- **232CON-M** RS-232 adapter cable (male)

Ordering Information

- **ETU02A-MUX.X/XX**

2 or 4 port type _____ AC or DC type _____

- **Example :**

ETU02A-MUX.4/AC

ETU02A-MUX, 4 ports with universal AC power supply

E1/T1 CONVERTER

G703FTEC Standalone

E1 / T1 Crossrate Converter

The **G703FTEC** is T1/E1 converter and timeslot cross connect which enables conversion between one T1 signal and one E1 signal. Tests and diagnostics can easily be performed from the front panel push-switches. Diagnostics include T1 local/remote and E1 local/remote loop back.

The T1 interface complies with ANSI T1.403, and AT&T TR-62411 standards, and supports both D4 or ESF frame formats with B8ZS or AMI line code.

The E1 interface complies with ITU G.703, G.704, G.732, and G.823 standards, and supports both 2 and 16 frames per multiframe without CRC-4 and framing with CRC-4. The line code is HDB3.

All setup controls can be performed via internal DIP switch settings or via the RS-232 Craft port and ASCII terminal.

Features

- Support G.802 Annex B
- Enables equipment to operate at T1 and E1 rates.
- Converts between T1 and E1 data and signaling.
- Configurable A-law/ μ -law and signaling conversion.
- Transparent conversion at 64kbps timeslot level.
- Controlled slip for buffer over/underflow.
- The 24 timeslots of T1(nx64) can be inserted into E1(nx64), 30/CAS or 31/CCS timeslots.
- Local/remote loopback test capabilities on both T1 and E1 interface.
- Complies with ITU-T G703, G.704, G.823, G.824, ANSI T1.403 recommendations.
- Function setting via internal DIP switch setting or console port (RS-232 Async.).
- Timing selection:
 - Transparent timing,
 - T1/E1 recovery timing
 - Internal timing (1.544Mbps/2.048Mbps)
 - External timing (1.544Mbps/2.048Mbps)
 - Loopback timing.
- Signaling version: MFCR2

Application



- G703FTEC/220
- G703FTEC/110
- G703FTEC/48
- G703FTEC/24



Interface Specifications

E1 Interface

- **Complies with ITU-T G.703** Recommendation.
- **Bit rate** 2.048Mbps
- **Line code** HDB3
- **Frame format** CAS/PCM30 or CCS/PCM31 selectable
- **Voice channel sample rule** A-Law
- **CRC check** CRC-4 enable/disable
- **Impedance** 75 Ω or 120 Ω selectable
- **Transmit pulse level** 75 Ω + 2.37V (\pm 10%)
120 Ω + 3.0V (\pm 10%)
- **Connectors** DB15/BNC

T1 Interface

- **Complies with ITU-T G.703** Recommendation.
- **Bit rate** 1.544Mbps
- **Line code** AMI or B8ZS selectable.
- **Frame format** D4 or ESF selectable.
- **Equalization** 0 - 655 feet settable.
- **Voice channel sample rule** μ -Law
- **CRC check** CRC-6 (when ESF)
- **Impedance** 100 Ω balanced
- **Transmit pulse level** +3.0V (\pm 10%)
- **Receive signal level** 0 to -10dB
- **Connectors** DB15/ Bantam jack

Ordering Information

- | | |
|---------------------|-----------------|
| G703FTEC-110 | AC 110VAC model |
| G703FTEC-220 | AC 220VAC model |
| G703FTEC-48 | DC-48V model |
| G703FTEC-24 | DC+24V model |

ERM01 E1 Rack Mount

Fractional E1 Concentrator



The **ERM01** series product is a rack type E1 DSU/CSU for Fractional E1 Digital Access which is nested in a hub to provide an economic solution for central office installations. There are 13 slots available for G.703 E1 cards for installation into the **ERM01** RACK. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for line cards. The SNMP card provides both local control via an RS-232 Craft port and remote management using industry standard SNMP protocol via an Ethernet 10BASE-T connection. Each E1 card may be linked to a remote **ETU01** standalone E1 Access Unit for various LAN, Video Conference, or Hosts over E1 network services.

The **ERM01** accommodates a redundant power supply as optional equipment, which may derive power from AC (100-240) or DC (-48V) power sources. The power supply modules provide power redundancy and are hot swappable even during the E1 cards' data transmissions. Individual E1 Line cards are also hot swappable.

The **ERM01** provides all interface connection on the rear panel. When cards are inserted and power applied, LEDs will show the E1 Line and data port status on the front panel. On the rear panel, BNC and Terminal Blocks are utilized for E1 Line interface connectors. Adapter cables are used to convert the DB-26F DCE data ports for V.35, RS-530, X.21, or 10Base-T Ethernet bridge operation.

Features

- Central Solution in Standard 19" Rack.
- Up to 13 cards can be installed.
- High density & Compact, 4U high.
- Hot Swapping of cards and redundant power supplies (optional).
- LED Line status display on each card.
 - PWR
 - TD
 - RD
 - RTS
 - DCD
 - TxCLK Loss
 - Sig Loss
 - Sync Loss
 - Alarm
 - Er
 - Test
- Test Pushbutton switches on each card.
 - Local digital loopback
 - Local analog loopback
 - Remote loopback
 - Pattern Generator
- All Interface connectors on the Rear Panel.
- Different Power Source Options, AC or DC.
- Optional SNMP network management system card.
- Compliance with ITU-G.703, G.704, G.706, G.732, and G.823.

G.703 Interface Specifications

E1 Lines

- **Framing** Unframed/Framed
CCS(PCM31)/CAS(PCM30)
CRC4 ON/ OFF
- **Bit Rate** 2.048Mbps
- **Line Codes** AMI
HDB3
- **Line impedance** 75 ohm
120ohm
- **Relative receive level** 0 to -43dB
- **Transmit Level**
 - **Pulse Amplitude** Nominal 2.37V±10% for 75 ohm
Nominal 3.00V±10% for 120ohm
 - **Zero Amplitude** ±0.1 V
- **Transmit frequency tracking**
 - **Internal timing** ±30ppm
 - **Loopback timing** ±50ppm
 - **External timing** ±100ppm
- **Jitter performance** According to ITU-T G.823
- **Complies with** ITU-T G.703, G.704, G.706 and G.732
- **Interface connectors** BNC for unbalanced
5 Pin Wire Connector for balanced

ERM01 Rack Mount Specifications (Cont.)

User Data Channels (Line Card Options)

- **Interface types**
 - RS-530
 - X.21
 - V.35
 - RS-449
 - 10Base-T Bridge
- **Interface connector** High density DB26 Female
- **Line code** NRZ (except bridge)
- **Data rate** N x 56kbps or N x 64kbps where N equal 1 to 31 in CCS and N equal 1 to 30 in CAS

G.703 E1 Clock Modes

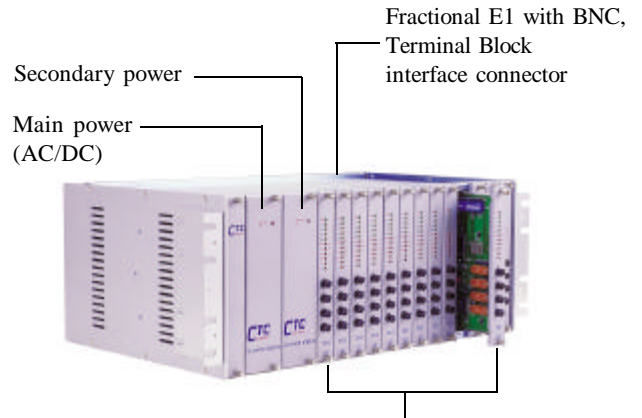
- **Clock mode 0 (DCE1)** Rx and Tx clocks (recovered) to the synchronous DTE
- **Clock mode 1 (DCE2)** Rx and Tx clocks (internal oscillator) to the sync. DTE
- **Clock mode 2 (DTE1)** Rx clock to the sync. device, Tx clock from the sync. device
- **Clock mode 3 (DTE2)** Rx and Tx clock from the sync. DCE (from ETC and ERC pin)
- **Clock mode 4 (DTE3)** Rx and Tx clocks from the sync. DCE (all from ETC pin)

Data Port (Misc.)

- **Control signals**
 - CTS constantly ON
 - DSR constantly ON, except during test loops
 - DCD constantly ON or follows RTS, except during signal loss
- **Time slot allocation** User defined

Ordering Information

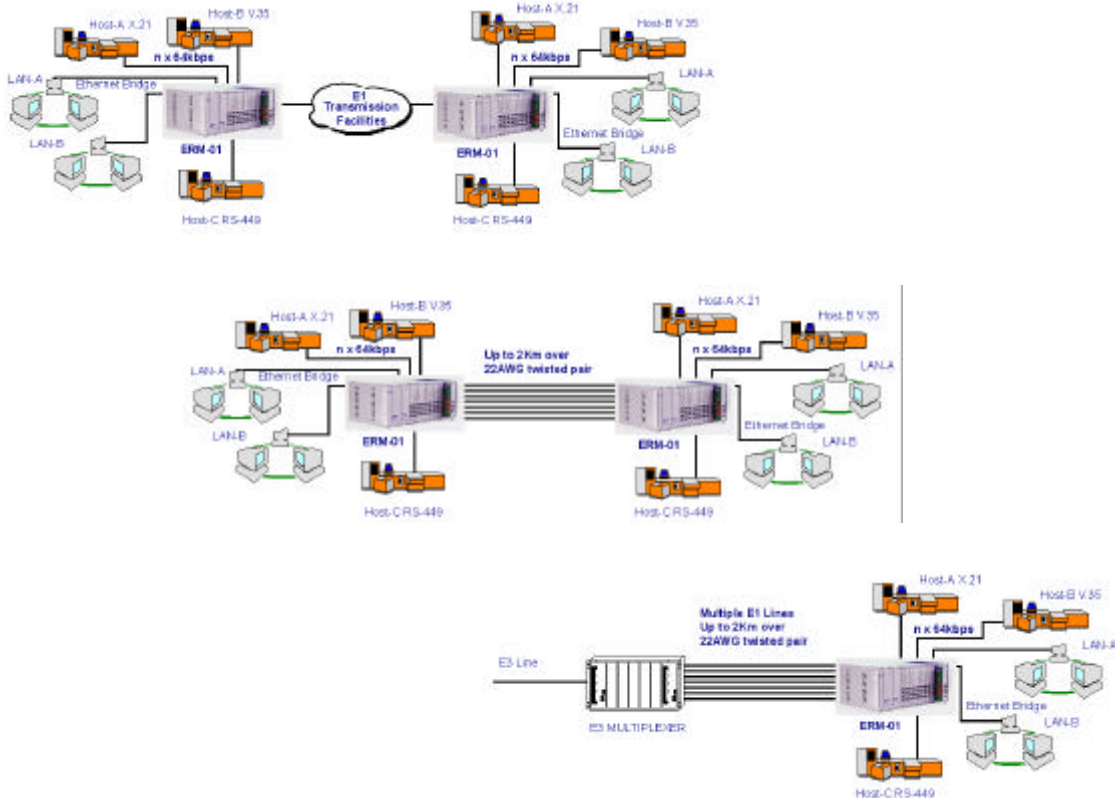
ERM01/RACK	RACK Cage
ERM01/AC	AC power plug-in module
ERM01/DC	DC-48V power plug-in module
ERM01/FE1	Fractional E1 Line card
ERM01/EIU	Unframed Only E1 Line card
ERM01/SNMP	SNMP plug-in card



13 line card can be installed into the rack, 12 when the SNMP option is installed.

ERM01 OVERVIEW

Application



ERM01 Interface Cards

E1 Digital Access Unit-RACK Mount



Product: ERM01/V35
Connection: HD26 to V35/MB34
Cable M/F



Product: ERM01/RS530
Connection: HD26M to RS-530/DB25
Cable M/F



Product: ERM01/RS449
Connection: HD26M to RS-449/DB37
Cable M/F



Product: ERM01/X21
Connection: HD26M to X.21/DB15
Cable M/F



Product: ERM01/ET10
Connection: HD26M to RJ-45G.C.



Product: ERM01/RS232
Connection: HD26M to RS-232/DB25
Cable M/F

ERM-MUX E1 Rack Mount

E1 Time Division Multiplexer - Rack



The **ERM-MUX** is a Rack Type E1 CSU/DSU Time Division Multiplexer for Fractional E1 network access which is nested in a hub and provides an economic solution for central site installations. There are 10 slots available for **ERM-MUX-I/O** cards for installation into the **ERM-MUX** Rack. Two slots are provided for MUX-E1 cards, which may be configured as two separate E1 links or for redundant operation of the E1 line, safe guarding against expensive network down time. Each MUX-E1 card may be linked to another **ERM-MUX** Rack to provide a variety of LAN, Video Conference, or Hosts over E1 network services.

The **ERM-MUX** 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 power redundancy and are hot swappable even during the E1 cards' transmission.

The **ERM-MUX** provides all interface connections on the rear panel. BNC and Terminal Blocks are used for E1 Line interface connection, while optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to V.35, RS-530, RS-449, RS-232 or X.21. When cards are inserted in slots, LEDs will show the Line status on the front panel.

Features

- Central Multiplexer Solution in a Standard 19" Rack. Up to 10 I/O cards may be installed (10 additional with expansion rack).
- High density & compact design in a 4U high rack.
- Hot Swapping of cards and redundant power supplies supported.
- Redundant E1 line cards, auto switching. E1 Cards separately configurable for two E1 line operation.
- Standard console port allows terminal to setup and monitor operation locally.
- Windows™ based NMP management over the E1 link (one timeslot) to retrieve remote alarm, for remote configuration, and remote status. Software included. No extra hardware required (Ethernet or serial).
- LED Line status display on each card.

PWR	Sig-Loss
TD	Sync-Loss
RD	Err
Alarm	
- All Interface and connectors are on the Rear Panel.
- Optional Power Source, AC or DC for power supplies.
- Compliance with ITU-T G.703, G.704, G.706, G.732, and G.823.

Specifications

E1 Line Module

- **Framing** CCS(PCM31)/CAS(PCM30)
CRC4 ON/ OFF
- **Bit Rate** 2.048Mbps
- **Line Codes** AMI
HDB3
- **Line impedance** 75 ohm
120ohm
- **Relative receive level** 0 to -43dB
- **Transmit Level**
 - **Pulse Amplitude** Nominal 2.37V±10% for 75 ohm
Nominal 3.00V±10% for 120ohm
 - **Zero Amplitude** ±0.1 V
- **Transmit frequency tracking**
 - **Internal timing** ±30ppm
 - **Loopback timing** ±50ppm
 - **External timing** ±100ppm
- **Jitter performance** According to ITU-T G.823
- **Complies with** ITU-T G.703, G.704, G.706 and G.732
- **Interface connectors** BNC for unbalanced
RJ-45 Connector for balanced

I/O Card Options**N x 64 Module, 2 HS Data Interfaces**

Interfaces types	RS-530, X.21, V.35, RS-449
Interface connector	High density DB62 Female with appropriate cable adapter.
Line code	NRZ
Data rate	N x 64kbps where N equal 1 to 31 in CCS and N equal 1 to 30 in CAS

64K/128K Module, 3-64K or 3-128K Data Interfaces

Interfaces type	RS-530, X.21, V.35, RS-449
Interface connector	High density DB62 Female with appropriate cable adapter.
Line code	NRZ
Data rate	64kbps x 3ch or 128kbps x 3ch

X.50 Module, 5 £19.2kbps Sync/Async Data Interfaces

Interfaces type	RS-232(V.24)
Interface connector	High density DB26 Female with appropriate cable adapter.
Line code	NRZ
Data rate	£19.2kbps x 5ch

ASYN Module, 4 £19.2kbps Async or 4-64kbps Sync

Interfaces type	RS-232(V.24)
Interface connector	High density DB26 Female with appropriate cable adapter.
Line code	NRZ
Data rate	£19.2kbps x 4ch or 64kbps x 4ch

E&M Voice Card Option**E&M Voice Card Features**

- E&M wires used in communicating control information.
- BD/ED wires are for battery and ground detection.
- E&M interface provides 2 pairs of E and 2 pairs of M.
- Loop current range is normally 5-30mA, 70mA max.
- Each E&M can support Type I, II, III, IV or V.
- Timeslot 16 complies with ITU-T G.711.
- E&M card provides 4 voice channels.
- Each E&M voice channel can independently set Type, TX / RX attenuation, and 2 / 4 wire operation.

E&M Voice Card Specifications

Input level	0 to -16dB, in 0.5dB steps.
Output level	0 to -16dB, in 0.5dB steps.
Impedance	900 or 600 Ohms; option.
Return loss 2W	300-600Hz: >12dB 600-3400Hz: >15dB
Return loss 4W	300-3400Hz: >20dB
Group delay 2W	@-10dBm0: <750uSec
Group delay 4W	@-10dBm0: <600uSec
Total Distortion	according to ITU-T G.223.
Channel xtalk	not exceed -65dB, 1020Hz@0dBm0.
Out-of-band signal attenuation;	condition:-25dBm@4.6K-72KHz;
	level not to exceed -50dBm.
Noise	<-65dBm0p weighted.

FXS/FXO Voice Card Option**FXS/FXO Card Features**

- FXS/FXO card provides 4 independent channels.
- Card has one alarm LED and 4 ring indicator LEDs.
- Each channel can individually set FXO or FXS mode.

FXS/FXO Card Specifications**FXO line specifications**

On-hook DC resistance	>100K Ohms.
Ring AC resistance	>7.5K Ohms.
Ring power sensitivity	<less than 50mW.
Off-hook DC resistance	<less than 300 Ohms.
Maximum input voltage	70VDC.
Maximum input current	150mA.

FXS line output specifications

Effective ring voltage	AC 75VRMS ±15V @25Hz ±3Hz sine less than 10% THD.
Ring voltage	>AC50VRMS at 300mA load
Loop resistance	<1.8K Ohms; voltage -48VDC including 300 Ohms telephone handset current >18mA
On-hook current	10mA ±3mA
Loop current range	18-50mA(off-hook)
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no damage to any components 220VRMS for 15 minutes damage only local loop, no fire hazard

Voice Channel Specification

Input level	0 to -5dBr, adj. in 0.5dB steps.
Output level	0to-7.5dBr, adj.in 0.5dB steps.
900 or 600 Ohms	option.
Return loss	300-600Hz: >12dB 600-3400Hz: >15dB
Group delay	@-10dBm0: <750uSec
Total Distortion	according to ITU-T G.223.
Channel crosstalk	not exceed -65dB, 1020Hz@0dBm0.
Out-of-band signal attenuation;	condition:-25dBm@4.6K-72KHz;
	not to exceed -50dBm.
Noise	<-65dBm0p weighted

Ordering Information

ERM-MUX/CAGE	ERM-MUX Chassis
ERM-MUX/PMAC	ERM AC Power Module
ERM-MUX/PMDC	ERM DC Power Module
ERM-MUX/E1	E1 Line Module
ERM-MUX/N64	N x 64 Data Module
ERM-MUX/128	64K/128K Data Module
ERM-MUX/X50	X.50 Data Module
ERM-MUX/ASY	ASYN Data Module

E1 FAMILY

ERM-MUX/PLUS

E1 Time Division Multiplexer - Rack



The **ERM-MUX/PLUS** is a Rack Type E1 CSU/DSU Time Division Multiplexer for Fractional E1 network access which is nested in a hub and provides an economic solution for central site installations. There are 10 slots available for **ERM-MUX/PLUS-I/O** cards for installation into the **ERM-MUX/PLUS** Rack. Two slots are provided for MUX-E1 cards, which may be configured as two separate E1 links or for redundant operation of the E1 line, safe guarding against expensive network down time. Each MUX-E1 card may be linked to another **ERM-MUX/PLUS** Rack to provide a variety of LAN, Video Conference, or Hosts 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 power sharing 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 connection, while optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to RS-232 or HP68F DCE port of I/O card to V.35, RS-232, RS-530, RS-449 and X.21. When cards are inserted in slots, LEDs will show the Line status on the front panel.

Features

- CPU redundancy (1+1)
- E1 redundancy (1+1)
- Power redundancy (1+1)
- DTE plug-in card types
 - * 6-channel magneto card
 - * 6-channel 2W/4W E&M card
 - * 6-channel FXS card
 - * 6-channel FXO card
 - * 6-channel RS-232 card (low speed)
 - * 4-channel G.703/64K-CO card
 - * 4-channel V.35 card (n*64K)
- Drop & Insert function
- NMP & SNMP management

Specifications

E1 Line Module

- **Framing** CCS(PCM31)/CAS(PCM30)
CRC4 ON/ OFF
- **Bit Rate** 2.048Mbps
- **Line Codes** AMI/HDB3
- **Line impedance** 75/120ohm
- **Relative receive level** 0 to -43dB
- **Transmit Level**
 - **Pulse Amplitude** Nominal 2.37V±10% for 75 ohm
Nominal 3.00V±10% for 120ohm
 - **Zero Amplitude** ±0.1 V
- **Transmit frequency tracking**
 - **Internal timing** ±30ppm
 - **Loopback timing** ±50ppm
 - **External timing** ±100ppm
- **Jitter performance** According to ITU-T G.823
- **Complies with** ITU-T G.703, G.704, G.706 and G.732
- **Interface connectors** BNC for unbalanced
RJ-45 Connector for balanced

I/O Card Options

N x 64 Module, 4 channels, High Speed Data Interfaces

- **Interfaces types** RS-530, X.21, V.35, RS-449 and RS-232
- **Interface connector** High density HD68 Female with appropriate cable adapter.
- **Line code** NRZ
- **Data rate** N x 64kbps where N equal 1 to 31 in CCS and N equal 1 to 30 in CAS

ASYN Module, 6 channels, ≤38.4kbps Async or 6 channels, 128kbps Sync

- **Interfaces type** RS-232(V.24)
- **Interface connector** High density HDB62 Female with appropriate cable adapter.
- **Line code** NRZ
- **Data rate** ≤19.2kbps x 6ch or 64kbps x 6channels

G.703/64K Co-directional Module, 4 channels, Co-directional 64K

- **Interfaces type** G.703/64K Co-directional
- **Interface connector** RJ-45 x 4
- **Line impedance** 120 ohm(balanced)
- **Frame mode** Unframed only
- **Line code** ITU-T G.703/64K, Co-directional
- **Data rate** 64Kbps±100ppm x 4 channels

E&M Voice Card Option**E&M Voice Card Features**

E&M card provides 6 independent channels.
E&M wires used in communicating control information.
BD/ED wires are for battery and ground detection.
E&M interface provides 2 pairs of E and 2 pairs of M.
Loop current range is normally 5-30mA, 70mA max.
Each E&M can support Type I, II, III, IV or V.
Timeslot 16 complies with ITU-T G.711.
Each E&M voice channel can independently set Type,
TX / RX attenuation, and 2 / 4 wire operation.

E&M Voice Card Specifications

Input level	0 to -16dB, in 0.5dB steps.
Output level	0 to -16dB, in 0.5dB steps.
Impedance	900 or 600 Ohms; option.
Return loss 2Wire	300-600Hz: >12dB ; 600-3400Hz: >15dB
Return loss 4Wire	300-3400Hz: >20dB
Group delay 2Wire	@-10dBm0: <750uSec
Group delay 4Wire	@-10dBm0: <600uSec
Total Distortion	according to ITU-T G.223.
Channel Cross-talk	not exceed -65dB, 1020Hz@0dBm0.
Out-of-band signal attenuation;	-25dBm@4.6K-72KHz ; level not to exceed -50dBm.
Noise	<-65dBm0p weighted.
Interface Connector	RJ-45 x 6

MAGNETO Voice Card Option**MAGNETO Card Features**

MAGNETO card provides 6 independent channels.
Card has one alarm LED and 6 ring indicator LEDs.

MAGNETO Card Output Specifications

Effective ring voltage	AC 75VRMS \pm 15V @25Hz \pm 3Hz sine less than 10% THD.
Ring voltage	>AC50VRMS at 300mA load
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no damage to any components 220VRMS for 15 minutes damage only local loop, no fire hazard
Input level	0 to -5dB, adj. in 0.5dB steps.
Output level	0 to -7.5dB, adj.in 0.5dB steps.
Impedance	900 or 600 Ohms; option.
Return loss	300-600Hz: >12dB 600-3400Hz: >15dB
Group delay	@-10dBm0: <750uSec
Total Distortion	according to ITU-T G.223.
Channel crosstalk	not exceed -65dB, 1020Hz@0dBm0.
Out-of-band signal attenuation;	-25dBm@4.6K-72KHz ; not to exceed -50dBm.
Noise	<-65dBm0p weighted
Interface connectors	RJ-45 x 6

FXO Voice Card Option**FXO Card Features**

FXO card provides 6 independent channels.
Card has one alarm LED and 6 ring indicator LEDs.

FXO Card Output Specifications

On-hook resistance	greater than 100K ohms
Off-hook resistance	less than 300 ohms
DC voltage	greater than 70V
DC current	greater than 150mA
DC voltage	greater than 70V
Input level	0 to -5dB, adj. in 0.5dB steps.
Output level	0 to -7.5dB, adj.in 0.5dB steps.
Impedance	600 Ohms
Interface connectors	RJ-45 x 6

FXS Voice Card Option**FXS Card Features**

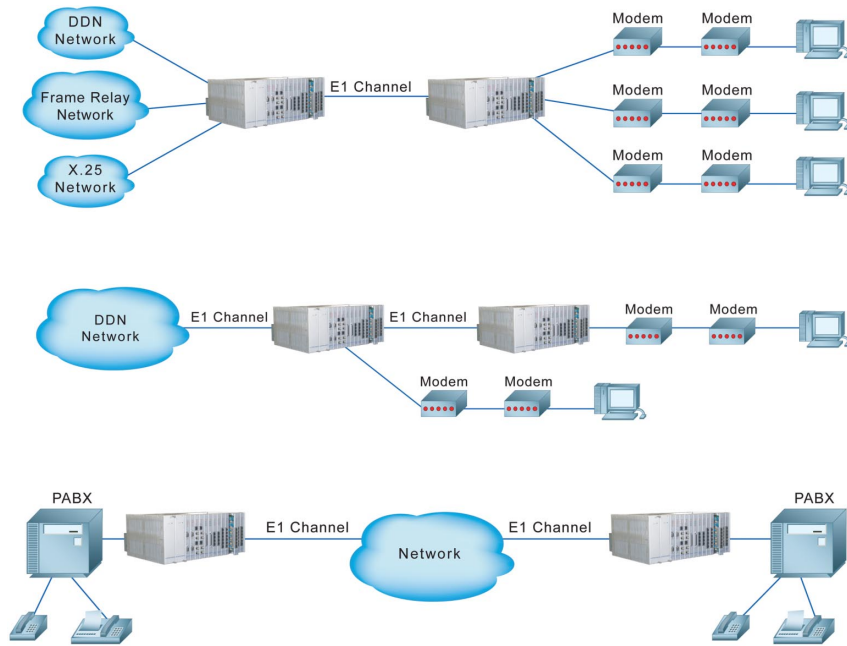
FXS card provides 6 independent channels.
Card has one alarm LED and 6 ring indicator LEDs.

FXS Card Output Specifications

Effective ring voltage	AC 75VRMS \pm 15V@25Hz \pm 3Hz sine less than 10% THD.
Ring voltage	>AC50VRMS at 300mA load
Loop resistance	<1.8K Ohms; voltage -48VDC including 300 Ohms telephone handset current >18mA
On-hook current	10mA \pm 3mA
Loop current range	18-50mA(off-hook)
Surge protection	1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no damage to any components 220VRMS for 15 minutes damage only local loop, no fire hazard
Input level	0 to -5dB, adj. in 0.5dB steps.
Output level	0 to -7.5dB, adj.in 0.5dB steps.
Impedance	900 or 600 Ohms; option.
Return loss	300-600Hz: >12dB 600-3400Hz: >15dB
Group delay	@-10dBm0: <750uSec
Total Distortion	according to ITU-T G.223.
Channel crosstalk	not exceed -65dB, 1020Hz@0dBm0.
Out-of-band signal attenuation	-25dBm@4.6K-72KHz ; not to exceed -50dBm.
Noise	<-65dBm0p weighted
Interface connectors	RJ-45 x 6

ERM-MUX/PLUS

Application



Ordering Information

Master Unit : Rack Mount ERM-MUX/PLUS Chassis

ERM-MUX-PLUS/AA-CH	19 inch, 4U rack mount chassis for AC + AC power
ERM-MUX-PLUS/AD-CH	19 inch, 4U rack mount chassis for AC + DC power
ERM-MUX-PLUS/DD-CH	19 inch, 4U rack mount chassis for DC + DC power

Optional Power Module for ERM-MUX/PLUS (Redundant Power Protection Available)

ERM-MUX/AC	AC power plug-in module (90~250 VAC)
ERM-MUX/ACV	AC power plug-in module (90~250 VAC) with Voice Support
ERM-MUX/DC	DC power plug-in module ($\pm 36 \sim \pm 76$ VDC)
ERM-MUX/DCV	DC power plug-in module ($\pm 36 \sim \pm 72$ VDC) with Voice Support

Optional SNMP Module for ERM-MUX/PLUS

ERM-MUX-PLUS-SNMP	SNMP interface module (installs onto the CPU card)
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Optional LTU Card

ERM-MUX-PLUS-E1	2 channels main E1 LTU card: G.703/G.704 (Fractional E1)
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Optional CPU Card

ERM-MUX-PLUS-CPU	CPU card for NMP management (without SNMP I/F module)
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Optional Voice Interface Card

ERM-MUX-PLUS-FXO	6 channels FXO voice interface card
ERM-MUX-PLUS-FXS	6 channels FXS voice interface card
ERM-MUX-PLUS-E&M	6 channels 2/4 wires E&M voice interface card
ERM-MUX-PLUS-MAGNETO	6 channels MAGNETO interface card

Optional Low-Speed Interface Card

ERM-MUX-PLUS-LS-232	6 channels RS-232(V.24) interface card
ERM-MUX-PLUS-G64K	4 channels G.703 64Kbps Co-directional interface card

Optional High-Speed Interface Card

ERM-MUX-PLUS-HS-SERIAL	4 channels V.35/X.21/RS-449/RS-530 (cable selected) interface card
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Optional Cable (Non-included item)

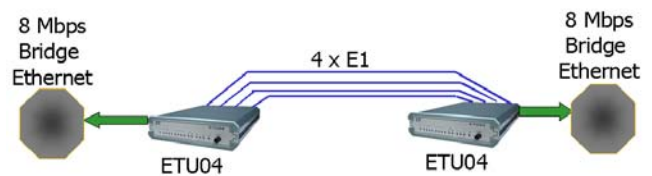
CAB-DB62DB25F6-232-LS	RS-232 adapter cable for low speed: DB62 male to 6 x DB25 female, 2 meter
CAB-HP68MB34F-V35	V.35 adapter cable for high speed: HP68 male to 4 x MB34 female, 2 meter
CAB-HP68DB15F-X21	X.21 adapter cable for high speed: HP68 male to 4 x DB15 female, 2 meter
CAB-HP68DB37F-449	RS-449 adapter cable for high speed: HP68 male to 4 x DB37 male, 2 meter
CAB-HP68DB25F-530	RS-530 adapter cable for high speed: HP68 male to 4 x DB25 male, 2 meter
CAB-RJ45RJ11M-VOICE	Voice adapter cable for FXO, FXS, MAGNETO: RJ45 male to RJ-11 male, 2 meter
CAB-DB62DB62M-EXP	Expanded adapter cable for expanding rack: DB62 male to DB62 male, 0.4 meter
CAB-RJ45RJ45M-485	Connection adapter cable for connecting with SNMP, RJ45 male to RJ45 male, 0.4 meter

ETU04

4E1 Inverse Multiplexer

The **ETU04** is an inverse E1 multiplexer that will multi-link up to 4 E1 lines and offers simple, cost-effective connection between E1 service and 10/100BaseT LANs. The Built-in Ethernet bridge enables LAN to LAN connections. The **ETU04** inverse multiplexer transmits a 8Mbps Ethernet bridge channel over up to 4 E1 links. It bridges the gap between E1 and E3, allowing bridges and routers to operate at faster rates. It also provides high speed access to SDH/SONET backbones where the only access service available is E1 lines. The **ETU04** supports up to a maximum 7.68Mbps, 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 **ETU04** fully meets all of the E1 specifications including ITU-T G.703, G.704, G.706, and G.823. The **ETU04** features diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the **ETU04** and the line in the digital loopback mode. The Ethernet interface supports auto-negotiation, allows plug-and-play Ethernet connection without any additional configuration.



Features

- Connects one high speed Ethernet channel over up to four E1 links
- Supports data rates from 1.92Mbps to 7.68Mbps
- Built-in bridge operating at Fast Ethernet rates
- Supports transparent passing of VLAN tags
- Plug and play LAN connection
- Fully compatible with IEEE 802.3U & IEEE 802.1Q
- Allows maximum of 8ms delay variance between E1 links, the system will automatically shut-down when the delay value is over-range
- Unbalanced E1 I/F(BNC) complies with ITU-T G.703, G.704, G.823
- Provides alarm indication output
- Provides E1 diagnostic loopback function

Specifications

E1/T1 Interface

Frame format	CCS(PCM31)
Bit rate	2.048Mbps +/- 50ppm
Line Code	HDB3
Receiving level	-43dB
Line Impedance	Unbalanced 75 Ohms +/- 5%
Jitter Performance	complies with ITU-T G.823
Pulse Mask	Complies with ITU-T G.703
Pulse amplitude	Nominal 2.37V +/- 10%
Delay Variance	8 ms (maximum)
Connector	BNC
Diagnostics	Digital remote loopback

Power

DC	-48 (-40 ~ -57)VDC
AC	220VAC +/- 15% @47-63Hz
Power Consumption	10W

LEDs

PWR, LOS(A~D), LOF(A~D), CRC, TMO, LINK, TX, RX, LOOP

Ethernet Interface

Compliance:	IEEE 802.3/802.3u
Connector:	Shielded RJ-45
Data Rate:	10/100Mbps; Half Duplex (20/200Mbps; Full duplex)
Delay:	1 frame
WAN Protocol:	HDLC
Automatic aging duration	5~10 minutes
MAC address	1024
Buffer	1E1 channel 320 frame/sec. 2E1 channel 632 frame/sec. 3E1 channel 942 frame/sec. 4E1 channel 1262 frame/sec.

SYSTEM

Temperature	0~50°C, 32~122°F (operating)
Humidity	Up to 90% (non-condensing)
Weight	1.5 kg (3.2lb.) Net
Dimensions	45 x 195 x 235 mm (HxWxD)

IPM-1SE, IPM-4SE

IP MUX Family

Features:

- ▶ Supports synchronous TDM-based and Ethernet services over IP and Ethernet networks.
- ▶ Multiplexes up to 4 E1/T1. (4 port type)
- ▶ Devices can be cascaded to increase the number of interfaces.
- ▶ Point-to-point and point-to-multipoint applications.
- ▶ Provides accurate E1/T1 clock recovery.
- ▶ Supports SNMP management.
- ▶ Configurable with CLI via:
 - RS-232/V.24
 - Telnet via Ethernet (Configuration stored in flash)
- ▶ Remotely upgradeable.
- ▶ Compact package, 1U high, 1/2 19-inch rack.



Specifications

Uplink and LAN Ethernet specification

- **Standards** IEEE 802.3, 802.3U, 802.1 p&Q
- **Data Rate** 10 or 100 Mbps, Half-Duplex or Full-Duplex
- **Range** Up to 120m on UTP category 5
- **Connector** RJ-45, 8-Pin

E1 specification

- **Ports** 1 or 4 ports
- **Standards** ITU-T G.703, G.704, G.706, G.732, G.823
- **Framing** Unframed, CAS, CCS
- **Data rate** 2.048 Mbps
- **Line Code** HDB3
- **Receive Level** Short haul - 15dB
Long haul - 43dB
- **Line impedance** 75 ohms
120 ohms
- **Pulse amplitude** Nominal 2.37+/-10% for 75 ohms
Nominal 3.0+/-10% for 120 ohms
- **Zero amplitude** +/-0.1V
- **Connector** RJ-48C for 120 ohms
BNC for 75 ohms

Power supply

- **Voltage** AC Model: 100~240 VAC
DC Model: 18~75 VDC
- **Frequency** 47 to 63 HZ for AC power
- **Power consumption** 15 Watts maximum
- **Connector** AC Model: 3 Pin plug
DC Model: Plug in type 3Pin terminal Blocks

T1 specification

- **Ports** 1 or 4 ports
- **Standards** ITU-T G.703, G.704, AT&T TR-62411, ANSI T1.403
- **Framing** Unframed, D4, ESF
- **Data rate** 1.544 Mbps
- **Line Code** B8ZS
AMI
- **Receive Level** Short haul - 15dB
Long haul - 36dB
- **Line impedance** 100 ohms
- **Pulse amplitude** Nominal 3.0+/-20%
- **Zero amplitude** +/-0.15V
- **Connector** RJ-48C

Control interface

- **Standards** RS-232/V.24 (DCE)
(Direct connection to PC)
- **Data rate** 115200 baud
- **Data format** One start bit
8 data bits
No parity
One stop bit
- **Connector** DB-9 Female

Physical

- **Height** 44.4 mm
- **Width** 196 mm
- **Depth** 255 mm
- **Weight** 1.6 Kg

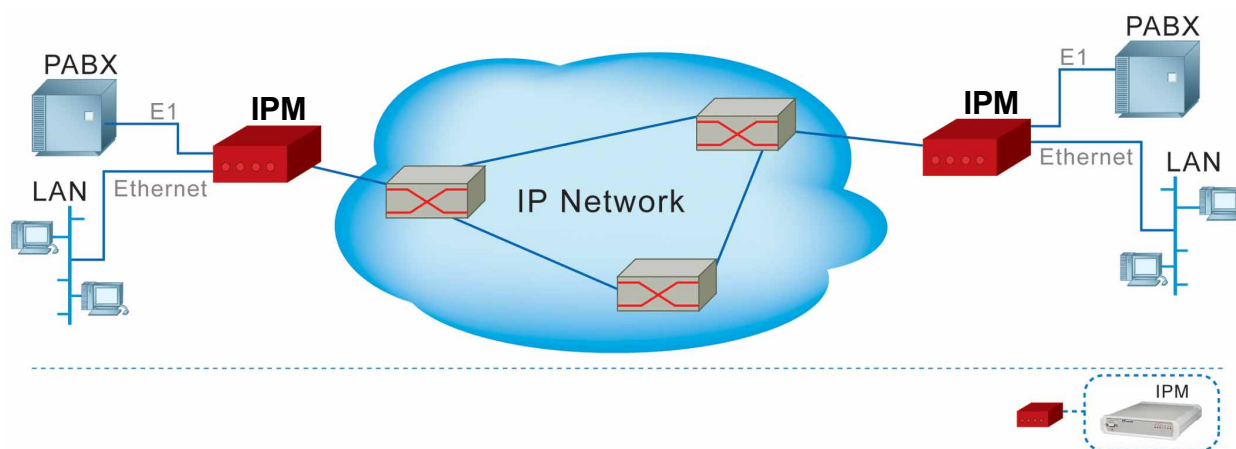
LED Display

Group	Name	Color	Function
System	Power	Green	ON: Power OK, OFF: Power failure.
	Sys OK	Green	ON: System OK, OFF: System failure.
Uplink	Link	Green	ON: Link, OFF: No Link
	Activity	Green	ON: Transmit or receive Activity.
	100	Green	ON: 100 BASE-TX, OFF: 10 BASE-T.
	Full	Green	ON: Full-duplex, OFF: Half-duplex.
LAN	Link	Green	ON: Link, OFF: No Link
	Activity	Green	ON: Transmit or receive Activity.
	100	Green	ON: 100 BASE-TX, OFF: 10 BASE-T.
	Full	Green	ON: Full-duplex, OFF: Half-duplex.
E1/T1	Ch1 Synchronizer	Green	ON: E1/T1 Synchronizer.
	Ch2 Synchronizer	Green	ON: E1/T1 Synchronizer. (4 port type)
	Ch3 Synchronizer	Green	ON: E1/T1 Synchronizer. (4 port type)
	Ch4 Synchronizer	Green	ON: E1/T1 Synchronizer. (4 port type)

Connectors

Interface Port	Format	Speed	Connector Type
Uplink	Ethernet	10/100 Mbps	RJ-45
LAN	Ethernet	10/100 Mbps	RJ-45
E1/T1 Port	E1	2.048 Mbps	RJ-48C and BNC
	T1	1.544 Mbps	RJ-48C
Console	RS-232 Asynchronous	115200 baud	DB-9 Female

Application



Ordering Information

- IPM-1SE-AC IPM-1SE-AC with universal AC power input (100-240VAC)
- IPM-1SE-DC IPM-1SE-DC with DC power input (18-75VDC)
- IPM-4SE-AC IPM-4SE-AC with universal AC power input (100-240VAC)
- IPM-4SE-DC IPM-4SE-DC with DC power input (18-75VDC)