



## FCD-E1A

### E1 or Fractional E1 Access Unit

The basic unit includes a wide range power supply, one E1 main link, and one data port.

The electrical E1 interface is compatible with virtually all carrier-provided E1 services and meets ITU recommendations G.703, G.704, G.706, and G.732. It supports both 2 and 16 frames per multiframe, with or without CRC-4. Line coding is HDB3. The integral LTU (soft-configurable) ensures a range of up to 2 km (1.2 miles).

The optional sub-E1 port can be configured to work without CRC-4, while the E1 main link is working with CRC-4. This allows non-CRC-4 E1 equipment to be connected over an E1 network that is using CRC-4.

Bypassing the sub-E1 port to the G.703 main link (electric only) ensures uninterrupted service to the sub-E1 port and provides immunity from hardware or power failures.

Timeslot assignment is programmable, allowing data from each data or sub-E1 port to be placed automatically into consecutive timeslots. Alternatively, the user can assign timeslots manually.

Multiple clock source selection ensures maximum flexibility for supporting different applications. The E1 main link may derive its timing from the recovered receive clock, from an internal oscillator, from one of the data ports, or from the sub-E1 port.

ISDN dial backup ensures the continuity of data services.

FCD-E1A is a standalone unit. An optional rack mount adapter kit enables installation of one or two side-by-side units in a 19-inch rack (see *Ordering*).

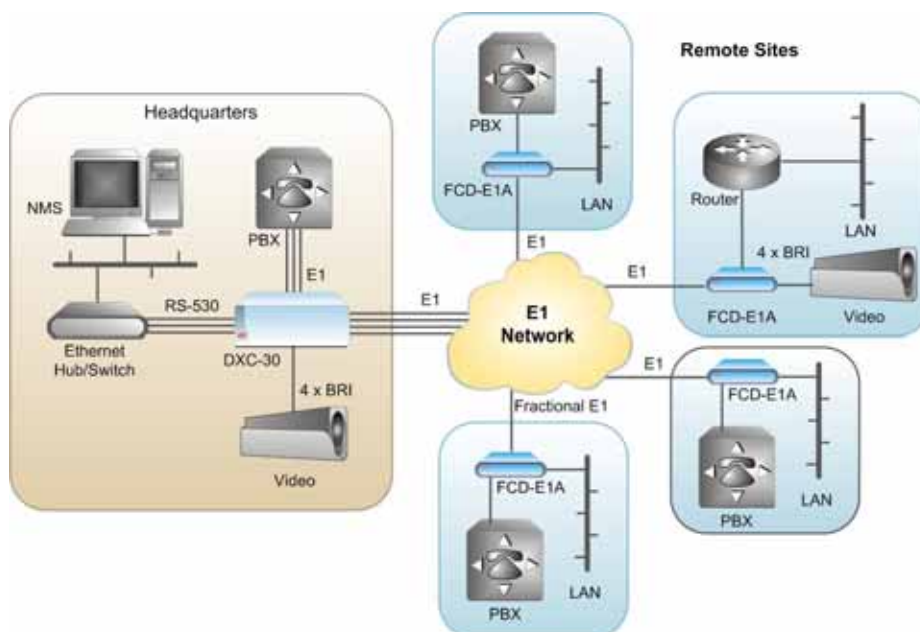


Figure 1. Extended Ethernet Management over E1 Network

### USER INTERFACES

The following interfaces can be ordered for the data port: V.35, RS-530, V.36/RS-449, or X.21.

An optional second data port can be ordered with V.35, RS-530, V.24, V.36/RS-449, or X.21 and IR-ETH/QN interfaces.

The synchronous data ports can operate in the following clock modes:

- **DCE:** FCD-E1A provides both transmit and receive clocks to the user equipment, with optional sampling of the incoming data with an inverted clock.
- **DTE1:** FCD-E1A provides the transmit clock. The connected user equipment provides receive clock (not for X.21).
- **DTE2:** The connected user equipment provides both transmit and receive clocks (not for X.21).

When equipped with an IR-ETH/QN interface module, FCD-E1A transparently connects remote LANs, as well as VLANs, over the E1 links. It filters Ethernet packets, forwarding only packets destined to the WAN.

The IR-ETH/QN port has a 10/100BaseT interface that supports autonegotiation and VLAN frames.

The optional four ISDN "S" interfaces can extend ISDN services to locations that do not support ISDN. Each "S" interface port operates in full-duplex mode over a 4-wire twisted-pair at a range of up to 1000m (3300 ft).

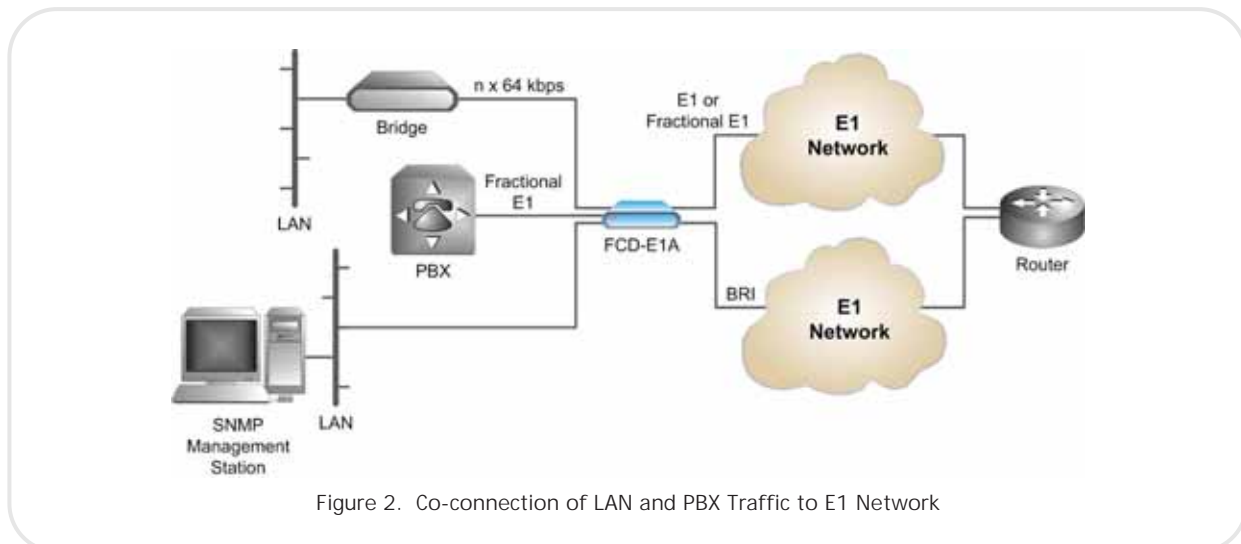


Figure 2. Co-connection of LAN and PBX Traffic to E1 Network

## FCD-E1A

### E1 or Fractional E1 Access Unit

#### MANAGEMENT & MAINTENANCE

Status and diagnostic information is defined, configured, and monitored using one of the following methods:

- Menu-driven management using the front panel LCD with three pushbuttons.
- ASCII terminal connected to the SLIP control port
- SNMP or Telnet management through either the SLIP control port or inband

The internal SNMP agent can be controlled by the RADview SNMP network management application or any generic SNMP station.

FCD-E1A supports both dial-in and dial-out modem connections. These connections allow remote out-of-band configuration and monitoring, as well as sending callout alarm messages. Modems can be connected using the serial V.24 SLIP, PPP, or Ethernet ports.

Inband management uses the spare bits ( $S_a$  bits) on timeslot 0 (TS0) or a dedicated timeslot with standard protocols: Frame Relay (RFC 1490), PPP, and standard RIP2 routing. If spare bits on TS0 are used for management access, they must be passed transparently end-to-end.

Maintenance capabilities include user-activated local and remote loopbacks on the E1 main link, sub-E1, and data ports. The user can activate a BER test for the sub-E1 port and each data port individually.

Each data port responds to an ANSI FT1 inband loop code (RDL) generated by a remote FCD-E1A or DXC in a specific bundle of timeslots allocated only to that port.

E1 network statistics are stored in memory according to RFC-1406 and can be retrieved locally through the control port.

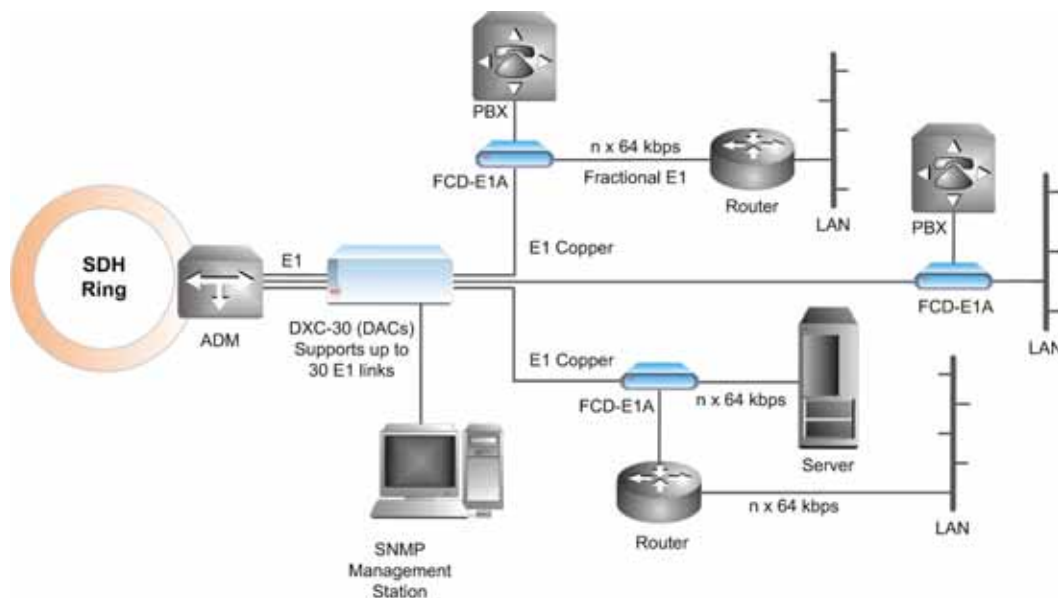


Figure 3. SDH Access Solution for Multiple Remote Sites

## Specifications

### ELECTRIC E1 MAIN LINK (NETWORK) AND SUB-E1 PORTS

#### Framing

256N (no MF, CCS)  
256N with CRC-4 (no MF, CCS)  
256S (TS16 MF, CAS)  
256S with CRC-4 (TS16 MF CAS)  
Unframed

#### Bit Rate

2.048 Mbps

#### Line Code

HDB3

#### Impedance

120Ω, balanced  
75Ω, unbalanced

#### Signal Level

Receive:

0 to -36 dB with LTU  
0 to -10 dB without LTU

Transmit:

±3V (±10%), balanced  
±2.37V (±10%), unbalanced

#### Jitter Performance

As per ITU G.823,  
ETSI TBR-12, TBR-13

#### Connectors

RJ-45, 8-pin, balanced  
Two BNC coaxial, unbalanced

#### Transmit Timing

Locked to the system clock

#### Compliance

ITU G.703, G.704, G.706, G.732

#### Performance Monitoring (Main Link only)

Local support of CRC-4  
Statistics according to RFC-1406

### DATA PORTS

#### Number of Data Ports

One or two (see *Ordering*)

#### Interfaces

V.35, RS-530, V.36, X.21  
V.24 (data port 2 only)

#### Connectors

D-type 25-pin RS-530, female

#### Data Rate

$n \times 56$  or  $n \times 64$  kbps, (n=1 to 31)

#### Clock Modes

DCE: Rx and Tx clock to DTE  
DTE1: Rx clock to user device,  
Tx clock from user device  
DTE2: Rx and Tx clock from DCE

#### Control Signals

CTS follows RTS or constantly ON,  
soft-selectable  
DSR constantly ON, unless in test mode  
DCD constantly ON, unless in SYNC LOSS

### ETHERNET BRIDGE PORT

#### Interface Module

IR-ETH/QN

#### LAN Table

1,000

#### Filtering and Forwarding

150,000 frame/second

#### Buffer

85 frames

#### Line Code

10BaseT: Manchester  
100BaseT: MLT3

#### WAN Protocol

HDLC

#### Compliance

IEEE 802.3/Ethernet V2, 802.1Q (relevant parts), 802.1p and 802.3x.

#### Connector

Shielded RJ-45

## FCD-E1A

### E1 or Fractional E1 Access Unit

#### "S" INTERFACE PORTS

**Number of Ports**

Four "S" 2B+D interface channels

**Compliance**

ETS 300012

**Interface**

4-wire, full-duplex

**Bit Rate**

192 kbps  $\pm$ 100 ppm

**Line Code**

Pseudoternary

**Line Termination**

100 $\Omega$   $\pm$ 5%

**Range**

1000m (3300 ft)

**Signal Levels**

Receive: +1.5 to -7.5 dB relative to the nominal amplitude

Transmit:  $\pm$ 750 mV

**Timing Modes**

NT: Transmit timing is locked to system timing clock

TE: Looped back towards the "S" interface (timing is derived from Rx signal from the ISDN switch NT)

**Connector**

RJ-45 (8-pin) per channel

**Power Feeding Voltage**

38V ( $\pm$ 4V), as per TR5805-3074, 1W per channel

#### MANAGEMENT PORTS

**CONTROL DCE Port**

Interface and connector: V.24/RS-232, 9-pin D-type, female

Format: Asynchronous

Baud rate: 1.2–19.2 kbps, autobaud

Character: 8 bit no parity, 7 bit odd, or even parity

**CONTROL Port (Serial)**

Connector: V.24/RS-232, 9-pin D-type, female

Format: Asynchronous

Baud rate: 0.3–57.6 kbps, autobaud

Character: 8 bit no parity, 7 bit odd or even parity

**CONTROL Port (Ethernet)**

Type: Ethernet 10BaseT

**Connector**

RJ-45

#### GENERAL

**System Clock**

Internal clock:  $\pm$ 30 ppm

Loopback timing (sub, main E1):  $\pm$ 130 ppm

External timing from data port:  $n \times 56$ ,  $n \times 64$  kbps  $\pm$ 130 ppm

**Diagnostics**

Main E1 link:

Local and remote loopbacks

Inband code loopback

Sub-E1 port:

Local and remote loopbacks

BER test

Data port:

Local and remote loopbacks

BER test

**Timeslot Allocation**

Consecutive (bundled)  
User-defined

**Front Panel Control**

LCD: 2 rows of 16 characters  
Push buttons: Cursor, Scroll, Enter

**Indicators**

General: TST, ALM  
Main E1: LOC SYNC LOSS, REM SYNC LOSS  
Sub-E1: LOC SYNC LOSS, REM SYNC LOSS  
All indicators are red except TST (yellow).

**Alarms**

Last 100 alarms are stored and available for retrieval. Each alarm is time-stamped.

**Alarm Relay**

3 relay contacts on the alarm relay port  
Activated by alarms in the user-defined alarm buffer

**Physical**

Height: 4.3 cm (1.7 in) (1U)  
Width: 21.5 cm (8.5 in)  
Depth: 24.3 cm (9.5 in)  
Weight: 1.3 kg (2.9 lb)



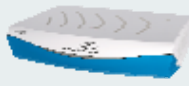


**Power Supply**

Wide range AC/DC: 100 to 240 VAC,  
-48 to -60 VDC  
Nominal power consumption: 5W max.

**Environment**

Temperature: 0°C to 50°C (32°F to 122°F)  
Humidity: up to 90%, non-condensing

Table 1. FCD Comparison Table

Features	FCD-E1 	FCD-E1L 	FCD-E1LC/T1LC 	FCD-E1E 	FCD-E1A 
Total user ports	3	2	3	2	3
Interface types	RS-530, V.35, V.36, X.21, Sub-E1	RS-530, V.35, V.36, X.21, Ethernet bridge (10/100BaseT with VLAN support)	RS-530, V.24, V.35, V.36, X.21, Ethernet Bridge (10/100BaseT with VLAN support), Sub-E1/T1	RS-530, V.35, V.36/RS-449, X.21, V.24/RS-232, Ethernet Bridge (10/100BaseT with VLAN support), Sub-E1	RS-530, V.35, V.36/RS-449, X.21, Sub-E1
E1/T1 line type	Copper	Copper	Copper	Copper	Copper
LCD panel	✓	–	–	✓	✓
Auto-configuration	–	✓	–	–	–
SNMP management	✓	✓	✓	✓	✓
Interoperability	Megaplex, DXC	Megaplex, DXC	Megaplex, DXC	Megaplex, DXC	Megaplex, DXC
ETH out-of-band for management	✓	✓	✓	✓	✓
E1 bypass	✓	–	–	✓	✓
ETH performance	–	VLAN transparent	VLAN transparent	VLAN priority tagging (802.1p/Q)	VLAN transparent

**FCD-E1A****E1 or Fractional E1 Access Unit****Ordering****STANDARD CONFIGURATIONS**

FCD-E1A/AC/UTP/X21/S0

FCD-E1A/S1/AC/UTP/X21/X21

FCD-E1A/S1/AC/UTP/V35/S0

FCD-E1A/S1/AC/UTP/X21/S0

FCD-E1A/AC/UTP/V35/S0

**SPECIAL CONFIGURATIONS**

FCD-E1A/\*/~/\$/&amp;/%

*Legend*

- \* Optional drop & insert sub-E1 port.  
(Default= no sub-E1 port)
- S1** Sub-E1 port
- ~ Power supply type:
  - AC** 110 VAC to 240 VAC
  - 48** -48 VDC
- \$** Management port interface:
  - V24** V.24/RS-232 (DB-9)
  - UTP** Ethernet 10BaseT (UTP)
- &** Data port interface:
  - 530** RS-530
  - V35** V.35
  - X21** X.21
  - 449** V.36/RS-449
- %** Second data port interface  
(Default=single port):
  - 530** RS-530
  - V24** V.24
  - V35** V.35
  - X21** X.21
  - 449** V.36/RS-449
- ETQN** IR-ETH/QN UTP Ethernet bridge  
VLAN (10/100BaseT)
- S0** 4xS0 ISDN

**SUPPLIED ACCESSORIES**

AC power cord

AC/DC adaptor plug

The following cables (suitable for use in DCE clock mode only) are supplied for each data port interface specified. Cable length is 2m (6 ft):

**CBL-HS2/^**

Adapter cables for DB-25 channel connectors for use in DCE clock mode only

*Note: Cable length is 2m (6 ft).**Legend*

- ^ Data port interface:
  - V/1** 34-pin V.35
  - R/1** 37-pin V.36/RS-449
  - X/1** 15-pin X.21

**OPTIONAL ACCESSORIES****RM-17**

Hardware kit for mounting one or two units side-by-side in a 19-inch rack

**CBL-HS2/\*/#**

Adapter cables for DB-25 channel connectors for use in DTE clock mode only

*Legend*

- \* Interface, clock mode:
  - V/2** for 34-pin V.35, DTE1
  - V/3** for 34-pin V.35, DTE2
  - R/2** for 37-pin V.36/RS-449, DTE1
  - R/3** for 37-pin V.36/RS-449, DTE2
- # Cable connector type:
  - F** Female
  - M** Male

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**data communications**

The Access Company