

# IMX-4E1

## E1 Inverse Multiplexer



### FEATURES

- Provides inverse multiplexing to transmit a single high-speed data channel over up to four E1 links
- Data rates from 1.92 Mbps to 7.68 Mbps, with automatic rate fallback
- Sync data port interfaces: V.35, RS-530, V.36/RS-449, X.21 or HSSI
- Features Ethernet/Fast Ethernet bridge with VLAN support as DTE interface to connect 10BaseT and 100BaseT LANs and VLANs over E1 services
- Compensates for differential delays up to 64 msec
- Built-in BERT (V.52) and remote/local loopbacks

### DESCRIPTION

- The IMX-4E1 Inverse Multiplexer enables splitting and transmitting a high-speed data channel of up to 7.68 Mbps, over up to four E1 links. IMX-4E1 spans the bandwidth gap between E1 and E3, providing increased bandwidth where services higher than E1 are either not available or too expensive.
- IMX-4E1 can be ordered with either two or four E1 links. For long range applications, an optional built-in LTU for each of the links is available.

- IMX-4E1 compensates for up to 64 msec differential delay between the E1 lines. The end-to-end delay of the IMX-4E1 is not more than the maximum delay between the links.
  - The automatic rate fallback feature ensures that the logical channel remains open even if individual E1 links fail, by automatically dropping to the next lower rate. When failed links are recovered, IMX-4E1 automatically returns to the original rate.
  - The synchronous user data port rate can be any multiple of 1.92 Mbps, up to a total of 7.68 Mbps.
  - An IR-ETH/QH Ethernet interface module can be ordered instead of a sync data port interface. When equipped with this module, IMX-4E1 transparently connects distant LANs over up to four unframed E1 links utilizing the full E1 bandwidth.
  - IMX-4E1 with the IR-ETH/QH bridge filters Ethernet/Fast Ethernet frames, forwarding only frames destined to the WAN. The IR-ETH/QH module can also block broadcast and multicast messages.
  - Two user-selectable clock modes are available for the sync type data ports:
    - DCE: IMX-4E1 provides both TX and RX clocks to the user DTE.
    - External-DCE: IMX-4E1 provides RX clock to the user, while receiving TX clock from the user.
- System timing options include:
    - Internal clock: the internal oscillator is the source for E1 links.
    - Loopback: the E1 transmit clock is derived from one of the E1 receive clocks.
    - Station clock: the E1 transmit clock is the source for framed/unframed all "1"s or G.703 compatible.
  - Diagnostics capabilities include:
    - Local/remote data port loopback
    - Local/remote E1 links loopback
    - V.52 BERT.
  - Setup, control, status, alarms and diagnostic information are provided via the front panel LCD display or an ASCII terminal/Telnet.
  - The supervisory port supports dial-in/dial-out for remote out-of-band configuration and monitoring (dial-in), as well as for alarm reporting (dial-out).

### SPECIFICATIONS

#### E1 INTERFACE

- **Number of links**  
2 or 4
- **Compliance**  
ITU-T Rec. G.703, G.704; G.823
- **Data rate**  
2.048 Mbps (per link)
- **Line code**  
HDB3
- **Framing**
  - *With CRC-4:* Time slot 0 multiframe for CRC-4 protection, and no multiframe (G.732N), intended for use with CCS.
  - *Without CRC-4:* No multiframe (G.732N), intended for use with CCS
- **Impedance**
  - 120 $\Omega$ , balanced
  - 75 $\Omega$ , unbalanced

# IMX-4E1

## E1 Inverse Multiplexer

- **Signal level**  
Receive level:  
0 to -34 dB with LTU  
0 to -10 dB without LTU  
Transmit pulse:  
Balanced:  $\pm 3V$  ( $\pm 10\%$ )  
Unbalanced:  $\pm 2.37V$  ( $\pm 10\%$ )
- **Jitter performance**  
As per ITU-T G.823
- **Connectors**  
8-pin RJ-45, for balanced  
Two BNC coaxial for unbalanced

### DATA PORT INTERFACE

- **Data rate (sync type only)**  
 $n \times 1.920$  Mbps (where  $n=1$  to 4),  
up to 7.68 Mbps
- **Interfaces and connectors**
  - V.35 with 34-pin connector
  - RS-530 with 25-pin connector
  - V.36/RS-449 with 37-pin connector (using RS-530 port, via supplied conversion cable)
  - X.21 with 15-pin connector
  - HSSI with 50-pin SCSI-2 connector
  - IR-ETH (Ethernet Bridge): RJ-45
  - IR-ETH/QH (Ethernet/Fast Ethernet bridge): RJ-45

**Note:** For specifications of Ethernet interfaces, refer to Table 1.

### SUPERVISORY PORT

- **Interface**  
V.24/RS-232, async
- **Connector**  
9-pin D-type, female
- **Speed**  
300-9600 bps, autobaud

### GENERAL

- **Sync Data Port Timing**  
DCE or External-DCE
- **System Timing**  
Loopback (from any E1 link)  
Internal ( $\pm 32$  ppm)  
Station clock
- **E1 Differential Delay**  
Up to 64 msec
- **Station Clock**  
Bit rate: 2.048 Mbps  
Line code: AMI or HDB3  
Impedance: 120 $\Omega$   
Connector: 8-pin RJ-45  
Format: Framed/Unframed all "1"s  
or G.703 compatible
- **Diagnostics**
  - Local/remote loopbacks for data port and E1 links
  - Bert V.52, built-in
- **Statistics and Alarms**  
E1 CRC-4 diagnostics per ITU-T G.706  
Alarm buffer size: 100 events
- **Alarm Response**  
Received impairment on E1  
E1 response: Remote alarm
- **Indicators**  
E1 (per link): LOC SYNC LOSS,  
REM SYNC LOSS  
Data port: TD, RD, TEST
- **Front Panel Control**  
LCD: 2 rows x 16 characters  
Push-buttons: Cursor, Scroll, Enter
- **Power Supply**  
100 to 240 VAC, 18.5W  
-48 VDC, 18.5W

### Physical

Height: 4.4 cm / 1.7 in (1U)  
Width: 43.2 cm / 17. in  
Depth: 24.2 cm / 9.5 in  
Weight: 2.3 kg / 5.0 lb

- **Environment**  
Temperature: 0-45°C / 32-113°F  
Humidity: Up to 90%,  
non-condensing

## ORDERING

**IMX-4E1/#/\*/~/%**

E1 Inverse Multiplexer

# Specify number of E1 links

**2** for 2 E1 links

**4** for 4 E1 links

\* Specify data port interface:

**V35** for V.35

**530** for RS-530

**V36** for V.36/RS-449 (via supplied conversion cable)

**X21** for X.21

**HSSI** for high-speed serial

**ET** for IR-ETH (UTP)

**ET/QH** for IR-ETH/QH (UTP)

~ Specify power supply:

**AC** for 100 to 240 VAC

**48** for -48 VDC

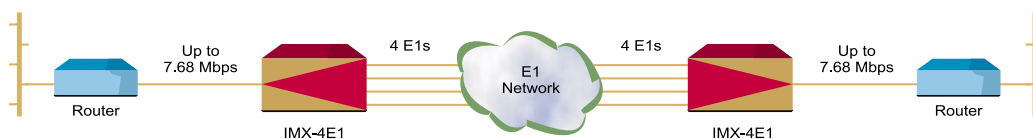
% Specify **LTU** for built-in LTU (default is without LTU)

**Table 1. Ethernet Interface Modules Characteristics**

Interface Module	LAN Table (addresses)	Filtering & Forwarding (frames/sec)	Buffer (frames)	Delay (frames)	Line Code	WAN Protocol	VLAN Support
IR-ETH	10,000	15,000	256	1	Manchester	HDLC	No
IR-ETH/QH	1,000	150,000	170	1	• Manchester (10BT) • MLT3 (100BT)	PPP	Yes

**Note:** Both Ethernet interface modules conform to the IEEE 802.3/Ethernet V2 standard.

## APPLICATION



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