

## Multichannel T1, DSX1, and E1 Port Adapters for Cisco 7200 and Cisco 7500 Series Routers

CISCO'S NEW FAMILY OF MULTICHANNEL PORT ADAPTERS HERALDS A NEW ERA FOR COST-EFFECTIVE AND FLEXIBLE WAN CONNECTIVITY.

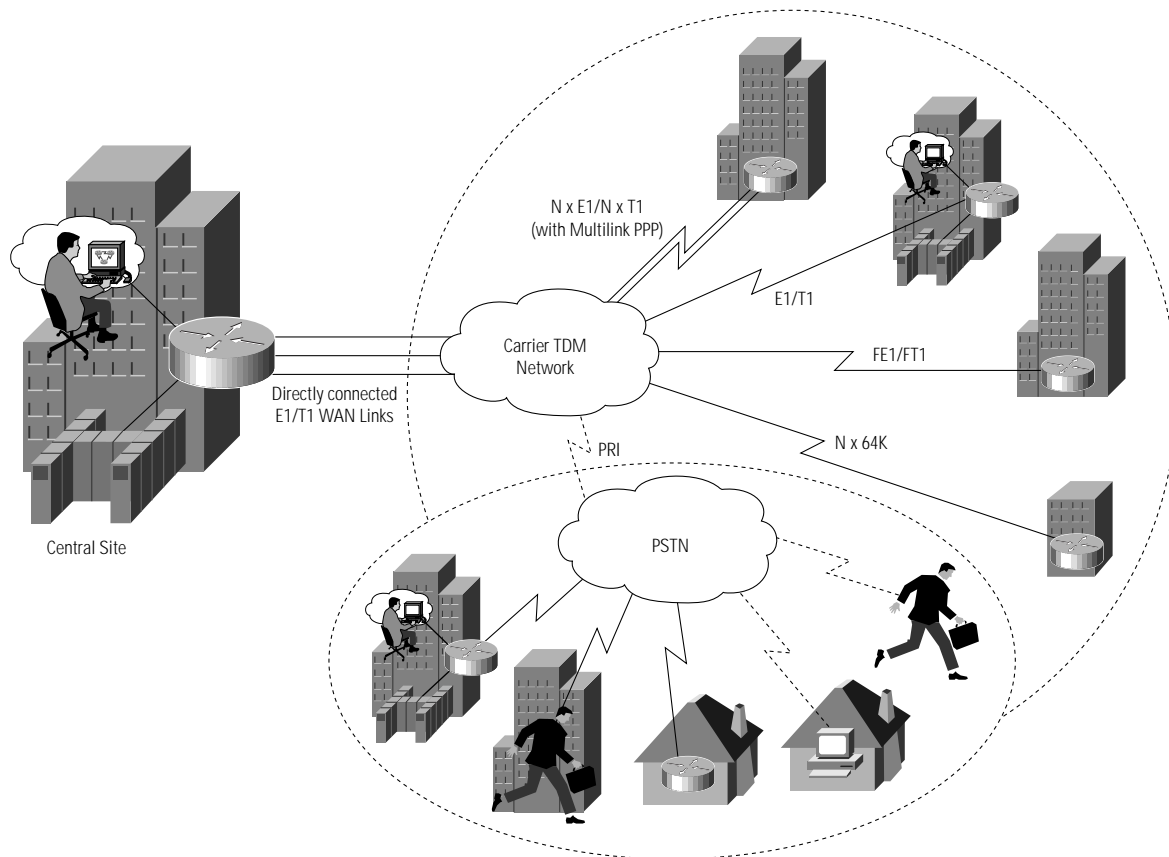
The family of multichannel interfaces for the Cisco 7200 and Cisco 7500 Series routers reduces cost and enhances manageability of WAN links by:

- Eliminating the need for any external channel service units/data service units (CSU/DSUs) or multiplexers
- Providing up to 128 software-configurable WAN connections per single-wide port adapter
- Supporting channel bandwidth from 64kbps, nx64 kbps, to full T1 or E1.

- Handling all major encapsulations, including Integrated Services Digital Network (ISDN) and Frame Relay

With these capabilities, the family of multichannel port adapters eliminates the need for separate interface types for separate connection requirements. At a cost per T1/E1 port less than that of a standard serial port with external CSU/DSU, Cisco's family of multichannel interfaces is cost-effective for all WAN connectivity.

Figure 1 Cisco's multichannel interface family supports multiple connection types, including bundled (N x T1/E1) links using Multilink PPP.



In Cisco's multichannel interface family, there are versions to support physical connectivity to T3 lines, E3 lines, T1 lines, and E1 lines. For direct termination to E1 and T1 lines, Cisco supports six versions of multichannel interfaces. For sites that require integrated T1 CSU and DSU functionality, the two, four- and eight-port multichannel T1 port adapters provide the right mix of integration and cost. For service provider applications where only DSU functionality is required (for example, at sites colocated with a carrier), the eight-port multichannel DSX1 card provides high port density at a reduced cost per port. For E1 applications, the multichannel E1/G.703 interface allows direct connectivity to 120-ohm G.703 lines.

The 128 channels of the multichannel port adapter can be allocated among clear-channel E1 links, N x DS0 (N x 64K) links, or ISDN Primary Rate Interface (PRI) links. For each N x DS0 (N x 64K) connection, a single channel is consumed and multiple N x DS0 connections can be supported on a single T1 or E1. Each T1 or E1 used as ISDN PRI consumes either 24 or 31 channels, respectively, one for each B channel and one for the D channel.

- Local, remote, and payload loopback at the DS1/E1 level
- Respond to embedded loopback commands
- Insertion of loopback commands into transmitted signal
- Full bit error rate testing capabilities on any channel:
  - Programmable pseudorandom pattern up to 32 bits long
  - 32-bit error-count and bit-count registers
  - Fully independent transmit and receive sections
  - Programmable bit error insertion
  - Detect test patterns with bit error rates up to  $10^{-2}$
- Alarm detection: alarm indication signal (AIS), time slot 16 AIS, remote alarm, far-end block error (FEBE), out of frame (OOF), cyclic redundancy check (CRC) multiframe OOF, signaling multiframe OOF, frame errors, CRC errors
- Onboard processor for real-time facility data link (FDL) messaging, in-band code detection and insertion, alarm integration, and performance monitoring
- Support for the following serial encapsulation protocols:
  - Frame Relay
  - Point-to-Point Protocol (PPP)

## Ordering Information

Ports	Part Number	Port Adapter Description	T1 CSU	T1 DSU	E1
eight	PA-MC-8T1	eight-port multichannel T1 with integrated CSUs and DSUs	X	X	
four	PA-MC-4T1	four-port multichannel T1 with integrated CSUs and DSUs	X	X	
two	PA-MC-2T1	two-port multichannel T1 with integrated CSUs and DSUs	X	X	
eight	PA-MC-8DSX1	eight-port multichannel T1 with integrated DSUs		X	
eight	PA-MC-8E1	eight-port multichannel E1 G.703/G.704 120-ohm interfaces			X
two	PA-MC-2E1	two-port multichannel E1 G.703/G.704 120-ohm interfaces			X

## Features

- Up to eight independent T1 or E1 ports per card
- Channelized T1/E1, fractional T1/E1, clear-channel E1, and ISDN PRI supported
  - Up to 128 usable N x 64K channels (where N is 1 to 31 for E1, 1 to 24 for T1) that can be allocated among the 8 T1 or E1 ports
- Internal or network clocking selectable on each port
- Per-port dual-color status LED
- ISDN D-channel support via Versatile Interface Processor or network processing engine (VIP/NPE)
- Line and payload loopback capabilities:
  - HDLC
  - Switched Multimegabit Data Service Data Exchange Interface (SMDS DXI)
  - X.25
  - ISDN PRI
- Support for the following networking protocols:
  - IP
  - IPX

T1/DSX1 version features:

- DS1 100-ohm interfaces with RJ-48c connectors
- D4 (Super Frame [SF]) and Extended Superframe (ESF) framing
- Alternate mark inversion (AMI) or binary 8-zero substitution (B8ZS) line encoding
- Data rate to 1.536 Mbps for each T1 port
- Internal and loop (recovered from network) clocking
- Full FDL support and FDL performance monitoring, according to configurable standard: ANSI T1.403 or AT&T TR 54016
- Selectable DSX-1 cable length in increments from 0 to 655 feet (PA-MC-8DSX1 and PA-MC-4T1/8T1 in DSU mode)
- Selectable DS1 CSU line build-out: 0, -7.5, -15, and -22.5 dB (PA-MC-4T1 and PA-MC-8T1 only)
- Selectable DS1 CSU receiver gain: 26 or 36 dB (PA-MC-4T1 and PA-MC-8T1 only)
- DS1 line protection per UL1459/1950, FCC part 68 (PA-MC-4T1 and PA-MC-8T1 only)
- Full support for DSX-1 Management Information Base (MIB, RFC 1406), including alarm detection and reporting
- DSX-1 MIB remote access supported (PA-MC-4T1 and PA-MC-8T1 only)

E1 Version Features:

- E1 120-ohm (G.703) with RJ-48c connectors
- Unframed E1 or G.704 framing modes
- Data rate to 2.048 Mbps (unframed mode) or 1.984 Mbps (framed mode) per E1 port
- Internal and loop (recovered from network) clocking
- Software-configurable E1 national bits
- HDB3 encoding

Compliance (Partial List)

T1/DSX1 Compliance:

- ANSI T1.403
- US (UL 1950, 1459, T1)
- FCC Part 68
- Canada (C1950, T1)
- US (FCC part 15J Class A, T1)
- U.K. (BS6301, EN60950, EN41003)
- Canada (CSA C108.8 Class A, T1)
- Bellcore—AT&T Accunet (62411)
- ATT 54016
- Japan (VCCI Class 2, T1)

E1 Compliance:

- Germany (TUV GS)
- Germany (VDE 0878 part 3 and 30)
- France (NFC98020)
- France (EN60950, EN41003)
- Sweden (SS447-2-22)
- Europe (EN55022 Class B, EN55102-1, EN55102-2)
- CCITT/ITU G.703, G.704, I.431
- ETSI NET5, ETS300156
- CTR-4, CTR-12
- TBR-13
- ETS 300011
- ITU I.431



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