

## Cisco 4000 Series Integrated Services Router Packet-over-T3/E3 Service Module

High-speed WAN access for Cisco 2900, 3900 and 4000 Series Integrated Services Routers (ISRs). The T3/E3 module offer both service providers and enterprises unprecedented flexibility in provisioning clear-channel T3 or E3 connections.

**Figure 1.** Cisco T3/E3 Module



The Cisco Packet-over-T3/E3 Service Module for the Cisco Integrated Services Routers offers the first software-configurable T3/E3 product from Cisco. This flexible T3/E3 module allows you to switch between T3 and E3 applications with a single Cisco IOS<sup>®</sup> Software command. This feature offers you increased flexibility and investment protection by allowing a Cisco partner, service provider, or enterprise customer to stock only a single product that can be deployed internationally.

The increased demand for bandwidth over the WAN and more attractive pricing of T3/E3 links by service providers has led to steady growth in T3/E3 deployments around the world. The T3/E3 module eliminates the need for an external data service unit (DSU), reduces provisioning costs, and provides highly manageable T3/E3 line termination. The module provides an integrated line interface unit (LIU) DSU that allows T3 or E3 lines to be directly terminated on a Cisco router, eliminating the need for external DSU equipment, simplifying the T3/E3 line management, reducing provisioning cost, and freeing valuable rack space.

The T3/E3 module supports the proprietary subrate and scrambling features of T3 DSU vendors such as Digital Link, Larscom, and ADC Kentrox. Subrate support in the module maximizes the utility of these products in service provider environments. By simultaneously supporting interoperability with a wide range of third-party DSU vendors, this module offers the flexibility to support installed equipment without locking customers into a proprietary solution.

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The Cisco T3/E3 Service Module provides direct connectivity to a T3 line for full-duplex communications at the T3 rate of 44.736 MHz and full-duplex E3 communications at 34.368 MHz. Each T3 or E3 port consists of a pair of 75-ohm BNC coaxial connectors (Type RG-59), one for transmit data and one for receive data, along with six LED indicators for line status. The T3/E3 module is supported in all Cisco IOS Software feature sets, and there are no additional memory requirements.

## Key Benefits

The combination of T3 and E3 options in a single module provides the following important customer benefits:

- Physical space savings: Eliminates the need for external DSU device, saving valuable rack space
- Simplified management: Eliminates the need for two separate monitoring tools
- Software-configurable T3/E3: Provides the flexibility to deploy a single module worldwide

## Key Features

- One-port T3 with DSU or E3 with DSU module
- T3/E3-specific features for monitoring, bit error rate tester (BERT), MIBs, alarms, and more
- Ability to independently or simultaneously enable scrambling and subrate in each DSU mode; support for the following DSU vendors' algorithms: Digital Link, Kentrox, Larscom, Verilink, and Adtran
- Support for the serial encapsulation protocols: Frame Relay, Point-to-Point Protocol (PPP), and High-Level Data Link Control (HDLC)
- 16-bit cyclic redundancy check (CRC)

## Key Management Features

- Line and payload loopback capabilities
- DS-3 remote-line loopback (through Far-End Alarm and Control [FEAC] codes per American National Standards Institute [ANSI] T1.107a)
- Response to embedded loopback commands
- Insertion of loopback commands into transmitted signal
- Programmable pseudorandom pattern up to 32 bits long, including 223, 220, 215, 1s, 0s, and alt-0-1
- 32-bit error count and bit-count registers
- Alarm detection-Alarm indication signal (AIS), remote alarm, far-end block error (FEBE), and out of frame (OOF)
- Onboard processor for Maintenance Data Link (MDL)

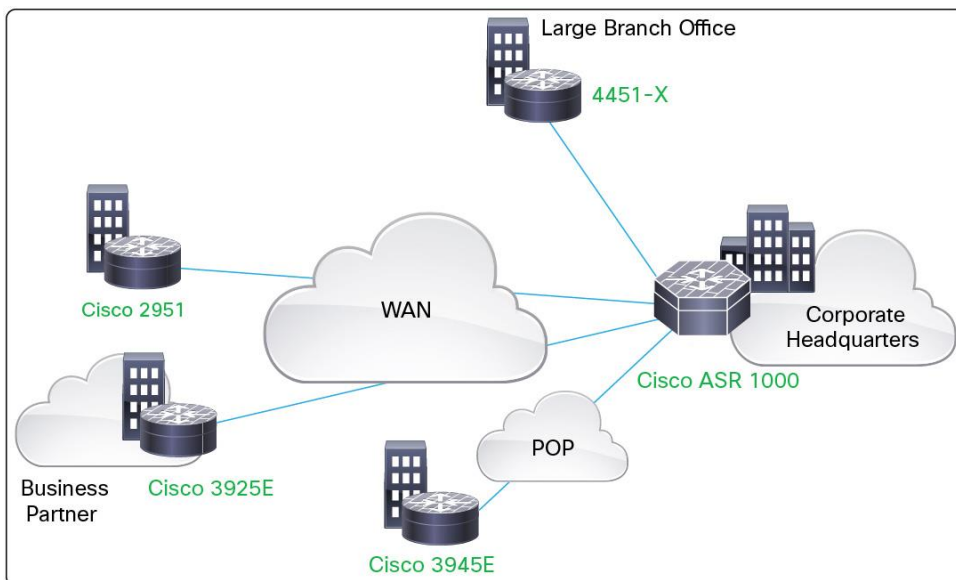
## T3/E3 Applications and Positioning

The Cisco T3/E3 Service Module provides the performance requirements to deploy advanced voice, video, and data applications over the WAN and supports key Cisco IOS Software features and services such as quality of service (QoS), Network-Based Application Recognition (NBAR), IP Security (IPsec), Firewall, intrusion detection system (IDS), Network Address Translation (NAT), and NetFlow. Table 1 gives performance recommendations for positioning of the module in the branch office (Figure 2).

**Table 1.** Cisco T3/E3 Service Module Branch-Office Positioning and Platform Support Matrix

Supported Platform	Recommended Type of Service	Maximum Number of T3/E3 Modules Supported	Minimum Cisco IOS Software Version (IP Base Feature Set or Later)
Cisco 2911, 2921, and 2951	Full-rate T3/E3 with concurrent services	1	15.2(4)M4, 15.3(1)T2, 15.3(2)T1
Cisco 3925 and 3925E	Full-rate T3/E3 with concurrent services	2	15.2(4)M4, 15.3(1)T2, 15.3(2)T1
Cisco 3945 and 3945E	Full-rate T3/E3 with concurrent services	2	15.2(4)M4, 15.3(1)T2, 15.3(2)T1
Cisco 4451, 4351 & 4331	Full-rate T3/E3 with concurrent services	2	IOS-XE3.9

**Figure 2.** Typical Cisco T3/E3 Service Module Deployments



## Specifications

Table 2 lists the product number and description, and Table 3 lists the LED port indicators and status for the Cisco T3/E3 Service Module.

**Table 2.** Product Name and Description

Product Number	Description
SM-X-1T3/E3	One-port clear-channel T3/E3 Service Module

## Hardware Specifications

### DS-3/E3 Specifications

- DSX-3 level interface with dual female 75-ohm BNC coaxial connectors per port (separate RX and TX)
- Full-duplex connectivity at DS-3 rate (44.736 MHz)
- Full-duplex connectivity at E3 rate (34.368 MHz)
- Scrambling and subrate support of major DSU vendors
- Line build-out programmable for up to 450 feet of 734A or equivalent coaxial cable or up to 225 feet for 728A or equivalent coaxial cable

- C-bit or M23 framing for T3; bypass and G.751 framing for E3 (software selectable)
- Binary three-zero substitution (B3ZS) (T3) or high-density bipolar with three zeros (HDB3) (E3) line coding
- Support for 16- and 32-bit CRC (16-bit default)
- DS-3 FEAC channel support
- Twenty-four-hour history maintained for error statistics and failure counts
- DS-3 alarm and event detection (once-per-second polling)
- AIS
- OOF
- Line code violation (LCV)
- Excessive zeros (EXZ)
- Far-end receive failure (FERF)

**Table 3.** LED Port Indicators and Status

LED Indicator	Color	Active State Description
CD	Green	Carrier detect. A signal is present on the port.
LP	Yellow	Loopback mode is on.
AIS	Yellow	Port is receiving AIS.
FERF	Yellow	Port is receiving FERF signal.
EN	Yellow	Service module is enabled.
Alarm	Yellow	Alarm Indicates LOF (Loss of Frame)

#### Serial Encapsulations

- HDLC
- PPP
- Frame Relay

#### Physical Specifications

- Single-wide service module, no slot restrictions
- Dimensions (H x W x D) 1.55 x 7.10 x 7.2 in. (3.9 x 18.0 x 18.3 cm)

#### Environmental Specifications

- Operating temperature: 32 to 104°F (0 to 40°C)
- Storage temperature: -4 to 149°F (-20 to 65°C)
- Relative humidity: 10 to 90%, noncondensing

#### Certification Compliance

##### DS-3 Physical Layer

- ANSI T1.102 and T1.107

### E3 Physical Layer

- TBR24
- ITU-T G.703 and G.823
- ACA TS016

### Safety

- United States (UL1950 3<sup>rd</sup> Edition/CSA C22.2, No.950)
- Canada (C1950)
- UK (BS6301, EN60950, EN41003)
- Germany (TUV GS)
- France (EN60950, EN41003, NFC98020)
- AS/NZS 3260 (Australia/New Zealand)
- EN60950/EN41003 (Europe)
- IEC 950 (national deviations)

### EMC

- 47 CFR 15: 2001 Class A (FCC)
- ICES003 Class A
- EN55022 Class A: 1998
- EN300386: 2001
- EN55024:1998, EN50082-1:1997 and EN61000-6-2: 1999 including:
  - ESD: EN61000-4-2
  - Radiated Immunity: EN61000-4-3
  - Burst Transients: EN61000-4-4
  - Surges: EN61000-4-5
  - Injected RF: EN61000-4-6
  - Dips + Sags: EN61000-4-11
- EN61000-3-2: 1995
- EN61000-3-3: 1995
- AS/NZS 3548 Class A
- VCCI V-3/2000.04 Class A

### Standards

- T3/E3 MIB (RFC 1407)

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