# Cisco T3/E3 Network Module

The Cisco® T3/E3 Network Module provides high-speed WAN access for the Cisco 2600, 2800, 3600, 3700 , 3800 Series routers, as well as the Cisco 2951, and  3900 Series Integrated Services Routers. The NM-1T3/E3 network module offers both Service Providers and Enterprise customer's unprecedented flexibility in provisioning clear-channel T3 or E3 connections.

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

Cisco's Packet-over-T3/E3 network module for the Cisco Integrated Services Routers series offers the first software-configurable T3/E3 product from Cisco. This flexible network module allows the customer to switch between T3 and E3 applications with a single Cisco IOS® command. This feature provides customers 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 SPs has led to steady growth in T3/E3 deployments around the world. The Packet-over T3/E3 network module (part number NM-1T3/E3) 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. This simplifies the T3/E3 line management, reduces provisioning cost, and frees up valuable rack space.

The Cisco T3/E3 network modules provide support for the proprietary subrate and scrambling features of T3 DSU vendors such as Digital Link, Larscom, and ADC Kentrox. Subrate support in the Cisco T3/E3 Network 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 network module offers the flexibility to support installed equipment without locking customers into a proprietary solution.

The Cisco T3/E3 Network 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 Cisco T3/E3 Network Module is supported in all Cisco IOS feature sets, and there are no additional memory requirements.

## Key Benefits

The combination of T3 and E3 options in a single network module provides the following key 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 network module
- T3/E3-specific features for monitoring, bit error rate tester (BERT), Management Information Bases (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, Adtran.
- Support for the serial encapsulation protocols: Frame Relay, Point-to-Point Protocol (PPP), High-Level Data Link Control (HDLC)
- 16-bit cyclic redundancy check (CRC)

## Key Management Features

- Line and payload loopback capabilities
- DS3 remote-line loopback (via 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, alt-0-1
- 32-bit error count and bit-count registers
- Alarm detection-Alarm indication signal (AIS), remote alarm, far-end block error (FEBE), out of frame (OOF)
- Onboard processor for Maintenance Data Link (MDL)

## T3/E3 Applications and Positioning

The Cisco T3/E3 Network Module provides the performance requirements to deploy advanced, voice, video and data applications over the WAN and supports key IOS features and services such as QoS, NBAR, IPSec, FW, IDS, NAT and NetFlow. The Cisco 3945E, for instance, is the highest-performing platform for the branch office and is recommended for deploying concurrent services at full T3/E3 line rates. See Table 1 below for performance recommendation for positioning of the NM-1T3/E3 in the branch office.

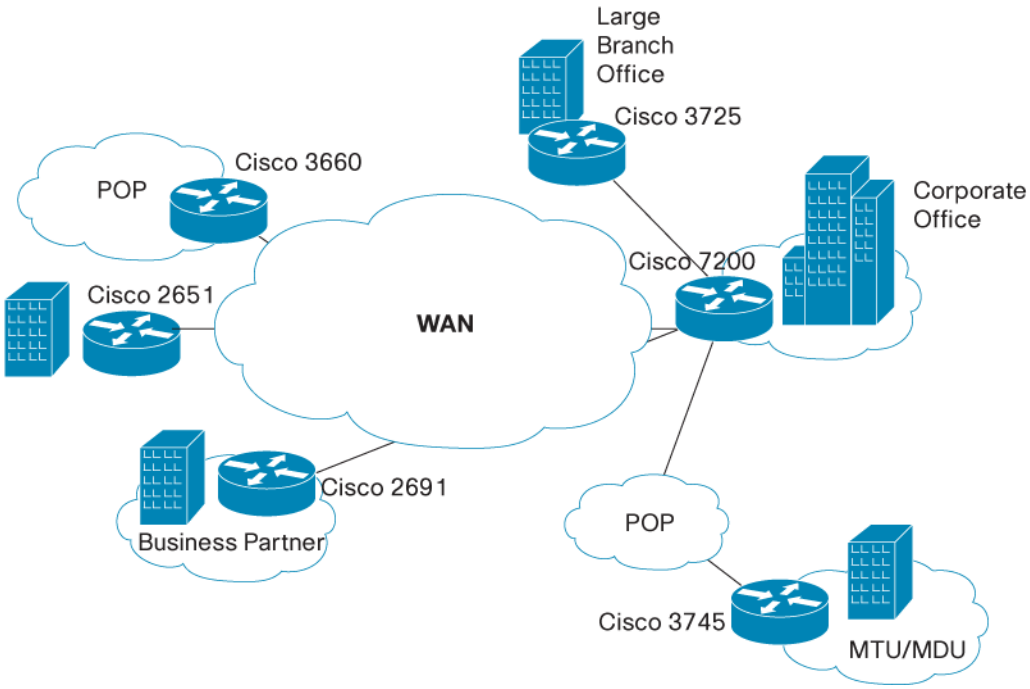
**Table 1.** Cisco T3/E3 Network Module Branch Office Positioning and Platform Support Matrix

| Supported Platform | Recommended Type of Service | Maximum T3/E3 Supported | Minimum Cisco IOS Software Version (IP Base Feature Set or Above) |
|---|---|---|---|
| **Cisco 2650 and 2651XM** | Subrate T3/E3 | 1 | 12.2(15)T |
| **Cisco 2691** | Subrate T3/E3 | 1 | 12.2(15)T |
| **Cisco 2800** | Subrate T3/E3 with concurrent services | 1 | 12.3(8)T |
| **Cisco 2951** | Full rate T3/E3 with concurrent services | 1 | 15.0(1)M |
| **Cisco 3661 and 3662** | Sub and full-rate T3/E3 with limited services | 1 | 12.2(15)T |
| **Cisco 3725/3745** | Full-rate T3/E3 with no services | 1 | 12.2(15)T |
| **Cisco 3825** | Full rate T3/E3 with no services | 1 | 12.3(8)T |

| Supported Platform | Recommended Type of Service | Maximum T3/E3 Supported | Minimum Cisco IOS Software Version (IP Base Feature Set or Above) |
|---|---|---|---|
| **Cisco 3845** | Full-rate T3/E3 with concurrent services | 2 | 12.3(8)T |
| **Cisco 3925/3925E*** | Full-rate T3/E3 with concurrent services | 1 | 15.0(1)M |
| **Cisco 3945/3945E*** | Full-rate T3/E3 with concurrent services | 2 | 15.0(1)M |

**Note:** Support for the NM-1T3/E3 network module in the 3925, 3925E and 3945, and 3945E will be via the network module adapter card (SM-NM-ADPTR).

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




## Specifications

Table 2 lists the product number and description for the Cisco T3/E3 Network Module.

**Table 2.** Product Name and Description

| Product Number | Description |
|---|---|
| **NM-1T3/E3** | One-port clear-channel T3/E3 network module |

### Hardware Specifications

DS3/E3 Specifications

- DSX3 level interface with dual female 75-ohm BNC coaxial connectors per port (separate RX and TX)
- Full-duplex connectivity at DS3 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 3-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)
- DS3 FEAC channel support
- Twenty-four-hour history maintained for error statistics and failure counts
- DS3 alarm and event detection (once per second polling)
- Alarm indication signal (AIS)
- Out of frame (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 | Loopback mode on |
| **LP** | Yellow | Port is receiving AIS |
| **AIS** | Yellow | Port is receiving FERF signal |
| **FERF** | Yellow | Network module is enabled |
| **EN** | Yellow | Port is receiving OOF errors |
| **Alarm** | Yellow | Loopback mode on |

Serial Encapsulations

- HDLC
- PPP
- Frame Relay

Physical Specifications

- Single-wide network module, no slot restrictions
- Dimensions (H x W x D) 1.55 x 7.10 x 7.2 inches (3.9 x 18.0 x 18.3 centimeters)

Environmental Specifications

- Operating temperature: 32 to 104℉ (0 to 40℃)
- Storage temperature: -4 to 149℉ (-20 to 65℃)
- Relative humidity: 10 to 90%, non condensing

**Certification Compliance**

DS3 Physical Layer

- ANSI T1.102, T1.107

E3 Physical Layer

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

Safety

- United States (UL1950 3rd 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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