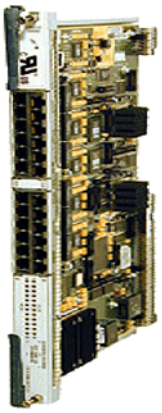
Data Sheet

Cisco 10000 Series 24-Port Channelized E1/T1 Line Card

The Cisco 10000 Series 24-Port Channelized E1/T1 Line Card provides flexibility, scalability, and an enhanced price-to-performance ratio in the E1/T1 aggregation market. Targeted primarily at Internet service providers (ISPs) for situations in which fiber interfaces are unavailable or prohibitively expensive, the Cisco 10000 Series Channelized E1/T1 Line Card supports 24 E1/T1 ports (Layer 2 connectivity), each of which can be independently channelized down to DS0 or NxDS0. Layer 3 services are supported by the Cisco 10000 Series advanced Performance Routing Engine (PRE). By taking advantage of the advanced PRE architecture, ISPs will enjoy the necessary processing performance to enable the advanced IP services that users demand.

Figure 1



Product Description

The 24-port channelized E1/T1 module is a full-height line card that supports maximum flexibility and can be used in any Cisco 10000 Series interface card slot. All cards are hot-swappable. The RJ-48c ports software-configurable to support either T1 or E1 (120-ohm) interfaces on a per-card basis, meaning all 24 ports in either E1 mode or in T1 mode. The 24-port channelized E1/T1 line card may be used in many customer applications. It is ideal for providing direct customer IP access or network-to-network connections where copper E1 or T1 is the only service to a remote point of presence (POP). The line card supports Frame Relay, High-Level Data Link (HDLC), and PPP, thereby offering three different Layer 2 encapsulations of IP packets.

Table 1

Cisco 10000 Series 24-port Channelized E1/T1 Line Card Port Densities (Assuming Dual Uplinks With Half-Height Line Cards)

Capabilities	Ports Per Line Card	Ports Per Chassis	Ports Per 7-Foot Rack
E1/T1	24	168	1,008

Each Cisco 10000 Series 24-port channelized E1/T1 line card supports up to 24 E1 or T1 connections, with up to 744 channels. As shown in Table 1, a fully configured Cisco 10008 chassis with two uplink half-height modules can support up to 168 E1s/T1s or up to 1,008 E1s/T1s per seven-foot rack.

Key Benefits

Two important benefits of the Cisco 10000 Series 24-port Channelized E1/T1 Line Card are its ability to provide full channelization and its ability to scale from 168 E1s/T1s per box up to 1,008 E1/T1 connections per seven-foot rack. Another benefit is that it can be configured with software to support either E1 or T1 on a per-card basis. This feature enhances its flexibility and augments services without changing the E1/T1 connection.

Scalability to Increase Services

The Cisco 10000 Series provides industry-leading scalability that enables an ISP to add more customers and services without requiring additional rack space in the POP. With the 24-port channelized E1/T1 line card, the Cisco 10008 chassis can accommodate 168 E1s/DS1s to 1008 E1s/DS1s.

The scalability of the Cisco 10000 Series with 24-port channelized E1/T1 card enables ISPs to stay ahead of the tremendous demand for Internet connectivity while at the same time making highly efficient use of scarce POP space.

Price and Performance Leadership

ISPs must be nimble, continuously providing new services such as quality of service (QoS), access lists, and Multiprotocol Label Switching (MPLS) virtual private networks (VPNs) to keep existing customers and to find new ones. But they also must be able to scale so that these new services are cost-effective. The 24-port channelized E1/T1 line card enables the Cisco 10000 Series to be one of the most cost-effective E1/T1 aggregation platforms on the market by:

- Integrating channel service unit (CSU) and data service unit (DSU) features like framing, performance monitoring, remote loopbacks, and BERT
- Distributing costs over the largest number of ports, reducing the overall cost per port of the Cisco 10000 Series solution
- Enabling ISPs to continue to use the existing physical infrastructure of E1 and T1 circuits while supporting new IP services, reducing costs for the ISP and for users

Key Features

- 24 E1/T1 ports per line card
- Support for creating as many as 744 separate channels per line card (full channelization) using various combinations of channelized, fractional, clear channel, and unframed services
- Channelization of E1 and T1 down to DS0 (64Kbps) or NxDS0
- Per-port selection of internal or external (line) clock source
- Support for the following serial encapsulation protocols: HDLC, Frame Relay, PPP
- Bit error rate test (BERT) function at E1 and T1 levels
- Error Correction Code (ECC) memory protection on processor's synchronous dynamic RAM (SDRAM)
- Online insertion and removal (OIR), also called "hot swappable," with no chassis slot dependency
- Support for high-availability features, including Route Processor Redundancy Plus (RPR+), Nonstop Forwarding (NSF), and Stateful Switchover
- Alarm detection-Alarm indication signal (AIS), loss of signal (LOS), loss of frame (LOF)

E1-Specific Features

- Framed or unframed modes; 31 time slots (DS0s) available to user in framed mode
- European 2.048-Mbps TU G.703 and G.704 serial interfaces
- Local or network loopback for any E1 port; network loopback supports line and payload
- Cyclic redundancy check (CRC4) and non-CRC framing modes
- Remote alarm indication (RAI)—This alarm is transmitted from the remote CSU/DSU when an alarm condition is detected in the received signal or when a high bit-error-rate occurs

T1-Specific Features

- Alternate mark inversion (AMI) or bipolar eight-zero substitution (B8ZS)
- Super Frame or Extended Super Frame modes
- Up to 24 separate interfaces per T1 port
- Support for facility data link (FDL)—Full American National Standards Institute (ANSI) T1.403 mode; ATT 54016 response messages only; SmartJack remote loopback
- Performance monitoring—Local and remote
- Loopback for each T1 port—Line and payload (types of network loopback), local, remote

- Counting of framing bit errors, CRC-6 errors
- Yellow alarm—Transmitted from the remote CSU/DSU when an alarm condition is detected in the received signal

Specifications

Physical

- Weight: 4.75 pounds (2.16 kilograms)
- Dimensions: 16.0 x 1.12 x 9.97 inches (40.64 x 2.83 x 25.32 centimeters) (H x W x D)

Cabling

You can use up to 24 Category 3 or Category 5 unshielded twisted pair (UTP) transmit and receive cables with RJ-48C plugs at each end. These cables connect to two staggered 12-line faceplate RJ-48C jacks with 110-ohm balanced-line inputs, which allow the line card to operate in either T1 (100-ohm balanced) or E1 (120-ohm balanced) mode. The faceplate RJ-48C jacks are numbered 0 to 11 and 12 to 23 left-to-right and top-to-bottom.

You can also use a Cisco cable adapter (CAB-ADAPT-75-120) for coaxial British Navel Connector (BNC) unbalanced transmit and receive E1 connections.

Cisco cable adapters connect 75-ohm unbalanced G.703 E1 coaxial BNC transmit and receive lines to Cisco E1 120-ohm balanced transmit and receive lines. The connections are made through eight-pin RJ-48C jacks on the 120-ohm side and dual coaxial lines (transmit and receive) with BNC connectors at the 75-ohm side.

Class A emissions compliance is met when the 120-ohm E1 port is connected to the 75-120-ohm cable adapter using RJ-48C connectors and Category 3 or Category 5 shielded foil twisted-pair (FTP) cable with 120-ohm impedance. Two switches on the 120-ohm side must be configured to connect the outer conductor of the shielded cable to a protected earth ground.

Class B emissions compliance is also met with shielded twisted pair (STP) cabling.

Environmental

- Storage temperature: -38 to 150 F (-40 to 70 C)
- Operating temperature, nominal: 41 to 104 F (5 to 40 C)
- Operating temperature, short term: 23 to 131 F (-5 to 55 C)
- Storage relative humidity: 5 to 95 percent relative humidity
- Operating humidity, nominal: 5 to 85 percent relative humidity
- Operating humidity, short term: 5 to 90 percent relative humidity
- Operating altitude: -198 to 13,200 feet (-60 to 4000 meters)

Regulatory Compliance

Safety

- UL 1950, Third Edition, (Safety of Information Technology Equipment, Including Electrical Business Equipment), with no D3 deviations
- CSA 22.2 No. 950-95 Third Edition (Safety of Information Equipment Technology, Including Electrical Business Equipment)
- EN 60950 (Safety of Information Equipment Technology, Including Electrical Business Equipment) incorporating Amendments 1, 2, 3, and 4, with all national deviations
- IEC 950, incorporating Amendments 1, 2, 3, and 4, with all national deviations
- ACA TS001 1997 Test Report and Statement of Compliance AS/NZS3260 incorporating Amendments 1, 2, 3, and 4

Electromagnetic Emissions Certification

- FCC Part 15 Class B
- EN55022: 1998 Class B
- CISPR 22: 1997 Class B
- • CFR 47 Part 15 Class A
- • ICES-003, Issue 2, Class B, April 1995
- • VCCI V-3/97.04 Class II
- • AS/NZS 3548: 1992, Class B
- • CNS-13438 Class B-BSMI (BCIQ) in Taiwan

Immunity

- EN61000-4-2: ESD immunity
- EN61000-4-3: Radiated radio frequency (RF) field immunity
- EN61000-4-4: Immunity to electrical fast transients
- EN61000-4-5: Surge immunity
- EN61000-4-6: RF conducted immunity
- EN61000-4-1: Dips and sags (AC input)
- EN61000-3-2: Power line harmonics (AC input)

Network Equipment Building Standards

- Network Equipment Building Standards (NEBS): Criteria Levels (Level 3 compliant)
- NEBS: Physical Protection
- NEBS: EMC and Safety
- GR-1089-Core
- GR-63-Core
- SR-3580

European Telecommunication Standards Institute

- *ETSI 300 386-1*—Levels for equipment with a "high priority of service" that is installed in "locations other than telecommunication centers"
- *ETSI 300 386-2:1997*—Levels for equipment with a "high priority of service" that is installed in "locations other than telecommunication centers"
- *ETSI 300 132-2: December 1994*—Power supply interfaces at the input to telecommunications equipment sections 4.8, 4.9

LEDs

- *Yellow fail*—This status LED lights momentarily during POST (Power-On Self Test) and then goes out on a properly working line card. If the line card fails during operation, this LED lights, stays lit, and an alarm event occurs
- *Status LEDs*—There are 24 dual-color status LEDs, one for each line card port; the two colors are green and yellow:
  - *Green (carrier detected)*—When green, this status LED indicates that a carrier signal exists at the corresponding port, which indicates normal interface operation. During loopback testing, this LED also lights green.
  - *Yellow (alarm active)*—When yellow, this status LED indicates that the corresponding port data path is in an alarm condition. The following alarms are monitored: loss of signal (LOS), loss of frame (LOF), remote alarm indication (RAI), and alarm indication signal (AIS).
  - *Off*—When not lit, this status LED indicates that the port is administratively down.

Network Management (Management Information Base) Support

- RFC 2495
- RFC 2496
- Simple Network Management Protocol (SNMP)
- MIB-II

Power Budget

- Component: 24-port channelized E1/T1 line card
- Unit Power: 60W maximum; 36W typical

Product System Requirements and Compatibility

Hardware Requirements

- *Chassis*—The line card is supported on all Cisco 10000 Series chassis
- *PREs*—The line card is supported on all PREs available on the Cisco 10000 Series

Software Requirements

Initial Cisco IOS® Software releases: The line card is supported in Cisco IOS Software Release 12.0(22)S and later releases. For the latest release information, refer to

http://www.cisco.com/cgi-bin/front.x/Support/HWSWmatrix/hwswmatrix.cgi

Ordering Information

Table 2 provides part numbers and descriptions.

Table 2

Part Numbers

Part Number	Description
ESR-24CT1/E1	24-port channelized E1/T1 line card
ESR-24CT1/E1=	24-port channelized E1/T1 line card, spare

Service and Support

Cisco Systems offers a wide range of service and support options for its customers. More information about Cisco service and support programs and benefits can be found at

http://www.cisco.com/public/Support_root.shtml.

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