Cisco 12000 Series Channelized Line Card

Service providers face the challenge of meeting customer demand by building scalable, feature-rich networks that can deliver value-added services such as private IP connectivity; integrated data, voice, and video services; and tiered service offerings at all interface rates without compromising density. The Cisco® 12000 Series Channelized IP Services Engine (ISE) line cards provide a solution for the ever-increasing need for bandwidth and transmission capacity. These line cards take advantage of existing infrastructure, significantly lowering provisioning costs in terms of transmission and routing equipment. With the high-density aggregation offered by these line cards, service providers can build cost-efficient networks to serve large numbers of customers using telco infrastructure for IP access.

The Cisco 12000 Series 1-Port Channelized OC-12/STM-4 (STS3/VC4) ISE Line Card provides DS-0/DS-1 channelization (Figure 1).
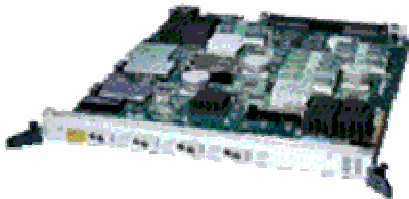
The Cisco 12000 4-Port Channelized OC-12/STM-4 POS ISE Line Card provides channelization to DS-3 (Figure 2).

The Cisco 12000 1-Port Channelized OC-48/STM-16 POS ISE Line Card provides channelization to DS-3 (Figure 3).
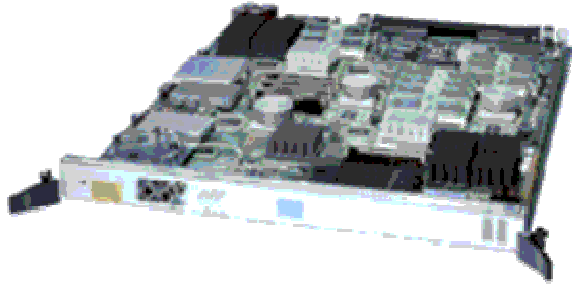
Figure 1.   Cisco 12000 Series 1-Port Channelized OC-12/STM-4 ISE Line Card

Figure 2.   Cisco 12000 4-Port Channelized OC-12/STM-4 POS ISE Line Card

Figure 3.   Cisco 12000 1-Port Channelized OC-48/STM-16 POS ISE Line Card

PRODUCT FEATURES

Table 1 describes the basic features on the Cisco 12000 Series Channelized line cards.

Table 1.   Product Features

Feature	Description
Performance	• 4 Mpps for IP and Multiprotocol Label Switching (MPLS) forwarding with most services enabled in isolation or in combination, including access control lists (ACLs), committed access rate (CAR), and NetFlow v5 (sampled) and v8
Reliability and availability	• Online insertion and removal (OIR) • Capability of support for both SONET automatic protection switching (APS) and SDH linear multiplex section protection (MSP) protocols; MR APS support is available today • Mean time between failure (MTBF) in excess of 100,000 hours
Network management	• Cisco IOS® command-line interface (CLI) • CiscoView • Simple Network Management Protocol (SNMP) ▪ SONET/SDH MIB (RFC 2558) ▪ DS3/E3 MIB (RFC 2496) ▪ DS1/E1 MIB (RFC 2495) • MIB-II ▪ MIB II, including interface extensions ▪ SONET MIB ▪ BGP-4 MIB ▪ CAR MIB ▪ Cisco CAR MIB ▪ Cisco CDP MIB ▪ DS1/E1 MIB ▪ SONET/SDH MIB

Protocols, as applicable	• IETF RFC 1490, Frame Relay Encapsulation
	• RFC 1662, Point-to-Point Protocol (PPP) in High-Level Data Link Control (HDLC)-Like Framing
	• Cisco HDLC
	• Cisco Discovery Protocol
	• Internet Control Message Protocol (ICMP)
	• Multilink PPP (RFC 1990) (as applicable for 1-port Channelized OC-12c/STM-4 (DS-1/E1) IP services engine [ISE] line card)
	• FRF.12, link fragmentation and interleaving (LFI) (as applicable for 1-port Channelized OC-12c/STM-4 (DS-1/E1) ISE line card)
	
	• Layer 3 routing protocols, including Border Gateway Protocol Version 4 (BGPv4), Open Shortest Path First (OSPF), Intermediate System-to-Intermediate System (IS-IS), Enhanced Interior Gateway Routing Protocol (EIGRP), IGRP, Routing Information Protocol (RIP), RIPv2, and others
	• Multicast forwarding with support for source and shared distribution trees and the following protocols, including others not listed:
	  ▪ Protocol Independent Multicast dense mode (PIM DM)
	  ▪ PIM sparse mode (PIM SX)
	  ▪ Auto-rendezvous point (AutoRP)
	  ▪ Internet Group Management Protocol Versions 1 and 2 (IGMPv1 and IGMPv2)
	  ▪ Cisco Group Management Protocol (GMP)
	  ▪ Multiprotocol BGP Extensions for IP Multicast (MBGP)
	  ▪ Multicast Source Discovery Protocol (MSDP)
	• Comprehensive MPLS support
	• Traffic engineering using Routing with Resource Reservation (RRR)
	• PPP, HDLC, and Frame Relay User Network Interface (UNI) encapsulations

Packet layer	• Multiple virtual output queues, eliminating head-of-line blocking • 512-KB burst buffers, which smooth out the arriving packet bursts • Default 64-MB Tx and Rx packet buffer memory, for TCP goodput • A Cisco Express Forwarding table that can accommodate up to 1 million forwarding entries • Application-specific integrated circuit (ASIC)-based queuing • Quality-of-service (QoS) support • Configurable with 4 or 8 queues per channel group (as applicable for 1-port Channelized OC-12c/STM-4 (DS-1/E1) ISE line card)
SONET/SDH layer	• Standards-compliant SONET/SDH interface • SONET/SDH alarm processing • Support for SONET data communications channels (DCCs) • Single-mode intermediate-reach line-card compliance with Bellcore GR-253, ITU G.707, and G.703 • Ability to interwork with both line and tributary (Trib) interfaces of commonly available SDH add/drop multiplexer (ADM) equipment • Compliance with G.783, G.784, G.957, G.958, as applicable • Synchronization local (internal) or loop timed (recovered from network) • Local (diagnostic) and line (network) loopback
DS-3 specifications , as applicable	• Full- and half-duplex connectivity at DS-3 rate (44.736 MHz) • Scrambling and subrate support of major data-service-unit (DSU) vendors • Unframed, C-bit, or M13 framing (software selectable) • Support for 16- and 32-bit cyclic redundancy check (CRC) (16-bit default) • 24-hour history maintained for error statistics and failure counts • DS-3 alarm and event detection (once-per-second polling) • Alarm indication signal (AIS) • Out of frame (OOF) • Far-end receive failure (FERF)

DS-1 specific features, as applicable	• Superframe (SF) and Extended Superframe (ESF) support • ANSI T1.403 FDL support • Internal or line-derived (loop) clocking, independently selectable on each T-1 tributary • Error and alarm detection: CRC errors, framing errors, loss of frame (red), AIS (blue), remote alarm indication (yellow) • Alarm reporting—24-hour history maintained, 15-minute intervals on all errors • Bit error rate testing (BERT) at T-1 level • Loopback capabilities: local, network line and network payload, remote network line, and remote network payload at the T-1 level
E-1 specific features, as applicable	• ITU-T G.703, as applicable • Framing: CRC-4 and no-CRC-4 conformance with ITU-T G.703 and G.704 • Internal or line-derived (loop) clocking, independently selectable on each E-1 tributary • Error and alarm detection: CRC errors, framing errors, loss of frame, AIS, and remote alarm indication • Performance monitoring: 24-hour history retained; 15-minute intervals on all errors • BERT at E-1 level • Line and payload loopback capabilities—local and network line, and network payload at the E-1 level

PRODUCT SPECIFICATIONS

Table 2 provides specifications for the different Cisco 12000 Series Channelized line cards.

Table 2. Product Specifications

Line Card	Forwarding Engine	Cisco IOS Software Release	Chassis Supported	Per-Chassis Port Densities
1-port Channelized OC-12c/STM-4 (DS-1/E1) ISE line lard	Engine 3	12.0S (27)	Cisco 12008	7 maximum ports per chassis
			Cisco 12012	11 maximum ports per chassis
			Cisco 12404	3 maximum ports per chassis
			Cisco 12006	5 maximum ports per chassis
			Cisco 12406	5 maximum ports per chassis
			Cisco 12010	9 maximum ports per chassis
			Cisco 12410	9 maximum ports per chassis
			Cisco 12416	15 maximum ports per chassis
			Cisco 12810	9 maximum ports per chassis
			Cisco 12816	15 maximum ports per chassis
4-port Channelized OC-12/STM-4 (DS-3/E3) POS/SDH ISE line card	Engine 3	12.0S (20)	Cisco 12008	7 maximum ports per chassis
			Cisco 12012	11 maximum ports per chassis
			Cisco 12404	3 maximum ports per chassis
			Cisco 12006	5 maximum ports per chassis
			Cisco 12406	5 maximum ports per chassis
			Cisco 12010	9 maximum ports per chassis
			Cisco 12410	9 maximum ports per chassis
			Cisco 12416	15 maximum ports per chassis
			Cisco 12810	9 maximum ports per chassis
			Cisco 12816	15 maximum ports per chassis

1-port Channelized OC-48/STM-16 (DS-3/E3) POS/SDH ISE line card	Engine 3	12.0S (20)	Cisco 12008	7 maximum ports per chassis
			Cisco 12012	11 maximum ports per chassis
			Cisco 12404	3 maximum ports per chassis
			Cisco 12006	5 maximum ports per chassis
			Cisco 12406	5 maximum ports per chassis
			Cisco 12010	9 maximum ports per chassis
			Cisco 12410	9 maximum ports per chassis
			Cisco 12416	15 maximum ports per chassis
			Cisco 12810	9 maximum ports per chassis
			Cisco 12816	15 maximum ports per chassis

Note: The Cisco 12008 requires updated AC power to support ISE-based line cards.

PHYSICAL AND ELECTRICAL SPECIFICATIONS

Table 3 provides details about the physical and electrical specifications of the different Cisco 12000 Series Channelized line cards.

Table 3. Physical and Electrical Specifications

Line Card	Dimensions	Weight	Power	Memory	LEDs
CHOC12/DS1-IR-SC (=)	Height: 14.5 in. (36.8 cm) Depth: 18.5 in. (46.9 cm)	6.0 lb (2.7 kg)	147 watts	Route: 256 MB (upgradeable-refer to table 6) Packet: 512 MB	Active Carrier Packet receive
4CHOC12/DS3-I-SCB	Height: 14.5 in. (36.8 cm) Depth: 18.5 in. (46.9 cm)	6.0 lb (2.7 kg)	140 watts	Route: 256 MB (upgradeable-refer to table 6) Packet: 512 MB	Active Carrier Packet receive
CHOC48/DS3-SR-SC (=)	Height: 14.5 in. (36.8 cm) Depth: 18.5 in. (46.9 cm)	6.0 lb (2.7 kg)	140 watts	Route: 256 MB (upgradeable-refer to table 6) Packet: 512 MB	Active Carrier Packet receive

OPTICAL SPECIFICATIONS

Table 4 provides details about the optical specifications of the different Cisco 12000 Series Channelized line cards.

Table 4. Optical Specifications

Line-Cards	CHOC12/DS1-IR-SC (=)	4CHOC12/DS3-I-SCB	CHOC48/DS3-SR-SC (=)
Connector type	SC	SC	SC
Wavelength	1310 nm	1310 nm	1310 nm
Fiber type	Single-mode fiber (SMF)	SMF	SMF
Core size	9/125 micrometers	9/125 micrometers	9/125 micrometers
Cable distance	15 km	15 km	2 km
Link power budget (GE-253)	0 to 12 dB	0 to 12 dB	0 to 7 dB
Transmit power	-5 to -8 dBm	-15 to -8 dBm	-10 to -3 dBm

Receive power	-28 to -8 dBm	-28 to -8 dBm	-18 to -0 dBm

ENVIRONMENTAL, APPROVALS AND COMPLIANCE

Table 5 gives standards-compliance information about the Cisco 12000 Series Channelized line cards.

Table 5. Compliance and Agency Approvals

Feature	Description

Environmental	• 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, operating conditions
	  – 5 to 95%, noncondensing, nonoperating conditions
	• Operating altitude: –60 to 4000m

Safety	• UL/CSA/IEC/EN 60950-1 • AS/NZS 60950 • EN60825/IEC 60825 Laser Safety • FDA – Code of Federal Regulations Laser Safety
EMI	• FCC 47 CFR Part 15 Class A • ICES 003 Class A • AS/NZS Class A • CISPR 22 • EN55022 • VCCI Class A • EN61000-3-2 Power Line Harmonics • EN61000-3-3 Voltage Fluctuations and Flicker
Immunity (basic standards)	• EN61000-4-2 Electrostatic Discharge Immunity (8-kV contact, 15-kV air) • EN61000-4-3 Radiated Immunity (10 V/m) • EN61000-4-4 Electrical Fast Transient Immunity (2-kV power, 1-kV signal) • EN61000-4-5 Surge AC Port (4-kV CM, 2-kV DM) • EN61000-4-5 Surge Signal Port (1-kV indoor, 2-kV outdoor) • EN61000-4-5 Surge DC Port (1 kV) • EN61000-4-6 Immunity to Conducted Disturbances (10 Vrms) • EN61000-4-8 Power Frequency Magnetic Field Immunity (30 A/m) • EN61000-4-11 Voltage Dips, Short Interruptions, and Voltage Variations
ETSI and EN	• EN 300386-2/EN55022 Class B • EN61000-4-2:1995 Level 4 • EN60950 • EN 41003 • EN 60825 Laser safety (Class 1) • ETS-300386-1 • ETS-300386-2: 1997 • ETS-300132-2: December 1994
Network Equipment Building Standards (NEBS)	These products have been designed to meet the following requirements: • GR-1089-CORE, Issue#3 NEBS EMC and Safety • GR-63-CORE NEBS Physical Protection • SR-3580 NEBS Criteria Levels (Level 3)

ORDERING INFORMATION

To place an order, contact your local Cisco Systems® representative or visit the ordering page on the Cisco Website. Use the ordering information in Table 6.

Table 6. Ordering Information

Product Part Number	Product Name
CHOC12/DS1-IR-SC (=)	Cisco 12000 Series 1-Port Channelized OC-12c/STM-4 (DS1/E1) ISE Line Card
4CHOC12/DS3-I-SCB	Cisco 12000 Series 4-Port Channelized OC-12/STM-4 (DS3/E3, OC-3c/STM-1c) POS/SDH ISE Line Card
CHOC48/DS3-SR-SC (=)	Cisco 12000 Series 1-Port Channelized OC-48/STM-16 (DS3/E3, OC-3c/STM-1c, OC-12c/STM-4c) POS/SDH ISE Line Card
MEM-LC-ISE-512 (=)	512-MB route memory upgrade option (two 256-MB dual in-line memory modules [DIMMs])
MEM-LC-ISE-512A=	512-MB route memory upgrade option (one 512-MB DIMM—spares orderable today)
MEM-ISE-512A-2PK=	1-GB route memory upgrade option (two 512-MB DIMMs—spares orderable today)

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FOR MORE INFORMATION

For more information about the Cisco 12000 Series Channelized line cards, contact your local Cisco representative or visit: http://www.cisco.com/go/12000.

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