DATA SHEET

CISCO 7600 SERIES 2- AND 4-PORT OC-12C/STM-4 POS/SDH ENHANCED OPTICAL SERVICES MODULE

High-Density, OC-12c/STM-4 Connectivity for Consolidated Service Provider POPs with Service Delivery over IP or MPLS Core Networks

Figure 1
4-Port OC-12c/STM-4 POS Enhanced OSM for Cisco 7600 Series Router

The rapid growth of Internet-enabled user applications has led to an increase in the bandwidth provisioned through service provider networks. To accommodate this growth, service providers are consolidating existing network architectures that deliver traditional Layer 2 WAN services, such as Frame Relay and ATM, with architectures that deliver Layer 3 WAN services, such as high-speed Internet access and Layer 3 VPNs. This network consolidation enables service providers to optimize their capital investments so that all such expenditures simultaneously benefit all network services.

Achieving network consolidation is particularly challenging at network aggregation points. The devices at these points must be able to deliver multiple Layer 2 and Layer 3 services, while providing efficient transfer of network traffic from customer access nodes to the core network and back. These aggregation devices must simultaneously provide scalable bandwidth and interface density between the access and core networks; support numerous network protocols, as well as quality-of-service (QoS), security, and accounting features; and be compatible with the existing SONET infrastructure.

Cisco® 7600 Series routers provide the performance, density, and features needed for network aggregation devices in consolidated network architectures. To provide aggregation services over an existing SONET infrastructure, Cisco 7600 Series routers can be configured to support various SONET interface cards, such as the Cisco 2- and 4-port OC-12c/STM-4 Packet over SONET (POS) enhanced optical services module (OSM). These enhanced OSMs deliver advanced IP and Multiprotocol Label Switching (MPLS) services based on the Cisco Parallel Express Forwarding (PXF) network processor. The 2-port OC-12c POS OSM includes one PXF per interface card, whereas the 4-port OC-12c POS OSM includes two PXF processors per interface card.

Enhanced OC-12/STM-4 OSM Feature Summary

The Cisco 2- and 4-port OC-12c/STM-4 POS enhanced OSMs support the capabilities listed in Table 1.

Table 1. Features and Benefits of the OC-12c/STM-4 POS Enhanced OSM

Feature	Benefits
Multiple OC-12 POS interfaces per OSM	High-density OC-12 connectivity per chassis and per rack
Software-upgradeable feature sets using the Cisco PXF network processor	Greater flexibility to support new features through software upgrades, while delivering performance similar to application-specific integrated circuit (ASIC)-based designs
Throughput of up to 5.5 Mpps per PXF IP services processor	High performance to support line-rate OC-12/STM-4 bandwidth
Four ports of Gigabit Ethernet, in addition to the OC-12 SONET ports	Simultaneous WAN and LAN access to meet diverse applications
Direct memory access (DMA) memory of 256 MB per PXF network processor	Supports a minimum of 8000 QoS queues per PXF network processor
Support for a minimum of 511 and a maximum of 1023 virtual routing and forwarding (VRF) instances per chassis for MPLS Layer 3	Outstanding service density per chassis for support of MPLS VPN services for end customers
Support for enhanced QoS features, including Class-Based Weighted Fair Queuing (CBWFQ), Low-Latency Queuing (LLQ), and Weighted Random Early Detection (WRED)	Improved delivery of service-level agreements (SLAs) to end customers
Support for Layer 2 network services, including Frame Relay and ATM, transported over MPLS network architectures	Ability to deliver both Layer 2 services, such as Frame Relay, Ethernet, and ATM, and Layer 3 services, such as Internet access and 2547 VPNs, in a consolidated network architecture

Investment Protection

The Cisco 7600 Series enables Cisco customers to take advantage of their existing investments in Cisco equipment. In addition to the enhanced OSMs, the Cisco 7600 Series can be configured with any combination of traditional Cisco Catalyst® 6000 Series LAN interfaces, and can also be configured with Cisco 7500 and 7200 Series WAN port adapters. As a result, the Cisco 7600 Series offers outstanding scalability, with WAN interfaces from DS-0 through OC-48/STM-16 and LAN interfaces from 10/100-Mbps Ethernet to Gigabit Ethernet and 10 Gigabit Ethernet.

Designed for Service Provider Environments

The Cisco 7600 Series is specifically designed to meet the high-availability requirements of service provider networks. Each Cisco 7600 Series router provides a Network Equipment Building Standards 3 (NEBS-3)-compliant chassis. Furthermore, the Cisco 7600 Series supports fully redundant route processing and forwarding configurations, with the ability to route using such core protocols as Border Gateway Protocol Version 4 (BGP4), Intermediate System-to-Intermediate System (IS-IS), and Open Shortest Path First (OSPF), as well as support for QoS and packet filtering. The Cisco 7600 Series supports a 720-Gbps switch fabric, providing high aggregate throughput, as well as high port density, enabling service providers to optimize space utilization in the central office. Table 2 shows the OC-12 port densities that can be supported with the Cisco 7600 Series.

Table 2. 2- and 4-Port OC-12c/STM-4 POS Enhanced OSM Chassis and Rack Density*

OSM	Cisco 7609 Chassis Density	Cisco 7609 Rack Density
OSM-2OC12-POS-X	14 OC-12 ports and 30 Gigabit Ethernet ports	28 OC-12 ports and 60 Gigabit Ethernet ports
OSM-4OC12-POS-X	28 OC-12 ports and 30 Gigabit Ethernet ports	56 OC-12 ports and 60 Gigabit Ethernet ports

* Based on the following configuration:

- One Cisco Supervisor Engine 720 per Cisco 7609 chassis
- Seven 2- or 4-port OC-12 POS modules per Cisco 7609 chassis
- Two Cisco 7609 chassis per 7-foot rack

Ordering Information

Table 3 lists parts and ordering information for the 2- and 4-port OSMs.

Table 3. Enhanced OSMs for 2- and 4-Port OC-12c/STM-4 POS Versions

Model Number	Description
OSM-2OC12-POS-MM+	2-port OC-12/STM-4 SONET/SDH Enhanced OSM, multimode with 4 Gigabit Ethernet (GE)
OSM-2OC12-POS-MM+=	2-port OC-12/STM-4 SONET/SDH Enhanced OSM, multimode with 4 GE (spare)
OSM-2OC12-POS-SI+	2-port OC-12/STM-4 SONET/SDH Enhanced OSM, single-mode intermediate-reach with 4 GE
OSM-2OC12-POS-SI+=	2-port OC-12/STM-4 SONET/SDH Enhanced OSM, single-mode intermediate-reach with 4 GE (spare)
OSM-4OC12-POS-SI+	4-port OC-12/STM-4 SONET/SDH Enhanced OSM, single-mode intermediate-reach with 4 GE
OSM-4OC12-POS-SI+=	4-port OC-12/STM-4 SONET/SDH Enhanced OSM, single-mode intermediate-reach with 4 GE (spare)
MEM-OSM-128M	128-MB ECC memory for OSMs
MEM-OSM-256M	256-MB ECC memory for OSMs
MEM-OSM-512M	512-MB ECC memory for OSMs

Technical Specifications

OC-12c/STM-4 POS Specifications

SONET/SDH Compliance:

Telecordia (Bellcore) GR-253-CORE (as applicable)

ITU-T G.707, G.957, G.825 (as applicable)

Support for 1+1 SONET Automatic Protection Switching (APS) as per GR253-CORE—per port, per line card, per chassis (as applicable)

Support for 1+1 SDH Multiplex Section Protection (MSP) as per G.783 Annex A—per port, per line card, per chassis (as applicable)

Encapsulations:

- IETF RFC 1661, Point-to-Point Protocol (PPP)
- IETF RFC 1973, PPP in Frame Relay
- IETF RFC 1662, PPP in High-Level Data Link Control (HDLC)-like framing
- IETF RFC 2615, PPP over SONET/SDH with 1+x43 Self-Synchronous Payload Scrambling

SONET/SDH Errors, Alarms, and Performance Monitoring:

- Signal Failure Bit Error Rate (SF-ber)
- Signal Degrade Bit Error Rate (SD-ber)
- Signal Label Payload Construction (C2)
- Path Trace Byte (J1)
- Section:
  - Loss of Signal (LOS)
  - Loss of Frame (LOF)
  - Error Counts for B1
  - Threshold Crossing Alarms (TCA) for B1
- Line:
  - Line Alarm Indication Signal (LAIS)
  - Line Remote Defect Indication (LRDI)
  - Line Remote Error Indication (LREI)
  - Error Counts for B2
  - Threshold Crossing Alarms (TCA) for B2
- Path:
  - Path Alarm Indication Signal (PAIS)
  - Path Remote Defect Indication (PRDI)
  - Path Remote Error Indication (PREI)
  - Error Counts for B3
  - Threshold Crossing Alarms (TCA) for B3
  - Loss of Pointer (LOP)
  - New Pointer Events (NEWPTR)
  - Positive Stuffing Event (PSE)
  - Negative Stuffing Event (NSE)
  - Path Unequipped Indication Signal (PUNEQ)
  - Path Payload Mismatch (PPLM) Indication Signal

SONET/SDH Synchronization:

Local (internal) timing (for inter-router connections over dark fiber or WDM equipment)

Loop (line) timing (for connection to SONET/SDH equipment)

–20 ppm clock accuracy over full operating temperature

Network Management:

Local loopback

Network loopback

NetFlow data export

RFC 1595, Performance Statistics for Timed Intervals (current, 15-minute, multiple-15-minute, and 1-day intervals)

Regenerator section

Multiplex section

Path errored seconds

Severely errored seconds

Severely errored framed seconds

Connector:

SC connector

Table 4. POS Optical Specifications

	Output Power		Input Power	Input Sensitivity	Wavelength	
Fiber Interface	**Min**	**Max**	**Max**	**Min**	**Min**	**Max**
Multimode	–9.0 dBm	–14.0 dBm	–14.0 dBm	–26.0 dBm	1270 nm	1380 nm
Single-mode Intermediate reach	–15.0 dBm	–8.0 dBm	–8.0 dBm	–28.0 dBm	1261 nm	1360 nm

Gigabit Ethernet Specifications

IEEE 802.3z-compliant

GBIC-based Gigabit Ethernet interfaces with SC connectors:

Gigabit Ethernet Optical Specifications

GBIC Distance

1000BASE-LX: 50 µm multimode fiber up to 550 m

1000BASE-LX: 9/10 µm single-mode fiber up to 5 km

1000BASE-LH: 62.5 µm multimode fiber up to 550 m

1000BASE-LH: 50 µm multimode fiber up to 550 m

1000BASE-LH: 9/10 µm single-mode fiber up to 10 km

1000BASE-ZX: 9/10 µm single-mode fiber up to 70 km

1000BASE-ZX: dispersion-shifted fiber up to 100 km

Support for IEEE 802.1Q VLAN trunking with up to 4000 simultaneous VLANs

Support for Hot Standby Router Protocol (HSRP)

Support for Jumbo frames with a maximum transmission unit (MTU) of 9192 bytes

Cisco 7600 System Features

Hardware-based Cisco Express Forwarding at 30 Mpps

ACL application at 30 Mpps

QoS classification at 30 Mpps

Policy routing at 30 Mpps

Support for 128,000 traffic accounting entries per system

Support for online insertion and removal (OIR)

Support for 200 ms of packet buffering per WAN port

Support for SNMP versions 1 and 2 and four Remote Monitoring (RMON) groups per port: statistics, history, alarms, and events

Physical Specifications of 2- or 4- port OC-12c/STM-4 POS OSM

Occupies one slot in any Cisco 7600 Series chassis

Occupies one slot in any Cisco Catalyst 6500 Series chassis

- WS-C6506—Cisco Catalyst 6506 chassis
- WS-C6509—Cisco Catalyst 6509 chassis
- WS-C6509-NEB—Cisco Catalyst 6509 chassis for NEBS environments

Two or four OC-12c/STM-4 ports supported per OSM

Four Gigabit Ethernet optical ports per OSM

Up to seven 2- or 4-port OC-12c/STM-4 optical modules supported in a 9-slot chassis

Required with either Cisco 7600 Series or Cisco Catalyst 6500 Series chassis:

Supervisor Engine 720: WS-SUP720-3BXL

Supervisor Engine 2: WS-X6K-S2-MFSC2

Recommended with either Cisco 7600 Series or Cisco Catalyst 6500 Series chassis:

Switch fabric module (only needed with Supervisor Engine 2)

256 Gbps crossbar fabric: WS-C6500-SFM

Dimensions (H x W x D): 1.2 x 14.4 x 16 in. (3.0 x 35.6 x 40.6 cm)

Weight: 11.0 lb (5 kg)

Power requirement: 141W (2-port); 201W (4-port)

Mean time between failure (MTBF): seven years for system configuration

Indicators and Interfaces

Status: green (operational)/red (faulty)/orange (module booting or running diagnostics)

Link good: green (port active)/orange (disabled)/off (not active/connected)/blinking orange (failed diagnostic and disabled)

Processors and Memory

One 262-MHz R7000 MIPS RISC processor

Configurable packet/route table memory options:

128 MB ECC SDRAM (default)

128 MB ECC SDRAM

256 MB ECC SDRAM

512 MB ECC SDRAM

Cisco PXF IP Services Processor(s):

Provides up to 5.5 Mpps of distributed IP service application per PXF IP Services Processor

Nonconfigurable PXF memory per line card:

256 MB SDRAM of route table memory per PXF IP Services Processor

128 MB SDRAM of packet buffer memory per PXF IP Services Processor (CRC Checks per Packet)

8 MB SSRAM of packet processing memory per PXF IP Services Processor

MIB Support

SONET MIB (RFC 1595)

RFC 1157 SNMP

RFC 1901 - 1907 SNMP v2c

SNMP v3 MIB

IF-MIB (RFC 1573)

CISCO-STACK-MIB

CISCO-CDP-MIB

RMON MIB (RFC 1757)

ENTITY-MIB (RFC 2037)

HC-RMON

RFC1213-MIB (MIB-II)

SMON-MIB

IP Statistics MIB

HSRP MIB

CAR MIB

WRED MIB

RSVP MIB

Cisco RTTMON MIB

Environmental Conditions

Operating temperature: 32 to 104°F (0 to 40°C)

Storage temperature: –4 to 149°F (–20 to 65°C)

Relative humidity: 5 to 90 percent, noncondensing

Operating altitude: –500 to 10,000 ft

Regulatory and Safety Compliance

UL 1950

CAN/CSA C22.2 No.950-95

EN 60825-1 Laser Safety (Class 1)

21CFR1040 Laser Safety

IEC60825-2

EN60950

IEC 60950

TS 001

AS/NZS 3260

EMC Compliance

FCC Part 15 (CFR 47) Class A

VCCI Class A

EN55022 Class A

CISPR 22 Class A

AS/NZS 3548 Class A

EN55024

CE Marking

NEBS Level 3 Compliance

The Cisco 7600 chassis has been certified as NEBS Level 3 compliant, according to the following specifications:

GR-63-CORE - NEBS: Physical Protection

GR-1089-CORE - NEBS: EMC and Safety

ETSI Compliance

ETS-300386-2 Switching Equipment

Minimum Software Version

Cisco IOS® Software Release 12.1(12)E (when used with Supervisor Engine 2)

Cisco IOS Software Release 12.2(17a)SXA (when used with Supervisor Engine 720)

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