DATA SHEET

CISCO 7600 SERIES 4- AND 8-PORT OC-3C/STM-1 POS ENHANCED OPTICAL SERVICES MODULE

High-Density, OC-3c/STM-1 Connectivity for Consolidated Service Provider POPs with Service Delivery over IP or MPLS Core Networks

Figure 1
8-Port OC-3c/STM-1 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 4-, and 8-port OC-3c STM-3 Packet-over-SONET (POS) enhanced optical services modules (OSMs). These enhanced OSMs deliver advanced IP and Multiprotocol Label Switching (MPLS) services based on the Cisco Parallel Express Forwarding (PXF) network processor.

ENHANCED OC-3/STM-1 OSM FEATURE SUMMARY

The Cisco 4-, and 8-port OC-3c/STM-1 POS enhanced OSMs support the capabilities listed in Table 1.

Table 1. Features and Benefits of the OC-3c/STM-1 POS OSM

Feature	Benefit
Multiple OC-3 POS interfaces per OSM	High-density OC-3 connectivity per chassis and per rack
Software-upgradable 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 optical interface speeds as high as OC-48
Four ports of Gigabit Ethernet, in addition to the OC-3 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. Port densities for OC-3/STM-1 that can be supported by the Cisco 7600 Series are shown in Table 2.

Table 2. 4-, and 8-Port OC-3c/STM-1 POS OSM Chassis and Rack Density*

OSM	Cisco 7609 Chassis Density	Cisco 7609 Rack Density
OSM-4OC3-POS-X	32 OC-3 ports and 34 Gigabit Ethernet ports	64 OC-3 ports and 68 Gigabit Ethernet ports
OSM-8OC3-POS-X	64 OC-3 ports and 34 Gigabit Ethernet ports	128 OC-3 ports and 68 Gigabit Ethernet ports

* Based on the following configuration:

- One Cisco Supervisor Engine 720 per Cisco 7609 chassis
- Eight 4- or 8-port OC-3 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 OSMs.

Table 3. Enhanced OSMs for 4-, and 8-Port OC-3c/STM-1 POS Versions

Model Number	Description
OSM-4OC3-POS-SI+	4-port OC-3/STM-1 SONET/SDH enhanced OSM, single-mode intermediate-reach with 4 Gigabit Ethernet (GE)
OSM-4OC3-POS-SI+=	4-port OC-3/STM-1 SONET/SDH enhanced OSM, single-mode intermediate-reach with 4 GE (spare)
OSM-8OC3-POS-SI+	8-port OC-3/STM-1 SONET/SDH enhanced OSM, single-mode intermediate-reach with 4 GE
OSM-8OC3-POS-SI+=	8-port OC-3/STM-1 SONET/SDH enhanced OSM, single-mode intermediate-reach with 4 GE (spare)
OSM-8OC3-POS-SL+	8-port OC-3/STM-1 SONET/SDH enhanced OSM, single-mode long-reach with 4 GE
OSM-8OC3-POS-SL+=	8-port OC-3/STM-1 SONET/SDH enhanced OSM, single-mode long-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-3c/STM-1 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: MT-RJ 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
Single-mode long reach	–5.0 dBm	0.0 dBm	–8.0 dBm	–28.0 dBm	1285 nm	1335 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 micron multimode fiber up to 550 m
- 1000BASE-LX: 9/10 micron single-mode fiber up to 5 km
- 1000BASE-LH: 62.5 micron multimode fiber up to 550 m
- 1000BASE-LH: 50 micron multimode fiber up to 550 m

- 1000BASE-LH: 9/10 micron single-mode fiber up to 10 km
- 1000BASE-ZX: 9/10 micron 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)
- IEEE 802.3x support for autonegotiation flow control
- Support for Jumbo frames with a maximum transmission unit (MTU) of 9192 bytes

Cisco 7600 Series System Features

- Hardware-based Cisco Express Forwarding at 30 Mpps
- Access control list (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 SNMP versions 1 and 2 and four Remote Monitoring (RMON) groups per port: statistics, history, alarms, and events

Physical Specifications of 4-, or 8-port OC-3c/STM-1 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
- Four or eight OC-3c/STM-1 ports supported per OSM
- Four Gigabit Ethernet optical ports per OSM
- Up to eight 4- or 8-port OC-3c/STM-1 OSMs supported in a 9-slot chassis
- OSMs supported in a 9-slot chassis
- Required with either Cisco 7600 Series or Cisco Catalyst 6500 Series chassis:
  - Supervisor Engine 2: WS-X6K-S2-MFSC2
  - Supervisor Engine 720: WS-SUP720-3BXL
- 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: 120W (4-port), 141W (8-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 Cisco PXF memory per line card:
  - 256 MB SDRAM of route table memory per Cisco PXF IP Services Processor
  - 256 MB SDRAM of packet buffer memory per Cisco PXF IP Services Processor (CRC Checks per Packet)
  - 8 MB SSRAM of packet processing memory per Cisco 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 Series 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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