Cisco 1-Port OC-48C/STM-16 ATM Shared Port Adapter

The Cisco® Interface Flexibility (I-Flex) design combines shared port adapters (SPAs) and SPA interface processors (SIPs), taking advantage of an extensible design that helps enable service prioritization for voice, video, and data services. Enterprise and service provider customers can take advantage of improved slot economics resulting from modular port adapters that are interchangeable across Cisco Systems® routing platforms. The Cisco I-Flex design maximizes connectivity options and offers superior service intelligence through programmable interface processors that deliver line-rate performance. Cisco I-Flex enhances speed-to-service revenue and provides a rich set of quality-of-service (QoS) features for premium service delivery while effectively reducing the overall cost of ownership. This data sheet contains the specifications for the Cisco 1-Port OC-48c/STM-16 ATM Shared Port Adapter (1-Port OC-48c ATM SPA; refer to Figure 1).

Figure 1. Cisco 1-Port OC-48c ATM SPA

Product Overview

This data sheet details the features of the new modular OC-48c/STM-16 ATM SPA for Cisco 7600 Series routers. The Cisco 1-Port OC-48c/STM-16 ATM SPA, in conjunction with other SPAs implementing various types of network technologies, allows users to flexibly build cost-effective routing solutions that focus on point-of-presence (POP) and service provider core applications targeted for all telcos and Internet service providers (ISPs), for worldwide use. This SPA includes a comprehensive ATM feature set, including per-virtual circuit and per-virtual path traffic shaping; ATM service classes, including constant bit rate (CBR), non-real time variable bit rate (VBR-nrt), real-time variable bit rate (VBR-rt), unspecified bit rate (UBR), Layer 3 QoS, a high-performance segmentation-and-reassembly (SAR) architecture, and support for a large number of ATM virtual connections. All these features are based on industry specifications and standards.

The Cisco 1-Port OC-48c/STM-16 ATM SPA along with other ATM SPAs address the growing demand for improved ATM QoS features, combined with the advanced Layer 3 class-of-service (CoS) capabilities provided by various Cisco routers. Users now can provide robust QoS mechanisms for prioritization of traffic from traditional and high-speed LANs over an ATM network.

The Cisco 1-Port OC-48c/STM-16 ATM SPA can be inserted in the Cisco 7600 platform that supports various services such as:

- IPv4, IPv6, and Multiprotocol Label Switching (MPLS) hardware-assisted forwarding
- Enhanced security features such as extended access control lists (ACLs), Unicast Return Path Forwarding (uRPF), Internet Control Message Protocol (ICMP) rate limiting, and others
- Extensive QoS implementation based on either “classical” QoS (three type-of-service [ToS] bits), Differentiated Services (DiffServ [six differentiated services code point (DSCP) bits]), or MPLS (3 bits Experimental [EXP])
- Enhanced NetFlow, statistics, and billing data to allow service providers to generate different billing profiles for their customers
- MPLS VPN support that allows for Layer 3 VPN deployments and various related applications

The Cisco 1-Port OC-48c/STM-16 ATM SPA uses replaceable Small Form-Factor Pluggable (SFP) optical modules that allow customer flexibility in using different optical interfaces on the same SPA. It is hot-swappable and supports service-transparent online insertion and removal (OIR), allowing removal of the SPA without impacting the interface processor and other SPAs.

Applications

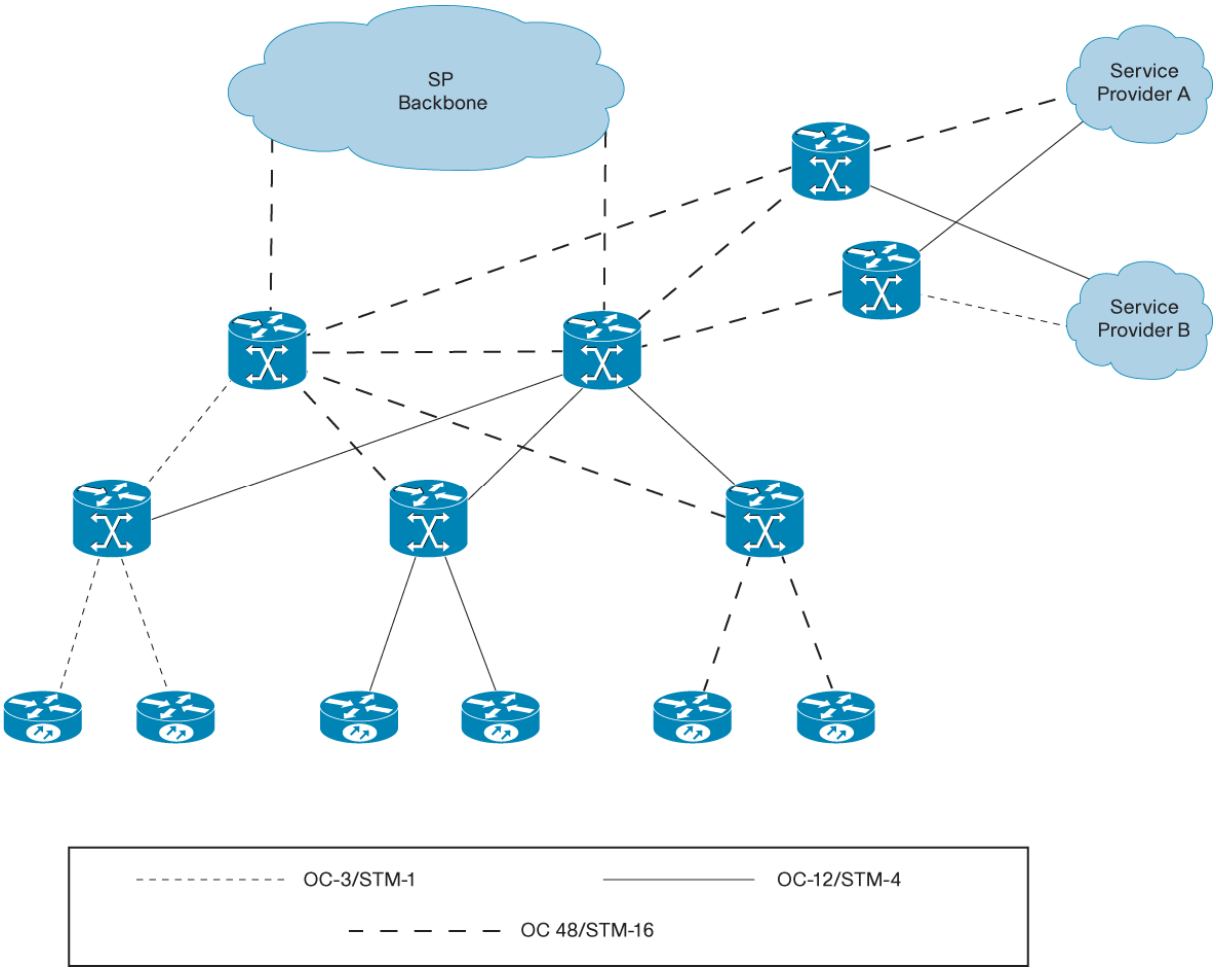
The Cisco ATM SPAs are designed for a wide range of network applications. The specific combination of ATM features and standards makes these SPAs ideal for service provider infrastructures.

Service Provider Infrastructures

The Cisco 1-Port OC-48c/STM-16 ATM SPA can be used in multiple applications, including (Figure 2):

- WAN core links
- Internet peering

Figure 2. ATM Applications



ATM deployment in service provider infrastructures has seen tremendous growth in recent years as well. This growth has been spurred for several reasons:

- ATM provides highly scalable bandwidth within SONET/SDH infrastructures.
- ATM is inherently a multiservice (data, voice, and video) technology.
- ATM is based on international standards.

The Cisco 1-Port OC-48c/STM-16 ATM SPA provides high-performance interconnectivity, metropolitan (metro), and intra-POP applications between service provider POPs for IP transport. This includes interconnecting multiservice edge to ATM core as well as ISP peering points. Through the support of ATM Forum specifications and IETF and ITU standards, the Cisco ATM SPAs can be deployed with any standards-based ATM switch, including the Cisco MGX® 8800 Series, Cisco MGX 8900 Series, Cisco BPX® 8600 Series, and Cisco IGX 8400 Series products.

The Cisco ATM SPAs in conjunction with the Cisco SIPs allow service providers to effectively manage the bandwidth at the edges and core of the network while implementing value-added Layer 3 QoS services such as Weighted Random Early Detection (WRED), policing, Low-Latency Queuing (LLQ), and Class-Based Weighted Fair Queuing (CBWFQ).

Key Features and Benefits

The ATM SPAs offer many advantages, including support for the following features:

- The Cisco ATM SPAs support per-virtual circuit and per-virtual path shaping, including industry-leading minimum 1-kbps granularity, allowing flexibility and control over every virtual circuit and virtual path configured.
- IP QoS and Layer 3 QoS features – The Cisco SIPs and ATM SPAs support per-virtual circuit IP QoS features that allow customers to apply advanced-queuing and bandwidth-management functions, including LLQ, WRED, and policing to individual virtual circuits to avoid congestion and delay. In addition, extended ACLs and distributed traffic shaping (dTS) are supported on a per-virtual circuit basis on both ingress and egress.
- IP/MPLS-to-ATM QoS mapping – Also supported is IP-to-ATM QoS matching and setting of cell loss priority (CLP) bit and virtual circuit bundling, which allows customers to divide traffic on different virtual circuits, depending on the desired CoS.

Product Specifications

Table 1 gives specifications of the Cisco 1-Port OC-48c ATM SPA.

Table 1. Product Specifications

Feature	Description
Product Compatibility	Cisco Catalyst 6500 Series Switches Cisco 7600 Series Routers
Maximum Number of SPAs per Carrier Card	7600-SIP-400: 1
Port Density per SPA	One port
Physical Interface	OC-48c/STM-16 Small Form-Factor Pluggable (SFP) optics module (refer to optical parameters that follow) Visual status indicators (LEDs): • SPA status LED • Per-port LEDs
Protocols	• IETF RFC 2684 (updated RFC 1483) support for multiple protocol encapsulations over ATM • ATM Forum User-Network Interface (UNI) 3.0, 3.1, and 4.0
Features and Functions	• CBR • VBR-nrt • VBR-rt • UBR • ATM and IP CoS • Per-virtual circuit and per-virtual path traffic shaping • Per-virtual circuit and per-virtual path statistics • F4 and F5 operation, administration, and maintenance (OAM) cell support • Integrated Local Management Interface (ILMI) 1.0 • Layer 3 QoS – Policing, Class-Based Weighted Fair Queuing (CBWFQ), WRED, and LLQ • Per-virtual circuit Layer 3 queuing • 1 + 1 automatic protection switching (APS) (K1/K2 bytes) Check the software releases for support.

Feature	Description
SONET 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 ◦ TCA for B2 • Path ◦ Path alarm indication signal (PAIS) ◦ Path remote defect indication (PRDI) ◦ Path remote error indication (PREI) ◦ Error counts for B3 ◦ 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 indication signal (PPLM)
SONET Synchronization	• Local (internal) timing (for inter-router connections over dark fiber or wavelength-division multiplexing [WDM] equipment) • Loop (line) timing (for connection to SONET/SDH equipment)
MIBs	• RFC 2558 MIB (SONET/SDH) • RFC 2515 MIB (ATM) • SONET-MIB • CISCO-SONET-MIB (rfc 2558) • ATM-MIB (RFC2515) • ATM-EXT-MIB • CISCO-AAL5-MIB • ATM-SOFT-PVC-MIB • CCBQ (CISCO-Class-Based-QOS-MIB) MIB support
Network Management	Simple Network Management Protocol (SNMP)
Reliability and Availability	• Online insertion and removal (OIR) • Field-replaceable SFP optical modules • 1 + 1 SONET APS and SDH Linear Multiplexer Section Protection (MSP) protocols • Single SPA software reset
Physical Specifications	• Weight: 1.27 lb (0.57 kg) • Height: 1.56 in. (3.96 cm) (double height) • Width: 6.75 in. (17.15 cm) • Depth: 7.28 in. (18.49 cm)
Power (without Optics)	1 port = 37.1 watts maximum
Environmental Specifications	• Operating temperature: 41 to 104°F or 5 to 40°C • Storage temperature: –38 to 150°F or –40 to 70°C • Operating humidity: 5 to 85% relative humidity • Storage humidity: 5 to 95% relative humidity

Feature	Description
Compliance and Agency Approvals	Safety • UL 60950 • CSA 22.2-No.60950 • EN60950 • IEC 60950 CB Scheme • ACA TS001 • AS/NZS 3260 • EN60825\IEC60825 laser safety (SR, IR-Class 1) (VSR-Class 1M)1 • 21CFR1040 –FDA Code of Federal Regulations (USA) laser safety (SR, IR-Class 1) (VSR-Class 1M)1 EMC • FCC Part 15 (CFR 47) • ICES 003 • EN55022 • CISPR 22 • AS/NZS CISPR • VCCI • EN55024 • EN50082-1 • EN61000-6-1 • EN61000-3-2 • EN61000-3-3 SONET/SDH • Telcordia (Bellcore GR-253 as applicable) • ITU-T G.957 as applicable • ITU-T G.958 as applicable • ANSI T1.105 as applicable Network Equipment Building System (NEBS): This product is designed to meet the following requirements (official qualification may be in progress): • SR-3580 – NEBS: criteria levels (Level 3 compliant) • GR-63-Core – NEBS: physical protection • GR-1089-Core – NEBS: EMC and safety European Telecommunications Standard Institute (ETSI): • EN300 386 • ETS 300 019 Storage Class 1.1 • ETS 300 019 Transportation Class 2.3 • ETS 300 019 Stationary Use Class 3.1

Table 2. Optical Specifications

SFP Optics	Transmit Power	Maximum Power to Receiver, dBm	Receiver Sensitivity, dBm	Power Budget, dB	Receiver Operating Wavelength	Nominal Distance Between Stations
Single-Mode Short Reach (SR)	–10 dBm minimum to –3 dBm maximum at 1310 nm	–3	–18	7	1290–1565 nm	Up to 1.2 mi (2 km)
Single-Mode Intermediate Reach (IR1)	–5 dBm minimum to 0 dBm maximum at 1310 nm	0	–18	12	1290–1565 nm	Up to 9 mi (15 km)

Ordering Information

To place an order, visit the Cisco Ordering Home Page or refer to Table 3.

Table 3. Ordering Information

Part Number	Product Name
SPA-1XOC48-ATM	Cisco 1-Port OC-48c/STM-16 ATM Shared Port Adapter
SPA-1XOC48-ATM=	Cisco 1-Port OC-48c/STM-16 ATM Shared Port Adapter, spare
SFP-OC48-SR	OC48c/STM-16 SFP, SR
SFP-OC48-IR1	OC48c/STM-16 SFP, IR1

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