Cisco 1-Port 10 Gigabit Ethernet LAN/WAN-PHY Shared Port Adapter

The Cisco® I-Flex approach combines shared port adapters (SPAs) and SPA interface processors (SIPs), providing an extensible design that facilitates service prioritization for data, voice, and video services. Enterprise and service provider customers can take advantage of improved slot economics resulting from modular port adapters that are interchangeable across Cisco 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 10-Gigabit Ethernet LAN/WAN-PHY Shared Port Adapter.

Figure 1. Cisco 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA

Product Overview

The Cisco 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA is available on high-end Cisco routing platforms, offering the benefits of network scalability with lower initial costs and ease of upgrades. The Cisco SPA/SIP portfolio continues Cisco's focus on investment protection along with consistent feature support, broad interface availability, and the latest technology. The Cisco SPA/SIP portfolio allows deployment of different interfaces (packet over SONET/SDH [POS], ATM, Ethernet, etc.) on the same interface processor.

Within a central office or data center or in a metropolitan-area network (MAN), 10-Gigabit Ethernet interfaces are commonly used to interconnect routers or other devices. The Cisco 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA supports a broad range of customer needs and applications. With this SPA, users can mix and match SPA ports with other types of interfaces in the same slot. The Cisco 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA introduces 10-Gigabit Ethernet connectivity based on IEEE 802.3ae standards for compatibility and interoperability in configurable WAN and LAN modes, with a single-height modular I/O form factor.

Applications

The Cisco 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA can be used in any combination of the following applications:

- Residential triple play
- Metro Ethernet services
- Converged residential and business services
- Internet peering
- Inter- and intra-point of presence (POP) aggregation
- WAN, SONET/SDH, dense wavelength division multiplexer (DWDM), and add/drop multiplexer (ADM) connectivity (WAN PHY mode)

Key Features and Benefits

The Cisco SPA/SIP portfolio offers many advantages, including the following:

- Modular, flexible, intelligent interface processors
  - Flexible design allows mixing and matching of interface types on the same interface processor for consistent services, independent of access technology.
  - Programmable interface processors provide flexibility for the service diversity required in next-generation networks.
  - Innovative design provides intelligent delivery of services without compromising performance.
- Increased speed-to-service revenue
  - The programmable Cisco architecture extended to 10 Gbps dramatically improves customer density, increasing potential revenue per platform and facilitating compatibility with future versions.
  - Interface breadth (copper, channelized, POS, ATM, and Ethernet) on a modular interface processor allows service providers to quickly roll out new services, facilitating consistent, secure services for all customers, large and small.
  - XFP interfaces are featured for high-port-count applications with reach flexibility. Future optical technology improvements can be adopted using existing SPAs.
- Dramatically improved return on your routing purchase
  - Improved slot economics and increased density reduce capital expenditures (CapEx).
  - The ability to easily add new interfaces as they are needed facilitates a "pay-as-you-grow" business model while still offering a high-density solution.
  - SPAs are shared across multiple platforms and can be easily moved from one to another, providing consistent feature support, accelerated product delivery, and a significant reduction in operating expenses (OpEx) through common sparing as service needs change.

Product Specifications

Tables 1 and 2 provide specifications of the Cisco 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA.

Table 1.   Product Specifications

Feature	Description
Product compatibility	• Cisco 12000 Series Routers • Cisco ASR 1000 Series Router • Cisco CRS Carrier Routing System
Port density per SPA	One 10-Gigabit Ethernet (GE) port
Physical interface	10-Gbps XFP optics
Physical connectivity	LAN, SONET,* SDH,* DWDM * Refer to Tables 3 and 4 for details
LED indicators	SPA status: Bicolor green and amber LEDs encode the SPA status as follows: • LED off: SPA is powered off • LED amber: SPA is powered on and initializing • LED green: SPA is powered on and operational In addition to the status LED, the SPA also has a bicolor LED dedicated to each port to indicate port status. The green and amber LEDs encode the port status as follows: • LED off: Port is not activated by software • LED amber: Port is activated by software, but there is a problem with the Ethernet link • LED green: Port is activated by software, and there is a valid Ethernet link
Features and functions	• 10 GE configurable LAN/WAN-PHY • SONET/SDH rate compatibility (detailed comparisons and feature summaries in Tables 3 and 4) • Full-duplex operation • 802.1Q VLAN termination • 802.1ad QinQ termination (stacked VLAN processing) • Jumbo frames support (9188 bytes) • Support for command-line interface (CLI)-controlled online insertion and removal (OIR) • 802.3x flow control • Bridge protocol data unit (BPDU), Cisco Discovery Protocol, and VLAN Trunking Protocol (VTP) filtering • Layer 2 Protocol (BPDU, Cisco Discovery Protocol, and VTP) tunneling • Layer 2 access list (MAC address-based filtering) • Up to 8000 VLANs per SPA and subject to a limit of 4000 VLANs per port for 802.1q • Up to 5000 MAC accounting entries per SPA (source MAC accounting on the ingress, and destination MAC accounting on the egress) • Up to 2000 MAC address entries for destination MAC address filtering per SPA, and up to 1000 MAC address filtering entries per port • Per-port byte and packet counters for policy drops; oversubscription drops; cyclic-redundancy-check (CRC) error drops; packet sizes; and unicast, multicast, and broadcast packets • Per-VLAN byte and packet counters for policy drops; oversubscription drops; and unicast, multicast, and broadcast packets • Per-port byte counters for good bytes and dropped bytes Other software features supported: • Ethernet over Multiprotocol Label Switching (EoMPLS) • QoS • Hot Standby Router Protocol (HSRP) • Virtual Router Redundancy Protocol (VRRP)
Reliability and availability	OIR of the SPA within the SIP and the optics within the SPA

Feature	Description
Network management	Network management: • Field-replaceable XFP modules • Host-system CLI • Simple Network Management Protocol (SNMP) Inventory- and asset management-related MIBs: • Entity-MIB (RFC 2737) • Cisco-entity-asset-MIB Fault management: • Cisco-entity-field-replaceable unit (FRU)-control-MIB • Cisco-entity-alarm-MIB • Cisco-entity-sensor-MIB Physical interface management: • IF-MIB • Ether like-MIB (RFC 2665) Other MIBs: • Remote Monitoring (RMON)-MIB (RFC 1757) • Cisco-class-based-QoS-MIB • MPLS-related MIBs • Ethernet MIB/RMON
Physical specifications	• Weight: 0.75 lb (0.34 kg) • Height: 0.8 in. (2.03 cm) (single height) • Width: 6.75 in. (17.15 cm) • Depth: 7.28 in. (18.49 cm)
Power	20 W
Environmental specifications	• Storage temperature: –38 to 150°F (–40 to 70°C) • Operating temperature, nominal: 32 to 104°F (0 to 40°C) • Operating temperature, short term: 32 to 131°F (0 to 55°C) • Storage relative humidity: 5 to 95% relative humidity • Operating humidity, nominal: 5 to 85% relative humidity • Operating humidity, short term: 5 to 90% relative humidity • Operating altitude: –60 to 4000 meters

Feature	Description
Compliance and agency approvals	**Safety** • UL 60950-1 • CSA C22 No. 60950-1 • EN 60950-1 • IEC 60950-1 • AS/NZS 60950 • EN 60825-1 • EN 60825-2 • 21 CRF 1040 **EMC** • CFR 47, FCC Part 15-Class A • ICES 003-Class A • CISPR 22 Class A • EN 55022 Class A • EN 300386 Class A • AS/NZS Class A • VCCI-Class B • EN 50082-1 • EN 55024 • IEC/EN61000-4-2 Electrostatic Discharge Immunity (8-kV contact, 15-kV air) • IEC/EN61000-4-3 Radiated Immunity (10 V/m) • IEC/EN61000-4-4 Electrical Fast Transient Immunity (2-kV power, 1-kV signal) • IEC/EN61000-4-5 Surge AC Port (4-kV CM, 2-kV DM) • IEC/EN61000-4-5 Surge Signal Port (1-kV indoor, 2-kV outdoor) • IEC/EN61000-4-5 Surge DC Port (1 kV) • IEC/EN61000-4-6 Immunity to Conducted Disturbances (10 Vrms) • IEC/EN61000-4-8 Power Frequency Magnetic Field Immunity (30 A/m) • IEC/EN61000-4-11 Voltage Dips, Short Interruptions, and Voltage Variations **Telecom** • IEEE 802.3ae (10 Gigabit Ethernet interface SPA) **Industry Standards** The Cisco 1-Port 10-GE LAN/WAN-PHY SPA is designed to meet the following requirements (some qualifications are currently in progress): • SR-3580-Network Equipment Building Standards (NEBS): Criteria levels (Level 3 compliant) • GR-63-CORE-NEBS: Physical protection • GR-1089-CORE-NEBS EMC and safety

Table 2.   Optical Specifications: Modular

Gigabit Ethernet XFP Optics	Maximum Distance
10 GE long-reach (LR) optics (single-mode fiber)	6.2 miles (10 km)
10 GE extended-reach (ER) optics (single-mode fiber)	25 miles (40 km)
10 GE long-haul (ZR) optics (single-mode fiber)	50 miles (80 km)

Table 3.   SONET/SDH Feature Support on 10 Gigabit Ethernet WAN Interface

SONET/SDH Features and Functions	Ethernet WAN Interface	Comments
Jitter Compliance	Not supported	Ethernet WAN interface cannot be used in SONET/SDH rings
Synchronization (Loop Timing Mode, High Accuracy PRS)	Not supported	Ethernet WAN interface cannot be used in SONET/SDH rings
Automatic Protection Switching	Not supported	Equivalent link redundancy functionality in Ethernet is 802.1ad link (LAG)
Section and Line DCC (Data Channel Communication)	Not supported	These user communication channels cannot be used in Ethernet
Section, Line, Path Order wire (64 kbps channel)	Not supported	
Section, Line, Path Growth	Not supported	

SONET/SDH Features and Functions	Ethernet WAN Interface	Comments
Virtual Tributary (VT)	Not supported	Only single Ethernet channel is supported (VLANs are supported)
Framing	Supported	
Section, Line, and Path BIP8	Supported	Errors are detected and counted
Section and Path Trace	Supported	16-byte messages (16 hardware registers to send and receive trace messages); automatic trace mismatch is not supported
Pointer operation/action	Supported	H1, H2 are used to get the location of SPE
Defects or anomalies – Unequipped payload (UNEQ-P), Path trace identifier mismatch (TIM-P), all Virtual tributary (VT) -related defects or anomalies	Not supported	
Defects or anomalies – LOS, SEF, LOF, S-BIP, L-BIP, AIS-L, RDI-L, AIS-P, LOP-P, P-BIP, PLM-P	Supported	Counters for section, line, and path BIP errors

Table 4.   Feature and Application Comparison Between 10 Gigabit Ethernet Interfaces

Feature/Application	10 GE LAN Mode	10 GE WAN Mode	SONET/SDH
Maximum data rate	10 Gbps	9.2946 Gbps	9.584646 Gbps
Fault Detection and Diagnostics			
Link availability	Link detect (up/down)	Loss of signal, signal fail	Loss of signal, signal fail
Link quality or faulty TX/RX	Encoding error, runt, jabber, CRC	Both GE LAN and SONET capabilities	B1, B2, B3, far end block error (FEBE)/remote error indication (REI)
Remote alarm/defect	Remote fault/ local fault and keep alive	Remote fault/local fault and alarm indication signal (AIS), remote defect indication (RDI)	AIS, RDI
Summary (fault detection and diagnostics)	10 GE WAN has same or more diagnostics capability as SONET; 10 GE LAN has less diagnostics capabilities		
Fault protection/ redundancy	Done by link aggregation (802.1 ad)	Done by link aggregation (802.1 ad)	Automatic protections switching (APS) (linear)
Channel multiplexing (multiple low-speed channels)	Via VLAN best effort traffic (requires policer, shaper for QoS)	Via VLAN best effort traffic (requires policer, shaper for QoS)	TDM multiplexing with guaranteed bandwidth
Applications			
Back-to-back connection over dark fiber	Yes	Yes	Yes
DWDM with SONET interface	No	Yes (may get relatively higher pointer adjustments)	Yes
DWDM with 10 GE LAN interface	Yes	No	No
Direct connection to ADM	No	Yes – conditional (could have relatively higher pointer adjustment, network management software should be able to handle these)	Yes

Ordering Information

To place an order, visit the Cisco Ordering Home Page or refer to Table 5.

Table 5.   Ordering Information

Product Name	Part Number
Cisco 1-Port 10-Gigabit Ethernet LAN/WAN PHY Shared Port Adapter	SPA-1X10GE-WL-V2
Cisco 1-Port 10-Gigabit Ethernet LAN/WAN PHY Shared Port Adapter, spare	SPA-1X10GE-WL-V2=
Cisco SPA Blank Cover	SPA-BLANK
Cisco SPA Blank Cover, spare	SPA-BLANK=
Cisco 10 Gigabit Ethernet LR (10 km) Optics	XFP-10GLR-OC192SR
Cisco 10 Gigabit Ethernet LR (10 km) Optics, spare	XFP-10GLR-OC192SR=
Cisco 10 Gigabit Ethernet ER (40 km) Optics	XFP-10GER-OC192IR
Cisco 10 Gigabit Ethernet ER (40 km) Optics, spare	XFP-10GER-OC192IR=
Cisco 10 Gigabit Ethernet ZR (80 km) Optics	XFP-10GZR-OC192LR
Cisco 10 Gigabit Ethernet ZR (80 km) Optics, spare	XFP-10GZR-OC192LR=
Cisco 10 Gigabit BASE-SR XFP Module	XFP-10G-MM-SR

Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco services, refer to Cisco Technical Support Services.

For More Information

For more information about the Cisco SPA/SIP portfolio, visit http://www.cisco.com/go/spa or contact your local Cisco account representative.

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