**CISCO SYSTEMS**

CISCO XR 12000 AND 12000 SERIES SPA INTERFACE PROCESSOR-600

The Cisco® I-Flex design combines shared port adapters (SPAs) and SPA interface processors (SIPs), leveraging an extensible design that enables 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 routing platforms. The I-Flex design maximizes connectivity options and offers superior service intelligence through programmable interface processors that deliver line-rate performance. I-Flex enhances speed-to-service revenue and provides a rich set of QoS features for premium service delivery while effectively reducing the overall cost of ownership. This data sheet contains the specifications for the Cisco XR 12000 and 12000 Series SPA Interface Processor-600 (Cisco XR 12000/12000 SIP-600; refer to Figure 1).

Figure 1. Cisco XR 12000/12000 Series SIP-600 with Gigabit Ethernet SPAs
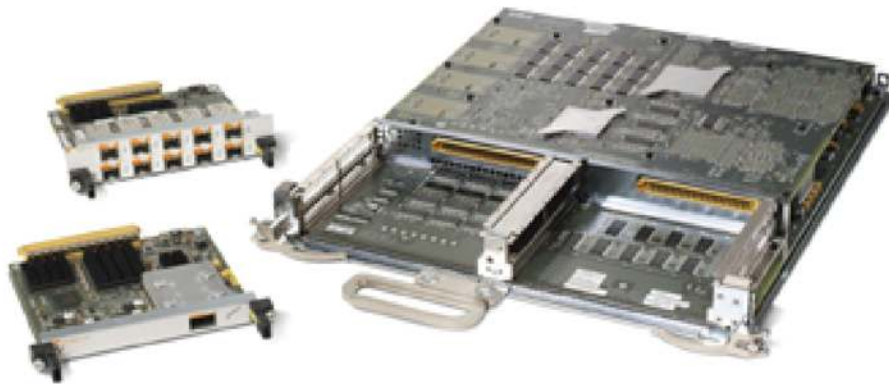
PRODUCT OVERVIEW

The Cisco XR 12000/12000 SIP-600 is a modular high-speed 10-Gbps SIP based on IP Services Engine (ISE) technology. The Cisco XR 12000/12000 SIP-600 hosts the common SPAs used for interconnecting routers with each other or with other networking devices such as Web servers, storage devices, and ATM or Ethernet switches. The Cisco XR 12000/12000 SIP-600 enhances and scales all functions and services previously available on the 2.5-Gbps ISE line card. Examples of these enhancements include line-rate IPv6 at 10 Gbps, scalable multicast and native multicast quality of service (QoS), and thousands of user interfaces, each dynamically associated with one or multiple class-of-service (CoS) queues.

The Cisco XR 12000/12000 SIP-600 provides:

- **A common 10-Gpbs forwarding and queuing engine** responsible for packet classification, forwarding, queuing, and accounting without compromising the performance. The Cisco XR 12000/12000 SIP-600 has two forwarding engines, one for ingress and one for egress. This allows the user to implement different features and QoS policies at the incoming traffic independently from the features and the QoS policies applied at the egress interfaces. The multicast replication is done by the egress forwarding engine, hence a very scalable multicast with built-in QoS.
- **A modular physical layer interface module (PLIM) front end** that hosts up to two SPAs. Each SPA has a dedicated 10 Gbps to the SPA controller. A fair bandwidth allocation algorithm shares available and excess bandwidth between the SPAs (the oversubscribed SPA does not

cause any packet drop on the nonoversubscribed SPA, and any unused bandwidth from one SPA is used by the other SPA).
The Cisco XR 12000/12000 SIP-600 supports any combination of the following pluggable SPAs and Layer 2 encapsulations: concatenated OC-192 and OC-48; Gigabit Ethernet and 10 Gigabit Ethernet interfaces; Point-to-Point Protocol (PPP), High-Level Data Link Control (HDLC), and Frame Relay; Dynamic Packet Transport (DPT), Resilient Packet Ring (RPR), and 802.17; and VLANs.

- **A SPA controller** that is responsible for adapting the user traffic flowing between the SPA interfaces and the Layer 3 forwarding engine. The SPA controller can handle up 256 physical ports, and has enough buffers to absorb up to 6 msec of 20-Gbps traffic burst without packet drops. The SPA controller has two levels of priority queuing with Deficit Round Robin (DRR) and strict priority servicing. The strict priority is designed to protect higher-priority traffic by first dropping lower-priority packets in an oversubscribed configuration (persistent incoming traffic rate of 20 Gbps).

KEY FEATURES AND BENEFITS

The Cisco XR 12000/12000 SIP-600 offers the following key features for service providers who are implementing new value-added services from their network infrastructures:

- Dynamic allocation of 4096 input-shaped queues to any interface (or subinterface), Frame Relay connection, or VLAN
- Ingress queuing: 2048 unicast Modified DRR (MDRR) queues, 16 high-priority queues, 8 multicast queues, and 2 fabric priority queues
- Egress queuing: 8192 MDRR queues dynamically shared across 4096 interfaces; hierarchical shaping (interface, queue)
- High number of IPv4, IPv6, Multiprotocol Label Switching (MPLS), and MPLS VPN unicast and multicast routes: up to 1M IPv4/MPLS or 512,000 IPv6 route entries
- Per-VLAN/source-destination MAC address filtering, trunking, accounting, QoS, match VLAN QoS, Hot Standby Router Protocol (HSRP)/Virtual Router Redundancy Protocol (VRRP) hierarchical rate limiting and policing, dynamic queuing, and traffic shaping
- Input and output full NetFlow Version 8 in hardware
- Input and output Sampled NetFlow, Versions 5, 8, and 9 in hardware
- Building Integrated Timing Supply (BITS)
- Online insertion and removal (OIR) of SPAs; OIR of one SPA does not affect the traffic on other SPA interfaces
- Multirouter automatic protection switching (MR-APS)
- Layer 3 VPNs over MPLS (RFC2547) and over IP (MPLS-VPNs over IP)
- Layer 2 VPNs over MPLS (Any Transport over MPLS [AToM]) and over IP Layer 2 Tunneling Protocol Version 3 (L2TPv3)

PRODUCT SPECIFICATIONS

Table 1 gives product specifications of the Cisco XR 12000/12000 SIP-600.

Table 1.   Product Specifications

Feature	Description
Chassis Compatibility	Cisco XR 12000 and 12000 Series
Software Compatibility	Cisco IOS® Software Release 12.0(31)S or later
Supported SPAs	Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter (2 ports per slot) Cisco 1-Port 10-Gigabit Ethernet Shared Port Adapter (2 ports per slot) Cisco 5- or 10-Port Gigabit Ethernet Shared Port Adapter (maximum 20 ports per slot)
Port Density	Two single height SPAs; two double height SPAs; or a combination
Memory	Route memory: 1G Packet memory: 256 MB in; 256 MB out

Feature	Description
Network Management	Cisco IOS Software Command-Line Interface (CLI) Simple Network Management Protocol (SNMP)
Physical Dimensions	Occupies one line card slot • Weight: 12.2 pounds (5.534 kg) without any SPAs, 15.2 pounds (6.895) with 2-SPA configuration • Height: 1.8 in. (4.572 cm) • Depth: 20.625 in. (52.388 cm) • Width: 16 in. (40.64 cm)
Power	240W with 2-SPA configuration
Environmental Conditions	Storage temperature: –40 to 70℃ (–40 to 158℉) Operating temperature: • Normal: 5 to 40℃ (41 to 104℉) • Short term: –5 to 50℃ (23 to 122℉) short term Relative humidity: • Normal: 5 to 85% • Short-term: 5 to 90% but not to exceed 0.024 kg of water per kg of dry air
Safety Standards	UL/CSA/IEC/EN 60950-1 AS/NZS 60950
EMI	FCC Class A ICES 003 Class A AS/NZS 3548 Class A CISPR 22 (EN55022) Class A VCCI Class A
Immunity (Basic Standards)	IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8-kV Contact, 15-kV Air) IEC/EN-61000-4-3: Radiated Immunity (10 V/m)
ETSI and EN	EN300 386: Telecommunications Network Equipment (EMC) EN55022: Information Technology Equipment (Emissions) EN55024: Information Technology Equipment (Immunity) EN50082-1/EN-61000-6-1: Generic Immunity Standard
Network Equipment Building System (NEBS)	This product is designed to meet the following requirements (qualification in progress): • SR-3580: NEBS Criteria Levels (Level 3) • GR-1089-CORE: NEBS EMC and Safety • GR-63-CORE: NEBS Physical Protection

ORDERING INFORMATION

To place an order, visit Cisco Ordering Home Page or refer to Table 2.

Table 2. Ordering Information

Product Name	Product Part Number
Cisco XR 12000/12000 Series SPA Interface Processor-600	12000-SIP-600
Cisco XR 12000/12000 Series SPA Interface Processor-600, spare	12000-SIP-600=

Bezel extenders are required on the installed base of Cisco 12000 10-slot and 16-slot chassis to allow installation of front covers when the SIP-600 SIPs are inserted in these chassis. Bezel extender kits are available for the 10-slot chassis (part number ACS-10-BZLX2=) and for the 16-slot chassis (part number ACS-16-BZLX2=).

COMPATIBILITY MATRIX

Table 3 provides a compatibility matrix for the Cisco XR 12000 and 12000 Series SIP 600.

Table 3. Supported SPAs

SPA Part Number	SIP 600
SPA-8XCHT1/E1	N/S
SPA-2XT3/E3	N/S
SPA-4XT3/E3	N/S
SPA-2XCT3/DS0	N/S
SPA-4XCT3/DS0	N/S
SPA-1XCHSTM1/OC3	N/S
SPA-4XOC3-POS-V2	N/S
SPA-8XOC3-POS	N/S
SPA-2XOC12-POS	N/S
SPA-4XOC12-POS	N/S
SPA-8XOC12-POS	N/S
SPA-2XOC48POS/RPR	X
SPA-OC192POS-VSR	X
SPA-OC192POS-LR	X
SPA-OC192POS-XFP	X
SPA-8XFE-TX	N/S
SPA-2x1GE	N/S
SPA-5X1GE	X
SPA-10X1GE	X
SPA-1XTENGE-XFP	X
SPA-5X1GE-V2	X
SPA-10X1GE-V2	X
SPA-1X10GE-L-V2	X

SPA-IPSEC-2G	N/S

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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 or Cisco Advanced Services.

FOR MORE INFORMATION

For more information about Cisco XR 12000 and 12000 Series Routers, visit http://www.cisco.com/go/XR12000.

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

CISCO SYSTEMS

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
    800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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