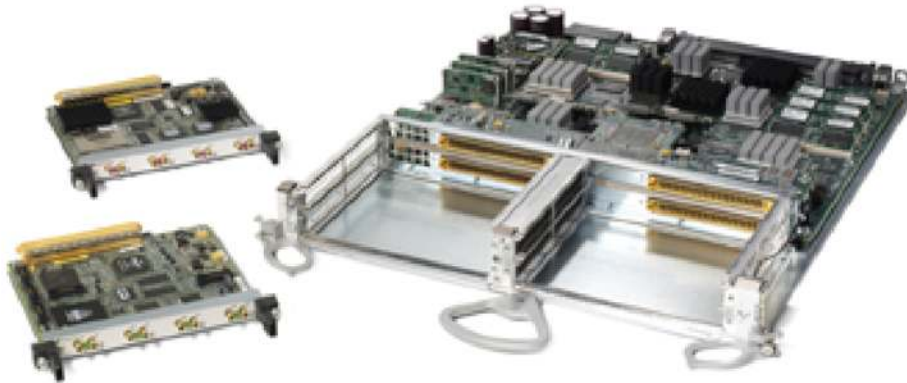


## CISCO 12000 SERIES SPA INTERFACE PROCESSOR-400

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 12000 Series SPA Interface Processor-400 (Cisco 12000 SIP-400; refer to Figure 1).

Figure 1. Cisco 12000 SIP-400 with SPAs



### PRODUCT OVERVIEW

The Cisco 12000 SIP-400 is a 2.5-Gbps IP Services Engine (ISE)-based SIP that hosts SPAs used for applications that require a high level of performance, scalable physical and logical connections, and high-touch QoS and security features. It enhances and scales functions and benefits previously available on the 2.5-Gbps ISE line card, allowing carriers to offer services such as voice over IP (VoIP), Multiprotocol Label Switching (MPLS) VPN, Internet access, and low-speed leased-line aggregation (DS-3, E3, Channelized T3 [CT3], n x T1, and n x DS-0).

The Cisco 12000 SIP-400 offers:

- **A common 2.5-Gbps forwarding and queuing engine** responsible for packet classification, forwarding, queuing, and accounting without compromising the performance. The forwarding engine, based on the Cisco 12000 Series ISE technology, features a unique, edge-optimized, programmable adaptive network processor that combines the hardware performance of application-specific integrated circuits (ASICs) with the flexibility of software.

- **A modular physical layer interface module (PLIM) front end** that hosts up to 4 SPAs. Each SPA has a dedicated 2.5-Gbps interface to the SPA controller. The Cisco 12000 SIP-400 supports any combination of the following pluggable SPAs and Layer 2 encapsulations: T3; E3; CT3; Point-to-Point Protocol (PPP), High-Level Data Link Control (HDLC), and Frame Relay; Multilink PPP (MLPPP); and Multilink Frame Relay (MLFR).
- **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 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.

## FEATURES AND BENEFITS

The Cisco 12000 SIP-400 offers the following primary features for service providers who are implementing new value-added services from their network infrastructures:

- **QoS**
  - **Traffic shaping** offers additional value to service providers that want to build tiered service models. With traffic shaping, the Cisco 12000 SIP-400 can absorb bursty traffic in both the ingress and egress directions. This allows service providers to present smooth flows to both internal network resources and customer networks. The Cisco 12000 SIP-400 supports up to 2048 input-shaped queues and up to 1024 output-shaped queues dynamically allocated to any interface (or subinterface). Traffic can be shaped down to 64 kbps.
  - **Traffic rate-limiting and marking** using committed access rate (CAR) or Modular QoS CLI (MQC) allows service providers to control access to internal network resources. This can be used to protect against denial-of-service (DoS) attacks, or as a mechanism to deliver tiered services, offering customers a “pay-as-you-grow” model.
  - **Traffic prioritization** through Modified DRR (MDRR) with low-latency queuing (LLQ) offers class-based packet queuing that controls the packet dequeuing process to assure transit latency for differentiated flows. The Cisco 12000 SIP-400 supports 2048 unicast MDRR queues, 16 high-priority queues, and 1 multicast queue in the ingress direction; and up to 4096 MDRR queues dynamically shared across 1024 interfaces in the egress direction.
  - **Congestion control** through Weighted Random Early Detection (WRED) and query management allows selective discard of low-priority flows before dropping packets from higher-priority flows.
- **Provider edge**
  - Comprehensive MPLS capabilities support the development of service-optimized networks and can accelerate migration from circuit-based networks to packet-based networks, creating new market opportunities for service providers. These include Layer 2 VPNs over MPLS (Any Transport over MPLS [AToM]) and over IP (Layer 2 Tunneling Protocol Version 3 [L2TPv3]); Layer 3 VPNS over MPLS and over IP Multicast VPNs; MLPPP, MLFR, link fragmentation and interleaving (LFI) over Frame Relay; IPv6 Unicast and Multicast; and 6PE.
- **Security**
  - Access control lists (ACLs) and Unicast Reverse Path Forwarding (URPF) provide security and access control by checking or filtering unwanted packets on specific interfaces. With ACLs, filtering can be done on source or destination IP addresses, on transport protocols, or at input or output interfaces.
- **Accounting**
  - Service providers can take advantage of the ISE accounting tools to provide data for end-customer billing, or to monitor network usage. The accounting tools available on the Cisco 12000 SIP-400 include input and output full NetFlow v8 in hardware; input and output sampled NetFlow v5, v8, and v9 in hardware; Border Gateway Protocol (BGP) policy accounting; and per-interface, -protocol, or -class-of-service accounting.
- **High availability**
  - Online insertion and removal (OIR) of one SPA does not affect the traffic on other SPA interfaces. The Cisco 12000 SIP-400 also supports Layer 3 nonstop forwarding (NSF) and stateful switchover (SSO).

## PRODUCT SPECIFICATIONS

Table 1 gives the specifications of the Cisco 12000 SIP-400.

**Table 1.** Product Specifications

Feature	Description
<b>Chassis Compatibility</b>	Cisco 12000 Series
<b>Software Compatibility</b>	Cisco IOS® Software Release 12.0(31)S
<b>Supported SPAs</b>	Cisco 2-Port Clear Channel T3/E3 Shared Port Adapter Cisco 4-Port Clear Channel T3/E3 Shared Port Adapter Cisco 2-Port Channelized T3 (DS0) Shared Port Adapter Cisco 4-Port Channelized T3 (DS0) Shared Port Adapter
<b>Port Density</b>	Up to four single-height SPAs per SIP
<b>Memory</b>	Route memory: 512 MB Packet memory 512 MB
<b>Reliability and Availability</b>	OIR without affecting system traffic
<b>Network Management</b>	Cisco IOS Software Command-Line Interface (CLI) Simple Network Management Protocol (SNMP)
<b>Physical Dimensions</b>	Occupies one line-card slot <ul style="list-style-type: none"><li>• Weight: 8.4 lb (3800g) without any SPAs 11.9 lb (5400g) with four SPAs</li><li>• Height: 1.85 in. (4.70 cm)</li><li>• Depth: 20.67 in. (52.50 cm)</li><li>• Width: 15.83 in. (40.20 cm)</li></ul>
<b>Power</b>	200W with four SPAs
<b>Environmental Conditions</b>	Storage temperature: –40 to 70°C (–40 to 158°F) Operating temperature: <ul style="list-style-type: none"><li>• Normal: 5 to 40°C (41 to 104°F)</li><li>• Short term: –5 to 50°C (23 to 122°F) short term</li></ul> Relative humidity: <ul style="list-style-type: none"><li>• Normal: 5 to 85%</li><li>• Short-term: 5 to 90% but not to exceed 0.024 kg water/kg of dry air</li></ul>
<b>Safety Standards</b>	UL/CSA/IEC/EN 60950-1 AS/NZS 60950
<b>EMI</b>	FCC Class A ICES 003 Class A AS/NZS 3548 Class A CISPR 22 (EN55022) Class A VCCI Class A

Feature	Description
<b>Immunity (Basic Standards)</b>	IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8 kV Contact, 15 kV Air) IEC/EN-61000-4-3: Radiated Immunity (10V/m)
<b>ETSI and EN</b>	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
<b>Network Equipment Building System (NEBS)</b>	This product is designed to meet the following requirements (qualification in progress): <ul style="list-style-type: none"> <li>• SR-3580: NEBS Criteria Levels (Level 3)</li> <li>• GR-1089-CORE: NEBS EMC and Safety</li> <li>• GR-63-CORE: NEBS Physical Protection</li> </ul>

## 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 12000 Series SPA Interface Processor-400	12000-SIP-400
Cisco 12000 Series SPA Interface Processor-400, spare	12000-SIP-400=

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## FOR MORE INFORMATION

For more information about Cisco 12000 Series Routers, visit <http://www.cisco.com/go/12000>.

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



**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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