SIP and SPA Product Overview

This chapter provides an introduction to SPA interface processors (SIPs)and shared port adapters (SPAs). It includes the following sections:

For more hardware details for the specific SIPs and SPAs that are supported on the Cisco ASR 1000 Series Routers, refer to the companion publication, Cisco Aggregation Services Router 1000 Series SIP and SPA Hardware Installation Guide.

- Introduction to SIPs and SPAs, on page 1
- SIP and SPA Compatibility, on page 3
- Modular Optics Compatibility, on page 5

Introduction to SIPs and SPAs

Cisco Aggregation Services Router 1000 Series SIPs and SPAs are a carrier card and port adapter architecture that increases modularity, flexibility, and density across Cisco routers for network connectivity. This section describes the SIPs and SPAs and provides some guidelines for their use.

SPA Interface Processors

The following list describes some of the general characteristics of a SIP:

- A SIP is a carrier card that inserts into a router slot like a line card. It provides no network connectivity on its own.
- A SIP contains one or more subslots, which are used to house one or more SPAs. The SPA provides interface ports for network connectivity.
- During normal operation, the SIP should reside in the router fully populated either with functional SPAs in all subslots, or with a blank filler plate (SPA-BLANK=) inserted in all empty subslots.
- SIPs support online insertion and removal (OIR) with SPAs inserted in their subslots. SPAs also support OIR and can be inserted or removed independently from the SIP.

Note   Fully populate all slots and subslots with blank filler plates or functional SPAs for maximum efficiency of the cooling system.

Shared Port Adapters

The following list describes some of the general characteristics of a SPA:

- A SPA is a modular type of port adapter that inserts into a subslot of a compatible SIP carrier card to provide network connectivity and increased interface port density. A SIP can hold one or more SPAs, depending on the SIP type.

- Some SPAs provide services rather than network connectivity, and can be inserted into the subslots of a compatible SIP, for example, the Cisco WebEx Node for ASR 1000 Series that provides WebEx meeting services, and the DSP SPA that provides voice transcoding and transrating capabilities.

- SPAs are available in the following sizes, as shown in the following figures:

  - Single-height SPA—Inserts into one SIP subslot.

  - Double-height SPA—Inserts into two single, vertically aligned SIP subslots.

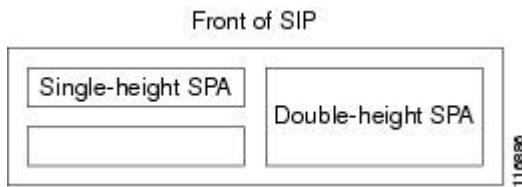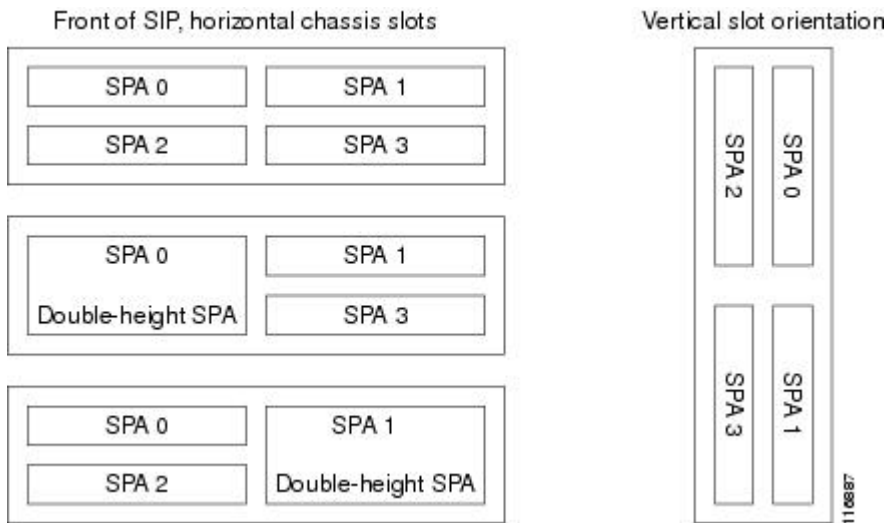*Figure 1: Single-Height and Double-Height SPA Sizes*

Front of SIP

Single-height SPA

Double-height SPA

Figure 2: Horizontal and Vertical Chassis Slot Orientation for SPAs

Front of SIP, horizontal chassis slots

| SPA 0 | SPA 1 |
| SPA 2 | SPA 3 |

| SPA 0 | SPA 1 |
| Double-height SPA | SPA 3 |

| SPA 0 | SPA 1 |
| SPA 2 | Double-height SPA |

Vertical slot orientation

SPA 2 SPA 0

SPA 3 SPA 1

> ⚠ **Caution**   SIP subslot 0 is not available on the Cisco ASR 1002 Router as that is the slot occupied by the integrated Route Processor with native Gigabit Ethernet ports.

- Each SPA provides a certain number of connectors, or ports, that are the interfaces to one or more networks. These interfaces can be individually configured using the Cisco IOS command-line interface (CLI).

- Either a blank filler plate or a functional SPA should reside in every subslot of a SIP during normal operation to maintain cooling integrity. Blank filler plates are available in single-height form only.

- SPAs support online insertion and removal (OIR). They can be inserted or removed independently from the SIP. SIPs also support OIR with SPAs inserted in their subslots.

SIP and SPA Compatibility

The following tables explain SIP and SPA compatibility by SPA technology area on the Cisco ASR 1000 Series Routers.

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Note For more information about the support for different SIPs and SPAs, refer to the "Release History" section in the *Overview of the SIP* chapter.

Table 1: SIP and SPA Compatibility for Ethernet SPAs

SPA	Product ID	SIP Supported: Cisco ASR1000-SIP40
4-Port and 8-Port Fast Ethernet SPA	SPA-4X1FE-TX-V2 SPA-8X1FE-TX-V2	Yes
1-Port 10-Gigabit Ethernet SPA	SPA-1X10GE-L-V2	Yes
1-Port 10-Gigabit Ethernet LAN/WAN PHY SPA	SPA-1X10GE-WL-V2	Yes
2-Port Gigabit Ethernet SPA	SPA-2X1GE-V2	Yes
5-Port Gigabit Ethernet SPA	SPA-5X1GE-	Yes
10-Port Gigabit Ethernet SPA[1]	SPA-10X1GE-V2	Yes
2-Port Gigabit Synchronous Ethernet SPA	SPA-2X1GE-SYNCE	Yes

[1] The 10-Port Gigabit Ethernet SPA is a double-height SPA. The 10-Port Gigabit Ethernet SPA is not supported on Cisco ASR 1001 or Cisco ASR 1002-F Routers.

Table 2: SIP and SPA Compatibility for Packet over SONET SPAs

SPA	Product ID	SIP Supported: Cisco ASR1000-SIP40
1-Port OC-12c/STM-4 POS SPA	SPA-1XOC12-POS	Yes
2-Port, 4-Port, and 8-Port OC-3c/STM-1 and OC-12c/STM-4 POS SPA	SPA-2XOC12-POSSPA-4XOC12-POSSPA-8XOC12-POS	Yes

SPA	Product ID	SIP Supported: Cisco ASR1000-SIP40
2-Port, 4-Port, and 8-Port OC-3c/STM-1 POS SPA	SPA-2XOC3-POS SPA-4XOC3-POSSPA-8XOC3-POS	Yes
1-Port OC-48c/STM-16 POS SPA	SPA-1XOC48-POS	Yes
2-Port and 4-Port OC-48c/STM-16 POS SPA	SPA-2XOC48-POS/RPR SPA-4XOC48-POS/RPR	Yes
1-Port OC-192c/STM-64 POS/RPR XFP SPA	SPA-1XOC192POS-XFP	Yes
4-Port OC-3c/STM-1 POS SPA	SPA-4XOC3-POS-V2	Yes

Table 3: SIP and SPA Compatibility for Serial SPAs

SPA	Product ID	SIP Supported: Cisco ASR1000-SIP40
2-Port and 4-Port T3/E3 Serial SPA	SPA-2XT3/E3 SPA-4XT3/E3	Yes
8-Port Clear-Channel T3/E3 Serial SPA	SPA-8XT3/E3	Yes
2-Port and 4-Port Channelized T3 SPA	SPA-2XCT3/DS0 SPA-4XCT3/DS0	Yes
4-Port Serial Interface SPA	SPA-4XT-Serial	Yes[2]
8-Port Channelized T1/E1 Serial SPA	SPA-8XCHT1/E1 SPA-8XCHT1/E1-V2	Yes
1-Port Channelized OC-3/STM-1 SPA	SPA-1XCHSTM1/OC3	Yes
1-Port Channelized OC-12/STM-4 SPA	SPA-1XCHOC12/DS0	Yes

[2] The SPA-4XT-Serial SPA is supported on SIP-40 with the initial Cisco IOS XE Release 3.1.1S when plugged into an ASR1000 SIP-40 linecard.

Table 4: SIP and SPA Compatibility for Service SPAs

SPA	Product ID	SIP Supported: Cisco ASR1000-SIP40
Cisco WebEx Node for ASR 1000 Series	SPA-WMA-K9	Yes
Cisco DSP SPA for ASR 1000 Series	SPA-DSP	Yes

Table 5: SIP and SPA Compatibility for CEoP SPA

SPA	Product ID	SIP Supported: Cisco ASR1000-SIP40
1-Port Channelized OC3/STM-1 ATM and Circuit Emulation SPA[3]	SPA-1CHOC3-CE-ATM	Yes
2-Port Channelized T3/E3 ATM CEoP SPA[4]	SPA-2CHT3-CE-ATM	Yes
24-Port Channelized T1/E1 ATM CEoP SPA[5]	SPA-24CHT1-CE-ATM	Yes

[3] Restriction: The SPA-1CHOC3-CE-ATM is not supported on the Cisco ASR 1001 Router (1 RU chassis), but supported on all other ASR 1000 chassis. All the other ASR 1000 Routers support the SPA-1CHOC3-CE-ATM for Circuit Emulation application; but not ATM applications. Effective from Cisco IOS XE Release 3.3.0S, the SPA-1CHOC3-CE-ATM is supported only with these software images: ADVANCED ENTERPRISE SERVICES, ADVANCED ENTERPRISE W/O CRYPTO, ADVANCED IP SERVICES, or ADVANCED IP SERVICES W/O CRYPTO. The SPA-1CHOC3-CE-ATM is not supported with these software images: IP BASE and IP BASE W/O CRYPTO.

[4] Restriction: Effective from Cisco IOS XE Release 3.4.0S, the SPA-2CHT3-CE-ATM is supported on all the Cisco ASR 1000 Series Routers except on the Cisco ASR 1001 Router. However, the SPA-2CHT3-CE-ATM supports only the T3 ATM mode in Cisco IOS XE Release 3.4.0S and not the Circuit Emulation (CEM) mode. Maximum Virtual Circuits supported are 1024. Interim Local Management Interface (ILMI) 1.0 is not supported. IETF RFC 2364 and 2516 for Point-to-Point Protocol (PPP) over ATM is not supported. IETF RFC 1577 support for classical IP and Address Resolution Protocol (ARP) over ATM is not supported. ATM Forum UNI 3.0, 3.1, and 4.0 is not supported. Effective from Cisco IOS XE Release 3.5.0S, the SPA-2CHT3-CE-ATM supports ATM on clear-channel E3 SPA. All the existing ATM features are supported in the E3 mode. Effective from Cisco IOS XE Release 3.8.0S, the SPA-2CHT3-CE-ATM is supported on the Cisco ASR 1001 Router. The SPA-2CHT3-CE-ATM on the Cisco ASR 1001 Router supports both the T3 and E3 ATM modes and does not support the CEM mode.

[5] Restriction: The SPA-24CHT1-CE-ATM is not supported on the Cisco ASR 1001 Router (1 RU chassis), but supported on all other ASR 1000 chassis. Effective from Cisco IOS XE Release 3.4.0S, the SPA-24CHT1-CE-ATM supports only the CEM mode. Effective from Cisco IOS XE Release 3.4.0S, the SPA-24CHT1-CE-ATM is supported only with these software images: ADVANCED ENTERPRISE SERVICES, ADVANCED ENTERPRISE W/O CRYPTO, ADVANCED IP SERVICES, or ADVANCED IP SERVICES W/O CRYPTO. The SPA-24CHT1-CE-ATM is not supported with these software images: IP BASE and IP BASE W/O CRYPTO.

Modular Optics Compatibility

Some SPAs implement small form-factor pluggable (SFP) optical transceivers to provide network connectivity. An SFP module is a transceiver device that mounts into the front panel to provide network connectivity.

Cisco qualifies the SFP modules that can be used with SPAs.

Note The SPAs will only accept the SFP modules listed as supported in this document. An SFP module check is run every time an SFP module is inserted into a SPA and only SFP modules that pass this check will be usable.

See the following for detailed information about the types of optics modules that have been qualified for use with a SPA:

- ATM SPA Optics Compatibility
- CWDM Optics Compatibility for Built-in Gigabit Ethernet Ports (4x1GE) and All Gigabit Ethernet SPAs Supported on the Cisco ASR 1000 Series Routers
- DWDM Optics Compatibility for Built-in Gigabit Ethernet Ports (4x1GE) and Gigabit Ethernet SPAs
- POS SPA SFP Optics Compatibility
- Serial SPA SFP Optics Compatibility
- CEoP SPA SFP Optics Compatibility
- Gigabit Ethernet SPA Optics Compatibility—See the SIP and SPA Product Overview chapter in Cisco ASR 1000 Series Aggregation Services Routers SIP and SPA Hardware Installation Guide.

For more information about any of the supported transceivers for SPAs in these tables, refer to *http://www.cisco.com/en/US/products/hw/modules/ps5455/prod_installation_guides_list.html*

Table 6: ATM SPA Optics Compatibility

SPA	Qualified Optics Modules (Cisco Part Numbers)
1-Port Clear Channel OC-3 ATM SPA	• SFP-OC3-MM • SFP-OC3-SR • SFP-OC3-IR1 • SFP-OC3-LR1 • SFP-OC3-LR2
3-Port Clear Channel OC-3 ATM SPA	• SFP-OC3-MM • SFP-OC3-SR • SFP-OC3-IR1 • SFP-OC3-LR1 • SFP-OC3-LR2
1-Port Clear Channel OC-12 ATM SPA	• SFP-OC12-MM • SFP-OC12-SR • SFP-OC12-IR1 • SFP-OC12-LR1 • SFP-OC12-LR2

Table 7: CWDM Optics Compatibility for Built-in Gigabit Ethernet Ports (4x1GE) and All Gigabit Ethernet SPAs Supported on the Cisco ASR 1000 Series Routers

Qualified Optics Modules (Cisco Part Numbers)
CWDM-SFP-1470=
CWDM-SFP-1490=
CWDM-SFP-1510=
CWDM-SFP-1530=
CWDM-SFP-1550=
CWDM-SFP-1570=
CWDM-SFP-1590=
CWDM-SFP-1610=

Table 8: DWDM Optics Compatibility for Built-in Gigabit Ethernet Ports (4x1GE) and Gigabit Ethernet SPAs

SPA	Qualified Optics Modules (Cisco Part Numbers)
2-Port Gigabit Ethernet SPA	DWDM-SFP-3033=
5-Port Gigabit Ethernet SPA	DWDM-SFP-3112=
8-Port Gigabit Ethernet SPA	DWDM-SFP-3190=
10-Port Gigabit Ethernet SPA	DWDM-SFP-3268=
Built-in Gigabit Ethernet Ports (4x1GE)	DWDM-SFP-3425=
Cisco ASR 1001, Cisco ASR 1002 Fixed, and Cisco ASR 1002 Chassis	DWDM-SFP-3504=
	DWDM-SFP-3582=
	DWDM-SFP-3661=
	DWDM-SFP-3819=
	DWDM-SFP-3898=
	DWDM-SFP-3977=
	DWDM-SFP-4056=
	DWDM-SFP-4214=
	DWDM-SFP-4294=
	DWDM-SFP-4373=
	DWDM-SFP-4453=
	DWDM-SFP-4612=
	DWDM-SFP-4692=
	DWDM-SFP-4772=
	DWDM-SFP-4851=
	DWDM-SFP-5012=
	DWDM-SFP-5092=
	DWDM-SFP-5172=
	DWDM-SFP-5252=
	DWDM-SFP-5413=
	DWDM-SFP-5494=
	DWDM-SFP-5575=
	DWDM-SFP-5655=
	DWDM-SFP-5817=
	DWDM-SFP-5898=
	DWDM-SFP-5979=
	DWDM-SFP-6061=

Table 9: POS SPA SFP Optics Compatibility

SPA	Qualified Optics Modules (Cisco Part Numbers)
2-Port and 4-Port OC-3 POS SPA	• SFP-OC3-MM • SFP-OC3-SR • SFP-OC3-IR1 • SFP-OC3-LR1 • SFP-OC3-LR2
1-Port OC-48c/STM-16 POS SPA	• SFP-OC48-SR • SFP-OC48-IR1 • SFP-OC48-LR2
2-Port and 4-Port OC-48c/STM-16 POS SPA	• SFP-OC48-SR • SFP-OC48-IR1 • SFP-OC48-LR2
2-Port, 4-Port, and 8-Port OC-3c/STM-1 and OC-12c/STM-4 POS SPA	• SFP-OC3-MM • SFP-OC3-SR • SFP-OC3-IR1 • SFP-OC3-LR1 • SFP-OC3-LR2
2-Port, 4-Port, and 8-Port OC-12c/STM-4 POS SPA	• SFP-OC12-MM • SFP-OC12-SR • SFP-OC12-IR1 • SFP-OC12-LR1 • SFP-OC12-LR2
1-Port OC-12c/STM-4 POS SPA	• SFP-OC12-MM • SFP-OC12-SR • SFP-OC12-IR1 • SFP-OC12-LR1 • SFP-OC12-LR2
1-Port OC-192c/STM-64 POS/RPR XFP SPA	• XFP10GER-192IR-L • XFP10GLR-192SR-L • XFP-10GLR-OC192SR • XFP-10GER-OC192IR • XFP-10GZR-OC192LR

Table 10: Serial SPA SFP Optics Compatibility

SPA	Qualified Optics Modules (Cisco Part Numbers)
1-Port Channelized OC-3/STM-1 SPA	• SFP-OC3-MM • SFP-OC3-SR • SFP-OC3-IR1 • SFP-OC3-LR1 • SFP-OC3-LR2
1-Port Channelized OC-12/STM-4 SPA	• SFP-OC12-MM • SFP-OC12-SR • SFP-OC12-IR1 • SFP-OC12-LR1 • SFP-OC12-LR2

Table 11: CEoP SPA SFP Optics Compatibility

SPA	Qualified Optics Modules (Cisco Part Numbers)
1-Port Channelized OC-3 STM1 ATM CEoP SPA	• SFP-OC3-MM • SFP-OC3-SR • SFP-OC3-IR1 • SFP-OC3-LR1 • SFP-OC3-LR2
2-Port Channelized T3/E3 ATM CEoP SPA	• CAB-T3E3-RF-BNC-F • CAB-T3E3-RF-BNC-M • CAB-T3E3-RF-OPEN
24-Port Channelized T1/E1/J1 Circuit Emulation over Packet Port Adapter	• CABLE-24T1E1