Preface

This preface describes the objectives and organization of this document and explains how to find additional information on related products and services. This preface contains the following sections:

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Objectives

This document describes the configuration and troubleshooting of SPA interface processors (SIPs) and shared port adapters (SPAs) that are supported on the Cisco ASR 1000 Series Routers.

Documentation Revision History

The Document Revision History records technical changes to this document. The table shows the Cisco IOS XE software release number and document revision number for the change, the date of the change, and a brief summary of the change.

Release No.	Revision No.	Date	Change Summary
Cisco IOS XE Release 3.12.0S	OL-14127-18	March 21, 2014	The following PB-free SPAs were supported on the Cisco ASR 1000 Series Routers: • SPA-2XT3/E3-V2, SPA-4XT3/E3-V2 • SPA-1CHSTM1/OC3V2 • SPA-2XCT3/DS0-V2, SPA-4XCT3/DS0-V2 The following serial SPAs were supported on the SIP40 linecard: • Channelized TE1 SPA • Channelized T3 SPA • Channelized OC3 STM SPA • Clear Channel T3E3 SPA All serial SPAs supported SIP10 on cascades release will be supported on SIP40.
Cisco IOS XE Release 3.11.0S	OL-14127-17	November 21, 2013	The Adjustable statistics poll interval for SPA-8XCHT1/E1 feature was supported on the Cisco ASR 1000 Series Routers: The8XCHT1/E1-V2 SPA was supported on the Cisco ASR 1000 Series Routers. **Note** SPA-8XCHT1/E1-V2 is supported from Cisco IOS XE Release 3.10.1S.
Cisco IOS XE Release 3.10.0S	OL-14127-16	July 31, 2013	Added support for the following POS SPAs to the Minimal Disruptive Restart (MDR) feature on the Cisco ASR 1000 Series Routers with SIP40s: • SPA-2XOC3-POS • SPA-4XOC3-POS • SPA-4XOC3-POS-V2 • SPA-8XOC3-POS • SPA-1XOC12-POS • SPA-2XOC12-POS • SPA-4XOC12-POS • SPA-8XOC12-POS
Cisco IOS XE Release 3.9.0S	OL-14127-15	March 28, 2013	Added information pertaining to the support for the 8-Port Clear-Channel T3/E3 Serial SPA on the Cisco ASR1000-SIP10, the Cisco ASR 1001 Router, the Cisco ASR 1002 Router, and the Cisco ASR 1002-F Router.

Release No.	Revision No.	Date	Change Summary

Cisco IOS XE Release 3.8.0S	OL-14127-14	November 28, 2012	Added information pertaining to the following updates:
			• Support for the WebEx T28.4 version of the WebEx Node SPA
			• Support for the 8-Port Clear-Channel T3/E3 Serial SPA (SPA-8XT3/E3) on the Cisco ASR 1000 Series SIP
			• Added support for the following GigabitEthernet SPAs to the Minimal Disruptive Restart (MDR) feature on the Cisco ASR 1000 Series Routers with SIP40s:
			  • SPA-2X1GE-V2
			  • SPA-5X1GE-V2
			  • SPA-8X1GE-V2
			  • SPA-10X1GE-V2
			  • SPA-1X10GE-L-V2
			• Support for the Adaptive Multi-Rate Wideband (AMR-WB) feature on the session border controller (SBC) on the Cisco ASR 1000 Series Aggregation Services Routers
			Information about these new features has been added in various sections in this guide.

Cisco IOS XE Release 3.7.0S	OL-14127-13	July 2012	Added information pertaining to the following updates: • Introduction of the Cisco ASR 1002-X Router • Introduction of the Cisco ASR1000-ESP100 • Support for Cisco ASR1000-SIP40 on all routers that support Cisco ASR1000-SIP10 Information about these new features has been added in various sections in this guide.
Cisco IOS XE Release 3.6.0S	OL-14127-12	March 29, 2012	• Added information about support for the circuit emulation (CEM) mode in the *2-Port Channelized T3/E3 ATM CEoP SPA* chapter. • Added information about Audio and Video SPA supporting high-definition (HD) video.
Cisco IOS XE Release 3.5.0S	OL-14127-11	November 28, 2011	Added information pertaining to support for clear-channel E3 ATM mode in the *SPA-2CHT3-CE-ATM* chapter.
Cisco IOS XE Release 3.4.0S	OL-14127-10	July 25, 2011	Addition of information pertaining to the overview and configuration for the following SPAs added on the Cisco ASR 1000 Series Aggregation Services Routers: • 2-Port Channelized T3/E3 ATM CEoP SPA • 24-Port Channelized T1/E1 ATM CEoP SPA • Support for generation and termination of RTCP on the SPA-DSP

Release No.	Revision No.	Date	Change Summary
Cisco IOS XE Release 3.3.0S	OL-14127-09	March 30, 2011	Addition of information pertaining to the overview and configuration for the following SPAs added on the Cisco ASR 1000 Series Aggregation Services Routers: • 1-Port 10-Gigabit Ethernet LAN/WAN Phy SPA • 1-Port Channelized OC-3 STM1 ATM CEoP SPA (Circuit Emulation Mode only)
Cisco IOS XE Release 3.2S	OL-14127-08	November 24, 2010	Addition of information pertaining to the overview and configuration for the following SPAs added on the Cisco ASR 1000 Series Aggregation Services Routers: • Introduction of a 2-Port Synchronous Gigabit Ethernet SPA • Configuration of a 2-Port Synchronous Gigabit Ethernet SPA • Introduction of a SPA DSP • Configuration of a SPA DSP
Cisco IOS XE Release 3.1S	OL-14127-07	July 23, 2010	Addition of information pertaining to: • Change in **show running-config interface Fast Ethernet** *slot/subslot/port* command output for 4-Port Fast Ethernet SPA added. • Information and features added to support the new SIPCisco ASR1000-SIP40. • Applying default maximum bandwidth of SIP-10 when SIP--40 is downgraded to SIP-10 was added • Support of ingress classification on QinQ VLAN based on either outer or inner VLAN Id cos bits was added.

Cisco IOS XE Release 2.6	OL-14127-06	February 26, 2010	Addition of information pertaining to the support of the following SPA and other information updates:
			• 1-Port Channelized OC-12/STM-4 SPA
			• Updates for optics module behavior and compatibility including:
			  • Correction to show support for the GLC-GE-100FX optics module for the 5-Port and 10-Port Gigabit Ethernet SPA.
			  • Correction to the auto negotiation behavior for the SFP-GE-T module.
			  • Correction to show support for additional modules for the 2-Port, 4-Port, and 8-Port OC-3c/STM-1 and OC-12c/STM-4 POS SPA.
			• Added descriptions for the services SPAs and double-height SPAs.

Release No.	Revision No.	Date	Change Summary
Cisco IOS XE Release 2.5	OL-14127-05	November 25, 2009	Addition of information pertaining to the support for the following areas: • 1-Port Clear Channel OC-12 ATM SPA • The **hw-module subslot ethernet vlan unlimited** command was introduced to remove the restriction of a maximum of 8100 802.1Q VLANs per Ethernet SPA. • Additional verification and troubleshooting information was added for the Cisco WebEx Node for ASR 1000 Series.
Cisco IOS XE Release 2.4	OL-14127-04	June 30, 2009	Addition of information pertaining to the support for the following SPAs: • 2-Port, 4-Port, and 8-Port OC-3c/STM-1 and OC-12c/STM-4 POS SPA • 1-Port OC-48c/STM-16 POS SPA • 8-Port OC-3c/STM-1 POS SPA • 1-Port OC-192c/STM-64 POS/RPR XFP SPA • Cisco WebEx Node for ASR 1000 Series
Cisco IOS XE Release 2.3	OL-14127-03	November 24, 2008	Addition of information pertaining to the support for the following SPA: • 1-Port and 3-Port Clear Channel OC-3 ATM SPA
Cisco IOS XE Release 2.2	OL-14127-02	September 10, 2008	Addition of information pertaining to the support for the following SPAs: • 2-Port and 4-Port OC-48c/STM-16 POS SPA • 1-Port Channelized STM-1/OC-3 SPA
Cisco IOS XE Release 2.1	OL-14127-01	April 25, 2008	First release.

Document Organization

This document is organized into the following chapters:

Chapter	Title	Description
Chapter 1	Using Cisco IOS XE Software	Provides an introduction to accessing the command-line interface (CLI) and using the Cisco IOS software and related tools.
Chapter 2	SIP and SPA Product Overview	Provides a brief introduction to the SIP and SPA products on the Cisco ASR 1000 Series Routers, and information about the SIP and SPAs, and optics compatibility.
Chapter 3	Overview of the SIP	Describes release history, and feature and Management Information Base (MIB) support for the SIP on the Cisco ASR 1000 Series Routers.

Chapter	Title	Description
Chapter 4	Configuring the SIP	Describes related configuration and verification
Chapter 5	Troubleshooting the SIP	Describes techniques that you can use to troubleshoot the operation of the SIP on the Cisco ASR 1000 Series Routers.
Chapter 7	Overview of the ATM SPAs	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the ATM SPA architecture on the Cisco ASR 1000 Series Routers.
Chapter 6	Configuring the ATM SPAs	Describes the related configuration and verification information for the ATM SPAs on the Cisco ASR 1000 Series Routers.
Chapter 8	Troubleshooting the ATM SPAs	Describes techniques that you can use to troubleshoot the operation of the ATM SPAs on the Cisco ASR 1000 Series Routers.
Chapter 9	Overview of the Ethernet SPAs	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the Gigabit Ethernet SPA architecture on the Cisco ASR 1000 Series Routers.
Chapter 10	Configuring the Ethernet SPAs	Describes the related configuration and verification information for the Gigabit Ethernet SPAs on the Cisco ASR 1000 Series Routers.
Chapter 11	Troubleshooting the Gigabit Ethernet SPAs	Describes techniques that you can use to troubleshoot the operation of the Gigabit Ethernet SPAs on the Cisco ASR 1000 Series Routers.
Chapter 12	Overview of the POS SPAs	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the POS SPA architecture on the Cisco ASR 1000 Series Routers.
Chapter 13	Configuring the POS SPAs	Describes the related configuration and verification information for the POS SPAs on the Cisco ASR 1000 Series Routers.
Chapter 14	Overview of the Serial SPAs	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the serial SPA architecture on the Cisco ASR 1000 Series Routers.
Chapter 15	Configuring the 8-Port Channelized T1/E1 Serial SPA	Describes the related configuration and verification information for the 8-Port Channelized T1/E1 Serial SPAs on the Cisco ASR 1000 Series Routers.
Chapter 16	Configuring the 2-Port and 4-Port Channelized T3 Serial SPAs	Describes the related configuration and verification information for the 2-Port and 4-Port Channelized T3 SPAs on the Cisco ASR 1000 Series Routers.
Chapter 17	Configuring the 2-Port and 4-Port T3/E3 Clear Channel Serial SPA	Describes the related configuration and verification information for the 2-Port and 4-Port T3/E3 Serial SPAs on the Cisco ASR 1000 Series Routers.
Chapter 18	Configuring the 4-Port Serial Interface SPA	Describes the related configuration and verification information for the 4-Port Serial Interface SPA on the Cisco ASR 1000 Series Routers.

Chapter	Title	Description
Chapter 19	Configuring the 1-Port Channelized OC-3/STM-1 SPA and 1-Port Channelized OC-12/STM-4 SPA	Describes the related configuration and verification information for the 1-Port Channelized STM-1/OC-3 SPA on the Cisco ASR 1000 Series Routers.
Chapter 20	Troubleshooting the Serial SPAs	Describes techniques that you can use to troubleshoot the operation of the serial SPAs on the Cisco ASR 1000 Series Routers.
Chapter 21	Overview of the Cisco WebEx Node for the Cisco ASR 1000 Series Routers	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the Cisco WebEx Node for ASR 1000 Series on the Cisco ASR 1000 Series Aggregation Services Routers, also referred to as the Cisco WebEx Node services shared port adapter (SPA).
Chapter 22	Configuring the Cisco WebEx Node for the ASR 1000 Series Aggregation Services Routers	Describes the related configuration and verification information for the Cisco WebEx Node for ASR 1000 Series on the Cisco ASR 1000 Series Aggregation Services Routers, including information about registering the Cisco WebEx Node SPA with the Cisco WebEx Data Center and Cisco WebEx Node Management System.
Chapter 23	Troubleshooting the Cisco WebEx Node for the ASR 1000 Series Aggregation Services Routers	Describes techniques that you can use to troubleshoot the operation of the Cisco WebEx Node for ASR 1000 Series on the Cisco ASR 1000 Series Aggregation Services Routers.
Chapter 24	Overview of the Cisco DSP SPA for the ASR 1000 Series Aggregation Services Routers	Describes the release history, features, and Management Information Base (MIB) support, and an introduction to the Cisco DSP SPA for the ASR 1000 Series on the Cisco ASR 1000 Series Aggregation Services Routers. The Cisco DSP SPA is referred to as the SPA-DSP shared port adapter (SPA).
Chapter 25	Configuring the Cisco DSP SPA for the ASR 1000 Series Aggregation Services Routers	Describes the related configuration information pertaining to the Cisco DSP SPA for the ASR 1000 Series on the Cisco ASR 1000 Series Aggregation Services Routers, including information about enabling DSP SPA, and creating the profiles and commands used to configure the DSP SPA.
Chapter 26	Upgrading Field-Programmable Devices	Provides information about upgrading the field-programmable devices on the Cisco ASR 1000 Series Routers.
Chapter 27	Classifying and Scheduling Packets for the ASR 1000 Series Aggregation Services Routers	Provides information about classifying and scheduling the ingress packets on the Cisco ASR 1000 Series Aggregation Service Routers.
Chapter 28	Overview of the Circuit Emulation over Packet Shared Port Adapter	Describes the release history, feature, and the MIBs supported, and provides an introduction to the Circuit Emulation over Packet Shared Port Adapter.

Chapter	Title	Description
Chapter 29	Configuring the Circuit Emulation over Packet Shared Port Adapter	Describes the related configuration information pertaining to the Circuit Emulation over Packet (CEoP) Shared Port Adapter on the Cisco ASR 1000 Series Routers.

Document Conventions

Within the SIP and SPA software configuration guides, the term router is generally used to refer to a variety of Cisco products (for example, routers, access servers, and switches). Routers, access servers, and other networking devices that support Cisco IOS software are shown interchangeably within examples. These products are used only for illustrative purposes; that is, an example that shows one product does not necessarily indicate that other products are not supported.

This document uses the following conventions:

Convention	Description
^ or Ctrl	Both the ^ symbol and Ctrl represent the Control (Ctrl) key on a keyboard. For example, the key combination **^D** or **Ctrl-D** means that you hold down the Control key while you press the D key. (Keys are indicated in capital letters but are not case sensitive.)
bold font	Commands and keywords and user-entered text appear in **bold** font.
Italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
`Courier font`	Terminal sessions and information the system displays appear in `courier` font.
`Bold Courier font`	Bold Courier font indicates text that the user must enter.
[x]	Elements in square brackets are optional.
...	An ellipsis (three consecutive nonbolded periods without spaces) after a syntax element indicates that the element can be repeated.
|	A vertical line, called a pipe, indicates a choice within a set of keywords or arguments.
[x | y]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
{x | y}	Required alternative keywords are grouped in braces and separated by vertical bars.
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.

Convention	Description
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Reader Alert Conventions

This document uses the following conventions for reader alerts:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Tip Means *the following information will help you solve a problem.*

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Timesaver Means *the described action saves time.* You can save time by performing the action described in the paragraph.

Warning **Means *reader be warned.* In this situation, you might perform an action that could result in bodily injury.**

Related Documentation

This section refers you to other documentation that also might be useful as you configure your Cisco ASR 1000 Series Aggregation Services Routers.

Cisco IOS XE Features and Software Configuration

- Information about supported features and their configuration on the Cisco ASR 1000 Series Aggregation Services Routers are available in the Cisco IOS XE software configuration guides at: http://www.cisco.com/en/US/products/ps9587/products_installation_and_configuration_guides_list.html
- A summary of the new features in a particular release can be found at: http://www.cisco.com/en/US/products/ps9587/products_feature_guides_list.html

- Command documentation for the Cisco ASR 1000 Series Aggregation Services Routers is available at:http://www.cisco.com/en/US/products/ps9587/prod_command_reference_list.html

Cisco ASR 1000 Series Aggregation Services Routers Documentation

As you configure SIPs and SPAs on your Cisco Aggregation Services Router 1000 Series, you should also refer to the following companion publication for important hardware installation information:

- *Cisco Aggregation Services Router 1000 Series SIP and SPA Hardware Installation Guide*

Some of the following other Cisco ASR 1000 Series Routers publications might be useful to you as you configure your Cisco ASR 1000 Series Routers.

- *Cisco ASR 1000 Series Routers Hardware Installation Guide*
- Three Quick Start Guides:
  - *Cisco ASR 1002 Router Quick Start Guide*
  - *Cisco ASR 1004 Router Quick Start Guide*
  - *Cisco ASR 1006 Router Quick Start Guide*
- Command Reference Guide: *Cisco IOS Quality of Service Solutions Command Reference guide at the URL:* http://www.cisco.com/en/US/docs/ios/qos/command/reference/qos_book.html
- *Regulatory Compliance and Safety Information for the Cisco ASR 1000 Series Routers*
- *Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide*
- *Cisco ASR 1000 Series Routers MIB Specifications Guide*
- *Release Notes for Cisco ASR 1000 Series Aggregation Services Routers*

Several other publications are also related to the Cisco ASR 1000 Series Routers. For a complete reference of related documentation, see the Cisco ASR 1000 Series Routers Documentation Roadmap located at the following URL: http://www.cisco.com/en/US/products/ps9343/products_documentation_roadmaps_list.html

Your router and the Cisco IOS software running on it contain extensive features. You can find documentation for Cisco products at the following URL:

http://www.cisco.com/cisco/web/psa/default.html?mode=prod

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business results you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco DevNet.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.