



## Preface

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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:

- [Objectives](#)
- [Document Revision History](#)
- [Organization](#)
- [Related Documentation](#)
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## Objectives

This document describes the configuration and troubleshooting of SPA interface processors (SIPs), SPA services cards (SSCs), and shared port adapters (SPAs) that are supported on a Cisco 7600 series router.

# Document Revision History

The Document Revision History records technical changes to this document. The table shows the Cisco IOS 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	Date	Change Summary
12.2(33)SRE	OL-5070-14	November 2009	<p>Support was added for:</p> <ul style="list-style-type: none"> <li>• STM1 Electrical SFP to SPA-1ChOC3-CE-ATM and SPA-1xCHSTM1/OC3 on 7600 in <a href="#">Modular Optics Compatibility, page 6 of Chapter 2, “SIP, SSC, and SPA Product Overview”</a>.</li> <li>• XFP-10F-MM-SR for 10GE SPAs on the SIP400 and SIP600 in <a href="#">Modular Optics Compatibility, page 6 of Chapter 2, “SIP, SSC, and SPA Product Overview”</a></li> <li>• X2-DWDM and X2-10GB-LRM/ZR support on RSP720-10GE in <a href="#">Modular Optics Compatibility, page 6 of Chapter 2, “SIP, SSC, and SPA Product Overview”</a></li> <li>• Access Circuit Redundancy on SIP400 2-Port and 4-Port OC-3c/STM-1 ATM SPA and QoS support (<a href="#">Chapter 7, “Configuring the ATM SPAs”</a> added section <a href="#">Configuring Access Circuit Redundancy on SIP-400 ATM SPA s, page 57</a></li> <li>• VC QoS on VP pseudowire. Added support for <b>match atm-vci</b> command to ATM VP interface in <a href="#">Cisco 7600 SIP-400 Classification Into a Queue, page 12</a></li> <li>• Triple nesting QoS support on SIP-400 to add support for an additional level of policy-map nesting to <a href="#">Cisco 7600 SIP-400 Policing and Dropping, page 12</a></li> <li>• RSP720-10GE on Cisco 7600-SSC-400 to <a href="#">SPA Services Cards, page 2</a></li> <li>• VP and VC mode support on 7600/SIP400 for CEoP and 1-Port OC-48c/STM-16 ATM SPA to <a href="#">Chapter 9, “Overview of the CEoP and Channelized ATM SPAs”</a> and <a href="#">Configuring PCRoMPLS on SIP-400 for CeOP and 1-Port OC-48c/STM-16 ATM SPA, page 12</a></li> <li>• IEEE IEEE 802.1ag Draft 8.1compliant Connectivity Fault Management on EVC (VPLS and pseudowire) on SIP-400 and SIP-600 in <a href="#">Cisco 7600 SIP-400 Features, page 10</a> and <a href="#">Cisco 7600 SIP-600 Features, page 15</a></li> <li>• Updates to IPv6 Hop-by-Hop on SIP-200 to <a href="#">Cisco 7600 SIP-200 Other QoS Features, page 8</a> and <a href="#">Configuring IPv6 Hop-by-Hop Header Security on SIP-200 or SIP-400, page 119</a></li> </ul>

12.2 (33) SRD3	OL-5070-13	September 2009	<p>Support is added for Private Hosts SVI on CWAN linecards in <a href="#">Private Hosts SVI (Interface VLAN) Configuration Example, page 154</a>, <a href="#">Private Hosts on VPLS Configuration Example, page 129</a></p> <p><b>This version of the document with the Private Hosts feature is available only to a select set of customers.</b></p>
12.2 (33) SRD3	OL-5070-12	September 2009	<p>Support is added for:</p> <ul style="list-style-type: none"> <li>• IPv6 Hop-by-Hop Policing for SIP-200 in <a href="#">Configuring IPv6 Hop-By-Hop Policing on SIP-400 and SIP-200, page 103</a></li> <li>• AIS and RAI alarm forwarding in CESoPSN mode on CEoP SPA in <a href="#">Configuring AIS and RAI Alarm Forwarding in CESoPSN Mode on CEoP SPAs, page 44</a></li> <li>• CeOP SPA updates in <a href="#">Chapter 9, “Overview of the CEoP and Channelized ATM SPAs”</a> and <a href="#">Chapter 10, “Configuring the CEoP and Channelized ATM SPAs”</a></li> </ul>
12.2 (33) SRD 2	OL-5070-11	May 2009	<ul style="list-style-type: none"> <li>• Support was added for: <ul style="list-style-type: none"> <li>– PPP/MLPPP APS performance enhancement in <a href="#">Chapter 20, “Configuring 1-Port ChOC-3/STM-1 and ChOC-12 / STM-4 SPAs”</a> section <a href="#">Configuring APS, page 18</a> and <a href="#">Verifying the APS Configuration, page 19</a></li> <li>– Support for new pluggable SFP ONS-SC-155-ELthe section <a href="#">Modular Optics Compatibility, page 6</a> of <a href="#">Chapter 2, “SIP, SSC, and SPA Product Overview”</a></li> </ul> </li> </ul>
12.2 (33) SRD1	OL-5050-10	February 2009	<ul style="list-style-type: none"> <li>• Support was added for: <ul style="list-style-type: none"> <li>– 1xCHOC12STM4 SPA</li> <li>– IPv6 Hop-by-Hop</li> </ul> </li> </ul>

12.2 (33) SRD	OL-5050-10	October, 2008	<ul style="list-style-type: none"> <li>• Support was added for the following features: <ul style="list-style-type: none"> <li>– IMA on SIP-400 for 24xT1/E1 CEOP and 1xOC3 CEOP SPAs</li> <li>– Private Host SVI (interface VLAN)</li> <li>– SPA-8X1FE-TX-V2 &amp; SPA-4X1FE-TX-V2 Support on SIP400</li> <li>– Port Mode Cell Relay support on Cisco 7600 SIP400 ATM SPA</li> <li>– DBUS CoS API on SIP-400</li> <li>– SIP-400 Hierarchical Queuing Framework (HQF)</li> <li>– L2VPN Interworking- Ethernet VLAN to ATM AAL5</li> <li>– Bridging Routed Encapsulations (BRE) on Cisco SIP-400</li> <li>– Asymmetric Carrier Delay</li> </ul> </li> </ul>
12.2 (33) SRC 1	OL-5050-09	May 27, 2008	<p>Support was added for the following features:</p> <ul style="list-style-type: none"> <li>• SPA-4XT-Serial (Cisco 4-Port Serial Shared Port Adapter) support on 7600/SIP200- Added Chapter 21, “Configuring the 4-Port Serial Interface SPA”</li> <li>• Updated Restrictions in Chapter 23 to add the limitation that TCP ADJUST-MSS is NOT supported on VTI tunnel.</li> </ul>

12.2(33)SRC	OL-5050-08	Jan 2008	<p>Support was added for the following features:</p> <ul style="list-style-type: none"> <li>• CT3 CEoP on c7600-SIP-400</li> <li>• Accelerated Lawful Intercept on Cisco 7600 SIP-400</li> <li>• CoPP Enhancements of Cisco 7600 SIP-400</li> <li>• PPPoEoE on Cisco 7600 SIP-400</li> <li>• Source IPv4 and Source MAC Address Binding on Cisco 7600 SIP-400</li> <li>• IMA on SIP-400 for 24xT1/E1 CEOP and 1xOC3 CEOP SPAs</li> <li>• IGMP Snooping support on SIP-200</li> <li>• AFC and PFC support on Multilink Interface on SIP-200 for 2- and 4-port CT3, 8-port channelized T1/E1 channelized, and 1-port channelized OC3/STM-1 SPAs</li> <li>• Programmable BERT patterns enhancement on SIP-200 for 2- and 4-port channelized T3 and 1-port channelized OC3/STM-1 SPAs</li> <li>• TDM Local switching</li> <li>• Phase 2 Local Switching Redundancy</li> <li>• SPA-1xCHSTM1/OC3</li> <li>• Cisco Channelized T3 to DS0 Shared Port Adapter (SPA-2XCT3/DS0, SPA-4XCT3/DS0)</li> <li>• Cisco 8-Port Channelized T1/E1 Shared Port Adapter (SPA-8XCHT1/E1)</li> <li>• Cisco Clear Channel T3/E3 Shared Port Adapter (SPA-2XT3/E3, SPA-4XT3/E3)</li> </ul>
12.2(33)SRB1	OL-5070-07	June 4, 2007	<p>Support for the following features was introduced:</p> <ul style="list-style-type: none"> <li>• Backup interface for Flexible UNI (for Gigabit Ethernet SPAs) on a Cisco 7600 SIP-400</li> <li>• Any Transport over MPLS over GRE (AToM over GRE) on a Cisco 7600 SIP-400</li> <li>• MTU support on MLPPP interfaces on a Cisco 7600 SIP-200</li> <li>• ATM pseudowire redundancy for the CEoP SPA</li> <li>• Out-of-band clocking for the CEoP SPA</li> <li>• Support for XFP-10GZR-OC192LR</li> </ul>

12.2(33)SRB	OL-5070-06	February 27, 2007	<p>Sixth release. Support for the following features was introduced:</p> <ul style="list-style-type: none"> <li>• Software-based MLP bundles from 256 to 1024 on a Cisco 7600 SIP-200</li> <li>• Network clock support on a Cisco 7600 SIP-200</li> <li>• Lawful Intercept on a Cisco 7600 SIP-400</li> <li>• Per-subscriber/per-protocol CoPP support on a Cisco 7600 SIP-400</li> <li>• Security ACLs on a Cisco 7600 SIP-400</li> <li>• Percent priority/percent bandwidth support on a Cisco 7600 SIP-400</li> <li>• IGMP/PIM snooping for VPLS pseudowire on a Cisco 7600 SIP-400</li> <li>• Dual-priority queue support on a Cisco 7600 SIP-400</li> <li>• 24-Port Channelized T1/E1 ATM CEoP SPA, 1-Port Channelized OC-3 STM1 ATM CEoP SPAs, and 2-Port Copper and Optical Gigabit Ethernet SPAs.</li> </ul>
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12.2(33)SRA	OL-5070-05	June 5, 2006	<p>Fifth release. The following modifications were made:</p> <ul style="list-style-type: none"> <li>• Support was added for the following SPAs on the Cisco 7600 SIP-200: <ul style="list-style-type: none"> <li>– 1-Port Channelized OC-3/STM-1 SPA</li> <li>– 4-Port and 8-Port Fast Ethernet SPA</li> </ul> </li> <li>• Support was added for the 1-Port OC-48c/STM-16 POS SPA on the Cisco 7600 SIP-400</li> <li>• Support was added for the 2-Port and 4-Port OC-48c/STM-16 POS SPA on the Cisco 7600 SIP-600</li> <li>• The following features were introduced for the IPsec VPN SPA: <ul style="list-style-type: none"> <li>– Front-side VRF</li> <li>– IPsec Virtual Tunnel Interface (VTI)</li> <li>– Certificate to ISAKMP Profile Mapping</li> <li>– Call Admission Control</li> <li>– Periodic Message Option (now supported in Dead Peer Detection)</li> <li>– Reverse Route Injection (RRI)</li> <li>– IPsec Anti-replay Window size</li> <li>– IPsec Preferred Peer</li> <li>– Local Certificate Storage Location</li> <li>– Optional OCSP Nonces</li> <li>– Persistent Self-signed Certificates</li> <li>– Certificate Chain Verification</li> <li>– Easy VPN Remote RSA Signature Storage</li> <li>– IPsec and IKE MIB support for Cisco VRF-Aware IPsec</li> </ul> </li> </ul> <p><b>Note</b> Support is not included for IPsec stateful failover using HSRP and SSP.</p>
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12.2(33)SRA	OL-5070-05	June 5, 2006	<ul style="list-style-type: none"> <li>• The single configuration chapter for the IPsec VPN SPA has been restructured into seven smaller chapters.</li> <li>• Support for the following features was introduced on the Cisco 7600 SIP-200: <ul style="list-style-type: none"> <li>– AToM VP Mode Cell Relay—ATM SPAs</li> <li>– BCP over dMLPPP (Trunk Mode)—Channelized SPAs</li> <li>– MPLS over RBE—ATM SPAs</li> <li>– Multi-VC to VLAN scalability</li> <li>– QoS support on bridging features</li> <li>– Software-based MLPPP</li> <li>– Software-based MLFR</li> </ul> </li> <li>• Support for the following features was introduced on the Cisco 7600 SIP-400: <ul style="list-style-type: none"> <li>– AToM VP Mode Cell Relay—ATM SPAs</li> <li>– Ethernet over MPLS (EoMPLS) VC Scaling—Increase from 4K to 10K VCs</li> <li>– Ingress/Egress CoS classification with ingress policing per VLAN or EoMPLS VC</li> <li>– Hierarchical VPLS (H-VPLS) with MPLS Edge</li> <li>– Hierarchical QoS support for EoMPLS VCs</li> <li>– Multipoint Bridging (MPB) for Gigabit Ethernet SPA</li> <li>– Multi-VC to VLAN scalability</li> <li>– Multi-VLAN to VC—ATM SPAs</li> <li>– QoS support on bridging features</li> <li>– Tag-Native Mode for Trunk BCP</li> </ul> </li> </ul>
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12.2(18)SXF2	OL-5070-04	February 28, 2006	<p>The following updates were made to the documentation:</p> <ul style="list-style-type: none"> <li>• Removed the restriction of “Mapping DSCP values to MPLS EXP bits is not supported” from the Cisco 7600 SIP-600 list of restrictions.</li> <li>• Added the following VPLS scalability support information for the Cisco 7600 SIP-600: <ul style="list-style-type: none"> <li>– Up to 4000 VPLS domains</li> <li>– Up to 60 VPLS peers per domain</li> <li>– Up to 30,000 pseudowires, used in any combination of domains and peers up to the 4000-domain or 60-peer maximums. For example, support of up to 4000 domains with 7 peers or up to 60 peers in 500 domains.</li> </ul> </li> <li>• Added H-VPLS with Q-in-Q edge feature support on Cisco 7600 SIP-600—Requires Cisco 7600 SIP-600 in the uplink, and any LAN port or Cisco 7600 SIP-600 on the downlink</li> <li>• Removed VPLS pseudowire redundancy feature support for the Cisco 7600 SIP-600</li> <li>• Removed the “Cisco 7600 SIP-600 MPLS Marking” section</li> <li>• Modified the encapsulations supported in the ATM chapters to “aal5snap” only</li> <li>• Corrected the note in the “Configuring Compressed Real-Time Protocol” section of Chapter 4, “Configuring the SIPs and SSC” to state: <p>“cRTP is supported only on the Cisco 7600 SIP-200 with the 8-Port Channelized T1/E1 SPA and 2-Port and 4-Port Channelized T3 SPA.”</p> </li> </ul>
12.2(18)SXF2	OL-5070-04	January 27, 2006	<p>The following update to the hardware-based MLPPP LFI guidelines was made in Chapter 17, “Configuring the 8-Port Channelized T1/E1 SPA,” and Chapter 19, “Configuring the 2-Port and 4-Port Channelized T3 SPAs”:</p> <p>When hardware-based LFI is enabled, fragmentation counters are not displayed.</p>

12.2(18)SXF2	OL-5070-04	January 20, 2006	<p>Fourth release. The following modifications were made:</p> <ul style="list-style-type: none"> <li>• The 1-Port OC-192c/STM-64 POS/RPR VSR Optics SPA was introduced on the Cisco 7600 SIP-600.</li> <li>• Support was introduced for the configuration of IP multicast over a GRE tunnel on the IPsec VPN SPA.</li> <li>• Support for the “Enhancements to RFC 1483 Spanning Tree Interoperability” feature was added for ATM SPAs on the Cisco 7600 SIP-200.</li> <li>• Documentation of a workaround for ATM SPA configuration on the Cisco 7600 SIP-200 was added in <a href="#">Chapter 7, “Configuring the ATM SPAs”</a> to address a Routed Bridge Encapsulation (RBE) limitation where only one remote MAC address is supported.</li> </ul>
12.2(18)SXF	OL-5070-03	January 12, 2006	<p>The following modifications were made:</p> <ul style="list-style-type: none"> <li>• Adjusted ATM SPA PVC restriction (correctly noted elsewhere in the documentation) from “A maximum number of 400 PVCs or SVCs...” to “A maximum number of 1000 PVCs or 400 SVCs configured with MQC policy maps.”</li> <li>• Added cross-references throughout <a href="#">Chapter 3, “Overview of the SIPs and SSC”</a> to the Cisco IOS Release SX Supervisor Engine release notes.</li> <li>• Updated the Cisco 7600 SIP-400 restrictions to clarify that the SIP does not work with the Supervisor Engine PFC3A or in PFC3A mode.</li> <li>• Updated the Cisco 7600 SIP-600 restrictions to clarify lack of support for the Supervisor Engine 720 PFC3A or PFC3A mode:          “The Cisco 7600 SIP-600 is not supported by the Supervisor Engine 32. The Cisco 7600 SIP-600 is supported by the Supervisor Engine 720 PFC3B and Supervisor Engine 720 PFC3BXL. It is not supported with a Supervisor Engine 720 PFC3A or in PFC3A mode.”</li> </ul>

12.2(18)SXF	OL-5070-03	January 12, 2006	<ul style="list-style-type: none"> <li>• Added a cross-reference to <a href="#">Chapter 3, “Overview of the SIPs and SSC”</a> in each of the SPA overview chapters to ease location of additional features and restrictions that are SIP- or SSC-specific.</li> <li>• Removed the list of supported modules from <a href="#">Chapter 23, “Overview of the IPsec VPN SPA.”</a> Any unsupported modules will be documented in the “Restrictions” section.</li> <li>• Further qualified Cisco 7600 SIP-200 Any Transport over MPLS (AToM) support for ATM in <a href="#">Chapter 3, “Overview of the SIPs and SSC”</a> to state:  “Any Transport over MPLS (AToM) support, including: <ul style="list-style-type: none"> <li>– ATM over MPLS (ATMoMPLS)—AAL5 VC mode</li> <li>– Ethernet over MPLS (EoMPLS)—(Single cell relay) VC mode”</li> </ul> </li> <li>• Removed references to “1-Port 10-Gigabit Ethernet SPA and 10-Port Gigabit Ethernet SPA on a SIP-400” in the “Enabling Autonegotiation” and “Disabling Autonegotiation” sections of <a href="#">Chapter 12, “Configuring the Fast Ethernet and Gigabit Ethernet SPAs.”</a></li> <li>• Qualified AToM core-facing restriction for the Cisco 7600 SIP-200 as follows: <ul style="list-style-type: none"> <li>– AToM (ATMoMPLS, FRoMPLS, HDLCoMPLS, and PPPoMPLs) on a SPA requires a Cisco 7600 SIP-200, FlexWAN, Enhanced FlexWAN, or OSM PXF interface as the core-facing interface.</li> <li>– AToM (ATMoMPLS, FRoMPLS) on a Cisco 7600 SIP-200 also is supported with a Cisco 7600 SIP-400 as the core-facing interface.</li> </ul> </li> <li>• Documentation of the Fast Software Upgrade (FSU) procedure supported by Route Processor Redundancy (RPR) for supervisor engines was added to <a href="#">Chapter 32, “Upgrading Field-Programmable Devices.”</a></li> </ul>
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12.2(18)SXF	OL-5070-03	September 19, 2005	<p>Third release. The following hardware was introduced:</p> <ul style="list-style-type: none"> <li>• 1-Port OC-48c/STM-16 ATM SPA</li> <li>• 2-Port Gigabit Ethernet SPA</li> <li>• 5-Port Gigabit Ethernet SPA</li> <li>• 10-Port Gigabit Ethernet SPA</li> <li>• 1-Port 10-Gigabit Ethernet SPA</li> <li>• 1-Port OC-192c/STM-64 POS/RPR SPA</li> <li>• 1-Port OC-192c/STM-64 POS/RPR XFP SPA</li> </ul> <p>For specific feature changes, see the Release History tables in the “Overview” chapters of this book.</p>
12.2(18)SXE2	OL-5070-02	August 17, 2005	<p>The following modifications were made:</p> <ul style="list-style-type: none"> <li>• <a href="#">Chapter 17, “Configuring the 8-Port Channelized T1/E1 SPA”</a> and <a href="#">Chapter 19, “Configuring the 2-Port and 4-Port Channelized T3 SPAs”</a> were modified to clarify support of MLPPP and MLFR for both E1 and T1 links.</li> <li>• Added cRTP to the supported features list for the serial SPAs in <a href="#">Chapter 16, “Overview of the Serial SPAs.”</a></li> <li>• Document was modified with the following updates in <a href="#">Chapter 4, “Configuring the SIPs and SSC”</a>: <ul style="list-style-type: none"> <li>– Removed references to support of software-based MLFR.</li> <li>– In the “Assigning an Interface to an MLPPP Bundle,” moved step order of the <b>ppp multilink</b> command and qualified it as optional.</li> <li>– Under “MLPPP Configuration Guidelines,” added guidelines for distributed links on the Cisco 7600 SIP-200 and restrictions.</li> <li>– Under “MLPPP Configuration Tasks” and “MLFR Configuration Tasks,” added task to emphasize that distributed CEF is required for these features; however, dCEF is automatically enabled on the Cisco 7600 series router.</li> </ul> </li> </ul>
12.2(18)SXE2	OL-5070-02	July 25, 2005	<p>Second release. The Cisco 7600 SSC-400 and IPsec VPN SPA were introduced.</p>
12.2(18)SXE	OL-5070-01	March 28, 2005	<p>First release.</p>

# Organization

This document contains the following chapters:

Chapter	Title	Description
Chapter 1	<a href="#">Using Cisco IOS Software</a>	Provides an introduction to accessing the command-line interface (CLI) and using the Cisco IOS software and related tools.
Chapter 2	<a href="#">SIP, SSC, and SPA Product Overview</a>	Provides a brief introduction to the SIP and SPA products on the Cisco 7600 series router, and information about SIP, SSC, SPA, and optics compatibility.
Chapter 3	<a href="#">Overview of the SIPs and SSC</a>	Describes release history, and feature and Management Information Base (MIB) support for the SIPs and SSCs on the Cisco 7600 series router.
Chapter 4	<a href="#">Configuring the SIPs and SSC</a>	Describes related configuration and verification information for the SIPs and SSCs on the Cisco 7600 series router.
Chapter 5	<a href="#">Troubleshooting the SIPs and SSC</a>	Describes techniques that you can use to troubleshoot the operation of the SIPs and SSCs on the Cisco 7600 series router.
Chapter 6	<a href="#">Overview of the ATM SPAs</a>	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the ATM SPA architecture on the Cisco 7600 series router.
Chapter 7	<a href="#">Configuring the ATM SPAs</a>	Describes the related configuration and verification information for the ATM SPAs on the Cisco 7600 series router.
Chapter 8	<a href="#">Troubleshooting the ATM SPAs</a>	Describes techniques that you can use to troubleshoot the operation of the ATM SPAs on the Cisco 7600 series router.
Chapter 9	<a href="#">Overview of the CEoP and Channelized ATM SPAs</a>	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the CEoP SPA architecture on the Cisco 7600 series router.
Chapter 10	<a href="#">Configuring the CEoP and Channelized ATM SPAs</a>	Describes the related configuration and verification information for the CEoP and Channelized SPAs on the Cisco 7600 series router.
Chapter 11	<a href="#">Overview of the Ethernet SPAs</a>	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the Gigabit Ethernet SPA architecture on the Cisco 7600 series router.
Chapter 12	<a href="#">Configuring the Fast Ethernet and Gigabit Ethernet SPAs</a>	Describes the related configuration and verification information for the Gigabit Ethernet SPAs on the Cisco 7600 series router.

Chapter	Title	Description
Chapter 13	<a href="#">Troubleshooting the Fast Ethernet and Gigabit Ethernet SPAs</a>	Describes techniques that you can use to troubleshoot the operation of the Gigabit Ethernet SPAs on the Cisco 7600 series router.
Chapter 14	<a href="#">Overview of the POS SPAs</a>	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the POS SPA architecture on the Cisco 7600 series router.
Chapter 15	<a href="#">Configuring the POS SPAs</a>	Describes the related configuration and verification information for the POS SPAs on the Cisco 7600 series router.
Chapter 16	<a href="#">Overview of the Serial SPAs</a>	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the serial SPA architecture on the Cisco 7600 series router.
Chapter 17	<a href="#">Configuring the 8-Port Channelized T1/E1 SPA</a>	Describes the related configuration and verification information for the 8-Port Channelized T1/E1 SPAs on the Cisco 7600 series router.
Chapter 18	<a href="#">Configuring the 2-Port and 4-Port Clear Channel T3/E3 SPAs</a>	Describes the related configuration and verification information for the 2-Port and 4-Port Clear Channel T3/E3 SPAs on the Cisco 7600 series router.
Chapter 19	<a href="#">Configuring the 2-Port and 4-Port Channelized T3 SPAs</a>	Describes the related configuration and verification information for the 2-Port and 4-Port Channelized T3 SPAs on the Cisco 7600 series router.
Chapter 20	<a href="#">Configuring 1-Port ChOC-3/STM-1 and ChOC-12 / STM-4 SPAs</a>	Describes the related configuration and verification information for the 1-Port Channelized OC-3/STM-1 SPA on the Cisco 7600 series router.
Chapter 22	<a href="#">Configuring the 4-Port Serial Interface SPA</a>	Describes information about configuring the 4-Port Serial Interface Shared Port Adapter (SPA) on the Cisco 7600 series router.
Chapter 22	<a href="#">Troubleshooting the Serial SPAs</a>	Describes techniques that you can use to troubleshoot the operation of the serial SPAs on the Cisco 7600 series router.
Chapter 23	<a href="#">Overview of the IPsec VPN SPA</a>	Describes release history, feature and Management Information Base (MIB) support, and an introduction to the IPsec VPN SPA architecture on the Cisco 7600 series router.
Chapter 24	<a href="#">Configuring VPNs in Crypto-Connect Mode</a>	Describes the related configuration and verification information for IPsec VPNs using the IPsec VPN SPA on the Cisco 7600 series router.
Chapter 26	<a href="#">Configuring IKE Features Using the IPsec VPN SPA</a>	Describes the related configuration and verification information for Internet Key Exchange (IKE) features using the IPsec VPN SPA on the Cisco 7600 series router.

Chapter	Title	Description
Chapter 27	<a href="#">Configuring Enhanced IPsec Features Using the IPsec VPN SPA</a>	Describes the related configuration and verification information for enhanced IPsec features using the IPsec VPN SPA on the Cisco 7600 series router.
Chapter 28	<a href="#">Configuring PKI Using the IPsec VPN SPA</a>	Describes the related configuration and verification information for Public Key Infrastructure (PKI) features using the IPsec VPN SPA on the Cisco 7600 series router.
Chapter 29	<a href="#">Configuring Advanced VPNs Using the IPsec VPN SPA</a>	Describes the related configuration and verification information for advanced IPsec VPNs using the IPsec VPN SPA on the Cisco 7600 series router.
Chapter 30	<a href="#">Configuring Duplicate Hardware and IPsec Failover Using the IPsec VPN SPA</a>	Describes the related configuration and verification information for duplicate hardware configurations and IPsec failover using the IPsec VPN SPA on the Cisco 7600 series router.
Chapter 31	<a href="#">Configuring Monitoring and Accounting for the IPsec VPN SPA</a>	Describes the related configuration and verification information for monitoring and accounting using the IPsec VPN SPA on the Cisco 7600 series router.
Chapter 32	<a href="#">Troubleshooting the IPsec VPN SPA</a>	Describes techniques that you can use to troubleshoot the operation of the IPsec VPN SPA on the Cisco 7600 series router.
Chapter 33	<a href="#">Upgrading Field-Programmable Devices</a>	Provides information about upgrading the field-programmable devices on the Cisco 7600 series router.

## Related Documentation

This section refers you to other documentation that also might be useful as you configure your Cisco 7600 series router. The documentation listed below is available online.

### Cisco 7600 Series Router Documentation

As you configure your Cisco 7600 series router, you should also refer to the following companion publication for important hardware installation information:

- *Cisco 7600 Series Ethernet Services 20G Line Card Hardware Installation Guide*

An overview of the Cisco 7600 series router features, benefits, and applications can be found in the *Cisco 7600 Series Internet Router Essentials* document located at the following URL:

[http://www.cisco.com/en/US/products/hw/routers/ps368/products\\_quick\\_start09186a0080092248.html](http://www.cisco.com/en/US/products/hw/routers/ps368/products_quick_start09186a0080092248.html)

Some of the following other Cisco 7600 series router publications might be useful to you as you configure your Cisco 7600 series router.

- *Cisco 7600 Series Cisco IOS Software Configuration Guide*

[http://www.cisco.com/en/US/products/hw/routers/ps368/products\\_installation\\_and\\_configuration\\_guides\\_list.html](http://www.cisco.com/en/US/products/hw/routers/ps368/products_installation_and_configuration_guides_list.html)

- *Cisco 7600 Series Cisco IOS Command Reference*

[http://www.cisco.com/en/US/products/hw/routers/ps368/prod\\_command\\_reference\\_list.html](http://www.cisco.com/en/US/products/hw/routers/ps368/prod_command_reference_list.html)

- *Cisco 7600 Series Cisco IOS System Message Guide*

[http://www.cisco.com/en/US/products/hw/routers/ps368/products\\_system\\_message\\_guides\\_list.html](http://www.cisco.com/en/US/products/hw/routers/ps368/products_system_message_guides_list.html)

- Cisco 7600 Series Internet Router MIB Specifications Guide

[http://www.cisco.com/en/US/products/hw/routers/ps368/prod\\_technical\\_reference\\_list.html](http://www.cisco.com/en/US/products/hw/routers/ps368/prod_technical_reference_list.html)

Several other publications are also related to the Cisco 7600 series router. For a complete reference of related documentation, refer to the *Cisco 7600 Series Routers Documentation Roadmap* located at the following URL:

[http://www.cisco.com/en/US/products/hw/routers/ps368/products\\_documentation\\_roadmaps\\_list.html](http://www.cisco.com/en/US/products/hw/routers/ps368/products_documentation_roadmaps_list.html)

## Other Cisco IOS Software Publications

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

[http://www.cisco.com/en/US/products/sw/iosswrel/tsd\\_products\\_support\\_category\\_home.html](http://www.cisco.com/en/US/products/sw/iosswrel/tsd_products_support_category_home.html)

## Cisco IOS Release 12.2SR Software Publications

Documentation for Cisco IOS Release 12.2SR, including command reference and system error messages, can be found at the following URL:

[http://www.cisco.com/en/US/products/ps6922/tsd\\_products\\_support\\_series\\_home.html](http://www.cisco.com/en/US/products/ps6922/tsd_products_support_series_home.html)

## 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 documentation uses the following conventions:

Convention	Description
<b>^</b> or <b>Ctrl</b>	The <b>^</b> and <b>Ctrl</b> symbols represent the Control key. For example, the key combination <b>^D</b> or <b>Ctrl-D</b> means hold down the <b>Control</b> key while you press the <b>D</b> key. Keys are indicated in capital letters but are not case sensitive.
<i>string</i>	A string is a nonquoted set of characters shown in italics. For example, when setting an SNMP <i>community</i> string to <i>public</i> , do not use quotation marks around the string or the string will include the quotation marks.

Command syntax descriptions use the following conventions:

Convention	Description
<b>bold</b>	Bold text indicates commands and keywords that you enter exactly as shown.
<i>italics</i>	Italic text indicates arguments for which you supply values.
[x]	Square brackets enclose an optional element (keyword or argument).
	A vertical line indicates a choice within an optional or required set of keywords or arguments.
[x   y]	Square brackets enclosing keywords or arguments separated by a vertical line indicate an optional choice.
{x   y}	Braces enclosing keywords or arguments separated by a vertical line indicate a required choice.

Nested sets of square brackets or braces indicate optional or required choices within optional or required elements. For example:

Convention	Description
[x {y   z}]	Braces and a vertical line within square brackets indicate a required choice within an optional element.

Examples use the following conventions:

Convention	Description
screen	Examples of information displayed on the screen are set in Courier font.
<b>bold screen</b>	Examples of text that you must enter are set in Courier bold font.
< >	Angle brackets enclose text that is not printed to the screen, such as passwords.
!	An exclamation point at the beginning of a line indicates a comment line. (Exclamation points are also displayed by the Cisco IOS software for certain processes.)
[ ]	Square brackets enclose default responses to system prompts.

The following conventions are used to attract the attention of the reader:



**Caution**

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



**Note**

Means *reader take note*. Notes contain helpful suggestions or references to materials that may not be contained in this manual.



**Tip**

Means *the following information will help you solve a problem*. The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.

# Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>