



# Release Notes for Cisco IOS XR Software Release 3.2.0

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July 7, 2005

Cisco IOS XR Software Release 3.2.0

Text Part Number OL-7276-01



**Note**

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Please see the [“Important Notes” section on page 15](#) for important information on Cisco IOS XR Software Release 3.2.0.

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**Note**

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You can find the most current Cisco IOS XR software documentation on the World Wide Web at [http://www.cisco.com/en/US/products/ps5845/tsd\\_products\\_support\\_series\\_home.html](http://www.cisco.com/en/US/products/ps5845/tsd_products_support_series_home.html). These electronic documents may contain updates and modifications. See the [“Obtaining Documentation” section on page 20](#) for more information on obtaining Cisco documentation.

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These release notes describe the features provided in Cisco IOS XR Software Release 3.2.0 and are updated as needed.

For a list of software caveats that apply to Cisco IOS XR Software Release 3.2.0, see the [“Caveats” section on page 16](#). The caveats are updated for every release and are located on the World Wide Web at [www.cisco.com](http://www.cisco.com).

We recommend that you view the field notices for this release to see if your software or hardware platforms are affected, at [http://www.cisco.com/public/support/tac/fn\\_index.html](http://www.cisco.com/public/support/tac/fn_index.html).



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## Introduction

Cisco IOS XR software is a distributed operating system designed for continuous system operation combined with service flexibility and high performance.

Cisco IOS XR software provides the following features and benefits:

- **IP and Routing**—Supports a wide range of IPv4 and IPv6 services, and routing protocols; such as Border Gateway Protocol (BGP), Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), IP Multicast, Routing Policy Language (RPL), and Hot Standby Router Protocol (HSRP)/Virtual Router Redundancy Protocol features (VRRP).
- **MPLS**—Supports Multiprotocol Label Switching (MPLS) protocols such as Traffic Engineering (TE), Resource Reservation Protocol (RSVP), and Label Distribution Protocol (LDP).
- **Multicast**—Provides comprehensive IP Multicast software including Source Specific Multicast (SSM). The Cisco CRS-1 platform supports Bidirectional Protocol Independent Multicast (BIDIR-PIM).
- **Quality of service (QoS)**—Supports a rich QoS mechanisms including policing, marking, queuing, dropping, and shaping. Additionally the operating systems support Modular QoS CLI (MQC). MQC is used to configure various QoS features on various Cisco platforms.
- **Manageability**—Provides industry-standard management interfaces including modular command-line interface (CLI), Simple Network Management Protocol (SNMP), and native Extensible Markup Language (XML) interfaces.
- **Security**—Provides comprehensive network security features including access control lists (ACLs), routing authentications, AAA/TACACS+, Secure Shell (SSH), SNMPv3, and leading Routing Policy Language (RPL) support. Control-plane protections integrated into line card ASICs include Generalized TTL Security Mechanism (GTSM), RFC 3682, and dynamic control plane protection.

- The Craft Works Interface (CWI) is a client-side application used to configure and manage Cisco routers. The management and configuration features include fault, configuration, security, and inventory, with an emphasis on speed and efficiency. The CWI provides a context-sensitive graphical representation of the objects in a Cisco router, simplifying the process of configuring and managing the router. The CWI allows you to log in to multiple routers and perform management tasks.
- Availability—Supports rich availability features such as fault containment, fault tolerance, fast switchover, link aggregation, and nonstop forwarding (NSF).
- In Service Software Upgrade (ISSU)—Supports a modular-packaging-based release model in order to minimize impact of upgrades and supports ISSU with NSF, where possible.

See the [“New and Changed Information” section on page 13](#) for a detailed list of new features by platform for Cisco IOS XR Software Release 3.2.0.

## System Requirements

The Cisco IOS XR Software Release 3.2.0 is supported on the following platforms:

- [Cisco CRS-1, page 3](#)
- [Cisco XR 12000 Series Router, page 8](#)

## Cisco CRS-1

This section describes the system requirements for Cisco IOS XR Software Release 3.2.0 supported on Cisco CRS-1 routers and includes the following information:

- [Feature Set Table, page 3](#)
- [Memory Requirements, page 5](#)
- [Hardware Supported, page 5](#)
- [Software Compatibility, page 7](#)
- [Determining the Software Version, page 7](#)
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## Feature Set Table

The Cisco IOS XR software is packaged in feature sets (also called software images). Each feature set contains a specific set of Cisco IOS XR Software Release 3.2.0 features. [Table 1](#) and [Table 2](#) list the Cisco IOS XR software feature set matrix and associated filenames available for the Cisco IOS XR Software Release 3.2.0 supported on the Cisco CRS-1.

**Table 1 Cisco CRS-1 Supported Feature Sets (Cisco IOS XR Software Release 3.2.0 PIE Files)**

Feature Set	Filename	Description
<b>Composite Package</b>		
Cisco IOS XR IP Unicast Routing Core Bundle	comp-hfr-mini.pie-3.2.0	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, and Routing packages.
<b>Optional Individual Packages<sup>1</sup></b>		
Cisco IOS XR Manageability Package	hfr-mgbl-p.pie-3.2.0	CORBA agent, XML Parser, HTTP server, SNMP Agent, and Alarm correlation.
Cisco IOS XR MPLS Package	hfr-mpls-p.pie-3.2.0	MPLS-TE, LDP, MPLS-TE Link Management, MPLS Forwarding, MPLS Static, Optical Link Management, OUNI, and RSVP.
Cisco IOS XR Multicast Package	hfr-mcast-p.pie-3.2.0	Multicast Routing Protocols (PIM, MSDP, IGMP, Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB, MURIB, MFWD), and BIDIR.
Cisco IOS XR Security Package	hfr-k9sec-p.pie-3.2.0	Support for Encryption, Decryption, IPSec, SSH, SSL, and PKI.

1. Packages are installed individually.

**Table 2 Cisco CRS-1 Supported Feature Sets (Cisco IOS XR Software Release 3.2.0 TAR Files)**

Feature Set	Filename	Description
Cisco IOS XR RP Control Plane Software	CRS-1-iosxr-3.2.0.tar	Tar file containing: <ul style="list-style-type: none"> <li>• Cisco IOS XR IP Unicast Routing Core Bundle</li> <li>• Cisco IOS XR Manageability Package</li> <li>• Cisco IOS XR MPLS Package</li> <li>• Cisco IOS XR Multicast Package</li> </ul>
Cisco IOS XR RP Control Plane Software with Encryption	CRS-1-iosxr-k9-3.2.0.tar	Tar file containing: <ul style="list-style-type: none"> <li>• Cisco IOS XR IP Unicast Routing Core Bundle</li> <li>• Cisco IOS XR Manageability Package</li> <li>• Cisco IOS XR MPLS Package</li> <li>• Cisco IOS XR Multicast Package</li> <li>• Cisco IOS XR Security Package</li> </ul>

## Memory Requirements

The minimum memory requirements for Cisco CRS-1 routers running Cisco IOS XR Software Release 3.2.0 are:

- 2-GB memory on the route processors (RPs)
- 1-GB memory on the modular services cards (MSCs)

## Hardware Supported

Cisco IOS XR Software Release 3.2.0 supports Cisco CRS-1 routers. All hardware features are supported on Cisco IOS XR software, subject to the memory requirements specified in the [“Memory Requirements” section on page 5](#).

[Table 3](#) lists the hardware components supported on the Cisco CRS-1 and the minimum software versions required. See the [“Determining the Software Version” section on page 7](#).

**Table 3 Cisco CRS-1 Supported Hardware and Minimum Software Requirements**

Component	Part Number	Minimum Software Version Required
<b>Cisco CRS-1 Series 16-Slot Line Card Chassis</b>		
Cisco CRS-1 16-Slot Line Card Chassis	CRS-16-LCC	2.0.0
Cisco CRS-1 Fan Tray for 16-Slot LCC	CRS-16-LCC-FAN-TR	2.0.0
Cisco CRS-1 16-Slot Fabric Card / Single	CRS-16-FC/S	2.0.0
Cisco CRS-1 Fan Controller for 16-Slot Line Card Chassis	CRS-16-LCC-FAN-CT	2.0.0
Cisco CRS-1 16-Slot Route Processor	CRS-16-RP	2.0.0
Cisco CRS-1 Memory Module 2 GB	CRS-MEM-2G	2.0.0
Cisco CRS-1 PCMCIA Flash Disk 1 GB	CRS-FLASH-DISK-1G	2.0.0
Cisco CRS-1 Modular Services Card	CRS-MSC	2.0.0
Cisco CRS-1 LCC Front AC Power Panel	CRS-16-ACGRILLE	2.0.0
Cisco CRS-1 LCC Front DC Power Panel	CRS-16-DCGRILLE	2.0.0
Cisco CRS-1 16-Slot Alarm Board	CRS-16-ALARM	2.0.0
Cisco CRS-1 AC Delta Power Shelf for 16-Slot LCC	CRS-16-LCC-PS-ACD	2.0.0
Cisco CRS-1 AC Wye Power Shelf for 16-Slot LCC	CRS-16-LCC-PS-ACW	2.0.0
Cisco CRS-1 DC Power Shelf for 16-Slot LCC	CRS-1-LCC-PS-DC	2.0.0
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/VS	4OC192-POS/DPT-VS	2.0.0
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/SR	4OC192-POS/DPT-SR	2.0.0
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/IR	4OC192-POS/DPT-IR	2.0.0
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/LR	4OC192-POS/DPT-LR	2.0.0
Cisco CRS-1 16xOC-48/STM16 POS/DPT Interface Module	16OC48-POS/DPT	2.0.0
Cisco CRS-1 2.5 G SFP LR Optic	POM-OC48-LR2-LC-C	2.0.0
Cisco CRS-1 2.5 G SFP SR Optic	POM-OC48-SR-LC-C	2.0.0
Cisco CRS-1 Line Card Chassis Front Doors	CRS-16-LCC-DRS-F	2.0.0

**Table 3 Cisco CRS-1 Supported Hardware and Minimum Software Requirements (Continued)**

<b>Component</b>	<b>Part Number</b>	<b>Minimum Software Version Required</b>
Cisco CRS-1 Line Card Chassis Front Cable Mgmt	CRS-16-LCC-FRNT	2.0.0
Cisco CRS-1 LCC Expanded Front Cable Mgmt	CRS-16-LCC-FRNT-E	2.0.0
Cisco CRS-1 Line Card Chassis Rear Cable Mgmt	CRS-16-LCC-BCK-CM	2.0.0
Cisco CRS-1 Line Card Chassis Rear Doors	CRS-16-LCC-DRS-R	2.0.0
Cisco CRS-1 Lift for LCC 16 and FCC	CRS-16-LIFT	2.0.0
<b>Cisco CRS-1 Series 8-Slot Line Card Chassis</b>		
Cisco CRS-1 8-Slot Line Card Chassis	CRS-8-LCC	3.0.0
Cisco CRS-1 Fan Tray for 8-Slot Line Card Chassis	CRS-8-LCC-FAN-TR	3.0.0
Cisco CRS-1 Line Card Chassis Filter Pack	CRS-8-LCC-FILTER	3.0.0
Cisco CRS-1 AC Pwr Rectifier for 8-Slot LCC	CRS-8-AC-RECT	3.0.0
Cisco CRS-1 DC Power Entry Module for 8-Slot LCC	CRS-8-DC-PEM	3.0.0
Cisco CRS-1 AC & DC Power Module Filter for 8-Slot LCC	CRS-8-PWR-FILTER	3.0.0
Cisco CRS-1 AC Delta PDU for CRS-8 LCC	CRS-8-LCC-PDU-ACD	3.0.0
Cisco CRS-1 AC Wye PDU for CRS-8 LCC	CRS-8-LCC-PDU-ACW	3.0.0
Cisco CRS-1 DC PDU for CRS-8 LCC	CRS-8-LCC-PDU-DC	3.0.0
Cisco CRS-1 8-Slot Fabric Card / Single	CRS-8-FC/S	3.0.0
Cisco CRS-1 8-Slot Fabric Card Blank	CRS-8-FC-BLANK	3.0.0
Cisco CRS-1 8-Slot Fabric Handle	CRS-8-FC-HANDLE	3.0.0
Cisco CRS-1 8-Slot Route Processor	CRS-8-RP	3.0.0
Cisco CRS-1 8-Slot Route Processor Blank	CRS-8-RP-BLANK	3.0.0
Cisco CRS-1 8-Slot Route Processor Handle	CRS-8-RP-HANDLE	3.0.0
Cisco CRS-1 8x10 GbE Interface Module/LR	8-10GBE	3.0.0
10GBASE-LR XENPAK Module for CRS-1	CRS-XENPAK10GB-LR	3.0.0
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/LR	4OC192-POS/DPT-LR	3.0.0
Cisco CRS-1 1xOC-768/STM256 POS Interface Module/SR	1OC768-POS-SR	3.0.0
Cisco CRS-1 8-Slot Install Kit	CRS-8-INSTALL-KT	N/A
Cisco CRS-1 8-Slot Fork Lift Tube	CRS-8-LIFT-TUBE	N/A
Cisco CRS-1 8-Slot Front Badge Panel	CRS-8-BDG-PANEL	N/A
Cisco CRS-1 8-Slot Front Inlet Grill	CRS-8-FRNT-GRILL	N/A
Cisco CRS-1 8-Slot Horizontal Install Rails	CRS-8-HRZ-RAILS	N/A
Cisco Carrier 1 Series SPA SPA Interface Processor 40G	CRS1-SIP-800	3.2.0
Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with XFP Optics	SPA-OC192POS-XFP	3.2.0
Cisco 8-Port Gigabit Ethernet Shared Port Adapter	SPA-8X1GE	3.2.0
Cisco 4-Port OC-3 Shared Port Adapter	SPA-4XOC3-POS	3.2.0

## Software Compatibility

Cisco IOS XR Software Release 3.2.0 is compatible with the Cisco CRS-1 systems:

- Cisco CRS-1 8-Slot Line Card Chassis
- Cisco CRS-1 16-Slot Line Card Chassis

## Determining the Software Version

To determine the version of Cisco IOS XR software running on your router, log in to the router and enter the **show version** command:

**Step 1** Establish a Telnet session with the router.

**Step 2** Enter the **show version** command:

```
RP/0/RP0/CPU0:router# show version
```

The following version information is displayed:

```
Cisco IOS-XR Software, Version 3.2.0[Default]
Copyright (c) 2005 by cisco Systems, Inc.

ROM: System Bootstrap, Version 1.19(20041215:203844) [CRS-1 ROMMON],

router uptime is 4 hours, 14 minutes
System image file is "tftp://crs-1/images/comp-hfr-mini.vm"

cisco CRS-16/S (7455) processor with 4194304K bytes of memory.
7455 processor at 800Mhz, Revision 3.4

8 Packet over SONET network interface(s)
8 SONET/SDH Port controller(s)
1 Ethernet/IEEE 802.3 interface(s)
2043k bytes of non-volatile configuration memory.
11423M bytes of hard disk.
1000592k bytes of ATA PCMCIA card at disk 0 (Sector size 512 bytes).

Package active on node 0/0/SP:
sysdb, V 0.0.22[ci/24], Cisco Systems, at mem:sysdb-0.0.22
  Built on Tue May 24 13:15:34 UTC 2005
  By edde-view2 in /crs-1/images for c2.95.3-p8

hfr-admin, V 3.2.0[Default], Cisco Systems, at mem:hfr-admin-3.2.0
  Built on Tue May 24 10:21:17 UTC 2005
  By edde-view2 in /crs-1/images for c2.95.3-p8

hfr-base, V 3.2.0[Default], Cisco Systems, at mem:hfr-base-3.2.0
  Built on Tue May 24 10:19:01 UTC 2005
  By edde-view2 in /crs-1/images for c2.95.3-p8

hfr-os-mbi, V 3.2.0[Default], Cisco Systems, at mem:hfr-os-mbi-3.2.0
  Built on Tue May 24 10:08:29 UTC 2005
  By edde-view2 in /crs-1/images for c2.95.3-p8

Package active on node 0/0/CPU0:
sysdb, V 0.0.22[ci/24], Cisco Systems, at mem:sysdb-0.0.22
  Built on Tue May 24 13:15:34 UTC 2005
  By edde-view2 in /crs-1/images for c2.95.3-p8
```

```
hfr-1c, V 3.2.0[Default], Cisco Systems, at mem:hfr-1c-3.2.0
  Built on Tue May 24 10:25:24 UTC 2005
  By edde-view2 in /crs-1/images for c2.95.3-p8.
```

## Other Firmware Code

The following firmware code is supported by the Cisco CRS-1 router:

- The minimum ROMMON version required for this release is 1.19b.
- The minimum CPUCNTRL version required for this release is 2.07.
- For detailed information on ROMMON, refer to the *Cisco IOS XR Getting Started Guide*.

## Cisco XR 12000 Series Router

This section describes the system requirements for Cisco IOS XR Software Release 3.2.0 supported on the Cisco XR 12000 Series Router and includes the following information:

- [Feature Set Table, page 8](#)
- [Memory Requirements, page 10](#)
- [Hardware Supported, page 10](#)
- [Software Compatibility, page 11](#)
- [Determining the Software Version, page 11](#)
- [Other Firmware Code, page 12](#)

## Feature Set Table

The Cisco IOS XR software is packaged in feature sets (also called software images). Each feature set contains a specific set of Cisco IOS XR Software Release 3.2.0 features. [Table 4](#) and [Table 5](#) list the Cisco IOS XR software feature set matrix and associated filenames available for Cisco IOS XR Software Release 3.2.0 supported on the Cisco XR 12000 Series Router.

**Table 4** *Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 3.2.0 PIE Files)*

Feature Set	Filename	Description
<b>Composite Package</b>		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.vm-3.2.0	Contains the required core packages including, OS, Admin, Base, Forwarding, Modular Services Card, and Routing packages.

**Table 4 Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 3.2.0 PIE Files) (Continued)**

Feature Set	Filename	Description
<b>Optional Individual Packages<sup>1</sup></b>		
Cisco IOS XR Manageability Package	c12k-mgbl.pie-3.2.0	CORBA agent, XML Parser, HTTP server, SNMP Agent, and Alarm correlation.
Cisco IOS XR MPLS Package	c12k-mpls.pie-3.2.0	MPLS-TE, LDP, MPLS-TE Link Management, MPLS Forwarding, MPLS Static, Optical Link Management, OUNI, and RSVP.
Cisco IOS XR Multicast Package	c12k-mcast.pie-3.2.0	Multicast Routing Protocols (PIM, MSDP, IGMP, Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB, MURIB, MFW).
Cisco IOS XR Security Package	c12k-k9sec.pie-3.2.0	Support for Encryption, Decryption, IPSec, SSH, SSL, and PKI.
Cisco IOS XR Standby RP Boot Image	mbiprp-rp.vm-3.2.0	Support for booting the Standby RP on a Cisco XR 12000 (PRP).

1. Packages are installed individually.

**Table 5 Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 3.2.0 TAR Files)**

Feature Set	Filename	Description
Cisco IOS XR RP Control Plane Software	C12000-iosxr-3.2.0.tar	Tar file containing: <ul style="list-style-type: none"> <li>• Cisco IOS XR IP Unicast Routing Core Bundle</li> <li>• Cisco IOS XR Manageability Package</li> <li>• Cisco IOS XR MPLS Package</li> <li>• Cisco IOS XR Multicast Package</li> </ul>
Cisco IOS XR RP Control Plane Software with Encryption	C12000-iosxr-k9-3.2.0.tar	Tar file containing: <ul style="list-style-type: none"> <li>• Cisco IOS XR IP Unicast Routing Core Bundle</li> <li>• Cisco IOS XR Manageability Package</li> <li>• Cisco IOS XR MPLS Package</li> <li>• Cisco IOS XR Multicast Package</li> <li>• Cisco IOS XR Security Package</li> </ul>

## Memory Requirements

The minimum memory requirements for Cisco XR 12000 Series Router routers running Cisco IOS XR Software Release 3.2.0 are:

- 1-GB route memory on Performance Route Processor 1 (PRP-1) and Performance Route Processor 2 (PRP-2)
- 512-MB ATA flash storage on PRP-1 and PRP-2 (1-GB ATA flash is recommended)
- 512-MB line-card route memory on all line cards installed in the system

## Hardware Supported

Cisco IOS XR Software Release 3.2.0 supports the Cisco XR 12000 Series Router. All hardware features are supported on Cisco IOS XR software, subject to the memory requirements specified in the “[Memory Requirements](#)” section on page 10.

[Table 6](#) lists the hardware components supported on the Cisco XR 12000 Series Router and the minimum software versions required. See the “[Determining the Software Version](#)” section on page 11.

**Table 6 Cisco XR 12000 Series Router Supported Hardware and Minimum Software Requirements**

Component	Part Number	Minimum Software Version Required
Cisco XR 12000 Series 12404/80 Chassis	GSR4/80-xx	3.2.0
Cisco XR 12000 Series 12406/120 Chassis	GSR6/120-AC	3.2.0
Cisco XR 12000 Series 12410/200 Chassis	GSR10/200-xx	3.2.0
Cisco XR 12000 Series 12416/320 Chassis	GSR16/320-xx	3.2.0
Cisco XR 12000 Series Performance Route Processor 1 (PRP-2 is strongly recommended)	PRP-1	3.2.0
Cisco XR 12000 Series Performance Route Processor 2	PRP-2	3.2.0
Cisco 12000 Series 40 GB Hard Drive Option	HD-PRP2-40G	3.2.0
Cisco 12000 Series 4xOC12c/STM4c POS Intermediate Reach Single-Mode optics	4OC12X/POS-I-SC-B	3.2.0
Cisco 12000 Series 4xOC12c/STM4c POS Short Reach Multi-Mode optics	4OC12X/POS-M-SC-B	3.2.0
Cisco 12000 Series 16xOC3c/STM1c POS Short Reach Multi-Mode optics	16OC3X/POS-M-MJ-B	3.2.0
Cisco 12000 Series 16xOC3c/STM1c POS Intermediate Reach Single-Mode optics	16OC3X/POS-I-LC-B	3.2.0
Cisco 12000 Series 8xOC3c/STM1c POS Short Reach Multi-Mode optics	8OC3X/POS-MM-MJ-B	3.2.0
Cisco 12000 Series 8xOC3c/STM1c POS Intermediate Reach Single-Mode optics	8OC3X/POS-IR-LC-B	3.2.0
Cisco 12000 Series 4xOC3c/STM1c POS Short Reach Multi-Mode optics	4OC3X/POS-MM-MJ-B	3.2.0

**Table 6** Cisco XR 12000 Series Router Supported Hardware and Minimum Software Requirements (Continued)

Component	Part Number	Minimum Software Version Required
Cisco 12000 Series 4xOC3c/STM1c POS Intermediate Reach Single-Mode optics	4OC3X/POS-IR-LC-B	3.2.0
Cisco 12000 Series 4xOC3c/STM1c POS Long Reach Single-Mode optics	4OC3X/POS-LR-LC-B	3.2.0
Cisco 12000 Series 1xOC48c/STM16c POS Short Reach Single-Mode optics	OC48X/POS-SR-SC	3.2.0
Cisco 12000 Series 1xOC48c/STM16c POS Long Reach Single-Mode optics	OC48X/POS-LR-SC	3.2.0
Cisco 12000 Series 4xGE with SFP optics	4GE-SFP-LC	3.2.0
Cisco 12000 Series SPA Interface Processor 10G	12000-SIP-600	3.2.0
Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with VSR Optics	SPA-OC192-POS-VSR	3.2.0
Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with LR Optics	SPA-OC192-POS-LR	3.2.0
Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with XFP Optics	SPA-OC192-POS-XFP	3.2.0
Cisco 5-Port Gigabit Ethernet Shared Port Adapter with SFPoptics	SPA-5X1GE	3.2.0
Cisco 10-Port Gigabit Ethernet Shared Port Adapter with SFPoptics	SPA-10X1GE	3.2.0
Cisco 1-Port 10 Gigabit Ethernet Shared Port Adapter with XFPoptics	SPA-1XTENGE-XFP	3.2.0

## Software Compatibility

Cisco IOS XR Software Release 3.2.0 is compatible with the Cisco XR 12000 Series Router systems:

- Cisco XR 12404 Router
- Cisco XR 12406 Router
- Cisco XR 12410 Router
- Cisco XR 12416 Router

For the existing installed base, the following chassis are supported:

- Cisco 12008 Router
- Cisco 12012 Router

## Determining the Software Version

To determine the version of Cisco IOS XR software running on your router, log in to the router and enter the **show version** command:

**Step 1** Establish a Telnet session with the router.

**Step 2** Enter the **show version** command:

```
RP/0/0/CPU0:router# show version
```

The following version information is displayed:

```
Cisco IOS-XR Software, Version 3.2.0[Default]
Copyright (c) 2005 by cisco Systems, Inc.

ROM: System Bootstrap, Version 12.0(20040624:164256) [assafb-misc1 1.14dev(0.91)
] DEVELOPMENT SOFTWARE
Copyright (, Inc.
BOOTFLASH: GS Software (C12KPRP-BOOT-M), Version 12.0(30)S, RELEASE SOFTWARE (f
c1)

router uptime is 4 days, 14 hours, 5 minutes
System image file is "tftp://xr12000/images/c12k-mini.vm.ins2"

cisco 12410/PRP (7450) processor with 524288K bytes of memory.
7450 processor at 666Mhz, Revision 2.1

2 Cisco 12000 Series Performance Route Processors
1 8 port ISE OC3 Controller (8 POS)
1 4 Port ISE Packet Over SONET OC-12c/STM-4 Controller (4 POS)
2 Cisco 12000 4 Port Gigabit Ethernet Controllers (8 GigabitEthernet)
2 1 Port ISE Packet Over SONET OC-48c/STM-16 Controllers (2 POS)
14 Packet over SONET network interface(s)
14 SONET/SDH Port controller(s)
2 PLIM QoS controller(s)
2 Ethernet/IEEE 802.3 interface(s)
8 GigabitEthernet/IEEE 802.3 interface(s)
2042k bytes of non-volatile configuration memory.
250452k bytes of ATA PCMCIA card at disk 0 (Sector size 512 bytes).
62576k bytes of ATA PCMCIA card at disk 1 (Sector size 512 bytes).
65536k bytes of Flash internal SIMM (Sector size 256k).

Configuration register on node 0/0/CPU0 is 0x0
Package active on node 0/0/CPU0:
c12k-mgbl, V 3.2.0[Default], Cisco Systems, at mem:c12k-mgbl-3.2.0 Built on Fri Jun 10
16:15:38 PST 2005
    By edde-view5 in /xr12000/images for c2.95.3-p8

c12k-rout, V 3.2.0[Default], Cisco Systems, at mem:c12k-rout-3.2.0
    Built on Tue May 10 16:41:01 PST 2005
    By edde-view5 in /xr12000/images for c2.95.3-p8

c12k-lc, V 3.2.0[Default], Cisco Systems, at mem:c12k-lc-3.2.0
    Built on Tue May 10 16:40:46 PST 2005
    By edde-view5 in /xr12000/images for c2.95.3-p8
.
.
.
```

## Other Firmware Code

The following firmware code is supported by the Cisco XR 12000 Series Router:

- The minimum ROMMON version required for this release is 1.15. For more information on the minimum ROMMON version required for this release, ROMMON upgrade procedures, and flashdisk information, see the *Upgrading from Cisco IOS to Cisco IOS XR Software on the Cisco 12000 Series Router* document.
- The flashdisk Cisco part numbers are: MEM-12KRP-FD512M (=) and MEM-12KRP-FD1G(=)

# New and Changed Information

The following sections contain information on new features in Cisco IOS XR Software Release 3.2.0:

- [New Software Features in Cisco IOS XR Software Release 3.2.0, page 13](#)
- [New Hardware Features Supported in Cisco IOS XR Software Release 3.2.0, page 14](#)

## New Software Features in Cisco IOS XR Software Release 3.2.0

The following are new features in Cisco IOS XR Software Release 3.2.0 supported on the Cisco CRS-1 and Cisco XR 12000 Series Router platforms:

- IPv6 equal-cost multipath protocol (ECMP) is supported.
- OSPF Interior Gateway Protocol (IGP) fast convergence reduces the amount of time required to detect a failed routing neighbor, enabling the network to converge more quickly during a link or router failure. Fast convergence is configured by setting shortest path first (SPF) and link-state advertisement (LSA) throttle timers. OSPF LSA throttling provides a dynamic mechanism to slow down LSA updates in OSPF during network instability. LSA throttling also allows faster OSPF convergence by providing LSA rate limiting in milliseconds.
- OSPF graceful restart allows OSPF router to stay on a forwarding path as the OSPF software is restarted. This is compliant with RFC 3623.
- IP Security (IPSec) is supported for OSPFv3.
- OSPF graceful shutdown and out of memory (OOM) is supported.
- IS-IS suppress IP prefixes allows adjacencies to be formed but does not advertise connected prefixes.
- IS-IS out of memory is supported.
- Routing Policy Language (RPL) for IPv6, community range, and OSPFv3 is supported.
- BGP next-hop tracking, hide local AS, out of memory, and selection of multiple next hops is supported.
- Multicast Internet Group Management Protocol (IGMP) NSF is supported.
- MPLS RSVP prefix filtering provides for the configuration of extended access lists (ACLs) to forward, drop, or perform normal processing on RSVP Router-Alert (RA) packets. Prefix-filtering is designed for use at core access routers so that RA packets (identified by a source/destination address) can be seamlessly forwarded across the core from one access point to another (or, conversely to be dropped at this node). RSVP applies prefix filtering rules only to RA packets, because RA packets contain source and destination addresses of the RSVP flow.
- MPLS Label Distribution Protocol (LDP) outbound filtering allows outbound filtering for local label advertisement for one or more prefixes to one or more peers.
- MPLS LDP and Traffic Engineering (TE) over Gigabit Ethernet (GE) and RSVP bundling messages scalability is supported.
- Network management features including configuration replace, rollback in configuration mode, PERL scripting framework, SSH transport support for extensible markup language (XML), XML alarm notification over XML, multiple interface monitor command support, and 64-bit timestamp is supported.
- RADIUS client functionality including RADIUS Authentication, Authorization and RADIUS Accounting. This release also supports Task ID Based Authorization for RADIUS.

### Cisco CRS-1-specific Features

The following are new features in Cisco IOS XR Software Release 3.2.0 supported only on the Cisco CRS-1 platform:

- Link bundling allows a bundle of Ethernet or Packet-over-SONET (PoS) interfaces containing one or more ports to be aggregated together and treated as a single link. Link bundling allows multiple links to span several line cards to form a single interface, preventing the failure of a single link from causing a connectivity loss. Bundled interfaces increase bandwidth availability, because traffic is forwarded over all available members of the bundle.
- IPv6 Multicast routing, a bandwidth-conserving technology, reduces traffic by simultaneously delivering a single stream of information to potentially thousands of corporate recipients and homes. Multicast routing allows a host to send packets to a subset of all hosts as a group transmission rather than to a single host, as in unicast transmission, or to all hosts, as in broadcast transmission.
- IPv6 quality of service (QoS) prioritizes IPv6 traffic flows and provides preferential forwarding for higher-priority packets.
- IPv6 nonstop forwarding (NSF) allows for the forwarding of data packets to continue along known routes while routing protocol information is being restored following a switchover.
- QoS match differentiated services code point (DSCP) and precedence is supported.
- Bidirectional forwarding detection (BFD) provides low-overhead, short-duration detection of failures in the path between adjacent forwarding engines. BFD allows a single mechanism to be used for failure detection over any media and at any protocol layer, with a wide range of detection times and overhead. The fast detection of failures provides immediate reaction to failure in the event of a failed link or neighbor. OSPF, ISIS, BGP and MPLS-TE FRR use BFD to detect failures.
- Multicast bootstrap router is supported.
- Secure Shell (SSH) source address is supported.
- Sampled Netflow (IPv4).

### Cisco XR 12000 Series Router-specific Features

The following are new features in Cisco IOS XR Software Release 3.2.0 supported only on the Cisco XR 12000 Series Router platform:

- A logical router is a technology that allows a single physical router to be partitioned into multiple logical entities, each with its own dedicated route processor (RP) and line card (LC). The logical router boundaries are defined by RPs and LC. The Cisco IOS XR software definition of logical routers is clearly distinct from other logical router concepts in that other implementations are based on software partitioning of existing hardware resources.
- MPLS fast reroute (FRR) provides link protection to label switched paths (LSPs) enabling the traffic carried by LSPs that encounter a failed link to be rerouted around the failure. FRR is supported on POS interfaces. (Note: This feature is already supported on the Cisco CRS-1.)

## New Hardware Features Supported in Cisco IOS XR Software Release 3.2.0

The following are new hardware features supported in Cisco IOS XR Software Release 3.2.0:

- Cisco CRS-1 hardware
  - Cisco Carrier 1 Series SPA SPA Interface Processor 40G (CRS1-SIP-800)
  - Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with XFP Optics (SPA-OC192-POS-XFP)

- Cisco 8-Port Gigabit Ethernet Shared Port Adapter (SPA-8X1GE)
- Cisco 4-Port OC-3 Shared Port Adapter (SPA-4XOC3-POS)
- Cisco XR 12000 Series Router hardware
  - Cisco 12000 Series SPA Interface Processor 10G (12000-SIP-600)
  - Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with VSR Optics (SPA-OC192-POS-VSR)
  - Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with LR Optics (SPA-OC192-POS-LR)
  - Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with XFP Optics (SPA-OC192-POS-XFP)
  - Cisco 5-Port Gigabit Ethernet Shared Port Adapter with SFPoptics (SPA-5X1GE)
  - Cisco 10-Port Gigabit Ethernet Shared Port Adapter with SFPoptics (SPA-10X1GE)
  - Cisco 1-Port 10 Gigabit Ethernet Shared Port Adapter with XFPoptics (SPA-1XTENGE-XFP)

See the *Cisco CRS-1 SIP and SPA Configuration Guide, Cisco IOS XR Software Release 3.2* for detailed information on the shared port adapters (SPAs) and SPA interface processors (SIPs).

## Important Notes

In certain countries, use of these products may be prohibited and subject to laws, regulations, or licenses, including requirements applicable to the use of the products under telecommunications and other laws and regulations; customers must comply with all such applicable laws in the countries in which they intend to use the products.

When upgrading a Cisco XR 12000 Series Router from Cisco IOS to Cisco IOS XR software, follow the upgrade instructions provided to minimize traffic impact. For detailed instructions, see the *Upgrading from Cisco IOS to Cisco IOS XR Software on the Cisco 12000 Series Router, Release 3.2* document for procedures.

Follow the instructions provided by Cisco for all card removal and replacement (fabric cards, LC, fan controller and RP, and so on) to avoid impact to traffic. See the *Cisco IOS XR Getting Started Guide* for procedures.

If you intend to test beyond combined maximum configuration tested and published by Cisco, please contact your Cisco representative to discuss how to engineer a large-scale configuration maximum for your testing.

The Cisco SIP-600 line cards introduced in this release draw more power than previous line cards. Depending on the exact configuration of power entry modules (PEMs) and other cards in the chassis, there may not be enough power available when inserting a new card or removing a PEM. The admin command **show environment power-supply table** helps plan the power budget for the chassis. Before inserting a new card (of any type, not just a line card) or removing a PEM, execute the following command:

```
RP/0/0/CPU0:router# admin show environment power-supply table
              48V      Current
R/S/I   Module   (V)      (A)
0/24/*   PEM1       54        4
          PEM2       53        4
0/25/*   PEM1       54        4
          PEM2       53        4
```

```

Total Power Supplies:          3200W
Redundant Power Supplies:     1600W
Worst Case Power Used:        621W
Current Power Used:           428W
Current Redundant Power Available: 1172W
Current Total Power Available: 2772W
Worst Case Redundant Power Available: 979W
Worst Case Total Power Available: 2579W

```

PID	Description	Watts
---	-----	----
GRP-B	Route Processor	38
PRP-1	Cisco 12000 Series Performance Route Processor	60
LC-40C-3-POS-SM	4 Port Packet Over SONET OC-3c/STM-1	80
40C3X/POS-MM-MJ-B	4 port ISE OC3	90
.		
.		
.		

If you plan to insert a new card, locate the entry for the card to be inserted and note the power consumed by it. If this power is less than the figure given in Worst Case Redundant Power Available (the figure is displayed in the **show environment power-supply table** command output), the card can be safely inserted. As long as the Worst Case Redundant Power Available is not zero, a PEM can be powered down for replacement without impact.



**Note**

No alerts are issued if more cards are inserted than the PEMs can support. It is your responsibility to determine your power budget for the chassis before making any changes to it. Exceeding the power budget may result in the PEM being overloaded and cards powering down due to insufficient power being provided.

## Caveats

Caveats describe unexpected behavior in Cisco IOS XR software releases. Severity 1 caveats are the most serious caveats; severity 2 caveats are less serious.

### Release 3.0 Caveats Resolved in Release 3.2.0

This section lists the resolved caveats for Cisco IOS XR Software Release 3.2.0.

- **CSCef02773**  
Configuring the global default authorization method list does not enforce authorization on the lines or interfaces.
- **CSCef52683**  
Spurious Simple Network Management Protocol (SNMP) warning message occurs under certain conditions after a modular services card (MSC) OIR.
- **CSCef83884**  
MPLS forwarding may show stale label entries.

- **CSCef82239**

Hardware counters are not updated when log option is enabled for IPv6 access list (ACL) and that ACL is used as the access group on an interface in egress direction.

- **CSCef18563**

The `pfilter_ea` process can experience a small degree of memory leak.

## Open Caveats—Release 3.2.0

This section lists the caveats for Cisco IOS XR Software Release 3.2.0. The caveats are organized as follows:

- [Platform-Independent Caveats, page 17](#)
- [Cisco CRS-1-specific Caveats, page 18](#)
- [Cisco XR 12000 Series Router-specific Caveats, page 18](#)

### Platform-Independent Caveats

The following caveats apply to both platforms:

- **CSCei14219**

**Basic Description:** LDP installs "Unlabeled" as outgoing labels for prefixes over traffic-engineering tunnel interface (tunnel-te interface) after RP failover (FO) is performed.

**Symptom:** The traffic is not taking LDP label after RP FO, because prefixes pointing to a tunnel-te interface are marked as Unlabeled in the `show mpls forwarding` command output. Furthermore, LDP targeted session over tunnel-te interface does not seem to come up.

**Conditions:** When MPLS LDP is enabled on a tunnel-te interface and prefixes are learned over that tunnel-te interface with the `autoroute announce` command, labels are assigned to these prefixes pointing to the tunnel-te interface. After an RP switchover, these prefixes are marked as Unlabeled.

**Workaround:** Restart the `mpls_ldp` process with the `process restart mpls_ldp` command.

- **CSCei02630**

**Basic Description:** TURBOBOOT (cold boot) procedure with the `clean` option cleans all files on boot disk (disk0:) of all non-dSC RPs.

**Symptom:** The TURBOBOOT procedure used with the `clean` option cleans only the package files on the boot disk (typically disk0:) on the dSC. However, on all other RPs in the system all files on the boot disk will be deleted (including any user or configuration files).

The configuration for non-owner LRs is stored on the boot device of those RPs of the LRs (not the dSC). So if a TURBOBOOT is issued with the `clean` option when LRs are carved out, this has the effect of deleting the configuration on any non-owner LRs.

**Conditions:** All package and user files on disk0: are deleted when diskboot starts on the non-dSC RPs.

**Workaround:** The user should back up any configuration for non-owner LRs before starting the TURBOBOOT and reapply this configuration manually when the TURBOBOOT has completed.

Also, any other user files on the disk of any RP should be backed up before starting the TURBOBOOT.

- **CSCeh88606**

**Basic Description:** Unconfig and reconfig of address family can cause the BGP peer to remain down.

**Symptom:** IPv4 BGP neighbors do not come up after afi config is restored.

**Conditions:** If the address family IPv4 is restored (config rollback) under router bgp ~3 minutes after the cfg was removed, the IPv4 BGP neighbors do not come back up.

**Workaround:** Restart the BGP process on the RP.

## Cisco CRS-1-specific Caveats

The following caveats are specific to the Cisco CRS-1 platform:

- **CSCei17923**

**Basic Description:** On an 8-slot RP chassis, the **show environment fans** command returns 0 rpm for all fans if RP1 is active and RP0 is standby.

**Symptom:** On an 8-slot RP chassis, if RP1 is active RP and RP0 is booted and in IOS-XR RUN state, then the **show environment fans** command returns 0 rpm for all fans, even though the fans are spinning. Also, the **show environment leds** command returns UNKNOWN for the status of the fan-tray LED, even though the LEDs are green (that is, in the OK state).

**Conditions:** This problem can occur on any 8-slot chassis that has two RPs, with RP1 as the active RP and RP0 in the IOS-XR RUN state.

**Workaround:** The workaround is to run the **show environment fans** command from RP0 on the 8-slot chassis.

- **CSCei17943**

**Basic Description:** Intermittent errors regarding "ECC\_ERROR" or "ASIC errors" are seen when traffic is passing and a bundle is configured or removed or a line card that contains all bundle members is removed and replaced using Online Insertion and Removal (OIR) functionality.

**Symptom:** This problem may cause transient packet loss. In the worst case scenario, these errors can conceivably result in the line card being reset.

**Conditions:** This is a transient issue due to packets arriving during the short interval required to reprogram the hardware.

**Workaround:** Shut down the bundle interface before removing bundle interface.

## Cisco XR 12000 Series Router-specific Caveats

The following caveats are specific to the Cisco XR 12000 Series Router platform:

- **CSCei27436**

**Basic Description:** IPv4 Multicast is not supported on the SIP-600 Engine 5 line card.

**Symptom:** IPv4 Multicast is not supported on the SIP-600 Engine 5 line card.

**Conditions:** IPv4 Multicast is not supported on the SIP-600 Engine 5 line card.

**Workaround:** Use the IPv4 Multicast on Engine 3 line card.

- **CSCeh76018**

**Basic Description:** An invalid boothelper message is displayed when bootflash does not have a requisite boothelper file when installing the Cisco IOS XR software.

**Symptom:** Install Director raises PKG\_PLAT-4-INVALID\_BOOTHELPER\_VERSION warning message indicating the absence of a valid boothelper message. The device continues to boot.

**Conditions:** If Install Director cannot find a boothelper file with the name c12kprp-boot-mz.120-30.S or c12kprp-boot-mz.120-29.2.S on bootflash, it raises a PKG\_PLAT-4-INVALID\_BOOTHELPER\_VERSION warning message. Note that the supported boothelper version is 12.0(30)S and Install Director's check is out of date.

**Workaround:** If the device already has the correct boothelper version, you can either ignore the warning message or make sure that the filename of the boothelper is either c12kprp-boot-mz.120-30.S or c12kprp-boot-mz.120-29.2.S.

## Software Installation Notes

Cisco IOS XR software is installed and activated as modular "packages," allowing specific features or software patches to be installed, upgraded, or downgraded without impacting unrelated processes. In addition, a software package can be upgraded or downgraded on all supported card types, or on a single card (node). Cisco IOS XR software packages are installed from package installation envelopes (PIE) files that contain one or more software components.

Use the procedures in *Upgrading from Cisco IOS to Cisco IOS XR Software on the Cisco 12000 Series Router, Release 3.2* to upgrade a Cisco XR 12000 Series Router from Cisco IOS software 12.0(31)Sa to Cisco IOS XR Software Release 3.2.0.

For information on bringing up a router using the Cisco IOS XR software, refer to the *Cisco IOS XR Getting Started Guide*.

## Troubleshooting

Refer to the *Cisco IOS XR Getting Started Guide* for information on troubleshooting the Cisco IOS XR software.

## Related Documentation

The following sections describe the documentation available for the Cisco CRS-1 and Cisco XR 12000 Series Router. These documents consist of hardware and software installation guides, Cisco IOS XR software configuration and command references, feature modules, and other documents.

Documentation is available as electronic documents, which are available online on Cisco.com.

Use these release notes with these documents:

- [Hardware Documents, page 20](#)
- [Software Documents, page 20](#)

## Hardware Documents

You can find the most current hardware documentation at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/core/crs/index.htm>

## Software Documents

The Cisco IOS XR software documentation set consists of the Cisco IOS XR software configuration guides and command references, a getting started guide, and other supporting documents. Refer to the *About Cisco IOS XR Software Documentation for Release 3.2* for a list of Cisco IOS XR software documentation for Release 3.2.0.

You can find the most current software documentation at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/core/crs/index.htm>

## Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

### Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

[http://www.cisco.com/public/countries\\_languages.shtml](http://www.cisco.com/public/countries_languages.shtml)

### Documentation DVD

Cisco documentation and additional literature are available in a Documentation DVD package, which may have shipped with your product. The Documentation DVD is updated regularly and may be more current than printed documentation. The Documentation DVD package is available as a single unit.

Registered Cisco.com users (Cisco direct customers) can order a Cisco Documentation DVD (product number DOC-DOCDVD=) from the Ordering tool or Cisco Marketplace.

Cisco Ordering tool:

<http://www.cisco.com/en/US/partner/ordering/>

Cisco Marketplace:

<http://www.cisco.com/go/marketplace/>

## Ordering Documentation

You can find instructions for ordering documentation at this URL:

[http://www.cisco.com/univercd/cc/td/doc/es\\_inpck/pdi.htm](http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm)

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:

<http://www.cisco.com/en/US/partner/ordering/>

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

## Documentation Feedback

You can send comments about technical documentation to [bug-doc@cisco.com](mailto:bug-doc@cisco.com).

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems  
Attn: Customer Document Ordering  
170 West Tasman Drive  
San Jose, CA 95134-9883

We appreciate your comments.

## Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

[http://www.cisco.com/en/US/products/products\\_security\\_vulnerability\\_policy.html](http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html)

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

<http://www.cisco.com/go/psirt>

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

[http://www.cisco.com/en/US/products/products\\_psirt\\_rss\\_feed.html](http://www.cisco.com/en/US/products/products_psirt_rss_feed.html)

## Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—[security-alert@cisco.com](mailto:security-alert@cisco.com)
- Nonemergencies—[psirt@cisco.com](mailto:psirt@cisco.com)



### Tip

We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one that has the most recent creation date in this public key server list:

<http://pgp.mit.edu:11371/pks/lookup?search=psirt%40cisco.com&op=index&exact=on>

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

## Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

## Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>



### Note

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID

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or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

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## Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

## Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

**Severity 1 (S1)**—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

**Severity 2 (S2)**—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

**Severity 3 (S3)**—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

**Severity 4 (S4)**—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

# Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

<http://www.cisco.com/go/marketplace/>

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

<http://www.cisco.com/packet>

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

<http://www.cisco.com/go/iqmagazine>

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

<http://www.cisco.com/ipj>

- World-class networking training is available from Cisco. You can view current offerings at this URL:

<http://www.cisco.com/en/US/learning/index.html>

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This document is to be used in conjunction with the documents listed in the “[Related Documentation](#)” section.

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