



Release Notes for Cisco IOS XR Software Release 3.2.4

March 14, 2006

Cisco IOS XR Software Release 3.2.4

Text Part Number OL-8819-03



Note

See the “[Important Notes](#)” section on page 13 for important information on Cisco IOS XR Software Release 3.2.4.



Note

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. These electronic documents might contain updates and modifications. See the “[Obtaining Documentation](#)” section on page 22 for more information on obtaining Cisco documentation.

These release notes describe the features provided in Cisco IOS XR Software Release 3.2.4 and are updated as needed.

For a list of software caveats that apply to Cisco IOS XR Software Release 3.2.4, see the “[Caveats](#)” section on page 15. The caveats are updated for every release and are located on the World Wide Web at 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.



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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).
- *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. (CRS-1 only)
- *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 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.
- *Craft Works Interface (CWI)*—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 to minimize the 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 3.2.4.

System Requirements

The Cisco IOS XR Software Release 3.2.4 is supported on the following platforms:

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

Cisco CRS-1 Router

This section describes the system requirements for Cisco IOS XR Software Release 3.2.4 supported on Cisco CRS-1 routers and includes the following information:

- [Feature Set Table for the Cisco CRS-1 Router, page 4](#)
- [Memory Requirements for the Cisco CRS-1 Router, page 5](#)
- [Hardware Supported for the Cisco CRS-1 Router, page 5](#)
- [Software Compatibility for the Cisco CRS-1 Router, page 7](#)
- [Determining the Software Version for the Cisco CRS-1 Router, page 7](#)
- [Other Firmware Code for the Cisco CRS-1 Router, page 8](#)

Feature Set Table for the Cisco CRS-1 Router

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 3.2.4 features. [Table 1](#) and [Table 2](#) list the Cisco IOS XR software feature set matrix and associated filenames that are available for the Cisco IOS XR Software Release 3.2.4 that is supported on the Cisco CRS-1.

Table 1 Cisco CRS-1 Supported Feature Sets (Cisco IOS XR Software Release 3.2.4 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR Unicast Routing Core Bundle	comp-hfr-mini.pie-3.2.4	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, and Routing packages.
Optional Individual Packages¹		
Cisco IOS XR Manageability Package	hfr-mgbl-p.pie-3.2.4	CORBA agent, XML Parser, HTTP server, SNMP Agent, and Alarm correlation.
Cisco IOS XR MPLS Package	hfr-mpls-p.pie-3.2.4	MPLS-TE, LDP, MPLS-TE Link Management, MPLS Forwarding, Optical Link Management, OUNI, and RSVP.
Cisco IOS XR Multicast Package	hfr-mcast-p.pie-3.2.4	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-3.2.4	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 3.2.4 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	CRS-1-iosxr-3.2.4.tar	Tar file containing: <ul style="list-style-type: none"> • Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package
Cisco IOS XR IP/MPLS Core Software 3DES	CRS-1-iosxr-k9-3.2.4.tar	Tar file containing: <ul style="list-style-type: none"> • Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Security Package

Memory Requirements for the Cisco CRS-1 Router

The minimum memory requirements for a Cisco CRS-1 router running Cisco IOS XR software Release 3.2.4 are:

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

Hardware Supported for the Cisco CRS-1 Router

Cisco IOS XR Software Release 3.2.4 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 for the Cisco CRS-1 Router”](#) section on page 5.

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

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

Component	Part Number	Minimum Software Version Required
Cisco CRS-1 Series 16-Slot Line Card Chassis		
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)

Component	Part Number	Minimum Software Version Required
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
Cisco CRS-1 Series 8-Slot Line Card Chassis		
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
10GBASE-DWDM XENPAK	CRS-1 CRS-XENPAK10GB-DWDM	3.2.2
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 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

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

Component	Part Number	Minimum Software Version Required
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 for the Cisco CRS-1 Router

Cisco IOS XR Software Release 3.2.4 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 for the Cisco CRS-1 Router

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:crs-mi001#sh ver

Cisco IOS XR Software, Version 3.2.4[00] Copyright (c) 2006 by cisco Systems, Inc.

ROM: System Bootstrap, Version 1.38(20060207:032757) [CRS-1 ROMMON],

crs-mi001 uptime is 18 hours, 22 minutes System image file is
"disk0:hfr-os-mbi-3.2.4/mbihfr-rp.vm"

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

21 Packet over SONET network interface(s)
21 SONET/SDH Port controller(s)
8 TenGigabitEthernet/IEEE 802.3 interface(s)
2 Ethernet/IEEE 802.3 interface(s)
2043k bytes of non-volatile configuration memory.
38079M bytes of hard disk.
1000592k bytes of ATA PCMCIA card at disk 0 (Sector size 512 bytes).
1000592k bytes of ATA PCMCIA card at disk 1 (Sector size 512 bytes).

Package active on node 0/1/SP:
hfr-admin, V 3.2.4[00], Cisco Systems, at disk0:hfr-admin-3.2.4
  Built on Thu Feb 9 00:54:26 PST 2006
  By edde-bld1 in /vws/afz/production/3.2.4/hfr/workspace for
c2.95.3-p8

  hfr-base, V 3.2.4[00], Cisco Systems, at disk0:hfr-base-3.2.4
  Built on Thu Feb 9 00:46:15 PST 2006
  By edde-bld1 in /vws/afz/production/3.2.4/hfr/workspace for
c2.95.3-p8

hfr-os-mbi, V 3.2.4[00], Cisco Systems, at disk0:hfr-os-mbi-3.2.4
  Built on Thu Feb 9 00:16:02 PST 2006
  By edde-bld1 in /vws/afz/production/3.2.4/hfr/workspace for
```

```
c2.95.3-p8
```

```
Package active on node 0/1/CPU0:  
hfr-1c, V 3.2.4[00], Cisco Systems, at disk0:hfr-1c-3.2.4  
  Built on Thu Feb 9 01:07:47 PST 2006  
  By edde-bld1 in /vws/afz/production/3.2.4/hfr/workspace for  
c2.95.3-p8  
< snipped rest of lengthy output >
```

Other Firmware Code for the Cisco CRS-1 Router

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

- The minimum ROMMON version required for this release is 1.38.



Note

Be sure to upgrade the ROMMONs to version 1.38 *before* attempting the upgrade. The following URL points to procedures for a Cisco CRS-1 router.

<http://www.cisco.com/cgi-bin/tablebuild.pl/crs1rommon>

- The minimum CPUCTRL 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 3.2.4 supported on the Cisco XR 12000 Series Router and includes the following information:

- [Feature Set Table for the Cisco XR 12000 Series Router, page 8](#)
- [Memory Requirements for the Cisco XR 12000 Series Router, page 9](#)
- [Hardware Supported for the Cisco XR 12000 Series Router, page 10](#)
- [Software Compatibility for the Cisco XR 12000 Series Router, page 11](#)
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- [Other Firmware Code for the Cisco XR 12000 Series Router, page 13](#)

Feature Set Table for the Cisco XR 12000 Series Router

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 3.2.4 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 3.2.4 supported on the Cisco XR 12000 Series Router.

Table 4 Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 3.2.4 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR Unicast Routing Core Bundle	c12k-mini.vm-3.2.4	Contains the required core packages including, OS, Admin, Base, Forwarding, Line Cards, and Routing packages.
Optional Individual Packages¹		
Cisco IOS XR Manageability Package	c12k-mgbl.pie-3.2.4	CORBA agent, XML Parser, HTTP server, SNMP Agent, and Alarm correlation.
Cisco IOS XR MPLS Package	c12k-mpls.pie-3.2.4	MPLS-TE, LDP, MPLS-TE Link Management, MPLS Forwarding and RSVP.
Cisco IOS XR Multicast Package	c12k-mcast.pie-3.2.4	Multicast Routing Protocols (PIM, MSDP, IGMP, Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB, MURIB, MFWD).
Cisco IOS XR Security Package	c12k-k9sec.pie-3.2.4	Support for Encryption, Decryption, IPSec, SSH, SSL, and PKI.
Cisco IOS XR Standby RP Boot Image	mbiprp-rp.vm-3.2.4	Support for booting the standby RP on a Cisco XR 12000 Series Router (PRP).

1. Packages are installed individually.

Table 5 Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 3.2.4 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	C12000-iosxr-3.2.4.tar	Tar file containing: <ul style="list-style-type: none"> • Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package
Cisco IOS XR IP/MPLS Core Software 3DES	C12000-iosxr-k9-3.2.4.tar	Tar file containing: <ul style="list-style-type: none"> • Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Security Package

Memory Requirements for the Cisco XR 12000 Series Router

The minimum memory requirements for Cisco XR 12000 Series Router routers running Cisco IOS XR Software Release 3.2.4 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 packet and route memory on all line cards installed in the system

Hardware Supported for the Cisco XR 12000 Series Router

Cisco IOS XR Software Release 3.2.4 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 for the Cisco XR 12000 Series Router”](#) section on page 9.

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 for the Cisco XR 12000 Series Router”](#) 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 Router 12404/80 Chassis	GSR4/80-xx	3.2.0
Cisco XR 12000 Series Router 12406/120 Chassis	GSR6/120-AC	3.2.0
Cisco XR 12000 Series Router 12410/200 Chassis	GSR10/200-xx	3.2.0
Cisco XR 12000 Series Router 12416/320 Chassis	GSR16/320-xx	3.2.0
Cisco XR 12000 Series Router Performance Route Processor 1 (PRP-2 is strongly recommended)	PRP-1	3.2.0
Cisco XR 12000 Series Router Performance Route Processor 2	PRP-2	3.2.0
Cisco XR 12000 Series Router 40 GB Hard Drive Option	HD-PRP2-40G	3.2.0
Cisco XR 12000 Series Router 4xOC12c/STM4c POS Intermediate Reach Single-Mode optics	4OC12X/POS-I-SC-B	3.2.0
Cisco XR 12000 Series Router 4xOC12c/STM4c POS Short Reach Multi-Mode optics	4OC12X/POS-M-SC-B	3.2.0
Cisco XR 12000 Series Router 16xOC3c/STM1c POS Short Reach Multi-Mode optics	16OC3X/POS-M-MJ-B	3.2.0
Cisco XR 12000 Series Router 16xOC3c/STM1c POS Intermediate Reach Single-Mode optics	16OC3X/POS-I-LC-B	3.2.0
Cisco XR 12000 Series Router 8xOC3c/STM1c POS Short Reach Multi-Mode optics	8OC3X/POS-MM-MJ-B	3.2.0
Cisco XR 12000 Series Router 8xOC3c/STM1c POS Intermediate Reach Single-Mode optics	8OC3X/POS-IR-LC-B	3.2.0
Cisco XR 12000 Series Router 4xOC3c/STM1c POS Short Reach Multi-Mode optics	4OC3X/POS-MM-MJ-B	3.2.0
Cisco XR 12000 Series Router 4xOC3c/STM1c POS Intermediate Reach Single-Mode optics	4OC3X/POS-IR-LC-B	3.2.0
Cisco XR 12000 Series Router 4xOC3c/STM1c POS Long Reach Single-Mode optics	4OC3X/POS-LR-LC-B	3.2.0
Cisco XR 12000 Series Router 1xOC48c/STM16c POS Short Reach Single-Mode optics	OC48X/POS-SR-SC	3.2.0
Cisco XR 12000 Series Router 1xOC48c/STM16c POS Long Reach Single-Mode optics	OC48X/POS-LR-SC	3.2.0
Cisco XR 12000 Series Router 4xGE with SFP optics	4GE-SFP-LC	3.2.0
Cisco XR 12000 Series Router SPA Interface Processor 10G	12000-SIP-600	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 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 for the Cisco XR 12000 Series Router

Cisco IOS XR Software Release 3.2.4 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
- Cisco XR 12012 Router
- Cisco XR 12008 Router

Determining the Software Version for the Cisco XR 12000 Series Router

To see the current version of Cisco IOS XR software on a router, use the **show version** command:

Step 1 Establish a Telnet session with the router.

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

```
RP/0/0/CPU0:AR05#show version
Cisco IOS XR Software, Version 3.2.4[00] Copyright (c) 2006 by cisco Systems, Inc.

ROM: System Bootstrap, Version 12.0(20040624:164256) [assafb-misc1 1.14dev(0.91)]
DEVELOPMENT SOFTWARE Copyright (c) 2006 by cisco Systems, Inc., Inc. AR05 uptime is 16
hours, 35 minutes
System image file is "disk0:c12k-os-mbi-3.2.4/mbiprp-rp.vm"

cisco 12410/PRP (7450) processor with 1048576K bytes of memory.
7450 processor at 666Mhz, Revision 2.1
1 Cisco 12000 Series Performance Route Processor
1 Cisco 12000 4 Port Gigabit Ethernet Controller (4 GigabitEthernet)
2 1 Port ISE Packet Over SONET OC-48c/STM-16 Controllers (2 POS)
2 Packet over SONET network interface(s)
2 SONET/SDH Port controller(s)
1 PLIM QoS controller(s)
2 Ethernet/IEEE 802.3 interface(s)
4 GigabitEthernet/IEEE 802.3 interface(s) 2043k bytes of non-volatile configuration
```

memory.

1000496k bytes of ATA PCMCIA card at disk 0 (Sector size 512 bytes).

65536k bytes of Flash internal SIMM (Sector size 256k).

Configuration register on node 0/0/CPU0 is 0x102 Package active on node 0/0/CPU0:

c12k-mgbl, V 3.2.4[00], Cisco Systems, at disk0:c12k-mgbl-3.2.4

Built on Thu Feb 9 02:06:38 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-mcast, V 3.2.4[00], Cisco Systems, at disk0:c12k-mcast-3.2.4

Built on Thu Feb 9 02:06:17 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-mpls, V 3.2.4[00], Cisco Systems, at disk0:c12k-mpls-3.2.4

Built on Thu Feb 9 02:05:56 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-rout, V 3.2.4[00], Cisco Systems, at disk0:c12k-rout-3.2.4

Built on Thu Feb 9 02:55:30 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-k9sec, V 3.2.4[00], Cisco Systems, at disk0:c12k-k9sec-3.2.4

Built on Thu Feb 9 02:06:56 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-lc, V 3.2.4[00], Cisco Systems, at disk0:c12k-lc-3.2.4

Built on Thu Feb 9 02:55:21 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-fwdg, V 3.2.4[00], Cisco Systems, at disk0:c12k-fwdg-3.2.4

Built on Thu Feb 9 02:55:13 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-admin, V 3.2.4[00], Cisco Systems, at disk0:c12k-admin-3.2.4

Built on Thu Feb 9 02:55:07 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-base, V 3.2.4[00], Cisco Systems, at disk0:c12k-base-3.2.4

Built on Thu Feb 9 02:54:31 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-os-mpi, V 3.2.4[00], Cisco Systems, at disk0:c12k-os-mpi-3.2.4

Built on Thu Feb 9 02:54:02 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

Package active on node 0/2/CPU0:

c12k-mcast, V 3.2.4[00], Cisco Systems, at disk0:c12k-mcast-3.2.4

Built on Thu Feb 9 02:06:17 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

c12k-mpls, V 3.2.4[00], Cisco Systems, at disk0:c12k-mpls-3.2.4

Built on Thu Feb 9 02:05:56 PST 2006

By edde-bld1 in /vws/afz/production/3.2.4/prp/workspace for c2.95.3-p8

< snipped rest of lengthy output >

Other Firmware Code for the Cisco XR 12000 Series Router

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 3.2.4:

- [New Software Features in Cisco IOS XR Software Release 3.2.4, page 13](#)
- [Changed Software Features in Cisco IOS XR Software Release 3.2.4, page 13](#)

New Software Features in Cisco IOS XR Software Release 3.2.4

No new added software features to report in Cisco IOS XR software Release 3.2.4.

Changed Software Features in Cisco IOS XR Software Release 3.2.4

No software feature changes to report in Cisco IOS XR software Release 3.2.4.

Important Notes

In certain countries, use of these products might 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 we provide for all card removal and replacement (fabric cards, LC, fan controller and RP, and so on) to avoid impact to traffic. See *Cisco IOS XR Getting Started Guide* for procedures.

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

A Cisco SIP-600 LC draws more power than previous LCs. Depending on the configuration of power entry modules (PEMs) and other cards in the chassis, sufficient power might not be available when you insert a new card or remove a PEM. The **show environment power-supply table** command can help you plan the power budget for the chassis. Before inserting a new card (of any type) or removing a PEM, you should use the **show environment power-supply table** command, as in the following example:

```
RP/0/0/CPU0:router# admin
RP/0/0/CPU0:router(admin)#show env power-supply table

48V Current
R/S/I Module (V) (A)
0/24/* PEM1 46 12
PEM2 47 10
0/25/* PEM1 47 12
PEM2 47 10
Total Power Supplies: 4800W
Redundant Power Supplies: 2400W
Worst Case Power Used: 1559W
Current Power Used: 1022W
Current Redundant Power Available: 1378W
Current Total Power Available: 3778W
Worst Case Redundant Power Available: 841W
Worst Case Total Power Available: 3241W
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
80C3/POS-SM 8 Port Packet Over SONET OC-3c/STM-1 100
80C3X/POS-MM-MJ-B 8 port ISE OC3 105
160C3/POS-SM 16 Port Packet Over SONET OC-3c/STM-1 100
160C3X/POS-M-MJ-B 16 port ISE OC3 channelized DS3/E3 140
LC-10C12/POS-SM 1 Port OC12/STM4 Packet Over SONET/SDH Line Card 80
EOS. 4 Port E.D. Packet Over SONET OC-12c/STM-4 100
40C12/POS-IR-SC-B 4 Port Packet Over SONET OC-12c/STM-4 100
40C12X/POS-M-SC-B 4 Port ISE Packet Over SONET OC-12c/STM-4 140
EOS. 1 Port E.D. Packet Over SONET OC-48c/STM-16 80
OC48E/POS-SR-SC-B 1 Port Packet Over SONET OC-48c/STM-16 78
OC48X/POS-LR-SC 1 Port ISE Packet Over SONET OC-48c/STM-16 140
OC192/POS-VSR 1 Port Packet Over SONET OC-192c/STM-64 174
LC-OC12-DS3 1 port SONET OC12 channelized to DS3 80
CHOC-12/STS3-IR-SC 1 port SONET OC12 channelized to STS3/STM-1 80
4CHOC12/DS3-IR-SC-B 4 port ISE OC12 channelized STS-3c/STM-1 or DS3/E3 140
CHOC48/DS3-IR-SC 1 port ISE OC48 channelized STS-12c/STM-4, STS-.. 140
6DS3-SMB-B 6 Port Packet over DS3 80
12DS3-SMB-B 12 Port Packet over DS3 80
40C3/ATM-SM-SC 4 port ATM Over SONET OC-3c/STM-1 70
LC-10C12/ATM-SM 1 port ATM Over SONET OC12c/STM-4c 62
40C12/ATM-IR-SC 4 port ATM Over SONET OC12c/STM-4c 122
8FE-FX-SC-B 8 Port Fast Ethernet 77
GE-GBIC-SC-B 1 Port Gigabit Ethernet 65
3GE-GBIC-SC Cisco 12000 3 port Gigabit Ethernet 71
4GE-SFP-LC Cisco 12000 4 Port Gigabit Ethernet 106
OC12/SRP-IR-SC-B 1 Port SONET based SRP OC-12c/STM-4 80
OC48/SRP-LR-SC 1 Port SONET based SRP OC-48c/STM-16 100
12000-SIP-600 Cisco 12000 Series SPA Interface Processor-600 256
GSR04-FABRIC GSR 12404 Consolidated Fabric/Alarm Card 143
GSR6-CSC GSR 12406 Clock Scheduler Card 56
GSR6-SFC GSR 12406 Switch Fabric Card 45
GSR10-CSC GSR 12410 Clock Scheduler Card 19
GSR10-SFC GSR 12410 Switch Fabric Card 64
CSC-160,GSR12810 Clock Scheduler Card(10) OC-768 54
```

```
SFC-160,GSR12810 Switch Fabric Card(10) OC-768 107
GSR16/80-CSC Cisco 12016 80 Gbps GSR Clock Scheduler Card 43
GSR16/80-SFC Cisco 12016 80 Gbps GSR Switch Fabric Card 35
GSR16/320-CSC Cisco 12416 320 Gbps GSR Clock Scheduler Card 106
GSR16/320-SFC Cisco 12416 320 Gbps Switch Fabric Card 93
CSC-256,GSR12816 Clock Scheduler Card(16) OC-768 177
SFC-256,GSR12816 Switch Fabric Card(16) OC-768 151
GSR04-FABRIC Alarm Board(404) 208
GSR6-ALRM GSR 12406 Alarm Module 26
GSR10-ALRM GSR 12410 Alarm Module 33
GSR16-ALRM Cisco 12016 Alarm Module 35
GSR6-BLOWER GSR 12406 Blower Module 178
GSR16-BLOWER GSR 12016 Blower Module 178
Bus Board(16) 20
RP/0/0/CPU0:c12k#
```

If you plan to insert a new card, locate the entry for the card to be inserted and note the power it consumes. If this power is less than the figure given in Worst Case Redundant Power Available (the figure 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. You are responsible for determining the power budget for the chassis before you change it. Exceeding the power budget can result in the PEM being overloaded and cards powering down due to insufficient available power.

Caveats

Caveats describe unexpected behavior in Cisco IOS XR software. A severity 1 caveat is the most serious; a severity 2 caveat is less serious. This section lists resolved and open relevant caveats.

Resolved Caveats

The following caveats from prior releases have been resolved in Cisco IOS XR Software Release 3.2.4.

- **CSCek27805**

Brief Description: Loadbalancing can be uneven when the number of paths is a power of 2.

Conditions: The worst case behavior occurs when the number of paths taken is a power of 2.

Workaround: none

- **CSCeh90201**

Brief Description: An IS-IS instance aborts.

Conditions: Problem occurs if an IS-IS instance has a forward referenced interface configured (a non-existent interface) and the user issues the tech support command **show isis private all**.

Workaround: Prior to Release 3.2.4, the technical support command **show isis private all** should not be used for any instance of IS-IS that has been configured with a forward referenced interface.

Open Caveats—Release 3.2.4

This section lists the open caveats for Cisco IOS XR Software Release 3.2.4. The caveats are organized as follows:

- [Platform-Independent Caveats, page 16](#)
- [Cisco CRS-1-Specific Caveats, page 17](#)
- [Cisco XR 12000 Series Router-specific Caveats, page 17](#)

Platform-Independent Caveats

The following caveats apply to all platforms:

- **CSCej19339**

Brief Description: Internally found cosmetic defect: Reported % complete during the 'install add' command is inaccurate.

Symptoms: During the **install add** command operations, a window of 4–5 minutes might occur in which no status for the add operation appears on the terminal or console.

Conditions: This occurs only when performing the **install add** command operations.

Workaround: No workaround. Note that this does not impact the add operation. You should wait for the next install % (percentage) message to see the status of the **install add** command operations.
- **CSCeh88606**

Basic Description: Removing and restoring configuration of address family can cause a BGP peer to remain down.

Symptom: IPv4 BGP neighbors do not come up after Address Family Identifier configuration is restored.

Conditions: If the address-family ipv4 is restored (for example, with rollback configuration) under router BGP approximately three minutes after the configuration was removed, the IPv4 BGP neighbors do not come back up.

Workaround: Restart the bgp process on the RP by using **process restart bgp** command.
- **CSCei76841**

Basic Description: An Optical User Network Interface (OUNI) connection goes down a few minutes after the Resource Reservation Protocol (RSVP) hellos come back up.

Symptom: On an RSVP hello control-channel failure, an OUNI connection may go down.

Conditions: The OUNI connection goes down if the control channel failure is detected by the passive side of the OUNI connection. This is because the passive side of the OUNI connection stops refreshing its RSVP state for the OUNI connection, and the active side eventually times out.

Workaround: After the RSVP hello control-channel failure on the passive side restart the RSVP process with **process restart rsvp** command.

Cisco CRS-1-Specific Caveats

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

- **CSCei84404**

Basic Description: On Cisco CRS-1/16 chassis, the **show platform** command shows UNKNOWN entry after multiple AM0/AM1 card OIRs.

Symptom: After performing more than 15-20 OIRs of the alarm card while it is in various stages of booting, **show platform** command shows an UNKNOWN entry.

Conditions: On Cisco CRS-1/16 chassis, if we do more than 15-20 OIRs of AM0 or AM1 while these nodes are booting (that is, in MBI-BOOT or MBI-RUN state), an UNKNOWN entry may eventually show up in the output of the **show platform** command.

Workaround: The **process restart invmgr** command fixes this problem.

- **CSCei67225**

Basic Description: Following a SPA OIR operation, an error may be encountered which results in subsequent packet loss. This can be corrected by restarting the affected SPA.

Symptom: The following error message is reported: %L2-BAMBI-3-ASIC_ERR: plaspaspa instance 0 L2P UIDB Multi, check uidb hash table. Data arriving on the affected SPA is dropped.

Conditions: This symptom is observed on Cisco CRS-1 routers Shared Port Adapters (SPA) during Online Insertion and Removal (OIR).

Workaround: Consider the following workaround:

- Power-down the affected SPA, wait 3 minutes, then power-up the SPA and check traffic flow.
- On-line insert and remove the affected SPA, wait 3 minutes, then reinsert SPA and check traffic flow.
- On-line insert and remove the SIP-800 housing of the affected SPA. This action must be a tertiary course because other in-service SPAs that are housed in the SIP-800 could be affected by this action.

Cisco XR 12000 Series Router-specific Caveats

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

- **CSCei02630**

Basic Description: TURBOBOOT (cold boot) procedure with the **-clean** option cleans all files on the 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 are deleted (including any user or configuration files).

The configuration for non-owner LRs is stored on the boot device of the RPs of those LRs (not the DSC). 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 TURBOBOOT starts on the non-DSC RPs.

Workaround: You should back up any configuration for non-owner LRs before starting the turboboot and re-apply this configuration manually when the turboboot has finished. Also, any other user files on the disk of any RP should be backed up before starting the turboboot.

- **CSCei87011**

Brief Description: Class or mark policy counters multiply. Counter multiplication depends on the number of match criteria.

Symptom: When a QoS policy uses a class map that classifies traffic based on a number of match-any criteria and this policy is applied to an interface in ingress or egress direction, the **show policy map** command counters can increment in the multiples of the number of match criteria.

Conditions: This condition is observed on the Cisco XR 12000 Series Router using QoS configurations involving class maps with multiple match criteria.

Workaround: No workaround.

- **CSCsb90992**

Brief Description: Configuring APS in a router-to-router configuration may result in a PGP failure.

Symptom: Adding a working group and a protect group in a two-router topology may result in a PGP “no contact” failure between the newly configured groups.

Condition: The **ipv4_rib_best_local_address** command is returning 0 to aps.

Workaround: Remove the APS group configuration, followed by re-applying the configuration.

Upgrade Instructions for Release 3.2.4

This section contains upgrade information and instructions for the Cisco CRS-1 router and Cisco XR 12000 Series Router. The information consists of lists of required and optional software packages and, for the Cisco CRS-1 router, instructions for activating a required SMU.

Commands and Tasks for Upgrading Software

This section has URLs for directing you to on-line information you need to upgrade or downgrade the software. The topics at these locations are:

- Obtaining required PIE files
- Checking for mandatory SMUs
- Checking the system stability
- Performing pre-upgrade tasks
- Upgrading the software
- Downgrading the software
- Post-upgrade and post-downgrade procedures

For a Cisco CRS-1 router, go to:

<http://www.cisco.com/cgi-bin/tablebuild.pl/crs1upgrade>

For a Cisco XR 12000 Series Router, go to:

<http://www.cisco.com/cgi-bin/tablebuild.pl/c12000upgrade>

Upgrade Instructions for Cisco CRS-1 Router

This section lists the required and optional files for a Cisco CRS-1 3.2.4 upgrade. These filenames might differ from the actual filenames because the names can be changed. The actual filenames that are used do not affect operation.

Table 7 Required and Optional Packages for Upgrading From 3.2.x to 3.2.4 on Cisco CRS-1 Routers

PIE File Description	Sample PIE Filename	Sample Package Name
Required Package		
Composite mini package (OS-MBI, base, administration, forwarding, LC route)	comp-hfr-mini.pie-3.2.4	disk0:comp-hfr-mini-3.2.4
Optional Individual Packages¹		
Multicast Package	hfr-mcast.pie-3.2.4	disk0:hfr-mcast-3.2.4
Manageability Package	hfr-mgbl.pie-3.2.4	disk0:hfr-mgbl-3.2.4
MPLS Package	hfr-mpls.pie-3.2.4	disk0:hfr-mpls-3.2.4
Security Package	hfr-k9sec.pie-3.2.4	disk0:hfr-k9sec-3.2.4

1. Packages are installed individually.

Required SMUs for Upgrading Cisco CRS-1 Router

The required SMU for upgrading from release 3.2.0 to 3.2.x in the Cisco CRS-1 router and the instructions for adding and activating that SMU appear in [Table 8](#).

Table 8 Required SMU for Upgrading From 3.2.0 to 3.2.x on Cisco CRS-1 Routers

SMU filename	hfr-base-3.2.0.CSCei45039.pie
DDTS	CSCei45039
Problem summary	Configuration loss during upgrade from release 3.2.0 to 3.2.x
SMU installation impact	Low—no impact to running system.
SMU install procedure	<ol style="list-style-type: none"> Add SMU: (admin)# install add <hfr-base-3.2.0.CSCei45039.pie> to disk0: Activate SMU: (admin)# install activate disk0:hfr-base-3.2.0.CSCei45039-1.0.0 Trigger the SMU by committing the configuration: # config (config)# hostname <same-hostname> (config)# commit (config)# exit Commit the SMU: (admin)# install commit

Special Upgrade Instructions

This section contains any applicable special instructions for upgrading from 3.2.x to 3.2.4.

None

Special Downgrade Instructions

This section contains any applicable special instructions for downgrading from 3.2.4 to 3.2.x.

None

Caveats

This section contains any caveats for an upgrade from 3.2.x to 3.2.4.

None

Upgrade Instructions for Cisco XR 12000 Series Routers

This section contains one table, [Table 9](#). It lists the required and optional packages.

Table 9 Required and Optional Packages for Upgrading From 3.2.x to 3.2.4 on Cisco XR 12000 Series Routers

PIE File Description	Sample PIE Filename	Sample Package Name
Required Package		
Composite mini package (OS-MBI, base, administration, forwarding, LC route)	comp-c12k-mini.pie-3.2.4	disk0:comp-c12k-mini-3.2.4
Optional Individual Packages¹		
Multicast Package	c12k-mcast.pie-3.2.4	disk0:c12k-mcast-3.2.4
Manageability Package	c12k-mgbl.pie-3.2.4	disk0:c12k-mgbl-3.2.4
MPLS Package	c12k-mpls.pie-3.2.4	disk0:c12k-mpls-3.2.4
Security Package	c12k-k9sec.pie-3.2.4	disk0:c12k-k9sec-3.2.4

1. Packages are installed individually.

Mandatory SMUs

This section contains possible information for mandatory SMUs for the Cisco XR 12000 Series Router:

The following SMUs are required prior to upgrade (for upgrading from 3.2.0, 3.2.1, or 3.2.2):

None

Special Upgrade Instructions

This section contains special instructions for mandatory SMUs for the Cisco XR 12000 Series Router:

Please follow these special instructions during upgrade (for upgrading from 3.2.0, 3.2.1, or 3.2.2):

None

Special Downgrade Instructions

This section contains possible special instructions for downgrading software (to 3.2.0, 3.2.1, or 3.2.2) on a Cisco XR 12000 Series Router:

None

Caveats

This section contains possible caveats for upgrading software on a Cisco XR 12000 Series Router (from 3.2.0, 3.2.1, or 3.2.2):

None

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 21](#)
- [Software Documents, page 21](#)

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 3.2.4.

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/techsupport>

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

Product Documentation DVD

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

The Product Documentation DVD is a comprehensive library of technical product documentation on portable media. The DVD enables you to access multiple versions of hardware and software installation, configuration, and command guides for Cisco products and to view technical documentation in HTML. With the DVD, you have access to the same documentation that is found on the Cisco website without being connected to the Internet. Certain products also have PDF versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD=) from Cisco Marketplace at this URL:

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

Ordering Documentation

Beginning June 30, 2005, registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

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

Nonregistered Cisco.com users can order technical documentation from 8:00 a.m. to 5:00 p.m. (0800 to 1700) PDT by calling 1 866 463-3487 in the United States and Canada, or elsewhere by calling 011 408 519-5055. You can also order documentation by e-mail at tech-doc-store-mkpl@external.cisco.com or by fax at 1 408 519-5001 in the United States and Canada, or elsewhere at 011 408 519-5001.

Documentation Feedback

You can rate and provide feedback about Cisco technical documents by completing the online feedback form that appears with the technical documents on Cisco.com.

You can send comments about Cisco documentation to 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

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

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

An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- Nonemergencies—psirt@cisco.com

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

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

**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 linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation 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, at this URL:

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

Access to all tools on the Cisco Technical Support & Documentation 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 & Documentation 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 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.

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 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 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 defined these severities:

Severity 1 (S1)—Your network is down, or a critical impact to your business operations has occurred. You and Cisco 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 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 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, documentation, 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 can 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>
or view the digital edition at this URL:
<http://ciscoiq.texterity.com/ciscoiq/sample/>
- *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>
- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:
<http://www.cisco.com/en/US/products/index.html>
- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:
<http://www.cisco.com/discuss/networking>
- World-class networking training is available from Cisco. You can see current offerings at:
<http://www.cisco.com/en/US/learning/index.html>

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

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