



Release Notes for Cisco IOS XR Software Release 3.2.1

September 7, 2005

Cisco IOS XR Software Release 3.2.1

Text Part Number OL-8232-01



Note

Please see the [“Important Notes” section on page 15](#) for important information on Cisco IOS XR Software Release 3.2.1.



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 may contain updates and modifications. See the [“Obtaining Documentation” section on page 35](#) for more information on obtaining Cisco documentation.

These release notes describe the features provided in Cisco IOS XR Software Release 3.2.1 and are updated as needed.

For a list of software caveats that apply to Cisco IOS XR Software Release 3.2.1, see the [“Caveats” section on page 17](#). 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.
- **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 3.2.1.

System Requirements

The Cisco IOS XR Software Release 3.2.1 is supported on the following platforms:

- [Cisco CRS-1, page 3](#)
- [Cisco XR 12000 Series Router, page 9](#)

Cisco CRS-1

This section describes the system requirements for Cisco IOS XR Software Release 3.2.1 supported on Cisco CRS-1 routers and includes the following information:

- [Feature Set Table for the Cisco CRS-1, page 4](#)
- [Memory Requirements for the Cisco CRS-1, page 5](#)
- [Hardware Supported for the Cisco CRS-1, page 5](#)
- [Software Compatibility for the Cisco CRS-1, page 7](#)
- [Determining the Software Version for the Cisco CRS-1, page 8](#)
- [Other Firmware Code for the Cisco CRS-1, page 9](#)

Feature Set Table for the Cisco CRS-1

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 3.2.1 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 3.2.1 that is supported on the Cisco CRS-1.

Table 1 Cisco CRS-1 Supported Feature Sets (Cisco IOS XR Software Release 3.2.1 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	comp-hfr-mini.pie-3.2.1	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-3.2.1	CORBA agent, XML Parser, HTTP server, SNMP Agent, and Alarm correlation.
Cisco IOS XR MPLS Package	hfr-mpls-p.pie-3.2.1	MPLS-TE, LDP, MPLS-TE Link Management, MPLS Forwarding, Optical Link Management, OUNI, and RSVP.
Cisco IOS XR Multicast Package	hfr-mcast-p.pie-3.2.1	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-3.2.1	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 3.2.1 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR RP Control Plane Software	CRS-1-iosxr-3.2.1.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• Mandatory SMU and Upgrade instructions (hfr-base-3.2.0.CSCei45039.pie)<ul style="list-style-type: none">– Upgrade_Instructions_CRS-1_IOS-XR_3.0.x_to_3.2.1.htm– Upgrade_Instructions_CRS-1_IOS-XR_3.2.0_to_3.2.1.htm
Cisco IOS XR RP Control Plane Software with Encryption	CRS-1-iosxr-k9-3.2.1.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• Mandatory SMU and Upgrade instructions (hfr-base-3.2.0.CSCei45039.pie)<ul style="list-style-type: none">– Upgrade_Instructions_CRS-1_IOS-XR_3.0.x_to_3.2.1.htm– Upgrade_Instructions_CRS-1_IOS-XR_3.2.0_to_3.2.1.htm

Memory Requirements for the Cisco CRS-1

The minimum memory requirements for Cisco CRS-1 routers running Cisco IOS XR Software Release 3.2.1 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

Cisco IOS XR Software Release 3.2.1 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”](#) 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 for the Cisco CRS-1](#)” section on page 8.

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
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

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

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

Cisco IOS XR Software Release 3.2.1 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

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 3.2.1[00] Copyright (c) 2005 by cisco Systems, Inc.
```

```
ROM: System Bootstrap, Version 1.19(20050216:033559) [CRS-1 ROMMON],
```

```
equinox uptime is 7 hours, 49 minutes  
System image file is "disk0:<path_name>"
```

```
cisco CRS-8/S (7457) processor with 4194304K bytes of memory.  
7457 processor at 1197Mhz, Revision 1.1
```

```
24 Packet over SONET network interface(s)  
24 SONET/SDH Port controller(s)  
8 TenGigabitEthernet/IEEE 802.3 interface(s)  
2 Ethernet/IEEE 802.3 interface(s)  
16 GigabitEthernet/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).
```

```
Package active on node 0/1/SP:
```

```
hfr-admin, V 3.2.1[00], Cisco Systems, at disk0:hfr-admin-3.2.1  
  Built on Sun Aug 14 21:44:39 CEST 2005  
  By edde-bld1 in /vws/afz/production/3.2.1/hfr/workspace for c2.95.3-p8
```

```
hfr-base, V 3.2.1[00], Cisco Systems, at disk0:hfr-base-3.2.1  
  Built on Sun Aug 14 21:34:41 CEST 2005  
  By user_name in /path_name/path_name/3.2.1/workspace for c2.95.3-p8
```

```
hfr-os-mpi, V 3.2.1[00], Cisco Systems, at disk0:hfr-os-mpi-3.2.1  
  Built on Sun Aug 14 20:58:07 CEST 2005  
  By user_name in /path_name/path_name/3.2.1/workspace for c2.95.3-p8
```

Other Firmware Code for the Cisco CRS-1

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 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 3.2.1 supported on the Cisco XR 12000 Series Router and includes the following information:

- [Feature Set Table for the Cisco XR 12000 Series Router, page 9](#)
- [Memory Requirements for the Cisco XR 12000 Series Router, page 10](#)
- [Hardware Supported for the Cisco XR 12000 Series Router, page 10](#)
- [Software Compatibility for the Cisco XR 12000 Series Router, page 12](#)
- [Determining the Software Version for the Cisco XR 12000 Series Router, page 12](#)
- [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 3.2.1 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 3.2.1 supported on the Cisco XR 12000 Series Router.

Table 4 Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 3.2.1 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.vm-3.2.1	Contains the required core packages including, OS, Admin, Base, Forwarding, Modular Services Card, and Routing packages.
Optional Individual Packages¹		
Cisco IOS XR Manageability Package	c12k-mgbl.pie-3.2.1	CORBA agent, XML Parser, HTTP server, SNMP Agent, and Alarm correlation.
Cisco IOS XR MPLS Package	c12k-mpls.pie-3.2.1	MPLS-TE, LDP, MPLS-TE Link Management, MPLS Forwarding, Optical Link Management, OUNI, and RSVP.
Cisco IOS XR Multicast Package	c12k-mcast.pie-3.2.1	Multicast Routing Protocols (PIM, MSDP, IGMP, Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB, MURIB, MFWD).
Cisco IOS XR Security Package	c12k-k9sec.pie-3.2.1	Support for Encryption, Decryption, IPSec, SSH, SSL, and PKI.
Cisco IOS XR Standby RP Boot Image	mbiprp-rp.vm-3.2.1	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 3.2.1 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR RP Control Plane Software	C12000-iosxr-3.2.1.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 RP Control Plane Software with Encryption	C12000-iosxr-k9-3.2.1.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 3.2.1 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 for the Cisco XR 12000 Series Router

Cisco IOS XR Software Release 3.2.1 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 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 for the Cisco XR 12000 Series Router”](#) section on page 12.

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

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

Component	Part Number	Minimum Software Version Required
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
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 for the Cisco XR 12000 Series Router

Cisco IOS XR Software Release 3.2.1 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 for the Cisco XR 12000 Series 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/0/0/CPU0:router# show version
```

The following version information is displayed:

```
Cisco IOS XR Software, Version 3.2.1[00] Copyright (c) 2005 by cisco Systems, Inc.
```

```
ROM: System Bootstrap, Version 12.0(20041021:161156) [wdai-v120_30_s 1.15] RELEASE  
SOFTWARE Copyright (c) 1994-200, Inc.
```

```
12406_IOX uptime is 5 minutes  
System image file is "disk0:<path_name>"
```

```
cisco 12406/PRP (7457) processor with 1048576K bytes of memory.  
7457 processor at 1265Mhz, Revision 1.1
```

```
1 Cisco 12000 Series Performance Route Processor  
1 4 Port ISE Packet Over SONET OC-12c/STM-4 Controller (4 POS)  
1 1 Port ISE Packet Over SONET OC-48c/STM-16 Controller (1 POS)  
1 4 port ISE OC3 Controller (4 POS)  
1 Cisco 12000 Series SPA Interface Processor-600 Controller (4294967295  
Unknown)  
3 Ethernet/IEEE 802.3 interface(s)  
2042k bytes of non-volatile configuration memory.  
487M bytes of compact flash card.  
38079M bytes of hard disk.  
1000496k bytes of ATA PCMCIA card at disk 0 (Sector size 512 bytes).  
249764k 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 0x102 Package active on node 0/0/CPU0:  
c12k-rout, V 3.2.1[00], Cisco Systems, at disk0:c12k-rout-3.2.1  
Built on Fri Aug 26 01:15:38 UTC 2005  
By user_name1 in /path_name/path_name/3.2.1/workspace for c2.95.3-p8
```

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 3.2.1:

- [New Software Features in Cisco IOS XR Software Release 3.2.1, page 13](#)
- [Changed Software Features in Cisco IOS XR Software Release 3.2.1, page 15](#)

New Software Features in Cisco IOS XR Software Release 3.2.1

The following are new features in Cisco IOS XR Software Release 3.2.1 supported on the Cisco CRS-1 and Cisco XR 12000 Series Router platforms:

- The **alias** command creates a command alias. The **alias** command uses the following syntax in Global configuration mode:

```
alias alias-name command-syntax [(variable)]
```

The **alias** command syntax is describe in [Table 7](#):

Table 7 *alias Command Syntax Description*

Syntax	Description
<i>alias-name</i>	Name of the command alias. Alias names can be a single word, or multiple words joined by a dash (-) or an underscore (_). Note Space characters are not valid in an <i>alias-name</i> .
<i>command-syntax</i>	Original command for which you are creating an alias.
(<i>variable</i>)	Argument or keyword that belongs to the command you specified for the <i>command-syntax</i> argument. Note that the <i>variable</i> argument must be enclosed within parenthesis, as shown in the following example: RP/0/RP0/CPU0:equinox# show_int (0/1/0/0)

Multiple commands can be supported under a single command alias, and multiple variable can be supported for each command. If multiple commands are specified under a single alias, then each command is executed in the order in which it is listed in the **alias** command.

To specify multiple commands under a single command alias, include the *command-syntax [(variable)]* argument multiple times after **alias alias-name** argument, as show in the following example:

```
alias alias-name command-syntax [(variable)] command-syntax [(variable)] command-syntax [(variable)]
```

To delete an alias, use the no form of this command, as shown in the following example:

```
no alias alias-name command-syntax
```

The following example shows how to configure the **show interface pos** and **show controller sonet** commands with the **intf** keyword under the alias **show_intf**:

```
RP/0/RP0/CPU0:router(config)# alias show_intf (intf) show int pos $intf; show controller sonet $intf
RP/0/RP0/CPU0:router(config)# exit
RP/0/RP0/CPU0:router#show_int (0/1/0/0)
RP/0/RP0/CPU0:equinox#show int pos 0/1/0/0 POS0/1/0/0 is up, line protocol is up
  Dampening enabled: penalty 0, not suppressed
    half_life: 1      reuse: 750
    suppress: 2000   max-suppress-time: 4
  Hardware is Packet over SONET network interface(s)
<snip>

RP/0/RP0/CPU0:router#show controller sonet 0/1/0/0
Port SONET0/1/0/0:
Status: Up
<snip>
```



Note The **alias** command is available only for commands that run in EXEC mode or Admin EXEC mode.

- Use the **logging events link-status** command to enable link and line-protocol state change messages on a per-interface basis. To disable link and line-protocol state change messages on a per-interface basis, use the **no** form of this command. The **logging events link-status** command is available under the interface submode of all bundles, tunnels and VLAN interfaces.



Note Link and line-protocol state change messages are disabled by default.

The following example shows how to enable link and line-protocol state change messages:

```
RP/0/0/CPU0:router(config-if)# logging events link-status
```

The following example shows how to disable link and line-protocol state change messages:

```
RP/0/0/CPU0:router(config-if)# no logging events link-status
```

- MPLS and IP load balancing replicate the paths in the load-balance (LB) table based on the input from the platform. This path replication ensures the optimal distribution of the traffic between output links. For example, two paths are replicated to five paths, and so forth. This change affects the LDP label switching, and the TE and IP-imposition are not affected.

Prior to Release 3.2.1, MPLS and IP populated load-balance (LB) tables based on the information from the LDP routing plane without consulting with the platform. For example if route has two paths, then MPLS will populate the LB table with two entries for this route.

Changed Software Features in Cisco IOS XR Software Release 3.2.1

The following features were modified in Cisco IOS XR Software Release 3.2.1, and are supported on the Cisco CRS-1 and Cisco XR 12000 Series Router platforms:

- In Release 3.2.1, all Admin mode commands can be run only by entering into Admin mode, and not by prefixing the command with the **admin** keyword in EXEC mode.

The following example illustrates the correct usage of the **admin** command. In this example, the user executes the **show running** command from Admin mode by enter the admin command in EXEC mode, followed by the **show running** command in Admin mode:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# show running
```

The following example illustrates incorrect usage of the **admin** command. In this example, the user executes the **show running** command from EXEC mode by prefixing the **show running** command with **admin** keyword:

```
RP/0/RP0/CPU0:router# admin show running
^
% Invalid input detected at '^' marker.
```

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 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 commands:

```
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 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 3.2.0 Caveats Resolved in Release 3.2.1

This section lists the caveats from Cisco IOS XR Software Release 3.2.0 that were resolved in Cisco IOS XR Software Release 3.2.1.

- **CSCei14219**

Basic Description: LDP installing “Unlabelled” as outgoing labels for prefixes over tunnel-te interface after RP Failover is performed.

Symptom: The traffic is not taking LDP label after RP Fail Over (FO) because prefixes pointing to a tunnel-te interface are marked as Unlabelled in **show mpls forwarding**.

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 autoroute announce, labels are assigned to these prefixes pointing to the tunnel-te interface. After an RP switchover, these prefixes are marked as “Unlabelled.”

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

- **CSCei17923**

Basic Description: On a Cisco CRS-1-8 RP chassis, **show environment fans** returns “0 rpm” for all fans if RP1 is active and RP0 is standby.

Symptom: On a Cisco CRS-1-8 RP chassis, if RP1 is active RP and RP0 is booted and in IOS XR RUN state, then **show env fans** will return “0 rpm” for all fans, even though the fans are spinning. Also, **show environment leds** will return UNKNOWN for the status of the fan-tray LED even though the LEDs are green (i.e. OK state).

Conditions: This problem can occur on any Cisco CRS-1-8 testbed which has 2 RPs, with RP1 as the active RP and RP0 in IOS XR RUN state.

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

- **CSCei27436**

Basic Description: IPV4 Multicast is not supported on SIP-600 Engine 5 Line card.

Symptom: IPV4 Multicast is not supported on SIP-600 Engine 5 Line card.

Conditions: IPV4 Multicast is not supported on SIP-600 Engine 5 Line card.

Workaround: Use IPV4 Multicast on Engine 3 Line Card.

- **CSCeh76018**

Basic Description: An invalid boothelper message displayed upon installing IOS XR when bootflash does not have requisite boothelper file.

Symptom: Install Director raises PKG_PLAT-4-INVALID_BOOTHELPER_VERSION warning message indicating the absence of a valid boothelper message. The device will continue to boot.

Conditions: If Install Director cannot find a boothelper file with named “c12kprp-boot-mz.120-30.S” or “c12kprp-boot-mz.120-29.2.S” on bootflash, it raises PKG_PLAT-4-INVALID_BOOTHELPER_VERSION warning message. Please 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 this 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.”

Open Caveats—Release 3.2.1

This section lists the open caveats for Cisco IOS XR Software Release 3.2.1. The caveats are organized as follows:

- [Platform-Independent Caveats, page 19](#)
- [Cisco CRS-1-specific Caveats, page 20](#)

Platform-Independent Caveats

The following caveats apply to all platforms:

- **CSCei02630**

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

Symptom: The TURBOBOOT procedure used with the clean option will clean 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 LRs' RPs (not the DSC). So if a turboboot is issued with the clean option when LRs are carved out this will have the effect of deleting the configuration on any non-owner LRs.

Conditions: All package and user files on disk0: are deleted when easybake starts on the non-DSC RPs.

Workaround: The user should backup any configuration for non-owner LRs before starting the turboboot and re-apply this configuration manually once 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/reconfig of address family can cause 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 min after the cfg was removed, the ipv4 bgp neighbors do not come back up.

Workaround: Restart the BGP process on the RP.

- **CSCei83676**

Basic Description: This happens when FO is triggered with a heavy load on the systems:

many BGP/IGP routes and 1000s of tunnels. In this case, the FO goes awry and MPLS-TE might have the wrong labels installed in forwarding. This would cause forwarding over those tunnels to be broken. The solution is to restart te_control after the FO is done.

Symptom: Forwarding over TE tunnels may stop.

Conditions: With a heavy load, and after RP failover.

Workaround: Restart te_control **process restart te_control**.

- **CSCei76841**

Basic Description: The OUNI connection goes down a few minutes after the RSVP Hellos come back up. 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.

Symptom: On an Resource Reservation Protocol (RSVP) Hello control channel failure, an OUNI (Optical User Network Interface) 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.

Workaround: After the RSVP Hello control channel failure on the passive side, restart the RSVP process.

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, **show hfr** 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, **sh hfr** shows up an UNKNOWN entry.

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

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

- **CSCei67225**

Basic Description: The error message in this DDTS is indicating that the uidb table in PLIM ASIC is inconsistent. There is a TCAM lookup in the uidb table for each packet passing through the PLIM ASIC to determine the uidb and other fields that need to be set in ingress PLIM header. What is happening is that the lookup results in multiple matches. So all packets entering into PLIM ASIC that hit this error are getting dropped

The error message is as follows:

```
LC/0/4/CPU0:Jul 29 16:33:03.301 : bambi_server[104]: %L2-BAMBI-3-ASIC_ERR : plaspa
instance 0 L2P UIDB Multi, check uidb hash table
LC/0/4/CPU0:Jul 29 16:33:03.334 : bambi_server[104]: %L2-BAMBI-3-ASIC_ERR : plaspa
instance 0 L2P UIDB Multi, check uidb hash table
```

Symptom: PLIM ASIC error message flooding console.

Conditions: Seen on SPA OIR.

Workaround:

1. Power down the SPA, wait a few minutes, power up the SPA.
2. OIR the LC.

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 3.2.1.



Note

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

Before performing an upgrade, perform the following tasks:

- Review the [“Caveats” section on page 17](#) before proceeding with the upgrade.
- Verify system stability with the commands described in the [“Verifying System Stability” section on page 22](#).
- Verify that your running configuration is backed up.



Note To back up your running configuration, type the **copy running-config destination** command in EXEC mode, as show in the example that follows. Replace the *destination* argument with the location where you want to store the configuration file.

```
RP/0/RP0/CPU0:router# copy running-config harddisk:
```

- Verify that all applicable mandatory SMUs, if any, are active on the router. Optional packages and SMUs can also be active on the system. Before proceeding with the upgrade, you need to activate any mandatory SMUs that are not active.
- If you are upgrading from Cisco IOS XR software Release 3.2.0 to Release 3.2.1 on a Cisco CRS-1 or Cisco XR 12000 Series Router, type the **show install rollback ?** command and note latest rollback point available.

```
RP/0/RP0/CPU0:router#(admin)# show install rollback ?
```

- If you are upgrading a Cisco CRS-1 from Release 3.0 to Release 3.2.1, type the **copy bootflash:/source harddisk:/destination** command to ensure that all files on the RP and standby RP bootflash are backed up, as shown in the example that follows. Replace the *source* argument with the name and location of the file you want to back up. Replace the *destination* argument with the name and location of the destination where you want to store the backup file.

```
RP/0/RP0/CPU0:router#(admin)# copy bootflash:/<files> harddisk:/<files>
```



Note In addition to backing up files on the RP bootflash, you can use the **copy bootflash:/source harddisk:/destination** command to back up files on the LC and SP bootflash. However, you are only required to back up those files that you have stored on the RP and standby RP boot flash.



Note This task is applicable on Cisco CRS-1 only, and it applies only to software upgrades from Release 3.0 to Release 3.2.1.

The following sections provide special instructions for upgrading Cisco IOS XR software on your router:

- [Verifying System Stability, page 22](#)
- [Upgrading Cisco IOS XR Software from Release 3.0 to Release 3.2.1 \(Cisco CRS-1\), page 22](#)
- [Upgrading Cisco IOS XR Software from Release 3.2.0 to 3.2.1 \(Cisco CRS-1\), page 25](#)
- [Upgrading Cisco IOS XR Software from Release 3.2.0 to 3.2.1 \(Cisco Cisco XR 12000 Series Router\), page 29](#)

Verifying System Stability

Before upgrading the software on a Cisco CRS-1 or Cisco XR 12000 Series Router, use the following commands to verify basic system stability before the upgrade:

- **show platform**—Verify that all nodes are in “IOS-XR RUN” state.
- **show redundancy**—Verify that a standby RP is available and in the “ready” state.
- **show ipv4 interface brief** or **show ipv6 interface brief**—Verify that all interfaces are in the “Up” state.
- **show install active**—Verify that the proper set of packages are active.



Note

For more information on the **show platform** and **show redundancy** commands, refer to the *Cisco IOS XR Interface and Hardware Component Command Reference*.

For more information on the **show ipv4 interface brief** and **show ipv6 interface brief** commands, refer to the *Cisco IOS XR IP Addresses and Services Command Reference*.

For more information on the **show install active** command, refer to the *Cisco IOS XR System Management Command Reference*.

Upgrading Cisco IOS XR Software from Release 3.0 to Release 3.2.1 (Cisco CRS-1)

This section provides instructions for upgrading Cisco IOS XR software from Release 3.0 to Release 3.2.1 on a Cisco CRS-1. [Table 8](#) lists the package files that are required to perform the upgrade from Release 3.0 to Release 3.2.1.

Table 8 Required packages for Upgrading from Release 3.0 to Release 3.2.1 (Cisco CRS-1)

PIE File Description	PIE Filename
Composite Mini Package (OS-MBI, Base, Admin, Fwdg, Ic Rout)	comp-hfr-mini.pie-3.2.1
Multicast Package	hfr-mcast-p.pie-3.2.1
Manageability Package	hfr-mgbl-p.pie-3.2.1
MPLS Package	hfr-mpls-p.pie-3.2.1
Security Package	hfr-k9sec-p.pie-3.2.1



Note

If you changed your PIE filenames so that they are different from the filenames listed in [Table 8](#), those PIE files will still operate properly. Changing the PIE filenames does not affect the operation of the PIE file.

Table 9 describes the SMU required to perform the upgrade from Release 3.0 to Release 3.2.1 on a Cisco CRS-1.

Table 9 Required SMUs for Upgrading from Release 3.2.0 to Release 3.2.1 (Cisco CRS-1)

SMU Information	Description
SMU Filename	hfr-admin-3.0.0.CSCeh04631.pie (for Release 3.0.0 release) hfr-admin-3.0.1.CSCeh04631.pie (for Release 3.0.1)
DDTS	CSCeh04631: Downgrade to 3.0 from 3.2 caused failover problems with MBI error.
SMU Install Impact	Low. There should be no impact to running system.
Problem Summary	Without this SMU, any node reload (or failover) will cause the system to re-sync all of the packages on the booting node, resulting in longer boot up time. This is caused by non-backwards compatible MBI related changes made in Release 3.2.0.

Use the following procedure to install the SMU:

-
- Step 1** Start a configuration session on your router.
- Step 2** Type the **install add hfr-admin-3.0.0.CSCeh04631.pie to disk0:** command to install the hfr-admin-3.0.0.CSCeh04631.pie SMU file.
- ```
RP/0/RP0/CPU0:router(admin)# install add hfr-admin-3.0.0.CSCeh04631.pie to disk0
```
- Step 3** Type the **install activate disk0:hfr-admin-3.0.0.CSCeh04631-1.0.0** command to activate the hfr-base-3.2.0.CSCEi45039.pie SMU.
- ```
RP/0/RP0/CPU0:router# install activate disk0:hfr-admin-3.0.0.CSCeh04631-1.0.0
```
- Step 4** Type the **config** command to enter global configuration mode.
- Step 5** In global configuration mode, type the **hostname name** command to specify the name of the current router. Replace the *name* argument with the host name for the router, as shown in the following example:
- ```
RP/0/RP0/CPU0:router(config)# hostname crs1
```
- Step 6** Type the **commit** command to commit the configuration to memory and trigger the SMU.
- ```
RP/0/RP0/CPU0:router(config)# commit
```
- Step 7** Type the **exit** command to exit global configuration mode.
- ```
RP/0/RP0/CPU0:router(config)# exit
```
- Step 8** Type the **admin** command to enter admin EXEC mode.
- ```
RP/0/RP0/CPU0:router # admin
```
- Step 9** Enter the **install commit** command to commit the SMU and save the active software set to be persistent across route processor (RP) reloads.
- ```
RP/0/RP0/CPU0:router (admin)# install commit
```
-

Use the following procedure to upgrade the Cisco IOS XR software from Release 3.0 to Release 3.2.1:

**Step 1** Start a configuration session on your router.

**Step 2** Type the **admin** command to enter admin EXEC mode, as shown in the following example:

```
RP/0/RP0/CPU0:router # admin
```

**Step 3** In admin EXEC mode, type the **install add pie-file to disk0: sync** command to add the required pie or pies to disk, as shown in the example that follows. Replace *pie-file* with the name and location of the PIE file (composite package) to install.

```
RP/0/RP0/CPU0:router(admin)# install add tftp://225.0.0.0/pies/comp-hfr-mini.pie-3.2.1 to disk0: sync
```



**Note** The **sync** keyword prevents the user from executing any other commands during the installation.



**Note** Multiple PIE files can be added to a device at a time by including all of the pie files in a single **install add** command. To add all pies using a single command, list all of the pies (including their source) with the **install add** command, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install add
tftp://225.0.0.0/pies/comp-hfr-mini.pie-3.2.1
tftp://225.0.0.0/pies/hfr-mcast-p.pie-3.2.1
tftp://225.0.0.0/pies/hfr-mgbl-p.pie-3.2.1
tftp://225.0.0.0/pies/hfr-mpls-p.pie-3.2.1
tftp://225.0.0.0/pies/hfr-k9sec-p.pie-3.2.1 to disk0: sync
```

**Step 4** Type the **install activate disk0:package sync** command to activate an added package, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install activate disk0:comp-hfr-mini-3.2.1 sync
```



**Note** The output from the **install add** command provides the list of names of packages to be used in with the **install activate** command.



**Note** Multiple packages can be activated with a single execution of the **install activate** command by specifying the **disk0:package** keyword argument once for each package, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install activate disk0:crs-mcast-0.46.0
disk0:crs-mcast-0.47.0 disk0:crs-mcast-0.48.0 sync
```



**Note** The **sync** keyword prevents the user from executing any other commands during the installation.

Once the router reloads, it uses the new specified packages.



**Note** Do not activate any other packages during the upgrade. Additional packages can be activated after upgrade has completed.

**Step 5** Verify system stability by executing the commands described in the “[Verifying System Stability](#)” section on page 22.

If system issues are detected, or if the newly activated software needs to be backed out for any reason, follow the steps described in “[Downgrade Procedure](#)” section on page 31 to rollback the software configuration to a previous rollback point.

**Step 6** Enter the `install commit` command to commit the newly activated software, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install commit
```

---

## Upgrading Cisco IOS XR Software from Release 3.2.0 to 3.2.1 (Cisco CRS-1)

This section provides instructions for upgrading Cisco IOS XR software from Release 3.2.0 to Release 3.2.1 on a Cisco CRS-1. [Table 10](#) lists the package files that are required to perform the upgrade from Release 3.2.0 to Release 3.2.1.

**Table 10** Required packages for Upgrading from Release 3.2.0 to Release 3.2.1 (Cisco CRS-1)

| PIE File Description                                           | PIE Filename            |
|----------------------------------------------------------------|-------------------------|
| Composite Mini Package<br>(OS-MBI, Base, Admin, Fwdg, Ic Rout) | comp-hfr-mini.pie-3.2.1 |
| Multicast Package                                              | hfr-mcast-p.pie-3.2.1   |
| Manageability Package                                          | hfr-mgbl-p.pie-3.2.1    |
| MPLS Package                                                   | hfr-mpls-p.pie-3.2.1    |
| Security Package                                               | hfr-k9sec-p.pie-3.2.1   |



**Note**

If you changed your PIE filenames so that they are different from the filenames listed in [Table 10](#), those PIE files will still operate properly. Changing the PIE filenames does not affect the operation of the PIE file.

---

Table 11 describes the SMU required to perform the upgrade from Release 3.2.0 to Release 3.2.1 on a Cisco CRS-1.

**Table 11 Required SMUs for Upgrading from Release 3.2.0 to Release 3.2.1 (Cisco CRS-1)**

| SMU Information    | Description                                            |
|--------------------|--------------------------------------------------------|
| SMU Filename       | hfr-base-3.2.0.CSCei45039.pie                          |
| DDTS               | CSCei45039                                             |
| Problem Summary    | Config loss when upgrading from 3.2.0 to 3.2.x release |
| SMU Install Impact | Low. There should be no impact to running system.      |

Use the following procedure to install the SMU:

- 
- Step 1** Start a configuration session on your router.
- Step 2** Type the **admin** command to enter admin EXEC mode, as shown in the following example:
- ```
RP/0/RP0/CPU0:router # admin
```
- Step 3** Type the **install add hfr-base-3.2.0.CSCei45039.pie to disk0:** command to install the hfr-base-3.2.0.CSCei45039.pie SMU file.
- ```
RP/0/RP0/CPU0:router(admin)# install add hfr-base-3.2.0.CSCei45039.pie to disk0
```
- Step 4** Type the **install activate disk0:hfr-base-3.2.0.CSCei45039-1.0.0** command to activate the hfr-base-3.2.0.CSCei45039.pie SMU.
- ```
RP/0/RP0/CPU0:router(admin)# install activate disk0:hfr-base-3.2.0.CSCei45039-1.0.0
```
- Step 5** Type the **exit** command to exit admin EXEC mode.
- Step 6** Type the **config** command to enter global configuration mode.
- Step 7** In global configuration mode, type the **hostname name** command to specify the name of the current router. Replace the *name* argument with the host name for the router, as shown in the following example:
- ```
RP/0/RP0/CPU0:router(config)# hostname crs1
```
- Step 8** Type the **commit** command to commit the configuration to memory and trigger the SMU.
- ```
RP/0/RP0/CPU0:router(config)# commit
```
- Step 9** Type the **exit** command to exit global configuration mode.
- ```
RP/0/RP0/CPU0:router(config)# exit
```
- Step 10** Type the **admin** command to enter admin EXEC mode.
- ```
RP/0/RP0/CPU0:router # admin
```
- Step 11** Enter the **install commit** command to commit the SMU and save the active software set to be persistent across route processor (RP) reloads.
- ```
RP/0/RP0/CPU0:router(admin)# install commit
```
-

Use the following procedure to upgrade the Cisco IOS XR software from Release 3.2.0 to Release 3.2.1:

**Step 1** Start a configuration session on your router.

**Step 2** Type the **admin** command to enter admin EXEC mode, as shown in the following example:

```
RP/0/RP0/CPU0:router # admin
```

**Step 3** In admin exec mode, type the **install add pie-file to disk0: sync** command to add the required pie or pies to disk, as shown in the example that follows. Replace *pie-file* with the name and location of the PIE file (composite package) to install.

```
RP/0/RP0/CPU0:router(admin)#install add tftp://225.0.0.0/pies/comp-hfr-mini.pie-3.2.1 to disk0: sync
```



**Note** The **sync** keyword prevents the user from executing any other commands during the installation.



**Note** Multiple PIE files can be added to a device at a time by including all of the pie files in a single **install add** command. To add all pies using a single command, list all of the pies (including their source) with the **install add** command, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install add
tftp://225.0.0.0/pies/comp-hfr-mini.pie-3.2.1
tftp://225.0.0.0/pies/hfr-mcast-p.pie-3.2.1
tftp://225.0.0.0/pies/hfr-mgbl-p.pie-3.2.1
tftp://225.0.0.0/pies/hfr-mpls-p.pie-3.2.1
tftp://225.0.0.0/pies/hfr-k9sec-p.pie-3.2.1 to disk0: sync
```

**Step 4** In admin EXEC mode, type the **install activate disk0:package sync** command to activate an added package, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install activate disk0:comp-hfr-mini-3.2.1 sync
```



**Note** The output from the **install add** command provides the list of names of packages to be used in with the **install activate** command.



**Note** Multiple packages can be activated with a single execution of the **install activate** command by specifying the **disk0:package** keyword argument once for each package, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install activate disk0:crs-mcast-0.46.0
disk0:crs-mcast-0.47.0 disk0:crs-mcast-0.48.0 sync
```



**Note** The **sync** keyword prevents the user from executing any other commands during the installation.

Once the router reloads, it uses the new specified packages.



**Note** Do not activate any other packages during the upgrade. Additional packages can be activated after upgrade has completed.

**Step 5** Verify system stability by executing the commands described in the [“Verifying System Stability” section on page 22](#).

If system issues are detected, or if the newly activated software needs to be backed out for any reason, follow the steps described in [“Downgrade Procedure” section on page 31](#) to rollback the software configuration to a previous rollback point.

**Step 6** Enter the `install commit` command to commit the newly activated software, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install commit
```

---



**Note** If you previously executed the `install remove` command to permanently remove any packages in the rollback configuration, then the rollback operation will not proceed. To resolve this issue, please run the `install add pie-file to disk0: sync` command to re-add the relevant packages to disk, as shown in the example that follows. Replace the `pie-file` argument with the name and location of the PIE file (composite package) to install.

```
RP/0/RP0/CPU0:router(admin)# install add pie-file to disk0: sync
```

---



**Note** If the rollback point is more than two operations away, then you need to include the `reload` keyword with the `install rollback point-id sync` command to be reload the router, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install rollback 2 sync reload
```

---

**Step 7** Enter the `install commit` command to install commit the newly activated software.

```
RP/0/RP0/CPU0:router(admin)# install commit
```

**Step 8** Verify system stability through commands described in the [“Verifying System Stability” section on page 22](#).

---

# Upgrading Cisco IOS XR Software from Release 3.2.0 to 3.2.1 (Cisco Cisco XR 12000 Series Router)

This section provides instructions for upgrading Cisco IOS XR software from Release 3.2.0 to Release 3.2.1 on a Cisco XR 12000 Series Router. [Table 12](#) lists the package files that are required to perform the upgrade from Release 3.2.0 to Release 3.2.1.

**Table 12 Required packages for Upgrading from Release 3.2.0 to Release 3.2.1 (Cisco XR 12000 Series Router)**

| PIE File Description                                         | PIE Filename         |
|--------------------------------------------------------------|----------------------|
| Composite Mini Package (OS-MBI, Base, Admin, Fwdg, LC, Rout) | c12k-mini.pie-3.2.1  |
| Multicast Package                                            | c12k-mcast.pie-3.2.1 |
| Manageability Package                                        | c12k-mgbl.pie-3.2.1  |
| MPLS Package                                                 | c12k-mpls.pie-3.2.1  |
| Security Package                                             | c12k-k9sec.pie-3.2.1 |



**Note**

If you changed your PIE filenames so that they are different from the filenames listed in [Table 12](#), those PIE files will still operate properly. Changing the PIE filenames does not affect the operation of the PIE file.



**Note**

There are no SMU files required for the Cisco XR 12000 Series Router in Cisco IOS XR software Release 3.2.1

Use the following procedure to upgrade the Cisco IOS XR software from Release 3.2.0 to Release 3.2.1:

- Step 1** Start a configuration session on your router.
- Step 2** Type the **admin** command to enter admin EXEC mode, as shown in the following example:
- ```
RP/0/0/CPU0:router # admin
```
- Step 3** In admin EXEC mode, type the **install add pie-file to disk0: sync** command to add the required pie or pies to disk, as shown in the example that follows. Replace *pie-file* with the name and location of the PIE file (composite package) to install.
- ```
RP/0/0/CPU0:router(admin)# install add tftp://225.0.0.0/pies/c12k-mini.pie-3.2.1 to disk0: sync
```



**Note**

The **sync** keyword prevents the user from executing any other commands during the installation.



**Note** Multiple PIE files can be added to a device at a time by including all of the pie files in a single **install add** command. To add all pies using a single command, list all of the pies (including their source) with the **install add** command, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install add
tftp://225.0.0.0/pies/c12k-mini.pie-3.2.1
tftp://225.0.0.0/pies/c12k-mcast.pie-3.2.1
tftp://225.0.0.0/pies/c12k-mgbl.pie-3.2.1
tftp://225.0.0.0/pies/c12k-mpls.pie-3.2.1
tftp://225.0.0.0/pies/c12k-k9sec.pie-3.2.1 to disk0: sync
```

**Step 4** In admin EXEC mode, type the **install activate disk0:package sync** command to activate an added package, as shown in the following example:

```
RP/0/0/CPU0:router(admin)# install activate disk0:c12k-mini.pie-3.2.1 sync
```



**Note** The output from the **install add** command provides the list of names of packages to be used in with the **install activate** command.



**Note** Multiple packages can be activated with a single execution of the **install activate** command by specifying the **disk0:package** keyword argument once for each package, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install activate disk0:c12k-mini.pie-3.2.1
disk0:c12k-mcast.pie-3.2.1 c12k-mcast.pie-3.2.1 sync
```



**Note** The **sync** keyword prevents the user from executing any other commands during the installation.

Once the router reloads, it uses the new specified packages.



**Note** Do not activate any other packages during the upgrade. Additional packages can be activated after upgrade has completed.

**Step 5** Verify system stability by executing the commands described in the [“Verifying System Stability” section on page 22](#).

If system issues are detected, or if the newly activated software needs to be backed out for any reason, follow the steps described in [“Downgrade Procedure” section on page 31](#) to rollback the software configuration to a previous rollback point.

**Step 6** Enter the **install commit** command to commit the newly activated software, as shown in the following example:

```
RP/0/0/CPU0:router(admin)# install commit
```

**Step 7** Verify system stability through commands described in the [“Verifying System Stability” section on page 22](#).

## Downgrade Procedure

Each **install activate**, **deactivate**, or **commit** operation automatically creates a rollback point, so that a software configuration can be reverted to a previous software configuration. Use the following procedure to downgrade Cisco IOS XR software to a previous rollback point.

**Note**

You can rollback to a previous software configuration only if all packages in that software configuration are still present on disk. If you removed a package with the **install remove** command, then a rollback operation to that package will fail. To resolve this issue, use the **install add** command to re-install any previously removed packages.

**Note**

This procedure is applicable to IOS XR software only.

**Note**

If you typed the **show install rollback ?** command and noted latest rollback point available, and you would like to roll back to that point, then you can skip Step 1 and Step 2 in the following procedure. If you are not sure which software configuration you want to rollback to, or if you performed an upgrade from IOS XR software Release 3.0 to 3.2.1, then you need to start from Step 1.

**Step 1** Start a configuration session on your router.

**Step 2** Type the **admin** command to enter admin EXEC mode, as shown in the following example:

```
RP/0/RP0/CPU0:router # admin
```

**Step 3** In admin EXEC mode, type the **show install rollback ?** command to obtain the list of available rollback points, as shown in the following example:

```
RP/0/RP0/CPU0:router#(admin)# show install rollback ?
```

**Step 4** Type the **show install rollback point-id** command to locate the rollback point you want to go back to, as shown in the following example. Replace the *point-id* argument with the appropriate installation point ID number.

```
RP/0/RP0/CPU0:router#(admin)# show install rollback 2
```

**Note**

You must run the **show install rollback point-id** command with a valid rollback point number. The command output shows list of active packages for that rollback point.

**Step 5** Enter the **install rollback point-id sync** command to perform the rollback operation, as show in the example that follows. Replace *point-id* with the appropriate installation point ID number (the same number you located in Step 2).

```
RP/0/RP0/CPU0:router(admin)# install rollback 2 sync
```

**Note**

The **sync** keyword prevents the user from executing any other commands during the installation.

Based on the set of packages being activated and deactivated as part of the rollback operation, one or more nodes may be reloaded. This operation could take some time.

If you are downgrading from 3.2.1 to 3.0.x version of Cisco IOS XR software, use the procedure in the “Restoring the Bootflash on RP, LC, and SP Nodes” section that follows to restore the bootflash on RP, LC, and SP nodes.

## Restoring the Bootflash on RP, LC, and SP Nodes

To ensure that a router comes up as quickly as possible after a reload, reformat the bootflashes on the RP, LC, and SP nodes that are installed in the router. The following sections describe how to restore the bootflashes on RP, LC, and SP nodes:

- [Restoring the Bootflashes on the RP Nodes, page 32](#)
- [Restoring the Bootflashes on the LC and SP Nodes, page 33](#)



### Note

You are only required to back up those files that you have stored on the RP and standby RP boot flash. If you did not back files on the LC and SP bootflashes, then you only need to follow the procedure described in the “Restoring the Bootflashes on the RP Nodes” section on page 32.

## Restoring the Bootflashes on the RP Nodes

Use the following procedure to restore the boot flashes on RP nodes.



### Note

Restore the bootflash on the active RP first, and then restore bootflash on the standby RP.

**Step 1** In EXEC or admin EXEC mode, type the **format bootflash: location node-id** command to restore the bootflash on the active RP card, as shown in the example that follows:

```
RP/0/RP0/CPU0:router# format bootflash: location RP0/0/0
```

**Step 2** Use the **dir bootflash: location node-id** command to display a list of files on a file system or in a specific directory, as shown in the example that follows:

```
RP/0/RP0/CPU0:router# dir bootflash: location RP0/0/0
```

**Step 3** Repeat Step 1 and Step 2 on the standby RP card.

**Step 4** Once you have restored the boot flashes on both the active and standby RP cards, enter the **copy bootflash:/source harddisk:/destination** command to copy back files (if any) from the hard disk to the bootflash, as shown in the following example. Replace the *source* argument with the name and location of the file you want to back up. Replace the *destination* argument with the name and location of the destination where you want to store the backup file.

```
RP/0/RP0/CPU0:router#(admin)# copy bootflash:/<files> harddisk:/<files>
```

## Restoring the Bootflashes on the LC and SP Nodes

Use the following procedure to restore the bootflashes on the LC and SP nodes.

After they have been downgraded, the LC and SP nodes run from memory due to the boot flash migration to Version 3 during the upgrade process. You need to manually downgrade the LC and SP nodes to restore proper operation.

- 
- Step 1** Start a configuration session on your router.
- Step 2** In EXEC mode, enter the **show platform** command to obtain a list of line card slots, as shown in the following example.
- ```
RP/0/RP0/CPU0:router# show platform
```
- Step 3** Enter the **format bootflash location nodeid force** command to format a file the bootflash on a specific LC or SP. Replace the *nodeid* argument with the location of one of the line cards listed in the **show platform** command output you obtained in Step 1.
- ```
RP/0/RP0/CPU0:router# format bootflash location 0/1/SP force
```
- Step 4** Enter the **dir bootflash location nodeid** command to display list of files on a specific LC or SP node's directory, as shown in the example that follows. Replace the *nodeid* argument the location of the node whose file directory you want to display, in the *rack/slot/module* notation.
- ```
RP/0/RP0/CPU0:router# dir bootflash location 0/1/SP
```
- Step 5** Enter the **configure** command to enter global configuration mode.
- Step 6** In global configuration mode, enter the **hw-module node nodeid reload** command to reset the power-cycle on a specific LC or SP node. Replace the *nodeid* argument the location of the node whose hardware attributes you want to configure, in the *rack/slot/module* notation.
- ```
RP/0/RP0/CPU0:router (config)# hw-module node 0/1/SP reload
```
- The node downloads all the packages to the local bootflash, resets itself, and boots from the local bootflash.
- Step 7** Repeat Steps 2 through Step 6 for each LC and SP listed in the **show platform** command output you obtained in Step 1.
- Step 8** After you have reloaded the software on all SP and LC nodes, enter the **exit** command to exit global configuration mode, as shown in the following example:
- ```
RP/0/RP0/CPU0:router (config)# exit
```
- Step 9** In EXEC mode, enter the **show platform** command to ensure that all SP and LC nodes are in the IOS-XR RUN state.
- ```
RP/0/RP0/CPU0:router# show platform
```
- Step 10** Enter the **show ip interface brief** command to ensure that all interfaces are created.
- ```
RP/0/RP0/CPU0:router# show ip interface brief
```
- Step 11** Verify system stability by executing the commands described in the [“Verifying System Stability” section on page 22](#).
-

Removing Inactive Packages from the Disk

Once a software upgrade or downgrade is complete, you can clear space on a disk by removing any inactive packages that are not needed any more. Use the following procedure to remove unnecessary inactive packages:

Step 1 Start a configuration session on your router.

Step 2 Enter the **admin** command to enter admin EXEC mode.

```
RP/0/RP0/CPU0:router# admin
```

Step 3 In admin EXEC mode, type the **show install inactive brief** command to obtain a list of inactive packages on the router, and note the names of packages that are not needed, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# show install inactive brief
```

Step 4 In admin EXEC mode, type the **install remove command disk0:package sync** command to remove the unnecessary inactive packages, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install remove disk0:crs-mcast-0.48.0 sync
```



Note The **sync** keyword prevents the user from executing any other commands during the installation.



Note Multiple packages can be removed at the same time by specifying the **disk0:package** keyword argument once for each package, as shown in the following example:

```
RP/0/RP0/CPU0:router(admin)# install remove disk0:crs-mcast-0.46.0  
disk0:crs-mcast-0.47.0 disk0:crs-mcast-0.48.0 sync
```

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 35](#)
- [Software Documents, page 35](#)

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 3.2.1.

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>

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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
- Nonemergencies—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 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 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>

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

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