



Release Notes for Cisco IOS XR Software Release 3.8.4

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Cisco IOS XR Software Release 3.8.4

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These release notes describe the features provided in the Cisco IOS XR Software Release 3.8.4 and are updated as needed.



Note

For information about Cisco IOS XR Software Release 3.8.4, see the “[Important Notes](#)” section on [page 32](#).

You can find the most current Cisco IOS XR software documentation on the World Wide Web at: http://www.cisco.com/en/US/partner/products/ps5845/tsd_products_support_series_home.html

These electronic documents may contain updates and modifications. For more information on obtaining Cisco documentation, see the “[Obtaining Documentation and Submitting a Service Request](#)” section on [page 45](#).

For a list of software caveats that apply to Cisco IOS XR Software Release 3.8.4, see the “[Caveats](#)” section on [page 37](#). The caveats are updated for every release and are described 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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Key Changes from Previous Releases in Cisco IOS XR Release 3.8.4

Cisco IOS XR Software Release 3.8.4 requires a 2-GB flash disk as a minimum. Therefore, you must upgrade an existing PCMCIA 1-GB flash disk to 2 GB or 4 GB before upgrading to Cisco IOS XR Software Release 3.8.4. For more information, see the [“Minimum Flash Disk Requirements When Upgrading to Release 3.8.4”](#) section on page 37.

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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), Routing Information Protocol (RIPv2), Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), IP Multicast, Routing Policy Language (RPL), Hot Standby Router Protocol (HSRP), and Virtual Router Redundancy Protocol features (VRRP).
- **BGP Prefix Independent Convergence**—Provides the ability to converge BGP routes within sub seconds instead of multiple seconds. The Forwarding Information Base (FIB) is updated, independent of a prefix, to converge multiple 100K BGP routes with the occurrence of a single failure. This convergence is applicable to both core and edge failures and with or without MPLS. This fast convergence innovation is unique to Cisco IOS XR software.
- **Multiprotocol Label Switching (MPLS)**—Supports MPLS protocols, including Traffic Engineering (TE), Resource Reservation Protocol (RSVP), Label Distribution Protocol (LDP), Virtual Private LAN Service (VPLS), and Layer 3 Virtual Private Network (L3VPN). The Cisco CRS-1 router supports Layer 2 Virtual Private Network (L2VPN).

- **Multicast**—Provides comprehensive IP Multicast software including Source Specific Multicast (SSM) and Protocol Independent Multicast (PIM) in Sparse Mode only. The Cisco CRS-1 router supports Bidirectional Protocol Independent Multicast (BIDIR-PIM).
- **Quality of Service (QoS)**—Supports QoS mechanisms including policing, marking, queuing, random and hard traffic dropping, and shaping. Additionally, Cisco IOS XR software also supports modular QoS command-line interface (MQC). MQC simplifies the configuration of 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. Includes a comprehensive set of Syslog messaging.
- **Security**—Provides comprehensive network security features including access control lists (ACLs); routing authentications; Authentication, Authorization, and Accounting (AAA)/Terminal Access Controller Access Control System (TACACS+); Secure Shell (SSH); Management Plane Protection (MPP) for control plane security; and Simple Network Management Protocol version3 (SNMPv3). Control plane protections integrated into line card Application-Specific Integrated Circuits (ASICs) include Generalized TTL Security Mechanism (GTSM), RFC 3682, and Dynamic Control Plane Protection (DCPP).
- **Craft Works Interface (CWI)**—CWI is a client-side application used to configure and manage Cisco routers. 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; nonstop routing for ISIS, LDP, BGP, and OSPF; and nonstop forwarding (NSF).
- **Multicast service delivery in SP NGN**—MVPNv4 support carries multicast traffic over an ISP MPLS core network.
- **IPv6 Provider Edge Router support for IPv6 applications**—Delivers IPv6 traffic over an IPv4/MPLS core with IPv6 provider edge router (6PE) support.
- **IPv6 VPN over MPLS (6VPE) support**—Delivers IPv6 VPN over MPLS (IPv6) VPN traffic over an IPv4 or MPLS core with 6VPE support.
- **6VPE over L2TPv3 support**—Delivers IPv6 VPN traffic over L2TPv3 core with 6VPE support (Cisco XR 12000 Series Router only). This feature is also available on Cisco IOS software.
- **Enhanced core competencies:**
 - IP fast convergence with Fast Reroute (FRR) support for Intermediate System-to-Intermediate System (IS-IS)
 - Traffic engineering support for unequal load balancing
 - Path Computation Element (PCE) capability for traffic engineering
- **Firewall Services**—Seamless insertion of Firewall Services in the data path with Virtual Firewall support on Multi Service Blade (XR-12K-MSB) for the Cisco XR 12000 Series Router.

- **VPN IPSec Aggregation** —The IPSec Aggregation feature is provided through SPA-IPSEC-2G-2 card. The IPSec Aggregation feature allows you to terminate up to 64-K VPN tunnels, both site-to-site and remote access, if four VPN SPAs are used.
- **L2TPv3 Tunneling Mechanism**—Service Providers who do not use MPLS in the core, but want to offer VPN services can use the L2TPv3 tunneling mechanism. This feature support includes IPv4 (VPNv4) and IPv6 (6VPE) VPN services using L2TPv3 encapsulation. The L2TPv3 packet is encapsulated in an IPv4 delivery header and is carried across an IPv4 backbone. VPN prefixes are advertised with BGP labels and resolved over L2TPv3 tunnels. This feature is supported only on the Cisco XR 12000 Series Router.

For more information about new features provided on various platforms for Cisco IOS XR Software Release 3.8.4, see the [“New Software Features in Cisco IOS XR Software Release 3.8.4”](#) section on page 24 in this document.

System Requirements

Cisco IOS XR Software Release 3.8.4 supports the following platforms:

- [Cisco CRS-1 Router, page 4](#)
- [Cisco XR 12000 Series Router, page 12](#)

To determine the software versions or levels of your current system, see the [“Determining Your Software Version”](#) section on page 23.

Cisco CRS-1 Router

This section describes the system requirements for Cisco IOS XR Software Release 3.8.4 supported on the Cisco CRS-1 router platform. The system requirements include the following information:

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- [Memory Requirements, page 7](#)
- [Hardware Supported, page 7](#)
- [Software Compatibility, page 12](#)
- [Other Firmware Support, page 12](#)

To determine the software versions or levels of your current system, see [Determining Your Software Version, page 23](#).

Feature Set Table

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 3.8.4 features. [Table 1](#) lists the Cisco IOS XR software feature set matrix (PIE files) and associated filenames available for the Cisco IOS XR Software Release 3.8 supported on the Cisco CRS-1.

Table 1 Cisco CRS-1 Supported Feature Sets
(Cisco IOS XR Software Release 3.8.4 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	comp-hfr-mini.pie-3.8.4	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Cisco IOS XR IP Unicast Routing Core Bundle	comp-hfr-mini.vm-3.8.4	Contains the required core packages including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Optional Individual Packages¹		
Cisco IOS XR Manageability Package	hfr-mgbl-p.pie-3.8.4	CORBA ² agent, XML ³ Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	hfr-mpls-p.pie-3.8.4	MPLS-TE ⁴ , LDP ⁵ , MPLS Forwarding, MPLS OAM ⁶ , LMP ⁷ , OUNI ⁸ , RSVP ⁹ , and Layer 2 VPN and Layer 3 VPN.
Cisco IOS XR Multicast Package	hfr-mcast-p.pie-3.8.4	Multicast Routing Protocols (PIM, MSDP ¹⁰ , IGMP ¹¹ , Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB ¹² , MURIB ¹³ , MFWD ¹⁴), and BIDIR-PIM ¹⁵ .
Cisco IOS XR Security Package	hfr-k9sec-p.pie-3.8.4	Support for Encryption, Decryption, IPSec ¹⁶ , SSH ¹⁷ , SSL ¹⁸ , and PKI ¹⁹ (Software based IPSec support—maximum of 500 tunnels)
Cisco IOS XR Documentation Package	hfr-doc.pie-3.8.4	Man pages for Cisco IOS XR CLI commands
Cisco IOS XR FPD Package	hfr-fpd.pie-3.8.4	Firmware for Fixed PLIM ²⁰ and SPA ²¹ modules as well as ROMMON ²² images for Cisco CRS-1 chassis.
Cisco IOS XR Diagnostic Package	hfr-diags-p.pie-3.8.4	Diagnostic utilities for Cisco IOS XR routers.

1. Packages installed individually
2. CORBA = Common Object Request Broker Architecture
3. Extensible Markup Language
4. MPLS Traffic Engineering
5. Label Distribution Protocol
6. Operations, Administration, and Maintenance
7. Link Manager Protocol

8. Optical User Network Interface
9. Resource Reservation Protocol
10. Multicast Source Discovery Protocol
11. Internet Group Management Protocol
12. Multicast Routing Information Base
13. Multicast-Unicast RIB
14. Multicast forwarding
15. Bidirectional Protocol Independent Multicast
16. IP Security
17. Secure Shell
18. Secure Socket Layer
19. Public-key infrastructure
20. Physical layer interface module
21. Shared port adapters
22. ROM monitor

Table 2 lists the Cisco CRS-1 TAR files.

Table 2 *Cisco CRS-1 Supported Feature Sets
(Cisco IOS XR Software Release 3.8.4 TAR Files)*

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	CRS-1-iosxr-3.8.4.tar	<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 Diagnostic Package • Cisco IOS XR FPD Package • Cisco IOS XR Documentation Package
Cisco IOS XR IP/MPLS Core Software 3DES	CRS-1-iosxr-k9-3.8.4.tar	<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 • Cisco IOS XR Diagnostic Package • Cisco IOS XR FPD Package • Cisco IOS XR Documentation Package

Memory Requirements


Caution

If you remove the media in which the software image or configuration is stored, the router may become unstable and fail.

The minimum memory requirements for Cisco CRS-1 running Cisco IOS XR Software Release 3.8.4 consist of the following:

- 4-GB memory on the route processors (RPs)
- 2-GB memory on each modular services card (MSC)
- 2-GB PCMCIA flash disk


Note

Cisco IOS XR Software Release 3.8.4 requires a 2-GB flash disk as a minimum. Therefore, you must upgrade an existing PCMCIA 1-GB flash disk to 2 GB or 4 GB before upgrading to Cisco IOS XR Software Release 3.8.4. For more information, see the [“Minimum Flash Disk Requirements When Upgrading to Release 3.8.4”](#) section on page 37.

Hardware Supported

All hardware features are supported on Cisco IOS XR software, subject to the memory requirements specified in the [“Memory Requirements”](#) section on page 7.

The following table lists the supported hardware components on the Cisco CRS-1 and the minimum required software versions. For more information, see the [“Other Firmware Support”](#) section on page 12.

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

Component	Part Number	Support from Version
Cisco CRS-1 Series 16-Slot Line Card Chassis		
Cisco CRS-1 16-Slot Line Card Chassis	CRS-16-LCC	3.2
Cisco CRS-1 Fan Tray for 16-Slot LCC	CRS-16-LCC-FAN-TR	3.2
Cisco CRS-1 Fan Controller for 16-Slot Line Card Chassis	CRS-16-LCC-FAN-CT	3.2
Cisco CRS-1 16-Slot Alarm Board	CRS-16-ALARM	3.2
Cisco CRS-1 AC Delta Power Shelf for 16-Slot LCC	CRS-16-LCC-PS-ACD	3.2
Cisco CRS-1 AC Wye Power Shelf for 16-Slot LCC	CRS-16-LCC-PS-ACW	3.2
Cisco CRS-1 DC Power Shelf for 16-Slot LCC	CRS-1-LCC-PS-DC	3.2
Cisco CRS-1 LCC Front AC Power Panel	CRS-16-ACGRILLE	3.2
Cisco CRS-1 LCC Front DC Power Panel	CRS-16-DCGRILLE	3.2
Cisco CRS-1 Line Card Chassis Front Doors	CRS-16-LCC-DRS-F	3.2
Cisco CRS-1 Line Card Chassis Front Cable Mgmt	CRS-16-LCC-FRNT	3.2
Cisco CRS-1 LCC Expanded Front Cable Mgmt	CRS-16-LCC-FRNT-E	3.2
Cisco CRS-1 Line Card Chassis Rear Cable Mgmt	CRS-16-LCC-BCK-CM	3.2
Cisco CRS-1 Line Card Chassis Rear Doors	CRS-16-LCC-DRS-R	3.2

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

Component	Part Number	Support from Version
Cisco CRS-1 Lift for LCC 16 and FCC	CRS-16-LIFT/B	3.2
Cisco CRS-1 DC PEM for 16 slot LCC and FCC	CRS-16-DC-PEM	3.2
Cisco CRS-1 16 Slot System Reduced-Noise DC PEM	CRS-16-DC-PEM-B	3.8
Cisco CRS-1 16 Slot System Reduced-Noise Fan Tray	CRS-16-LCC-FNTR-B	3.8
Cisco CRS-1 Series 8-Slot Line Card Chassis		
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 CRS-1 8-Slot Line Card Chassis	CRS-8-LCC	3.2
Cisco CRS-1 Fan Tray for 8-Slot Line Card Chassis	CRS-8-LCC-FAN-TR	3.2
Cisco CRS-1 Line Card Chassis Filter Pack	CRS-8-LCC-FILTER	3.2
Cisco CRS-1 AC Pwr Rectifier for 8-Slot LCC	CRS-8-AC-RECT	3.2
Cisco CRS-1 DC Power Entry Module for 8-Slot LCC	CRS-8-DC-PEM	3.2
Cisco CRS-1 AC & DC Power Module Filter for 8-Slot LCC	CRS-8-PWR-FILTER	3.2
Cisco CRS-1 AC Delta PDU for CRS-8 LCC	CRS-8-LCC-PDU-ACD	3.2
Cisco CRS-1 AC Wye PDU for CRS-8 LCC	CRS-8-LCC-PDU-ACW	3.2
Cisco CRS-1 DC PDU for CRS-8 LCC	CRS-8-LCC-PDU-DC	3.2
Cisco CRS-1 Series 4-Slot Line Card Chassis		
Cisco CRS-1 4-Slot Single-Shelf System	CRS-4/S	3.4
Cisco CRS-1 Fabric Chassis Hardware		
CRS-FCC= Cisco CRS-1 Series Fabric Card Chassis Only	CRS-FCC=	3.2
CRS-1 Fabric Chassis AC Delta Power Kit	CRS-FCC-ACD-KIT	3.2
CRS-1 Fabric Chassis AC Grille	CRS-FCC-ACGRILLE	3.2
CRS-1 Fabric Chassis AC-Wye Power Kit	CRS-FCC-ACW-KIT	3.2
CRS Fabric Chassis DC Power Kit	CRS-FCC-DC-KIT	3.2
CRS-1 Fabric Chassis DC Power Grille	CRS-FCC-DCGRILLE	3.2
CRS Fabric Chassis Lift Bracket	CRS-FCC-LIFT-BRKT	3.2
CRS Fabric Chassis OIM Modules	CRS-FCC-OIM-1S=	3.2
Cisco CRS-1 Series FC Chassis Shelf/Fan/Enet cntr	CRS-FCC-SC-GE=	3.2
CRS-1 Fabric Chassis AC Intake Grille	CRS-FCC-ACGRILLE=	3.2
CRS-1 Fabric Chassis DC Intake Grille	CRS-FCC-DCGRILLE=	3.2
Cisco CRS-1 Series Fan Tray for FCC	CRS-FCC-FAN-TR=	3.2
CRS-1 Fabric Card Chassis Fan Tray Filters	CRS-FCC-FILTER=	3.2
CRS-1 Fabric Chassis Front Cosmetic Kit	CRS-FCC-FRNT-CM=	3.2

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

Component	Part Number	Support from Version
Cisco CRS-1 Series Fabric Card Chassis Fiber Module LED	CRS-FCC-LED=	3.2
Cisco CRS-1 Series DC Power Shelf for FCC	CRS-FCC-PS-DC=	3.2
CRS-1 Fabric Chassis Rear Cosmetic Kit	CRS-FCC-REAR-CM=	3.2
CRS-LIFT Brackets for Fabric Chassis	CRS-FCC-LIFT-BRKT=	3.2
CRS Fabric Chassis OIM Module	CRS-FCC-OIM-1S	3.2
CRS-1 Fabric Chassis AC Delta Power Supply	CRS-FCC-PS-ACD	3.2
CRS-1 Fabric Chassis AC Wye Option	CRS-FCC-PS-ACW	3.2
CRS-1 Fabric Chassis DC Power Option	CRS-FCC-PS-DC	3.2
Cisco CRS-1 Series Fabric Card Chassis Switch Fabric Card	CRS-FCC-SFC=	3.2
CRS-1 Fabric Chassis Integrated Switch Controller Card	CRS-FCC-SC-22GE=	3.4.1
Cisco CRS-1 General Chassis Hardware		
Cisco CRS-1 PCMCIA Flash Disk 1 GB	CRS-FLASH-DISK-1G	3.2
Cisco CRS-1 PCM CIA Flash Disk 2 GB	CRS-FLASH-DISK-2G	3.7
Cisco CRS-1 PCMCIA Flash Disk 4 GB	CRS-FLASH-DISK-4G	3.8
Cisco CRS-1 Modular Services Card	CRS-MSC	3.2
Cisco CRS-1 Modular Service Card B	CRS-MSC-B	3.6
Cisco CRS-1 Series Forwarding Processor 40G	CRS-FP40	3.8.1

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

Component	Part Number	Support from Version
Cisco CRS-1 SFPs		
Cisco CRS-1 2.5 G SFP LR Optic	POM-OC48-LR2-LC-C	3.2
Cisco CRS-1 2.5 G SFP SR Optic	POM-OC48-SR-LC-C	3.2
Cisco CRS-1 Fabric Cards		
Cisco CRS-1 8-Slot Fabric Card/Single	CRS-8-FC/S	3.2
Cisco CRS-1 8-Slot Fabric Card Blank	CRS-8-FC-BLANK	3.2
Cisco CRS-1 8-Slot Fabric Handle	CRS-8-FC-HANDLE	3.2
Cisco CRS-1 16-Slot Fabric Card/Single	CRS-16-FC/S	3.2
Cisco CRS-1 Interface and Router Processor Cards		
Cisco CRS-1 8-Slot Route Processor	CRS-8-RP	3.2
Cisco CRS-1 8-Slot Route Processor Blank	CRS-8-RP-BLANK	3.2
Cisco CRS-1 8-Slot Route Processor Handle	CRS-8-RP-HANDLE	3.2
Cisco Carrier 1 Series SPA Interface Processor 40G	CRS1-SIP-800	3.2
Cisco CRS-1 16-Slot Route Processor	CRS-16-RP	3.2
Cisco CRS-1 Distributed Route Processor	CRS-DRP	3.3
Cisco CRS-1 Distributed Route Processor CPU Module	CRS-DRP-B-CPU	3.4.1
Cisco CRS-1 Distributed Route Processor PLIM Module	CRS-DRP-B-PLIM	3.4.1
Cisco CRS-1 16-slot Route Processor, revision B	CRS-16-RP-B	3.3
Cisco CRS-1 8x10GbE WAN/LAN XFP Interface Module	8-10GBE-WL-XFP	3.8.4
Cisco CRS-1 4x10GbE WAN/LAN XFP Interface Module	4-10GBE-WL-XFP	3.8.4

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

Component	Part Number	Support from Version
Cisco CRS-1 SONET Interface Modules and SPAs		
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/VS	4OC192-POS/DPT-VS	3.2
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/SR	4OC192-POS/DPT-SR	3.2
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/IR	4OC192-POS/DPT-IR	3.2
Cisco CRS-1 4xOC-192/STM64 POS/DPT Interface Module/LR	4OC192-POS/DPT-LR	3.2
Cisco CRS-1 16xOC-48/STM16 POS/DPT Interface Module	16OC48-POS/DPT	3.2
Cisco CRS-1 1xOC-768/STM256 POS Interface Module/SR	1OC768-POS-SR	3.2
Cisco CRS-1 8-Port OC-12 Shared Port Adapter	SPA-8XOC12-POS	3.3
Cisco CRS-1 2-Port OC-48c/STM-16c POS/RPR Shared Port Adapter	SPA-2XOC48-POS/RPR	3.4
Cisco CRS-1 4-Port OC-48c/STM-16c POS/RPR Shared Port Adapter	SPA-4XOC48-POS/RPR	3.4
Cisco CRS-1 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with XFP Optics	SPA-OC192POS-XFP	3.2
Cisco CRS-1 4-Port OC-3 Shared Port Adapter	SPA-4XOC3-POS	3.2
Cisco CRS-1 4-Port T3/E3 Serial Shared Port Adapter	SPA-4XT3/E3	3.4.1
Cisco CRS-1 1-Port OC-192/STM-64 POS/RPR SPA VSR Optics	SPA-OC192POS-VSR	3.4.1
ITU grid 40G PLIM	1OC768-ITU/C	3.3
3-Port Clear Channel OC-3 ATM SPA	SPA-3XOC3-ATM-V2	3.7
1-Port Clear Channel OC-12 ATM SPA	SPA-1XOC12-ATM-V2	3.7
Cisco CRS-1 1-Port OC-768/STM-256c (C-band) DPSK DWDM PLIM	1OC768-DPSK/C	3.6
Cisco CRS-1 Ethernet Interface Modules and SPAs		
Cisco CRS-1 8x10 GbE Interface Module/LR	8-10GBE	3.2
10GBASE-LR XENPAK Module for Cisco CRS-1	CRS-XENPAK10GB-LR	3.2
10GBASE-LR XENPAK Module for Cisco CRS-1	XENPAK-10GB-LR+	3.4
Cisco 5-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-5X1GE-V2	3.4
Cisco 8-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-8X1GE-V2	3.4
Cisco 8-Port Gigabit Ethernet Shared Port Adapter	SPA-8X1GE	3.2
Cisco 10-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-10X1GE-V2	3.4
Cisco 1-Port Ten Gigabit Ethernet Shared Port Adapter, Version 2	SPA-1X10GE-L-V2	3.4
10GBASE-DWDM XENPAK	CRS 1 CRS-XENPAK10GB-DWDM	3.2.2
ITU grid 4X10G PLIM	4-10GE-ITU/C	3.3
10GBASE-ER XENPAK Modular for Cisco CRS-1	XENPAK-10GB-ER+	3.4
1-port 10GbE SPA WAN/LAN PHY	SPA-1X10GE-WL-V2	3.5.2
Cisco CRS-1 Series 4x10GE Interface Module	4-10GE	3.8.1

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

Component	Part Number	Support from Version
Cisco CRS-1 Series 42x1GE Interface Module	42-1GE	3.8.1
Cisco CRS-1 Series 20x1GE Flexible Interface Module	20-1GE-FLEX	3.8.1
Cisco CRS-1 Series 2x10GE WAN/LAN Flexible Interface Module	2-10GE-WL-FLEX	3.8.1

Software Compatibility

Cisco IOS XR Software Release 3.8.4 is compatible with the following Cisco CRS-1 systems:

- Cisco CRS-1 4-Slot Line Card Chassis
- Cisco CRS-1 8-Slot Line Card Chassis
- Cisco CRS-1 16-Slot Line Card Chassis
- Cisco CRS-1 Multishelf

Other Firmware Support

The Cisco CRS-1 router supports the following firmware code:

- The minimum ROMMON version required for this release is 1.54. For more information about ROMMON specifications, see http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html
For information about upgrading the ROMMON, see http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/rommon/configuration/guide/rm38.html
- The minimum CPUCNTRL version required for this release is 2.07. For more information about CPU controller bits, see http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/system_management/configuration/guide/yc38hdwr.html

Cisco XR 12000 Series Router

This section describes the system requirements for Cisco IOS XR Software Release 3.8.4 supported on the Cisco XR 12000 Series Router. The system requirements include the following information:

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To determine the software versions or levels of your current system, see “[Determining Your Software Version](#)” section on page 23.

Feature Set Table

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 3.8.4 features. [Table 4](#) lists the Cisco IOS XR software feature set matrix (PIE files) and associated filenames available for Cisco IOS XR Software Release 3.8.4, supported on the Cisco XR 12000 Series Router.

Table 4 *Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 3.8.4 PIE Files)*

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.pie-3.8.4	Contains the required core packages, including OS, Admin, Base, Forwarding, Routing, SNMP Agent, and Alarm Correlation.
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.vm-3.8.4	Contains the required core packages including OS, Admin, Base, Forwarding, and Routing SNMP Agent, and Alarm Correlation.
Optional Individual Packages¹		
Cisco IOS XR Manageability Package	c12k-mgbl.pie-3.8.4	CORBA ² agent, XML Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	c12k-mpls.pie-3.8.4	MPLS-TE ³ , LDP ⁴ , MPLS Forwarding, MPLS OAM ⁵ , LMP ⁶ , OUNI ⁷ , and RSVP ⁸ .
Cisco IOS XR Multicast Package	c12k-mcast.pie-3.8.4	Multicast Routing Protocols (PIM ⁹ , MSDP ¹⁰ , IGMP ¹¹ , Auto-RP, BSR ¹²), Tools (SAP MTrace, MRINFO), and Infrastructure (MRIB ¹³ , MURIB ¹⁴ , MFWD ¹⁵).
Cisco IOS XR Security Package	c12k-k9sec.pie-3.8.4	Support for Encryption, Decryption, IPsec ¹⁶ , SSH ¹⁷ , SSL ¹⁸ , and PKI ¹⁹ . Software based IPsec support: maximum of 500 tunnels or Hardware based IPsec: maximum of 64K tunnels using the SPA-IPSEC-2G-2
Cisco IOS XR Standby RP Boot Image	mbiprp-rp.vm-3.8.4	Support for booting the Standby RP on a Cisco XR 12000 Series Router.
Cisco IOS XR Service IPsec Controller Package	c12k-ipsec-service.pie-3.8.4	Support for service-ipsec and service-gre interfaces in Cisco IOS XR software.

Table 4 Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 3.8.4 PIE Files) (continued)

Feature Set	Filename	Description
Cisco IOS XR Firewall Package	c12k-firewall.pie-3.8.4	Support for Virtual Firewall (VFW) on a Cisco XR 12000 Series Router.
Cisco IOS XR Documentation Package	c12k-doc.pie-3.8.4	Man pages for Cisco IOS XR CLI commands.
Cisco IOS XR FPD Package	c12k-fpd.pie-3.8.4	Firmware for shared port adapters (SPA) and for fixed port line cards supported in Cisco IOS XR.
Cisco IOS XR Diagnostic Package	c12k-diags.pie-3.8.4	Diagnostic utilities for Cisco IOS XR routers.

1. Packages installed individually
2. CORBA = Common Object Request Broker Architecture
3. MPLS Traffic Engineering
4. Label Distribution Protocol
5. Operations, Administration, and Maintenance
6. Link Manager Protocol
7. Optical User Network Interface
8. Resource Reservation Protocol
9. Protocol Independent Multicast
10. Multicast Source Discovery Protocol
11. Internet Group Management Protocol
12. Bootstrap router
13. Multicast Routing Information Base
14. Multicast-Unicast RIB
15. Multicast forwarding
16. IP Security
17. Secure Shell
18. Secure Socket Layer
19. Physical layer interface module

Table 5 lists the Cisco XR 12000 Series Router TAR files.

Table 5 Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 3.8.4 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	XR12000-iosxr-3.8.4.tar	<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	XR12000-iosxr-k9-3.8.4.tar	<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



Caution

If you remove the media in which the software image or configuration is stored, the router may become unstable and fail.

The minimum memory requirements for Cisco XR 12000 Series Routers running Cisco IOS XR Software Release 3.8.4 consist of the following:

- 2-GB route memory on performance route processor 2 (PRP-2)



Note 4-GB route memory on PRP-2 is required if it is planned to scale to more than 64K IPsec tunnels per chassis.

- 2-GB or greater ATA flash storage on PRP-2
- 4-GB route memory on performance route processor 3 (PRP-3)
- 2-GB or greater Compact flash storage on PRP-3
- 1-GB line card route memory on all Engine 3 line cards
- 1-GB line card memory on Engine 5-based SPA interface processor (SIP-600)
 - The default route memory on the 12000-SIP-600 is 1GB.

- 2-GB line card memory on all Engine 5-based SPA interface processors (SIPs)
 - The default route memory on the 12000-SIP-401, 501, and 601 is 2 GB.



Note The performance route processor 1 (PRP-1) is not supported in production environments.

- 2-GB PCMCIA flash disk



Note Cisco IOS XR Software Release 3.8.4 requires a 2-GB flash disk as a minimum. Therefore, you must upgrade an existing PCMCIA 1-GB flash disk to 2 GB before upgrading to Cisco IOS XR Software Release 3.8.4. For more information, see the [“Minimum Flash Disk Requirements When Upgrading to Release 3.8.4”](#) section on page 37.

Hardware Supported

Cisco IOS XR Software Release 3.8.4 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”](#) section on page 15.

[Table 6](#) lists the supported hardware components on the Cisco XR 12000 Series Router and the minimum required software versions. For more information, see the [“Determining Your Software Version”](#) section on page 23.

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

Component	Part Number	Support from Version
Cisco XR 12000 Series Router Series Router Systems		
Cisco XR 12000 Series 4-slot chassis	XR-12000/4	3.3
Cisco XR 12000 Series 6-slot chassis	XR-12000/6	3.3
Cisco XR 12000 Series 10-slot chassis	XR-12000/10	3.3
Cisco XR 12000 Series 16-slot chassis	XR-12000/16	3.3
Cisco XR 12000 Series Router Chassis Hardware		
4-slot chassis & backplane, 1 Blower, 2 AC	12000/4-AC	3.3
4-slot chassis & backplane, 1 Blower, 2 DC	12000/4-DC	3.3
6-slot chassis & backplane, 2 Alarm, 1 Blower, 2 AC	12000/6-AC	3.3
6-slot chassis & backplane, 2 Alarm, 1 Blower, 2 DC	12000/6-DC	3.3
10-slot chassis & backplane, 2 Alarm, 1 Blower, 2 AC	12000/10-AC	3.3
10-slot chassis & backplane, 2 Alarm, 1 Blower, 2 DC	12000/10-DC	3.3
16-slot chassis & backplane, 2 Alarm, 2 Blower, 3 AC	12000/16-AC3	3.3
16-slot chassis & backplane, 2 Alarm, 2 Blower, 4 DC	12000/16-DC	3.3
16-slot chassis & backplane, 2 Alarm, 2 Blower, 4 AC	12000/16-AC4	3.3
Cisco XR12000 16-slots; 2 Alarms, Advanced 2 Blowers, up to 8 DC	12000E/16-DC	3.8
Cisco XR12000 16-slots; 2 Alarms, Advanced 2 Blowers, up to 8 AC	12000E/16-AC	3.8

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

Component	Part Number	Support from Version
Cisco XR 12000 Series Router Fabric Hardware		
Enhanced 20 Gbps Fabric & Alarm card for Cisco 12004	12004E/20	3.6
Enhanced 80 Gbps Fabric & Alarm card for Cisco 12404	12404E/80	3.6
Enhanced 30 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12006	12006E/30	3.6
Enhanced 120 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12406	12406E/120	3.6
Enhanced 50 Gbps Fabric (2xCSC and 5xSFC) for Cisco 12010	12010E/50	3.5.2
Enhanced 200 Gbps Fabric (2xCSC and 5xSFC) for Cisco 12410	12410E/200	3.5.2
Enhanced 800 Gbps Fabric (2xCSC and 5xSFC) for Cisco 12810	12810E/800	3.4
Enhanced 80 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12016	12016E/80	3.5.2
Enhanced 320 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12416	12416E/320	3.5.2
Enhanced 1280 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12816	12816E/1280	3.4
80 Gbps Fabric & Alarm card for Cisco 12404	12404/80	3.3
30 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12006	12006/30	3.3
120 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12406	12406/120	3.3
50 Gbps Fabric (2xCSC and 5xSFC) for Cisco 12010	12010/50	3.3
200 Gbps Fabric (2xCSC and 5xSFC) for Cisco 12410	12410/200	3.3
80 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12016	12016/80	3.3
320 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12416	12416/320	3.3
Cisco XR 12000 Series Route Processor Hardware		
Cisco XR 12000 Series Performance Route Processor 2	PRP-2	3.2
Cisco XR 12000 Series Performance Route Processor 3	PRP-3	3.8
Cisco XR 12000 Series 40 GB Hard Drive Option	HD-PRP2-40G	3.2
Cisco XR 12000 Series PRP-3 80G Hard Drive	HD-PRP3	3.8
Cisco XR 12000 Series General Chassis Hardware		
Cisco XR 12000 Series PCMCIA Flash Disk 1 GB	MEM-FD1G	3.2
Cisco XR 12000 Series PCMCIA Flash Disk 2 GB	MEM-FD2G	3.2
Cisco XR 12000 Series PCMCIA Flash Disk 4 GB	MEM-FD4G	3.8
Cisco XR 12000 Series PRP-3 2GB Compact Flash	FLASH-PRP3-2G	3.8
Cisco XR 12000 Series PRP-3 4GB Compact Flash	FLASH-PRP3-4G	3.8
Cisco XR 12000 Series PRP-3 4GB Memory (2X2GB DIMM)	MEM-PRP3-4G	3.8
Cisco XR 12000 Series PRP-3 4GB Memory (2X4GB DIMM)	MEM-PRP3-8G	3.8
Cisco XR 12000 Series SPA Interface Processor Hardware		
Multirate 2.5G IP Services Engine (Modular)	12000-SIP-401	3.3
Multirate 5G IP Services Engine (Modular)	12000-SIP-501	3.3

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

Component	Part Number	Support from Version
Multirate 10G IP Services Engine (Modular)	12000-SIP-601	3.3
Cisco XR 12000 Series SPA Interface Processor 10G	12000-SIP-600	3.2
Cisco XR 12000 Series Router SONET Interface Modules and SPAs		
Cisco XR 12000 Series 4xOC12c/STM4c POS Intermediate Reach Single-Mode optics	4OC12X/POS-I-SC-B	3.2
Cisco XR 12000 Series 4xOC12c/STM4c POS Short Reach Multi-Mode optics	4OC12X/POS-M-SC-B	3.2
Cisco XR 12000 Series 16xOC3c/STM1c POS Short Reach Multi-Mode optics	16OC3X/POS-M-MJ-B	3.2
Cisco XR 12000 Series 16xOC3c/STM1c POS Intermediate Reach Single-Mode optics	16OC3X/POS-I-LC-B	3.2
Cisco XR 12000 Series 8xOC3c/STM1c POS Short Reach Multi-Mode optics	8OC3X/POS-MM-MJ-B	3.2
Cisco XR 12000 Series 8xOC3c/STM1c POS Intermediate Reach Single-Mode optics	8OC3X/POS-IR-LC-B	3.2
Cisco XR 12000 Series 4xOC3c/STM1c POS Short Reach Multi-Mode optics	4OC3X/POS-MM-MJ-B	3.2
Cisco XR 12000 Series 4xOC3c/STM1c POS Intermediate Reach Single-Mode optics	4OC3X/POS-IR-LC-B	3.2
Cisco XR 12000 Series 4xOC3c/STM1c POS Long Reach Single-Mode optics	4OC3X/POS-LR-LC-B	3.2
Cisco XR 12000 Series 1xOC48c/STM16c POS Short Reach Single-Mode optics	OC48X/POS-SR-SC	3.2
Cisco XR 12000 Series 1xOC48c/STM16c POS Long Reach Single-Mode optics	OC48X/POS-LR-SC	3.2
Cisco XR 12000 Series 4-Port OC-3c/STM-1c ATM ISE Line Card, multimode	4OC3X/ATM-MM-SC	3.4
Cisco XR 12000 Series 4-Port OC-3c/STM-1c ATM ISE Line Card, single-mode	4OC3X/ATM-IR-SC	3.4
Cisco XR 12000 Series 4-port OC-12/STM-4 ATM multimode ISE line card with SC connector	4OC12X/ATM-MM-SC	3.4
Cisco XR 12000 Series 4-port OC-12/STM-4 ATM single-mode, intermediate-reach ISE line card with SC Connector	4OC12X/ATM-IR-SC	3.4
Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with VSR Optics	SPA-OC192POS-VSR	3.3
Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with LR Optics	SPA-OC192POS-LR	3.2
Cisco 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with XFP Optics	SPA-OC192POS-XFP	3.2
2-Port OC-48/STM16 POS/RPR Shared Port Adapters	SPA-2XOC48POS/RPR	3.3

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

Component	Part Number	Support from Version
1-Port Channelized OC-12/DS0 Shared Port Adapters	SPA-1XCHOC12/DS0	3.5
1-Port Channelized STM-1/OC-3 to DS0 Shared Port Adapter	SPA-1XCHSTM1/OC3	3.5
1-Port OC-48c/STM-16 POS/RPR Shared Port Adapter	SPA-1XOC48POS/RPR	3.5
2-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-2XOC12-POS	3.5
4-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-4XOC12-POS	3.5
4-Port OC-3c/STM-1 POS Shared Port Adapter	SPA-4XOC3-POS-V2	3.5
8-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-8XOC12-POS	3.5
8-Port OC-3c/STM-1 POS Shared Port Adapter	SPA-8XOC3-POS	3.5
Cisco 8-Port Channelized T1/E1 Shared Port Adapter	SPA-8XCHT1/E1	3.6
Cisco 1-Port Channelized OC-48/DS3 Optical Packet Processor Shared Port Adapter	SPA-1XCHOC48/DS3	3.6
1-Port Clear Channel OC-3 ATM SPA	SPA-1XOC3-ATM-V2	3.7
3-Port Clear Channel OC-3 ATM SPA	SPA-3XOC3-ATM-V2	3.7
1-Port Clear Channel OC-12 ATM SPA	SPA-1XOC12-ATM-V2	3.7
2-Port Channelized T3/E3 ATM CEoP SPA	SPA-2CHT3-CE-ATM	3.7
Ethernet Interface Modules and SPAs		
Cisco XR 12000 Series 4xGE with SFP optics	4GE-SFP-LC	3.2
Cisco 5-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-5X1GE-V2	3.4
Cisco 8-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-8X1GE-V2	3.4
Cisco 8-Port 10BASE-T/100BASE-TX Fast Ethernet Shared Port Adapter, Version 2	SPA-8X1FE-TX-V2	3.4
Cisco 8-Port 100BASE-TX Fast Ethernet Shared Port Adapter	SPA-8XFE-TX	3.3
Cisco 10-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-10X1GE-V2	3.4
Cisco 1-Port Ten Gigabit Ethernet Shared Port Adapter, Version 2	SPA-1X10GE-L-V2	3.4
Cisco 5-Port Gigabit Ethernet Shared Port Adapter with SFP optics	SPA-5X1GE	3.2
Cisco 10-Port Gigabit Ethernet Shared Port Adapter with SFP optics	SPA-10X1GE	3.2
Cisco 1-Port 10 Gigabit Ethernet Shared Port Adapter with XFP optics	SPA-1XTENGE-XFP	3.2
Cisco 2-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-2X1GE-V2	3.4.1
Cisco XR 12000 Series Router T3 and E3 Interface Modules and SPAs		
2-port Channelized T3 to DS0 Shared Port Adapter	SPA-2XCT3/DS0	3.3
4-port Channelized T3 to DS0 Shared Port Adapter	SPA-4XCT3/DS0	3.3
2-port Clear Channel T3/E3 Shared Port Adapter	SPA-2XT3/E3	3.3
4-port Clear Channel T3/E3 Shared Port Adapter	SPA-4XT3/E3	3.3

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

Component	Part Number	Support from Version
Cisco XR 12000 Series Router Services		
IPSEC Shared Port Adapter with 2 Gbps DES/3DES/AES	SPA-IPSEC-2G-2	3.4
Cisco Multi Service Blade (MSB)	XR-12K-MSB	3.5
Cisco XR 12000 Series Router Channelized Line Cards		
Cisco 1-Port Channelized OC-48 line card	CHOC48/DS3-SR-SC	3.6
Cisco 1-Port Channelized OC-12 line card	CHOC12/DS1-SR-SC	3.8
Cisco 4-Port Channelized OC-12 line card	4CHOC12/DS3-I-SCB	3.8

Software Compatibility

Cisco IOS XR Software Release 3.8.4 is compatible with the following Cisco XR 12000 Series Router systems:

- Cisco XR 12004 Router
- Cisco XR 12006 Router
- Cisco XR 12010 Router
- Cisco XR 12016 Router
- Cisco XR 12404 Router
- Cisco XR 12406 Router
- Cisco XR 12410 Router
- Cisco XR 12416 Router
- Cisco XR 12810 Router
- Cisco XR 12816 Router

The following chassis are supported for an existing installed base:

- Cisco 12008 Router
- Cisco 12010 Router
- Cisco 12012 Router



Note

If you are running Cisco IOS XR software on a Cisco XR120xx system with SIP 600, 401, 501, or 601, you must upgrade the fabric. For ROMMON, MBUS, and Fabric Downloader versions, see the [“Firmware Support” section on page 21](#).

Firmware Support

Table 7 Cisco XR 12000 Series Router Firmware Versions for Release 3.8.4

Firmware Type	Engine 3 LC	Engine 5 LC	Route Processor
Maintenance Bus (Mbus) Agent Software			
• RAM	4.4	4.4	4.4
• ROM	4.4	4.4	4.4
ROM Monitor	17.1	17.1	1.20
Fabric Downloader			
• RAM version	8.0	4.7	—
• ROM version	8.0	4.7	

Minimum and Preferred Cisco IOS Image and Boot Helper Levels for Migration

If you are migrating from Cisco IOS to Cisco IOS XR software on the Cisco XR 12000 Series Router, you must have the following *minimum* Cisco IOS image level and Boot Helper version to support Release 3.8.4:

- Cisco IOS and Boot Helper images—12.0(32)S

However, the *recommended* Cisco IOS image level to support migration to Release 3.8.4 can be *either one* of the following:

- 12.0(32)SY5
- 12.0(32)S6

If you have an earlier version of this system, you must upgrade to at least the minimum supported level before performing a migration. Otherwise, your migration may fail.

For more information, see the *Migrating from Cisco IOS to Cisco IOS XR Software on the Cisco XR 12000 Series Router* document.

[Table 8](#) lists the recommended firmware level for Cisco IOS 12.0(32)SY5 when migrating to Cisco IOS XR Software Release 3.8.4.

Table 8 Recommended Cisco IOS Firmware Versions for Migration to Cisco IOS XR

Serial No.	Description	Version
1	Cisco 12000 Series Router line-card image	12
2	Mbus ROM firmware	3.51
3	Mbus RAM firmware	2.52
5	BFRP field diags	6.12(1.0)
6	PRP field diags	6.13(1.0)
9	Engine 3 LC fabric downloader	7
11	Engine 5 LC fabric downloader	4

- The list of minimum supported firmware versions is available online in this matrix:
http://www.cisco.com/web/Cisco_IOS_XR_Software/pdf/XR12000SoftwareFirmwareCompatibilityMatrix.pdf
- Links to PDF copies of the IOS XR Firmware Upgrade Guides are available online here:
http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html
Here's the link to the Cisco Systems IOS XR Firmware Upgrade Guide For CRS-1 and XR12000:
http://www.cisco.com/web/Cisco_IOS_XR_Software/pdf/IOSXRFirmwareUpgradeGuide.pdf
- Refer to the Hardware Redundancy and Node Administration Commands on Cisco IOS XR Software chapter of the Cisco IOS XR System Management Command Reference, Release 3.8 for the **upgrade all** command syntax:
http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/system_management/command/reference/yr38hw.html

Determining Your Software Version

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

-
- Step 1** Establish a Telnet session with the router.
 - Step 2** Enter the **show version** command from EXEC mode.

Cisco CRS-1

On the Cisco CRS-1, you should see a response similar to the following (which has been abbreviated for the Release Notes):

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

RP/0/RP1/CPU0:ben10#show version

Cisco IOS XR Software, Version 3.8.4[00]
Copyright (c) 2010 by Cisco Systems, Inc.

ROM: System Bootstrap, Version 1.54(20091016:214209) [CRS-1 ROMMON],

ben10 uptime is 2 days, 15 hours, 20 minutes
System image file is "bootflash:disk0/hfr-os-mpi-3.8.4/mbihfr-rp.vm"

cisco CRS-8/S (7457) processor with 4194304K bytes of memory.
7457 processor at 1197Mhz, Revision 1.2

2 Management Ethernet
14 TenGigE
12 WANPHY controller(s)
37 GigabitEthernet
```

Cisco XR 12000 Series Router

On the Cisco XR 12000 Series Router, you should see a response similar to the following (which has been abbreviated for the Release Notes):

```
RP/0/0/CPU0:PE6_C12406# show version
```

```
RP/0/7/CPU0:P2_UUT#sh ver
Mon Apr 26 20:25:39.987 PST

Cisco IOS XR Software, Version 3.8.4[00]
Copyright (c) 2010 by Cisco Systems, Inc.

ROM: System Bootstrap, Version 12.0(20090226:235859) [rtauro-sw30346-33S 1.23dev(0.35)]
DEVELOPMENT SOFTWARE
Copyright (c) 1994-2009 by cisco Systems, Inc.

P2_UUT uptime is 21 hours, 33 minutes
System image file is "disk0:c12k-os-mpi-3.8.4/mbiprp-rp.vm"

cisco 12416/PRP (7457) processor with 3670016K bytes of memory.
7457 processor at 1266Mhz, Revision 1.2

2 Cisco 12000 4 Port Gigabit Ethernet Controllers (8 GigabitEthernet)
3 Cisco 12000 Series SPA Interface Processor-601/501/401
2 Cisco 12000 Series Performance Route Processors
1 Cisco 12000 4-Port ISE ATM Over SONET OC3/STM-1 Controller (4 ATM)
1 Cisco 12000 4-Port ISE ATM Over SONET OC12/STM-4 Controller (4 ATM)
1 1 Port ISE Packet Over SONET OC-48c/STM-16 Controller (1 POS)
6 Management Ethernet
14 PLIM_QOS
2 TenGigE
11 SONET/SDH
3 Packet over SONET/SDH
18 GigabitEthernet/IEEE 802.3 interface(s)
8 FastEthernet
2 T3
10 Asynchronous Transfer Mode
1017k bytes of non-volatile configuration memory.
57119M bytes of hard disk.
2053376k bytes of disk0: (Sector size 512 bytes).
65536k bytes of Flash internal SIMM (Sector size 256k).
```

New Software Features in Cisco IOS XR Software Release 3.8.4

The following sections contain information on new features and enhancements in Cisco IOS XR Software Release 3.8.4:

- [New Software Features Supported on All Platforms, page 24](#)
- [Cisco CRS-1 Router-Specific Software Features, page 28](#)
- [Cisco XR 12000 Series Router-Specific Software Features, page 30](#)

New Software Features Supported on All Platforms

The following new software feature in Cisco IOS XR Software Release 3.8.4 is supported on both the Cisco CRS-1 and the Cisco XR 12000 Series Router:

- [Staggered Adjacency, page 25](#)
- [RSVP as a percentage of Interface BW, page 26](#)

- [TE Auto-BW underflow, page 26](#)
- [eBGP Multihop with Labeled Unicast, page 27](#)
- [Enhanced Process Distribution to Improve Load-Balancing Across Cisco CRS-1 RPs, page 27](#)
- [LDP Forward Port, page 28](#)

**Note**

Cisco Session Border Controller (SBC) is not supported on any platform.

Staggered Adjacency

This section contains the **adjacency stagger** command that is supported in Cisco IOS XR Software Release 3.8.4. This command is supported on the Cisco CRS-1 and the Cisco XR 12000 Series Router.

adjacency stagger

To configure staggering of OSPF adjacency during reload, process restart, and process clear, use the **adjacency stagger** command in router configuration mode. To turn off adjacency staggering, either use the **disable** keyword or use the **no** form of this command.

```
adjacency stagger {disable | initial-num-nbr max-num-nbr}
```

```
no adjacency stagger
```

Syntax Description

disable	Disables adjacency staggering.
<i>initial-num-nbr</i>	The initial number of simultaneous neighbors allowed to form adjacency to FULL in any area to bring up to FULL after a router reload, OSPF process restart, or OSPF process clear. Range is 1-65535. Default is 2.
<i>max-num-nbr</i>	The subsequent number of simultaneous neighbors allowed to form adjacency, per OSPF instance, after the initial set of OSPF neighbors have become FULL. Range is 1-65535. Default is 64.

Command Default

OSPF adjacency staggering is enabled.

Command Modes

Router configuration

Command History

Release	Modification
Release 3.8.4	This command was introduced on the Cisco CRS-1 and Cisco XR 12000 Series Router.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator. For detailed information about user groups and task IDs, refer to the *Configuring AAA Services on Cisco IOS-XR Software* module of the *Cisco IOS-XR System Security Configuration Guide*.

Staggering of the OSPF adjacency during a reload, process restart (without NSR or graceful-restart), and process clear reduces the overall adjacency convergence time.

Initially, allow two (configurable) neighbors to form adjacency to FULL per area. After the first adjacency reaches FULL, up to 64 (configurable) neighbors can form adjacency simultaneously for the OSPF instance (all areas). However, areas without any FULL adjacency are restricted by the initial area limit.



Note

Adjacency stagger and OSPF nonstop forwarding (NSF) are mutually exclusive. Adjacency stagger is not activated if NSF is configured under router OSPF configuration

Task ID

Task ID	Operations
ospf	read, write

Examples

The following example shows how to configure adjacency stagger for two neighbors initially and for a maximum of three neighbors:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router ospf 1
RP/0/RP0/CPU0:router(config-ospf)# adjacency stagger 2 3
RP/0/RP0/CPU0:router(config-ospf) commit
RP/0/RP0/CPU0:router(config) end
```

RSVP as a percentage of Interface BW

For information about changes to the interface bandwidth percentage, refer to the Cisco IOS XR MPLS Release 3.8 docs:

Cisco IOS XR MPLS Command Reference, Release 3.8:

http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/mpls/command/reference/gr38.html

Cisco IOS XR MPLS Configuration Guide, Release 3.8:

http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/mpls/configuration/guide/gc38.html

TE Auto-BW underflow

For information about changes to the TE Auto BW underflow command, refer to the Cisco IOS XR MPLS Release 3.8 docs:

Cisco IOS XR MPLS Command Reference, Release 3.8:

http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/mpls/command/reference/gr38.html

Cisco IOS XR MPLS Configuration Guide, Release 3.8:

http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/mpls/configuration/guide/gc38.html

eBGP Multihop with Labeled Unicast

The IPv4 labeled unicast address family is supported for both directly connected and non-directly connected BGP sessions.

For more information, about BGP, refer to the *Cisco IOS XR Routing Configuration Guide, Release 3.8* at http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/routing/configuration/guide/rc38.html

Enhanced Process Distribution to Improve Load-Balancing Across Cisco CRS-1 RPs

The default Cisco IOS XR process placement policy has changed to improve the distribution of processing load across active Cisco CRS-1 route processors (RPs). These changes affect systems with more than one active RP, such as Cisco CRS-1 Multichassis systems and Cisco CRS-1 Single-Chassis systems with optional, distributed route processors (DRPs) installed.

Highlights of the New Process Distribution Feature

- The new default process placement policy creates three groups of placeable processes:
 - Central Services and Infrastructure (CSI) group
 - IPv4 Routing/MPLS (IPv4) group
 - IPv6 Routing (IPv6) group
 - Multicast (IPv4 and IPv6) group
- Each group is placed as a unit, with all processes within a group placed together on the same node.
- The CSI group is, by definition, always placed on the dLRSC node. The only placement variation that can occur is in regard to the IPv4 and IPv6 groups.

If a single active non-dLRSC RP pair exists, the IPv4 and IPv6 groups will be placed on that pair.

If more than one active non-dLRSC RP pair exists, the IPv4 group will be placed on one such pair and the IPv6 group on another. The placement of each group occurs when that group starts.

If no non-dLRSC pairs exist, but an unpaired active non-dLRSC RP does, then, the first placeable group to start (IPv4/MPLS or IPv6) will be placed on the dLRSC, with the other group being placed on the non-dLRSC RP pair.

Information About How Process Placement Works

- An RP is considered paired for placement purposes if it was paired during system startup. This ensures that it is still considered to be paired even if the standby RP later becomes inactive. If a new pair was configured after system startup, you should perform a manual placement reoptimization to make sure that it is incorporated in the placement service. (See below.)
- Process placement is SDR-scoped, occurring independently in each SDR.
- Each DRP contains two processor complexes, CPU0 and CPU1, which are considered independent nodes by the placement service. For example, in a Cisco CRS-1 single-chassis system with two DRPs installed and configured as a pair, there are two non-dLRSC RP pairs, the CPU0 pair, and the CPU1 pair.
- Tie-breaker rule—When determining placement for a group where multiple candidate nodes for the group, each of which satisfies the placement policy, exist, the candidates are ordered first by RP versus DRP (with the RP taking precedence), and then by node ID. The group is then placed at the first node in the resulting list.

- RP failover events have no effect on process placement.
- If an RP pair or an unpaired RP fails, any processes that were on the failed location migrate automatically to an active RP in accordance with the rules previously described. This would occur, for example, on Cisco CRS-1 Multichassis systems when a rack online insertion and removal (OIR) event takes place.
- No automatic placement changes occur as the result of a new node becoming active.
- To redetermine placement of process groups based on the current state of the system, use the **placement reoptimize** command in EXEC mode.



Note You should use the **placement reoptimize** command only during a maintenance window, because migrating routing processes between nodes may have a negative effect on traffic. However, to view the effects that a **placement reoptimize** command would have before you execute it, use the **show placement reoptimize** command.

- Following an upgrade or downgrade of Cisco IOS XR Software, you must execute the **placement reoptimize** command to make sure that process placement is consistent.

LDP Forward Port

For information about the LDP IGP Sync Process Restart Delay command, refer to the *Cisco IOS XR Routing Configuration Guide, Release 3.8* at

http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/routing/configuration/guide/rc38.html

Cisco CRS-1 Router-Specific Software Features

The following Cisco CRS-1 platform-specific features are new in Cisco IOS XR Software Release 3.8.4:

- [Automatic Fabric Plane Disabling, page 28](#)
- [Bundle Fast Convergence, page 29](#)
- [PBTS Default Behavior Change, page 30](#)

Automatic Fabric Plane Disabling

In a multi-chassis CRS, the fabric components are in different racks and are physically interconnected by optical cables. If any one of the fabric components fails, the fabric plane also fails but does not automatically go out of service. Therefore, the faulty plane still operates.

In Cisco IOS XR Software Release 3.8.4 you can configure the minimum number of working fabric planes by using the new **controllers fabric capacity threshold** command. By configuring this threshold, you enable the faulty fabric planes to be automatically taken out of service.

For example, if you configure the threshold for 7 working planes, then only one faulty plane can be taken out of service.



Note A minimum of two planes must be operational (one odd and one even). The maximum number of planes is eight.

controllers fabric capacity threshold

To set the minimum number of fabric planes that must be in service for the multichassis system to be operational, use the **controllers fabric capacity threshold** command in administration configuration mode.

controllers fabric capacity threshold *threshold*

Syntax Description	<i>threshold</i>	Specifies the minimum number of fabric planes for the system to be operational. Range is 2 through 8. Setting this threshold specifies the number of faulty fabric planes that can be taken out of service.
Command Modes	Administration configuration	
Command History	Release	Modification
	Release 3.8.4	This command was introduced on the Cisco CRS-1.
Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator. For detailed information about user groups and task IDs, refer to the <i>Configuring AAA Services on Cisco IOS-XR Software</i> module of the <i>Cisco IOS-XR System Security Configuration Guide</i> .	
Task ID	Task ID	Operations
	fabric	read, write

Examples

The following example shows how to set the number of fabric planes that must be operational to 7 which indicates that only 1 faulty fabric plane can be taken out of service.

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin-config)#controllers fabric capacity threshold 7
RP/0/RP0/CPU0:router(admin-config) commit
RP/0/RP0/CPU0:router(admin-config) end
```

Bundle Fast Convergence

Cisco IOS XR Software Release 3.8.4 adds support for bundle fast convergence. This feature provides a quicker recovery time for protected TE tunnels over bundle interfaces.

PBTS Default Behavior Change

For information about the changes to the Policy-based Tunnel Selection (PBTS) defaults, refer to the Cisco IOS XR MPLS Release 3.8 docs:

Cisco IOS XR MPLS Command Reference, Release 3.8:

http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/mpls/command/reference/gr38.html

Cisco IOS XR MPLS Configuration Guide, Release 3.8:

http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/mpls/configuration/guide/gc38.html

Cisco IOS XR Software Release 3.8.4 includes support for prefix-length notation for ACLs on the Cisco CRS-1 platform.

The following example shows how to define an access list named Internetfilter with prefix-length notation:

```
RP/0/RSP0/CPU0:router(config)# ipv4 access-list Internetfilter
10 permit ipv4 12.10.10.1/24 any
20 permit ipv4 125.10.10.1/16 any
30 permit ipv4 135.10.10.1/27 any
40 permit ipv4 135.200.10.1/24 any
50 permit ipv4 any any
```

Cisco XR 12000 Series Router-Specific Software Features

No new Cisco XR 12000 Series Router platform-specific features were added in Cisco IOS XR Software Release 3.8.4.

New Hardware Features for Cisco IOS XR Software Release 3.8.4

The following new hardware features were introduced in Cisco IOS XR Software Release 3.8.4:

- [Cisco CRS-1 Router-Specific Hardware Features, page 30](#)
- [Cisco XR 12000 Series Router-Specific Hardware Features, page 32](#)

Cisco CRS-1 Router-Specific Hardware Features

The following new features in Cisco IOS XR Software Release 3.8.4 are supported on the Cisco CRS-1 platform:

- Cisco CRS-1 8x10GbE WAN/LAN XFP Interface Module
- Cisco CRS-1 4x10GbE WAN/LAN XFP Interface Module

CRS-FP40 Licenses

The following licenses apply to the CRS-FP40 on a per slot basis:

- **XC-L2L3VPN**—This license applies to the line card that needs to enable L2 Attachment Circuit for L2VPN (VPWS and VPLS), and/or L3 VRF interface for L3VPN applications.
- **XC-PERF-NETFLOW**—This license enables CRS-FP40 to support down to 1:360 Netflow sample rate running 45Mpps at a 40Gbps line rate. Without this license, the CRS-FP40 can support down to 1:1500 Netflow sample rate.
- **XC-ADV-IP**—This license is a placeholder for IP features, for example Lawful Interception, GRE tunnel, and L2TPv3.

For GRE and L2TPv3, this license applies to the line card required to enable GRE and/or L2TPv3 encapsulation.

Restrictions

- Link bundle cannot have members from CRS-MSB and CRS-FP40 at the same time.
- OC-192 DPT is not supported by 20-1GE-WL-FLEX.
- In general, the CRS-MSB and CRS-FP40 support the same features, but the CRS-FP40 requires a software license for some features.
- CRS-FP40 is not supported in CRS16 single chassis and multichassis configurations.
- A minimum ROMMON release of 1.54 is required to support the 20-port 1GE Flex PLIM (20-1GE-FLEX) and 42-port 1GE (42-1GE)

QoS Restrictions

- MQC-based QoS configuration will be accepted only on the port level but not on the VLAN subinterface level.
- CRS-FP40 supports Limited H-QoS on VLAN/VLAN-Group using L3/1C/1D, L3/1C/nD, and L3/nC/mD QoS Model with up to 8 queues per port in each direction.

Table 9 Chassis and Line Card Compatibility Matrix

Chassis	I/O Module	Line Card
Multichassis, CRS-16/S	4 port 10GE LAN (4-10GE) 42-1GE 20-1GE-FLEX 2-10 GE-WL-FLEX All existing CRS-1 PLIM/SIP800	CRS-MSB-40G-B
CRS-8/S, CRS-4/S	4 port 10GE LAN (4-10GE) 42-1GE 20-1GE-FLEX 2-10 GE-WL-FLE	CRS-FP40 ¹ or CRS-MSB-40G-B
	All existing CRS-1 PLIM/SIP800	CRS-MSB-40G-B

1. CRS-FP40 is supported only in 4/8 slot chassis and can be only paired with new PLIMs. New PLIMs can be paired with the CRS-FP40 and CRS-MSB-40G-B.

Table 10 SPA Support for FLEX PLIMs

FLEX PLIM	SPA Type	SPA
20-1GE-FLEX 2-10 GE-WL-FLEX	POS	SPA-4XOC3-POS SPA-8XOC12-POS (Multi-rate ¹) SPA-2XOC48POS/RPR SPA-4XOC48POS/RPR SPA-OC192POS-VSR SPA-OC192POS-XFP
	Ethernet	SPA-1X10GE-L-V2 SPA-1X10GE-WL-V2 SPA-10X1GE-V2 SPA-8X1GE SPA-8X1GE-V2 SPA-5X1GE-V2

1. Multi-rate: SPA-8XOC12-POS can support SFP-OC12-x and SFP-OC3-x.

Cisco XR 12000 Series Router-Specific Hardware Features

The following new features in Cisco IOS XR Software Release 3.8.4 are supported on the Cisco XR 12000 Series Router platform:

- E5 ATM Layer-2 TPv3 and FRF12 Over L2 VP
 - SPA-OC3/STM1 1&3 port; SPA-OC12/STM4 1-port
 - SPA-2CTH3-CE-ATM
- L2TPv3 ATM like-to-like pseudowires on Engine 5 LC (cell-relay, cell-packing, AAL5)
- L2TPv3 IP Interworking on Engine 5 LCs:
 - Ethernet port mode / 1Q (VLAN) <—> ATM AAL5 (SNAP/Mux/NLPID)
 - Frame Relay point-to-point DLCI/MLFR <—> ATM AAL5 (SNAP/Mux/NLPID)



Note Contact gsr-pm@cisco.com for hardware availability.

Important Notes

- **pw-class class name encapsulation mpls** default change for **control-word** option—In Cisco IOS XR Software Release 3.8.4 the control word is disabled by default. To configure the control word, enter the **control-word** keyword shown in the following example:

```
pw-class class1 encapsulation mpls control-word
```


- **Default timestamp setting**—The timestamp prompt that precedes console output is enabled by default in Cisco IOS XR Software Release 3.8.4. To disable the timestamp prompt, use the **timestamp disable** command. For more information, see http://www.cisco.com/en/US/docs/ios_xr_sw/iosxr_r3.8/system_management/command/reference/yr38term.html#wp1311395.
- For Cisco IOS XR Software Release 3.6.0 and later releases, WRED statements are collapsed, so that, if different random-detect statements using the same match types (EXP, DSCP, Prec, and so forth) are entered with identical minimum and maximum threshold values, a single configuration line is shown in the output of the **show running config** command. This reduces the length of the configuration, but creates a problem with backward compatibility with previous releases. In such a situation, on rollback, the QoS policy is rejected and must be manually entered again.

Configuration prior to Cisco IOS XR Software Release 3.6.0:

```
Policy-map wred_example
  Class class-default
    random-detect exp 0 384 packets 484 packets
    random-detect exp 1 384 packets 484 packets
    random-detect exp 2 384 packets 484 packets
    random-detect exp 3 484 packets 584 packets
    random-detect exp 4 484 packets 584 packets
    random-detect discard-class 0 384 packets 484 packets
    random-detect discard-class 1 384 packets 484 packets
    random-detect discard-class 2 484 packets 584 packets
    bandwidth remaining percent 20
  !
!
```

Cisco IOS XR Software Release 3.6.0 and later releases:

```
policy-map wred_example
  class class-default
    random-detect exp 0,1,2 384 packets 484 packets
    random-detect exp 3,4 484 packets 584 packets
    random-detect discard-class 0,1 384 packets 484 packets
    random-detect discard-class 2 484 packets 584 packets
    bandwidth remaining percent 20
  !
end-policy-map
!
```

In Cisco IOS XR Software Release 3.6.0 and later releases, the implicitly assigned QoS class class-default must have at least 1 percent bandwidth made available to it. This can be done either by assigning at least 1 percent explicitly (bandwidth remaining percent 1) or by ensuring that the total bandwidth assigned to all other classes in the policy is a maximum of 99 percent, leaving 1 percent available for the class-default. A QoS policy that does not have any bandwidth for class-default is rejected when upgrading to Cisco IOS XR Software Release 3.6.0 or later releases.

- **Country-specific laws, regulations, and licences**—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.
- **Migrating from Cisco IOS to Cisco IOS XR Software on the Cisco XR 12000 Series Router**—When migrating a Cisco XR 12000 Series Router from Cisco IOS to Cisco IOS XR software, follow the instructions provided in *Migrating from Cisco IOS to Cisco IOS XR Software on the Cisco XR 12000 Series Router*.
- **Card, fan controller, and RP removal**—For all card removal and replacement (including fabric cards, line cards, fan controller, and RP) follow the instructions provided by Cisco to avoid impact to traffic. See the *Cisco IOS XR Getting Started Guide* for procedures.
- **Exceeding Cisco testing**—If you intend to test beyond the combined maximum configuration tested and published by Cisco, contact your Cisco Technical Support representative to discuss how to engineer a large-scale configuration maximum for your purpose.
- **More power required for Cisco SIP line cards (SIP-401/501/600/601) on the Cisco XR 12000 Series Router**—These line cards draw more power than previous generation 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. Before you insert a new card or remove a PEM, run the following command in **admin** mode:

```
RP/0/0/CPU0:router# admin
RP/0/0/CPU0:router# show environment power-supply table
```

R/S/I	Module	48V (V)	Current (A)
0/24/*	PEM1	54	4
	PEM2	53	4
0/25/*	PEM1	54	4
	PEM2	53	4

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

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

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



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

- **Per-interface Internet Control Message Protocol (ICMP) disable** feature is not supported on Cisco XR 12000 Series Routers.
- **Online Diagnostics is not supported on the Cisco XR 12000 Series Router**—If you execute the **diagnostic** command, an error appears stating that there is no online diagnostics process running on the router.
- The **rp mgmtethernet forwarding** command is not supported on the Cisco XR 12000 Series Router.
- **mpls traffic engineering igp-intact** command—This command must be used only when policy based tunnel selection is configured for all tunnels originating on the device.
- **L2TPv3** traffic is not supported on Ethernet bundle interfaces on the Cisco XR 12000 Series Router.
- In Cisco IOS XR Release 3.8.4, the **show running-config** command includes an option to display the large configuration format. Using the *formal* option means that the output does not include submode indentations.
- **Layer 2 Tunnel Protocol Version 3 (L2TPv3) Limitations**—These limitations are applicable to the 1-port OC3c/STM1 SFP Optics ATM SPA, 3-port OC3c/STM1 SFP Optics ATM SPA, and 1-port OC12c/STM4 SFP Optics ATM SPA.
 - Sequence resync for L2TPv3 does not work on ATM L2VPNs.
 - Control word is processed by the SPA for ATM L2VPN. This process does not impact the L2VPN behavior. The following L2TPv3 commands do not work:
 - show l2tp session sequence**
 - show l2vpn forwarding detail** – This command does not show the sequence number for L2VPNs.
 - show l2tp session detail** – The sequence numbers are not displayed.
 - clear l2vpn forwarding table**
 - To see the sequence number for the L2VPNs, issue the following commands:
 - show controllers atm <> traffic vc <>**—This command prints the CID.
 - show hw-module subslot <> memory sar cid <>**—Use the CID obtained in the previous command.
- Static ATM AAL5 L2VPN sessions support the control word. Per the standard, any AAL5 L2VPN must have the control word enabled.
- Turboboot with disk mirroring is not supported in Cisco IOS XR Release 3.8.4.

- **Multicast Configuration Changes in Cisco IOS XR Release 3.8.4**—In releases prior to Cisco IOS XR Release 3.8.4, each VRF under multicast-routing and router pim configurations were in a separate submode. In Cisco IOS XR Release 3.8.4, the configurations are in a hierarchical format, similar to other routing protocols. This change is required for the multicast XML support in Cisco IOS XR Release 3.8.4.

Due to this change, when downgrading from Cisco IOS XR Release 3.8.4 to earlier releases, the multicast-routing and router pim MVPN (VRF) configurations are rejected. This failure is shown in the output of the **show configuration failed startup** command.

Multicast-routing and router pim MVPN (VRF) configurations need to be corrected and reapplied manually. Since a downgrade is typically done following an upgrade, save a copy of the older-release running-configuration before doing the upgrade.

In Cisco IOS XR Release 3.8.4, the following multicast routing configurations are on separate lines:

```
multicast-routing
 vrf vrf1
  address-family ipv4
  interface all enable
  !
  !
```

To correct the multicast-routing configurations, the vrf <> and address-family <> lines should be combined into the same line as shown in the following example:

```
multicast-routing
 vrf vrf1 address-family ipv4
  interface all enable
  !
```

In Cisco IOS XR Release 3.8.4, the following router PIM configurations are on separate lines:

```
router pim
 vrf vrf1
  address-family ipv4
  interface Loopback0
  !
  !
```

To correct the router pim configurations, the vrf <> and address-family <> lines should be combined into the same line as the router pim shown in the following example:

```
router pim vrf vrf1 address-family ipv4
 interface Loopback0
  !
  !
```

- The following commands are not supported on the Cisco CRS-1 Series Router:
 - affinity location set
 - affinity location type
 - affinity program
 - affinity self
- When configuring the LDP (Label Distribution Protocol) GR (graceful restart) process in a network with multiple [link and/or targeted] LDP hello adjacencies with the same neighbor, make sure that GR is activated on the session before any hello adjacency times out due to neighbor control plane failures. One way of achieving this is by configuring a lower session hold time between neighbors such that session time out always occurs before hello adjacency can time out. Cisco recommends setting LDP session hold time using the following formula:

LDP session hold time <= (Hello hold time - Hello interval) * 3

This means that for default values of 15/5 seconds respectively for the link Hello hold time and the Hello interval, the LDP session hold time should be set to 30 seconds or less.

For more information, refer to the "Implementing MPLS Label Distribution Protocol on Cisco IOS XR Software" section of the *Cisco IOS XR MPLS Configuration Guide, Release 3.8.4*.

Minimum Flash Disk Requirements When Upgrading to Release 3.8.4

Cisco IOS XR Software Release 3.8.4 requires a 2-GB flash disk as a minimum, so if your Cisco CRS-1 or Cisco XR 12000 Series Router currently uses a 1-GB flash disk, you must upgrade it to 2-GB before upgrading to Cisco IOS XR Software Release 3.8.4.

The PCMCIA 1-GB flash disk was the default size for the Cisco CRS-1 running Cisco IOS XR Software Release 3.6 and earlier and for the Cisco XR 12000 Series Router running Cisco IOS XR Software Release 3.5 and earlier.

A 4-GB flash disk is available for both platforms and can be installed instead of the 2-GB for greater disk storage for Cisco IOS XR Software Release 3.4 and later.

To upgrade from a 1-GB flash disk to a 2-GB or greater flash disk, refer to the *Cisco XR12000 and CRS-1 Flash Disk Upgrade Tasks* document at:

http://www.cisco.com/en/US/docs/routers/xr12000/xr_line_cards/flashdisk/flashdisk.pdf

Additional upgrade instructions for the Cisco CRS-1 router are available from:

http://www.cisco.com/web/Cisco_IOS_XR_Software/pdf/ReplacingPCMCIACardOnCRS-1.pdf

Caveats

Caveats describe unexpected behavior in Cisco IOS XR software releases. Severity-1 caveats are the most serious.

The following caveats are open for Cisco IOS XR Software Release 3.8.4 on the router platforms indicated:

- [Cisco IOS XR Caveats, page 37](#)
- [Caveats Specific to the Cisco CRS-1 Router, page 40](#)
- [Caveats Specific to the Cisco XR 12000 Series Router, page 42](#)

Cisco IOS XR Caveats

The following caveats apply to both platforms:

- **CSCtf20875**

Basic Description:

Processes terminated due to "did not signal end of initialization."

Symptom:

Multiple processes get abnormally terminated during a Cisco CRS-1 router reload. These processes may include ifindex_server, ipv4_io, ipv4_acl, ipv6_acl_daemon, ipv4_ma, ipv6_ma, ipv4_mfwd_partner, ipv6_mfwd_partner and intf_mgbl. For these processes, the console log reports: "sysdb' detected the 'try again' condition 'Couldn't create connection to SysDB or an EDM."

Conditions:

This issue is caused by a rare timing condition during a system reload.

Workaround:

None.

Recovery:

Automatically, the processes get respawned. If any configuration errors are reported, reapply the configuration.

- **CSCtg20877**

Basic Description:

Banner configuration ends up in configuration failed startup after upgrade.

Symptom:

Startup configurations, related to banner, fail during the upgrade scenario.

Conditions:

This issue may occur on rare occasions after upgrading to Cisco IOS XR Software Release 3.8.4.

Workaround:

None.

Recovery:

Reapply the banner configuration manually.

- **CSCtd69256**

Basic Description:

ATM SPA errors after VPI reuse in scaled configuration.

Symptom:

SPA related errors generally accompanied by channel statistics error.

Conditions:

1. Configure a scaled setup with 4K ATM xconnect sessions under a L2 VP mode.
2. Delete the L2 VPs which bring the xconnects down.
3. Configure VC mode L2 transport and bring the xconnect sessions backup.

Under such a sequence of actions, there is a possibility that one of the VP teardowns does not go through cleanly, leaving behind stale cChannel of the VP. If a subsequent VC is created with the same VPI value, it might sometimes result in a traffic outage on that particular L2-VC. When the problem occurs, the **show hw-module subslot <> counter sar** indicates a CID for VCD mapped to the L2-VP which was deleted indicating that it is stale.

Workaround:

Avoid using an L2-VC with the same VPI value as was the VPI of the previously configured VP on the same port. If the VPI has been re-used and the traffic does not pass over the newly configured L2 connection, change the VPI value to have a different allocated CID.

Recovery:

Reload the SPA to recover from this issue.

- **CSCtf93756**

Basic Description:

Cisco CRS-1 line card may exhibit dropping of traffic flows through the card.

Symptom:

Configuration-based applications:

- IPv6 source address compression (part of IPv6 ACL/classification)
- Security ACL
- Packet classification (ACL)

Forwarding or learning applications:

- LPTS/IFIB
- VPLS
- Layer 2 forwarding/VPN

On rare occasions, the order in which configuration and forwarding updates are produced and processed can trigger a mismatch between the control plane view of TCAM content and the actual content in the TCAM hardware.

When there is a mismatch, the outcome of TCAM lookups becomes undetermined, leading to undefined behavior in packet forwarding by the Metro.

The net effect of this mismatch can manifest itself in many different ways, including any or all of the following:

- No discernible effect (for example, if the mismatched entries are not being returned)
- Misclassified packets, which may impact their handling from a QoS point of view
- Incorrect statistics being incriminated (including otherwise unused counters)
- Packets forwarded to the wrong destination (if the lookup was used for forwarding decisions)
- Packets forwarded unnecessarily to the line card CPU
- Packets dropped by CAR (policer)
- Packets dropped by the microcode
- Packets forwarded to the wrong queue (including invalid queues)

Conditions:

This problem has a very low rate of incidence; only two incidents in the past 12 months are known to be related to this condition. This problem may occur on any line card where combinations of TCAM applications incur a high incidence of TCAM updates.

Workaround:

None.

Recovery:

When this condition occurs, it can sometimes correct itself. This occurs only if the TCAM entries that are mismatched receive additional updates that trigger the reprogramming of those entries into the TCAM. If the entries do not correct themselves, the line card needs to be reloaded.

• **CSCti50227**

Basic Description:

Not able to modify RPL and delete prefix-set in a single commit.

Symptom:

When a policy that is attached directly or indirectly to an attach point needs to be modified, a single commit operation cannot be performed when:

- Removing a set or policy referred by another policy that is attached to any attach point directly or indirectly.
- Modifying the policy to remove the reference to the same set or policy that is getting removed.

Workaround:

The commit must be performed in two steps:

1. Modify the policy to remove the reference to the policy or set and then commit.
2. Remove the policy or set and commit.

Caveats Specific to the Cisco CRS-1 Router

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

- **CSCtf21125**

Basic Description:

Unable to reapply a failed startup configuration after router reload.

Symptom:

Startup configuration cannot be reapplied following a router reload.

Example:

```
RP/0/RP0/CPU0:router(config)#load configuration failed startup
Loading. 527 bytes parsed in 1 sec (524)bytes/sec
RP/0/RP0/CPU0:router(config)#commit
% Failed to commit one or more configuration items during a pseudo- atomic operation.
All changes made have been reverted. Please issue 'show configuration failed' from
this session to view the errors
RP/0/RP0/CPU0:router(config)#show configuration failed
Wed Mar 31 15:18:52.846 UTC
!! SEMANTIC ERRORS: This configuration was rejected by
!! the system due to semantic errors. The individual
!! errors with each failed configuration command can be
!!found below.
```

Conditions:

This issue is caused by a rare timing condition following a system reload that causes the sysdb_svr_shared and sysdb_svr_admin processes to go out-of-sync with the sysdb_mc process.

This can be confirmed by the following steps:

1. Use the **show processes** command to get the job ID (JID) of the process that is failing to commit configuration.

For example:

```
RP/0/RP0/CPU0: router#show processes shelfmgr
JID   TID CPU Stack pri state      TimeInState   HR:MM:SS:MSEC  NAME
349   1   1  104K  10 Receive    0:00:02:0037  0:00:57:0275  shelfmgr
349   2   1  104K  10 Receive    0:00:04:0777  0:00:00:0012  shelfmgr
```

2. Use the **show sysdb medusa registrations verification location** command to display sysdb_mc registrations for the job ID

For example:

```
RP/0/RP1/CPU0: router# show sysdb medusa registrations verification location
0/RP0/CP0 | include 349
```

```
Mar 26 01:14:57.801 00349 0/RP1/CPU0 001 000003
'/admin/cfg/gl/shelfmgr/adminstate/power/'
Mar 26 01:14:57.801 00349 0/RP1/CPU0 001 000003
'/admin/cfg/gl/shelfmgr/adminstate/shutdown/'
Mar 26 01:14:57.801 00349 0/RP1/CPU0 001 000003
'/admin/cfg/gl/shelfmgr/adminstate/monitor/'
Mar 26 01:14:57.801 00349 0/RP1/CPU0 001 000003
'/admin/cfg/gl/shelfmgr/adminstate/reset'
Mar 26 01:14:57.801 00349 0/RP1/CPU0 001 000003
'/admin/cfg/gl/shelfmgr/adminstate/boot/'
```

3. Switch to admin mode and use the **show sysdb registrations verification job** command to display the `sysdb_svr_admin` registrations for the job ID.

For example:

```
RP/0/RP1/CPU0:router# admin
Mon Apr 5 18:38:52.611 UTC
```

```
RP/0/RP1/CPU0:router(admin)#show sysdb registrations verification job 349
Mon Apr 5 18:39:03.072 UTC
```

```
SysDB Verification Registrations:
  Time:          jid:      nid:      tid: handle:  reg_path:
Mar 26 01:14:57.800 00349 0/RP1/CPU0 001 000001
'/admin/cfg/gl/shelfmgr/adminstate/boot/'
Mar 26 01:14:57.800 00349 0/RP1/CPU0 001 000001
'/admin/cfg/gl/shelfmgr/adminstate/reset'
Mar 26 01:14:57.800 00349 0/RP1/CPU0 001 000001
'/admin/cfg/gl/shelfmgr/adminstate/power/'
```

4. Compare the output of the **show sysdb medusa registrations verification location** command (Step 2) and the **show sysdb registrations verification job** (Step 3). Note that some registrations listed by the **show sysdb medusa registrations verification location** command are not listed by the **show sysdb registrations verification job** command.

Workaround:

None.

Recovery:

1. Restart the `sysdb_svr_shared` and `sysdb_svr_admin` processes.
 2. Reapply the failed configuration.
- **CSCtg45646**

Basic Description:

TACACS authentication fails when mismatched server key is configured.

Symptom:

Authentication failures occur with TACACS+ when a mismatched server key is configured on the router for the primary server.

Conditions:

This condition occurs when you configure the wrong key for the first server (primary server) on the router but configure the correct key for the second server and try to login to the router with a username configured only on TACACS servers.

Workaround:

If a local user is configured and authentication is set to have local as the backup authentication method, that login succeeds. Configure the correct server key.

Recovery:

If no local user is configured and you are unable to match the router key on the TACACS+ server side, you must proceed with password recovery. Please contact technical support for further assistance.

Caveats Specific to the Cisco XR 12000 Series Router

Cisco IOS XR Software Release 3.8.4 does not include any Cisco XR 12000 Series Router caveats.

Resolved Cisco IOS XR Software PSIRT-Related Caveats

- **CSCti62211**

Basic Description:

BGP flaps due to unknown attribute

Symptom:

Cisco IOS XR Software contains a vulnerability in the Border Gateway Protocol (BGP) feature. The vulnerability manifests itself when a BGP peer announces a prefix with a specific, valid but unrecognized transitive attribute. On receipt of this prefix, the Cisco IOS XR device will corrupt the attribute before sending it to the neighboring devices. Neighboring devices that receive this corrupted update may reset the BGP peering session.

Conditions:

Affected devices running Cisco IOS XR Software corrupt the unrecognized attribute before sending to neighboring devices, but neighboring devices may be running operating systems other than Cisco IOS XR Software and may still reset the BGP peering session after receiving the corrupted update. This is per standards defining the operation of BGP.

Workaround:

No workaround. Cisco developed a fix that addresses this vulnerability and will be releasing free software maintenance upgrades (SMUs) progressively starting 28 August 2010.

A Security Advisory is posted at

<http://www.cisco.com/warp/public/707/cisco-sa-20100827-bgp.shtml>

Upgrading Cisco IOS XR Software

Cisco IOS XR software is installed and activated from modular packages, allowing specific features or software patches to be installed, upgraded, or downgraded without affecting unrelated processes. Software packages can be upgraded or downgraded on all supported card types, or on a single card (node).

Software packages are installed from package installation envelope (PIE) files that contain one or more software components.

The following URL contains links to information about how to upgrade Cisco IOS XR software:
http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html

**Note**

Cisco IOS XR Software Release 3.8.2 requires a 2-GB flash disk as a minimum. Therefore, you must upgrade an existing PCMCIA 1-GB flash disk to 2 GB before upgrading to Cisco IOS XR Software Release 3.8.4. For more information, see the “[Minimum Flash Disk Requirements When Upgrading to Release 3.8.4](#)” section on page 37.

Troubleshooting

For information on troubleshooting Cisco IOS XR software, see *Cisco IOS XR Getting Started Guide* and *Cisco IOS XR Troubleshooting Guide*.

Related Documentation

The following sections describe the documentation available for the Cisco CRS-1 Router and the Cisco XR 12000 Series Router. Documentation is available in the form of PDF and HTML files and is available on www.cisco.com:

- [Hardware Documents, page 43](#)
- [Software Documents, page 43](#)

Hardware Documents

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

Cisco CRS-1 Router:

http://www.cisco.com/en/US/products/ps5763/tsd_products_support_series_home.html

Cisco XR 12000 Series Router:

http://www.cisco.com/en/US/products/ps6342/tsd_products_support_series_home.html

Software Documents

The Cisco IOS XR software documentation set includes the Cisco IOS XR software configuration guides and command references, as well as a getting started guide. See *About Cisco IOS XR Software Documentation for Release 3.8* for a list of Cisco IOS XR Release 3.8.4 software documentation.

You can find the most current software documentation for the Cisco CRS-1 and Cisco XR 12000 Series Router at the following URL:

http://www.cisco.com/en/US/products/ps5845/tsd_products_support_series_home.html

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

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at:
<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>.

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